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Treatment-Related Reductions in Disability Are Associated with Reductions in Perceived Injustice Following Treatment of Whiplash Injury

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Abstract Emerging evidence suggests that perceived injustice is a risk factor for poor recovery outcomes in individuals with whiplash injuries. The present study examined the relative contributions of treatment-related reductions in pain severity, depressive symptoms, and disability in the prediction of reductions in perceived injustice in individuals with whiplash injury. The study sample consisted of 71 individuals (43 women and 28 men) who sustained whiplash injuries in motor vehicle accidents and who were enrolled in a treatment program designed to promote functional recovery following whiplash injury. For the purposes of this study, only individuals who scored above the risk threshold on a measure of perceived injustice were included in the study sample. Participants completed measures of pain severity, disability, depressive symptomatology, and perceived injustice prior to treatment and after treatment. Change scores were computed for study variables. The results revealed that reductions in pain severity and disability were correlated with reductions in perceived injustice. Regression analyses revealed that only reductions in disability contributed significant unique variance to the prediction of reductions in perceived injustice. Clinical and theoretical implications of the present findings are discussed.

Keywords Perceived injustice · Disability · Whiplash injury

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Emerging research suggests that perceived injustice is a psychosocial risk factor for poor recovery outcomes in individuals with musculoskeletal pain conditions (Ferrari, 2015; Scott, Trost, Milioto, & Sullivan, 2013; Scott, Trost, Milioto, & Sullivan, 2015; Sullivan et al., 2008). Perceived injustice has been conceptualized as an appraisal process comprising elements of unfairness, perceived severity and irreparability of pain-related losses, and a tendency to blame others for one's suffering and losses (Sullivan et al., 2008). The relation between perceived injustice and adverse recovery outcomes has been demonstrated in several populations where pain is a prominent symptom (Sullivan, Yakobov, Scott, & Tait, 2014).

Several investigators have suggested that the extent of suffering and the magnitude of losses consequent to the onset of a debilitating pain condition contribute to perceived injustice (McParland & Eccleston, 2013; McParland, Eccleston, Osborn, & Hezseltine, 2011; Scott, Trost, Milioto, et al., 2013; Sullivan et al., 2008). The suffering associated with persistent pain conditions might include symptoms of pain and emotional distress (Berglund, Bodin, Jensen, Wiklund, & Alfredsson, 2006; Nederhand, Hermens, Ijzerman, Turk, & Zilvold, 2003). Chronic pain can also interfere with functioning, leading the individual to experience losses in multiple life domains (Harris, Morley, & Barton, 2003). Losses associated with debilitating pain conditions might include the loss of employment, financial security, independence, identity, and other losses that can deprive the individual from participating in valued life activities (Harris et al., 2003; Lyons & Sullivan, 1998; Walker, Sofaer, & Holloway, 2006). Magnitude of losses has been discussed as a precursor of perceived injustice (Lind & Tyler, 1988; Montada, 1992, 1994; Sullivan et al., 2008). Themes reflecting losses and unfairness are common in narratives of individuals who suffer from injury-related chronic pain, suggesting that losses associated with functional

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disability are important drivers of perceived injustice (Sullivan, Scott, & Trost, 2012).

Cross-sectional studies have provided some support for the proposed contributions of suffering and loss to perceived injustice in individuals with debilitating pain conditions. For example Sullivan and colleagues found that, in individuals who had sustained musculoskeletal injuries, high scores in perceived injustice were associated with increased pain severity and depressive symptoms (Sullivan et al., 2008). In patients with chronic pain, scores on perceptions of injustice have been shown to be positively associated with depressive symptoms, pain severity, and disability (Scott, Trost, Bernier, & Sullivan, 2013; Yakobov et al., 2014). Although the pattern of findings that has emerged in previous studies is consistent with the view that injury-related losses and physical and emotional suffering are determinants of perceptions of injustice, the cross-sectional nature of research conducted to date precludes strong statements about the direction of causality. While injury-related suffering and losses might contribute to perceptions of injustice, it is also possible that perceptions of injustice might augment the experience of physical and emotional suffering and losses consequent to injury (Trost et al., 2014).

