ORIGINAL ARTICLE

The association between injustice perception and psychological outcomes in an inpatient spinal cord injury sample: the mediating effects of anger

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Study design: Cross-sectional study design involving completion of self-report measures.

Objective: To investigate the relationship between perceived injustice, post-traumatic stress symptoms and depression in a sample of individuals receiving inpatient rehabilitation care following hospitalization for acute spinal cord injury (SCI), as well as the mediating role of anger variables.

Setting: Inpatient rehabilitation program in a large urban city in the Southwestern United States.

Methods: A sample of 53 participants with an average of 204.51 days (s.d. = 410.67, median = 56) post injury occurrence completed measures of perceived injustice, depression and post-traumatic stress symptoms as well as measures of trait anger, state anger, anger inhibition and anger expression.

Results: Perceived injustice was significantly correlated with depression and post-traumatic stress symptoms, and accounted for unique variance in depression and post-traumatic stress symptoms when controlling for demographic and injury-related variables. Anger inhibition was found to mediate the relationship between perceived injustice and depression. Trait anger and anger expression were found to mediate the relationship between perceived injustice and post-traumatic stress symptoms.

Conclusions: Consistent with previous research, perceived injustice was associated with greater depression and post-traumatic stress symptoms. The results support previous findings that anger inhibition mediates between perceived injustice and depression, and provides novel findings regarding mediation of post-traumatic stress symptoms. Results provide preliminary evidence for the role of perceived injustice in SCI and potential mechanisms by which it may exert its effects.

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INTRODUCTION

A growing body of research highlights the deleterious impact of injustice perception on psychological outcomes in the context of chronic musculoskeletal pain^{1–4} and the following physical trauma.^{5–7} Injustice perception has been conceptualized as a cognitive appraisal reflecting the severity and irreparability of injury or condition-related loss, as well as externalized blame and perceived unfairness.^{2,3} Perception of injustice has been associated with depressive symptoms among individuals with persistent musculoskeletal pain^{2,6,8,9} and those with fibromyalgia.¹⁰ Perceived injustice was also associated with heightened depression among individuals with whiplash enrolled in a standard multidisciplinary rehabilitation program.^{11,12} In the same sample, elevated perception of injustice was associated with persistence of post-traumatic stress symptoms following whiplash injury.¹²

To date, research on perceived injustice and severe trauma requiring inpatient admission has been sparse. A study by Trost *et al.*⁷ found that, 12 months following admission to a Level-1 Trauma Center, perceived injustice was associated with greater post-traumatic stress symptom severity, greater depressive symptomatology and reduced

mental quality of life, after controlling for relevant demographic and injury-related variables. To our knowledge, no study to date has examined the impact of perceived injustice on psychological outcomes among individuals with spinal cord injury (SCI) or in the context of inpatient rehabilitation for SCI. As SCI is associated with substantial disruption to one's life, including challenges to mobility, personal independence, financial resources and social support,¹³ it is plausible that individuals with SCI may develop a sense of injustice following injury.

A number of mechanisms have been proposed to explain the impact of injustice perception on psychosocial outcomes. In particular, anger has received much attention as social psychological research suggests that anger is the primary emotional response to perceiving injustice.^{14,15} Perception of injustice has also been conceptualized as an essential antecedent to anger.^{16,17} Despite these established associations, research regarding the relationship between perceived injustice and anger in people with chronic health conditions is limited. One previous study examined anger intensity (state/trait) and regulation style (the tendency to express or inhibit anger) in

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a sample of individuals with diverse musculoskeletal pain conditions.⁹ Echoing findings linking depression and anger,^{18–23} results indicated that state anger, trait anger and anger inhibition partially mediated the relationship between perceived injustice and depressive symptoms.⁹ Another study found that anger expression mediated the association between perceived injustice and poor working alliance with treatment providers among musculoskeletal pain patients receiving multidisciplinary rehabilitation.²⁴ Research has not previously examined the role of anger in mediating between perceived injustice and post-traumatic stress symptoms. However, existing research that separately links perceived injustice and anger to post-traumatic stress^{12,25} suggests that anger may mediate the relationship between injustice and post-traumatic stress symptoms following injury.