One approach to examining the relations between changes in perceptions of injustice, and injury-related suffering and losses associated with pain is to examine the outcome of interventions designed to reduce symptom severity (i.e., pain severity and depressive symptoms) and disability. For the purpose of this study, reductions in symptom severity were used as a proxy for reductions in physical and emotional suffering. Reductions in disability were used as a proxy for reductions in injury-related losses. The relative contribution of suffering and losses to perceptions of injustice can be explored by examining the relations between treatment-related reductions in symptom severity and disability, and reductions in perceptions of injustice.

The aim of the present study was to investigate whether perceived injustice changes as a function of reductions in pain, depression, and disability in individuals receiving treatment for whiplash injuries. In this study, perceptions of injustice were assessed before and after treatment in individuals with whiplash injuries participating in an intervention designed to reduce pain, depressive symptoms, and disability. Proceeding from the view that perceived injustice emerges as a consequence of the losses in function associated with disability (McParland et al., 2011; Montada, 1992, 1994; Sullivan et al., 2008), it was predicted that perceived injustice would decrease as a function of treatment-related reductions in disability. Proceeding from the view that perceptions of injustice emerge as a function of the physical and emotional suffering that characterizes pain conditions (McParland & Eccleston, 2013; Sullivan et al., 2008), it was predicted that perceptions of injustice would decrease as a function of treatment-related reductions in pain severity and depressive symptoms.

Methods

Participants

The study sample consisted of 71 individuals (43 women and 28 men) who sustained whiplash injuries in motor vehicle accidents. The age range of the study sample was from 20 to 60 years (mean = 35.8; SD = 8.9). The number of weeks since injury ranged from 8 to 48 weeks (mean = 18.6; SD = 7.3). Approximately half of the sample completed more than 12 years of education (54.5 %) and was living with a partner (46.1 %). At the time of the treatment program, all participants were work-disabled and receiving salary indemnity payments through a no-fault provincial insurance system (Société de l'assurance automobile du Québec).

To be eligible to participate in the present study, individuals were required to have received a diagnosis of a whiplash associated disorder, grade 1 or 2, and scored above the risk threshold on a measure of perceived injustice. Individuals were not considered for participation if they were diagnosed with another pain-related condition, lost consciousness at the time of the accident, or had severe cognitive impairments.

Procedure

Participants were recruited from five collaborating rehabilitation clinics in the Montreal region. Participants in the present study were enrolled in a standardized 7-week multidisciplinary treatment program designed to promote functional recovery following whiplash injury. The intervention team included an occupational therapist, a physiotherapist, and psychologist. Exercise, education, and instruction in self-management skills were the core elements of the treatment program. Treatment techniques were not specifically designed to target perceptions of injustice. Portions of these data have previously been reported in a paper addressing clinically meaningful cut scores on the IEQ (Scott, Trost, Milioto, et al., 2013).

A letter describing the study objectives and procedures was provided to prospective participants. Interested participants were invited to contact a clinic coordinator, and sign a consent form as a condition of enrolment in the study. The research was approved by the Ethics Review Committee of the *Centre de recherche interdisciplinaire en réadaptation de Montréal métropolitain* (CRIR).

Participants were asked to provide demographic information and complete measures of pain severity, disability, perceived injustice, and depressive symptomatology following admission to the treatment program. Measures of pain

severity, disability, perceived injustice, and depressive symptoms were completed again during the final week of the program.

Measures

Demographic Variables

Participants provided information about their age, gender, marital status, level of education, and characteristics of the automobile accident that precipitated their injury.

Pain Severity

Pain severity was assessed with a numeric pain rating scale. Participants were asked to assess their pain severity on an 11-point numerical rating scale, ranging from 0 (no pain) to 10 (excruciating pain).

Self-Reported Disability

Self-rated disability associated with neck pain was assessed with the Neck Disability Index (NDI) (Vernon & Mior, 1991). The NDI is composed of ten items that describe domains of disability due to neck pain. Participants are asked to rate their levels of disability in domains that include pain, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation. An index of disability is derived by summing the items, with higher scores indicating worse disability. Reliability and validity of the NDI has been demonstrated in individuals with cervical spine disorders (Riddle & Stratford, 1998; Vernon & Mior, 1991; Wlodyka-Demaille et al., 2002).

Depressive Symptoms

Depressive symptomatology was assessed with the Beck Depression Inventory II (BDI-II) (Beck, Steer, & Brown, 1996). The scale consists of 21 items describing cognitive, affective, and somatic symptoms of depression. Items are summed to produce a total score; higher scores indicate more severe depressive symptoms with a total score of 0–13 considered to be in the minimal range, 14–19 in the mild range, 20–28 in the moderate range, and 29–63 in the severe range. The BDI-II has been shown to be a valid measure for use with chronic musculoskeletal pain patients (Arnau, Meagher, Norris, & Bramson, 2001).

Perceived Injustice

The Injustice Experiences Questionnaire (IEQ) was used to measure injury-related perceptions of injustice (Sullivan et al., 2008). Participants rated the frequency with which they experience each of 12 thoughts on a five-point scale, ranging from 0 (never) to 4 (all the time). The IEQ has been shown to have high internal reliability, and to be valid for use among individuals with persistent musculoskeletal pain following injury (Scott, Trost, Milioto, et al., 2013; Sullivan et al., 2008). Individuals who obtain a score of 18 or greater are considered to be in the risk range for problematic recovery following whiplash injury (Scott, Trost, Milioto, et al., 2013).

Data Analysis

All data analyses were conducted with SPSS version 20 (IBM Corp., 2011). Participants with pre-treatment IEQ with a cut-off score of 18 and higher were selected for the present analyses. Paired sample t tests were computed to compare pain severity, disability, depressive symptomatology, and perceived injustice before and after treatment. Raw change scores were computed for pain severity, disability, depressive symptomatology, and perceived injustice. Pearson correlations were used to examine the associations between changes in pain, disability, depressive symptoms, and perceived injustice. Multiple regression analyses were used to examine the unique contribution of changes in pain severity and disability to changes in scores of perceptions of injustice.

Results

Sample Characteristics

Demographic information is summarized in Table 1. Means and standard deviations of study variables before and after treatment are summarized in Table 2. Men and women did not differ significantly on any demographic or study variable. As expected, there was a significant decrease in pain severity $t(70) = 4.39$, $p < 0.001$, $d = 0.52$; self-reported disability $t(70) = 8.23$, $p < 0.001$, $d = 0.98$; depressive symptomatology $t(70) = 3.61$, $p = 0.001$, $d = 0.43$; and perceived injustice $t(70) = 4.60$, $p < 0.001$, $d = 0.55$, from the pre-treatment to post-treatment evaluation.

Correlations Among Change Scores

Change scores between pre-treatment and post-treatment measures of pain severity, disability, depressive symptomatology, and perceived injustice were computed (Table 3). Zero-order correlations between change scores revealed that reductions in scores for perceived injustice were associated with reductions in pain severity ($r = 0.37$, $p < 0.05$) and disability ($r = 0.46$, $p < 0.001$). Reductions in depressive symptomatology were associated with reductions in pain severity ($r = 0.38$,

Table 1 Sample characteristics

Variables	N (M)	% (SD)
Sex		
Male	28	39.4
Female	43	60.6
Age: years	(35.8)	(8.9)
Duration since injury (weeks)	(18.6)	(7.3)
Pain Site (not mutually exclusive)		
Neck	71	100
Back	65	91.5
Upper extremity	53	74.6
Lower extremity	16	22.5
Marital status		
Married/common law	32	45.1
Single	29	40.8
Separated/divorced	10	14.1
Education		
High school or less	33	46.5
Trade school/college	27	38
University	11	15.5

$p < 0.05$) and reductions in disability ($r = 0.55$, $p < 0.001$). Reductions in pain severity were also associated with reductions in disability ($r = 0.51$, $p < 0.001$).

Treatment-Related Determinants of Changes in Perceived Injustice

A hierarchical regression equation was computed to assess the contribution of changes in pain severity and disability to changes in perception of injustice from pre-treatment to post-treatment evaluation. Because reduction in depressive symptoms was not correlated with reduction in perceived injustice, changes in depressive symptomatology were not included in regression analyses. The overall model was significant, $F(4, 66) = 5.91$, $p < 0.001$, and accounted for 26 % of the variance. As shown in Table 4, the demographic variables entered in the first step of the regression analysis failed to reach statistical significance. Changes in pain severity entered in the second step accounted for 12 % of the variance to changes in perceived injustice. Changes in disability entered in the third step accounted for an additional 11 % of the variance in changes of perceived injustice. Examination of the standardized beta weights from the final regression equation indicated that only reduction in disability ($\beta = 0.38$, $p < 0.05$) contributed significant unique variance to the prediction of reductions in perceptions of injustice.

Table 2 Means and standard deviations of pre-treatment and post-treatment variables

Variables	Pre-treatment	Post-treatment	*p* value	Cohen's *d*
Pain severity	5.2 (1.8)	4.2 (1.8)	0.000	0.52
Disability	23.2 (6.3)	16.6 (7.8)	0.000	0.98
BDI	16.7 (9.5)	12.8 (9.5)	0.001	0.43
IEQ	27.0 (6.6)	22.6 (9.7)	0.000	0.55

$N = 71$

BDI Beck Depression Inventory, *IEQ* Injustice Experiences Questionnaire

Table 3 Correlations among change scores pre-treatment and post-treatment

	1	2	3
1. Δ IEQ			
2. Δ BDI	0.16		
3. Δ Pain severity	0.37*	0.38*	
4. Δ Disability	0.46**	0.55**	0.51**

$N = 71$

Δ BDI Changes in Beck Depression Inventory, *Δ IEQ* Changes in Injustice Experiences Questionnaire

*$p < 0.05$, **$p < 0.001$

Discussion

The present study explored whether an intervention designed to reduce emotional and physical suffering, and injury-related losses in individuals with whiplash injuries would be associated with reductions in perceptions of injustice. In the current study, reductions in symptom severity were used as a proxy for reductions in physical and emotional suffering, and reductions in disability were used as a proxy for reductions in injury-related losses. Consistent with conceptual models that

Table 4 Regression analyses predicting pretreatment to posttreatment changes in perceived injustice

	Beta	R^2 change	*F* change
Dependent = change in scores of IEQ			
Step 1			
Age	0.14		
Sex	−0.06	0.03	1.17 (2,68)
Step 2			
Δ Pain severity	0.16	0.12	9.86 (1,67)*
Step 3			
Δ NDI	0.38*	0.11	9.53 (1,66)*

$N = 71$. Standardized betas are reported from the final regression equation

Δ IEQ Changes in Injustice Experiences Questionnaire, *Δ NDI* Changes in Neck Disability

*$p < 0.05$

propose that suffering and injury-related losses contribute to perceptions of injustice, the results of univariate analyses showed that treatment-related reductions in pain and disability were associated with reductions in perceptions of injustice. The effect size was larger for the association between changes in perceived injustice and changes in disability (21 % of the variance) than between changes in perceived injustice and changes in pain (14 % of the variance). Changes in perceptions of injustice were not associated with changes in depressive symptoms. The results of a hierarchical regression indicated that reduction in disability was the only variable that contributed uniquely to reduction in perceptions of injustice, after controlling for demographic information, and changes in pain severity.

Several previous investigations have shown that the relation between perceptions of injustice and disability is stronger than the relation between perceived injustice and symptom severity (Scott, Trost, Bernier, et al., 2013; Sullivan et al., 2008). There may be several explanations for these findings. It is possible that the losses associated with disability might be more far reaching in terms of impact than symptom severity. Theories of distributive justice suggest that unfair outcomes such as significant loss may contribute to perceptions of injustice (Adams, 1965). Disability-related losses such as loss of employment, loss of participation in recreational, community and family activities, and loss of financial security might be experienced as a breach or violation of principles of distributive justice. Some of these losses might be experienced as extending into the foreseeable future; some losses might actually be experienced as irreversible (Evans, Mayer, & Gatchel, 2001; Suissa, 2003; Watson, Booker, Moores, & Main, 2004). It is also possible that individuals might have a more hopeful orientation to the possibility of reduced suffering since there are many symptom-reduction treatments that would be made available to them, while losses related to disability might not be always be reversed or mitigated.

In the current study, reductions in depressive symptoms were not associated with reductions in perceived injustice. The magnitude of reduction in depressive symptoms was also smaller than it was for other variables. One explanation to this finding might be due to the study sample's scores on depressive symptomatology. The mean score of the BDI-II before treatment was 16.7, falling in the mild range for depressive symptoms, and 12.8 after treatment, falling in the minimal range for depressive symptoms. It is possible that reductions in depressive symptoms were not associated with reductions in perceptions of injustice because the high levels of depression were not sufficiently represented in the present sample.

The results of regression analyses revealed that reductions in pain severity and disability accounted for less than 30 % of the variance in the prediction of reductions in perceived injustice. Over 70 % of the variance not accounted for by reductions in pain and disability might be attributed to other factors that are likely to play a role in justice appraisals. It has been proposed that injury-related losses and suffering might set the stage for appraisals associated with compensatory and retributive justice (Darley, 2001). Compensatory justice refers to the extent or the needs of the injured individual to be fairly compensated for losses incurred. It is reflected in the policies of injury insurers and is based on the notion that individuals should receive just compensation for their injuries (Carlsmith & Darley, 2008). When such compensation falls short of what was expected by the injured person, a sense of injustice might arise (Sullivan et al., 2014). Retributive justice is relevant when there is an identifiable source of injustice. It is based on the belief that the perpetrator of injustice must be punished in proportion to the losses and damages that he or she has inflicted on the injured person. Retribution motives are likely to arise in situations where blame can be attributed to someone's reckless, negligent, or intentional behavior that inflicted losses or suffering on the injured individual (Carlsmith & Darley, 2008; Lagnado & Channon, 2008; Levmore & Sharkey, 2012). Attribution of blame and a sense of unfairness have been discussed as precursors to perceptions of injustice (Mikula, 2003; Mikula, Scherer, & Athenstaedt, 1998; Montada, 1992; Sullivan et al., 2008). Blame attributions are likely to trigger anger reactions that in turn have been associated with heightened experience of pain and disability (Bruehl, Burns, Chung, Ward, & Johnson, 2002; Burns et al., 2008; Greenwood, Thurston, Rumble, Waters, & Keefe, 2003). Anger reactions have also been associated with nonadherence to treatment that could interfere with trajectory of recovery (Greenwood et al., 2003). Other dimensions of injustice might include the interpersonal and social context factors. For example, lack of social support and punitive or invalidating responses from others have been associated with greater symptom severity and disability in individuals with chronic pain (Boothby, Thorn, Overduin, & Ward, 2004; Ghavidel-Parsa et al., 2015; Kool et al., 2010). It is plausible that perceptions of injustice might emerge in the social or interpersonal context that is characterized by negligence, disrespect, or negative responses toward the injured person (Miller, 2001; Sullivan et al. 2008). In the present study, processes underlying these different dimensions of justice were not measured or targeted with treatment. Future research is needed to explore whether interventions that explicitly address beliefs related to compensatory justice, attributions of blame, and interpersonal difficulties related to postinjury distress will reduce perceptions of injustice.

The robust relationship between perceptions of injustice and adverse recovery outcomes has led to calls for more attention to the development of interventions specifically designed to target perceptions of injustice (Sullivan, Adams, Martel, Scott, & Wideman, 2011). There are indications that current approaches to the management of whiplash injury such as physical therapy and multidisciplinary rehabilitation

do not yield meaningful reductions in perceptions of injustice (Sullivan et al., 2008). Several investigators have suggested that intervention approaches such as validation, acceptance, or forgiveness might be useful in yielding reductions in perceived injustice (Scott, Trost, Milioto, et al., 2013; Sullivan et al., 2011). To date, however, the effectiveness of such techniques in reducing perceptions of injustice has not been demonstrated.

The results of the present are consistent with the growing consensus that pain-related disability might be the most important clinical dimension of the pain experience (National Institute of Mental Health, 2015). The findings in the present study also suggest that interventions specifically designed to improve function, or minimize disability-related losses, might be useful in reducing perceptions of injustice in individuals who have sustained whiplash injuries. At present, many intervention approaches for the management of whiplash injuries include a combination of symptom reduction techniques (e.g., medication, modalities, and relaxation) and physical function restoration techniques (e.g., mobilization and exercises) (Motor Accidents Authority, 2001). The results of the present study suggest that greater emphasis on reduction of disability, relative to symptom reduction techniques, might have advantages for yielding reductions in perceptions of injustice. Supplementing functional restoration techniques with strategies designed to promote re-integration into discontinued activities, as well as return-to-work, might also be experienced as a reduction in the magnitude of losses, and in turn, lead to reductions in perceived injustice.

The present study is not without limitations. The modest number of participants necessitates replication with larger samples to increase the validity and reliability of the present findings. Another limitation of the present study is that the sample was comprised entirely of individuals with persistent pain following whiplash injuries receiving treatment at a secondary care rehabilitation facility. Future research is needed to explore whether the present findings will generalize to populations with different chronic pain conditions receiving different forms of intervention. Even though the measure of disability used in the present study was valid, it was based only on self-report and the extent to which scores reflect actual limitations in function remains unclear. It is also noteworthy that the data of the present sample was collected under a no-fault system. It is unclear whether similar findings will emerge within "tort" systems where affected individuals might take legal action to demand financial compensation as means of retribution for sustained disability (Strang & Braithwaite, 2000).

In spite of these limitations, this was the first study to demonstrate that losses associated with disability appear to be the primary determinants of perceptions of injustice in individuals with whiplash injury. The results of the present study also suggest that treatments geared toward reduction in disability relative to reduction in symptom severity might have advantages in terms of yielding reductions in perceived injustice. Future research is needed to investigate whether greater focus on reducing disability, and promoting strategies aimed at re-integrating individuals into life activities will translate into lower scores of perceived injustice, and promote faster recovery.

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Compliance with Ethical Standards

Conflict of Interest The authors have no financial interests related to the contents of this paper.

References

Adams, J. S. (1965). Inequity in social exchange. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 2). New York: Academic.

Arnau, R. C., Meagher, M. W., Norris, M. P., & Bramson, R. (2001). Psychometric evaluation of the Beck Depression Inventory-II with primary care medical patients. *Health Psychology, 20*(2), 112–119.

Beck, A., Steer, R., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX: Psychological Corporation.

Berglund, A., Bodin, L., Jensen, I., Wiklund, A., & Alfredsson, L. (2006). The influence of prognostic factors on neck pain intensity, disability, anxiety and depression over a 2-year period in subjects with acute whiplash injury. *Pain, 125*(3), 244–256.

Boothby, J. L., Thorn, B. E., Overduin, L. Y., & Ward, L. C. (2004). Catastrophizing and perceived partner responses to pain. *Pain, 109*(3), 500–506.

Bruehl, S., Burns, J. W., Chung, O. Y., Ward, P., & Johnson, B. (2002). Anger and pain sensitivity in chronic low back pain patients and pain-free controls: The role of endogenous opioids. *Pain, 99*(1–2), 223–233.

Burns, J. W., Holly, A., Quartana, P., Wolff, B., Gray, E., & Bruehl, S. (2008). Trait anger management style moderates effects of actual ("state") anger regulation on symptom-specific reactivity and recovery among chronic low back pain patients. *Psychosomatic Medicine, 70*(8), 898–905.

Carlsmith, K. M., & Darley, J. M. (2008). Psychological aspects of retributive justice. In A. W. Kruglanski (Ed.), *Advances in experimental social psychology* (Vol. 40, pp. 193–236). Dublin, Ireland: Elsevier.

Darley, J. M. (2001). Citizens' sense of justice and the legal system. *Current Directions in Psychological Science, 10*(1), 10–13.

Evans, T. H., Mayer, T. G., & Gatchel, R. J. (2001). Recurrent disabling work-related spinal disorders after prior injury claims in a chronic low back pain population. *Spine Journal, 1,* 183–189.

Ferrari, R. (2015). A prospective study of perceived injustice in whiplash victims and its relationship to recovery. *Clinical Rheumatology, 34*(5), 975–979.

Ghavidel-Parsa, B., Amir Maafi, A., Aarabi, Y., Haghdoost, A., Khojamli, M., Montazeri, A., . . . Bidari, A. (2015). Correlation of invalidation with symptom severity and health status in fibromyalgia. *Rheumatology, 54*(3), 482–486.

Greenwood, K. A., Thurston, R., Rumble, M., Waters, S. J., & Keefe, F. J. (2003). Anger and persistent pain: Current status and future directions. *Pain, 103*(1–2), 1–5.

Harris, S., Morley, S., & Barton, S. B. (2003). Role loss and emotional adjustment in chronic pain. *Pain, 105,* 363–370.

IBM Corp. (2011). IBM SPSS Statistics for Windows (Version 20.0). Armonk, NY: IBM Corp.

Kool, M. B., van Middendorp, H., Lumley, M. A., Schenk, Y., Jacobs, J. W., Bijlsma, J. W., & Geenen, R. (2010). Lack of understanding in fibromyalgia and rheumatoid arthritis: The Illness Invalidation Inventory (3*I). *Annals of the Rheumatic Diseases, 69*(11), 1990–1995.

Lagnado, D. A., & Channon, S. (2008). Judgments of cause and blame: The effects of intentionality and foreseeability. *Cognition, 108*(3), 754–770.

Levmore, S., & Sharkey, C. M. (2012). *Foundations of tort law*. New York: Thompson Reuters/Foundation Press.

Lind, E. A., & Tyler, T. R. (1988). *The social psychology of procedural justice*. New York: Plenum.

Lyons, R., & Sullivan, M. J. L. (1998). Curbing loss in illness and disability. In J. Harvey (Ed.), *Perspectives on personal and interpersonal loss* (pp. 579–605). New York: Taylor & Francis.

McParland, & Eccleston, C. (2013). "It's Not Fair" social justice appraisals in the context of chronic pain. *Current Directions in Psychological Science, 22*(6), 484–489.

McParland, Eccleston, C., Osborn, M., & Hezseltine, L. (2011). It's not fair: An interpretative phenomenological analysis of discourses of justice and fairness in chronic pain. *Health (London, England), 15*(5), 459–474.

Mikula, G. (2003). Testing an attribution-of-blame model of judgments of injustice. *European Journal of Social Psychology, 33*(6), 793–811.

Mikula, G., Scherer, K. R., & Athenstaedt, U. (1998). The role of injustice in the elicitation of differential emotional reactions. *Personality and Social Psychology Bulletin, 24*(7), 769–783.

Miller, D. T. (2001). Disrespect and the experience of injustice. *Annual Review of Psychology, 52,* 527–553.

Montada, L. (1992). Attribution of responsibility for losses and perceived injustice. In L. Montada, F. Sigrun-Heide, & M. J. Lerner (Eds.), *Life crises and experiences of loss in adulthood*. Hillsdale: Lawrence Erlbaum and Associates.

Montada, L. (1994). Injustice in harm and loss. *Social Justice Research, 7*(1), 5–28.

Motor Accidents Authority (2001). *Guidelines for the management of whiplash-associated disorders*. Retrieved from http://www.whiplashprevention.org/SiteCollectionDocuments/Research%20Articles/Medical%20-%20Whiplash/GuidelinesDiagnosingWhiplash.pdf

Nederhand, M. J., Hermens, H. J., Ijzerman, M. J., Turk, D. C., & Zilvold, G. (2003). Chronic pain disability due to an acute whiplash injury. *Pain, 102,* 63–71.

Riddle, D. L., & Stratford, P. W. (1998). Use of generic versus region-specific functional status measures on patients with cervical spine disorders. *Physical Therapy, 78*(9), 951–963.

Scott, Trost, Bernier, & Sullivan. (2013a). Anger differentially mediates the relationship between perceived injustice and chronic pain outcomes. *Pain, 154*(9), 1691–1698.

Scott, Trost, Milioto, & Sullivan. (2013b). Further validation of a measure of injury-related injustice perceptions to identify risk for occupational disability: A prospective study of individuals with whiplash injury. *Journal of Occupational Rehabilitation, 23*(4), 557–565.

Scott, W., Trost, Z., Milioto, M., & Sullivan, M. J. (2015). Barriers to change in depressive symptoms after multidisciplinary rehabilitation for whiplash: The role of perceived injustice. *Clinical Journal of Pain, 31*(2), 145–151.

Strang, H., & Braithwaite, J. (2000). *Restorative justice: From philosophy to practice*. Dartmouth, CT: Aldershot Press.

Suissa, S. (2003). Risk factors for poor prognosis after whiplash injury. *Pain Research and Management, 8,* 69–75.

Sullivan, Adams, H., Horan, S., Maher, D., Boland, D., & Gross, R. (2008). The role of perceived injustice in the experience of chronic pain and disability: Scale development and validation. *Journal of Occupational Rehabilitation, 18*(3), 249–261.

Sullivan, Adams, H., Martel, M. O., Scott, W., & Wideman, T. (2011). Catastrophizing and perceived injustice: Risk factors for the transition to chronicity after whiplash injury. *Spine, 36*(25 Suppl), S244–S249.

Sullivan, Scott, W., & Trost, Z. (2012). Perceived injustice: A risk factor for problematic pain outcomes. *Clinical Journal of Pain, 28*(6), 484–488.

Sullivan, Yakobov, E., Scott, W., & Tait, R. (2014). Perceived injustice and adverse recovery outcomes. *Psychological Injury and Law, 7*(4), 325–334.

Trost, Z., Scott, W., Lange, J. M., Manganelli, L., Bernier, E., & Sullivan, M. J. (2014). An experimental investigation of the effect of a justice violation on pain experience and expression among individuals with high and low just world beliefs. *European Journal of Pain, 18*(3), 415–423.

U. S. Department of Health and. HumanServices, National Institutes of Health, National Institute of Neurological Disorders and Stroke (2015). National pain strategy. *A comprehensive population health-level strategy for pain.* Retrieved from http://iprcc.nih.gov/docs/DraftHHSNationalPainStrategy.pdf

Vernon, H., & Mior, S. (1991). The neck disability index - a study of reliability and validity. *Journal of Manipulative and Physiological Therapeutics, 14*(7), 409–415.

Walker, J., Sofaer, B., & Holloway, I. (2006). The experience of chronic back pain: Accounts of loss in those seeking help from pain clinics. *European Journal of Pain, 10*(3), 199–207.

Watson, P. J., Booker, C. K., Moores, L., & Main, C. (2004). Returning the chronically unemployed with low back pain to employment. *European Journal of Pain, 8,* 359–369.

Wlodyka-Demaille, S., Poiraudeau, S., Catanzariti, J. F., Rannou, F., Fermanian, J., & Revel, M. (2002). French translation and validation of 3 functional disability scales for neck pain. *Archives of Physical Medicine and Rehabilitation, 83*(3), 376–382.

Yakobov, E., Scott, W., Stanish, W., Tanzer, M., Dunbar, M., Richardson, G., & Sullivan, M. (2014). Validation of injustice experiences questionnaire adapted for use with patients with severe osteoarthritis of the knee. *Journal of Arthritis, 3,* 130–136.