Given the often irreparable and significant losses that can accompany SCI, it is plausible that perceived injustice and anger show similar adverse associations with psychological outcomes in this population. Anger has typically been explored as an outcome after SCI,^{26–28} particularly in relation to pain and mood; however, less research has explored the potential role of anger within SCI-related outcomes. The aims of the current cross-sectional study were therefore to (a) examine associations between perceived injustice and psychological outcomes, including depression and post-traumatic stress symptoms, in a sample of individuals admitted to a rehabilitation unit following SCI, (b) examine the unique contribution of perceived injustice to psychological outcomes and (c) in line with the theoretical conceptualization of anger arising out of perceptions of injustice, explore the mediating effect of anger variables. Specifically, we examined whether anger inhibition, anger expression and state and trait anger mediated the relationship between perceived injustice and psychological outcomes. On the basis of existing literature, it was hypothesized that the relationship between perceived injustice and depression would be mediated by anger and that anger would likewise mediate the relationship between injustice perception and post-traumatic stress symptoms. The findings are expected to add to understanding of factors that contribute to adjustment to spinal cord injury in the rehabilitation setting.

MATERIALS AND METHODS

Participants

The current study included 53 adults with SCI admitted to an inpatient rehabilitation facility in the Southwestern United States after a period of acute hospitalization. Given the acute nature of hospitalization, the focus of rehabilitation was on maximizing the health, independence and functional abilities of individuals with SCI. Eligible participants had traumatic or nontraumatic SCI (for example, infection, disk degeneration), were at minimum 18 years of age, medically stable, had sufficient cognitive capacity to participate as determined by brief psychological evaluation and had no serious mental illness or developmental disability. Completeness of SCI lesion was assessed by SCI physician using the International Standards for Neurological Classification of SCI (ISNCSCI) and the American Spinal Injury Association Impairment Scale (AIS). Of note, some patients were discharged from acute care several months prior to admission to the rehabilitation facility, due to the need to wait for state funding approval. Data from the current sample were included in a previously published paper regarding association between injustice appraisal, attribution of blame and intention litigation.²⁹

Procedure

Participants were approached within two weeks of admission; all data were collected during inpatient rehabilitation. Written informed consent or assent with presence of a witness was obtained prior to participation in the study. Participants were interviewed in 1- to 2-hour sessions during which relevant demographic, injury-related and psychosocial data were collected.

Medical information was retrieved from the electronic health record. Interviews were conducted by trained research assistants under supervision of a Licensed Psychologist. The study protocol was approved by the hospital's institutional review board, and all applicable institutional and governmental regulations concerning ethical use of human volunteers were followed during the course of this research.

Measures

Perceived injustice. Perception of injustice associated with injury was assessed using the Injustice Experience Questionnaire (IEQ²). The IEQ asks participants to indicate the frequency with which they experience 12 thoughts concerning a sense of unfairness in relation to their injury on a 5-point scale with endpoints 0 (never) and 4 (all the time). The IEQ is found to comprise two related factors, reflecting perceptions of the Severity/Irreparability of Loss (for example, 'Most people don't understand how severe my condition is'; 'My life will never be the same') and Blame/Unfairness ('I am suffering because of someone else's negligence'; 'It all seems so unfair'). The IEQ shows strong psychometric properties among individuals with persistent musculoskeletal pain and within rehabilitation settings.^{2,7} Internal consistency was high in the current sample ($\alpha = 0.91$). High correlations between the subscales in previous research warrant the use of a total score on this measure.²

Pain severity. The Present Pain Intensity index (PPI) of the McGill Pain Questionnaire—Short Form (SF-MPQ³⁰) was used to assess participant pain. Participants indicate which of six words, ranging from 0 (*No Pain*) to 5 (*Excruciating*), best reflects their current pain experience. The SF-MPQ has demonstrated high reliability, validity and sensitivity to change across a variety of pain and illness categories³¹ and has been utilized in SCI samples.^{32,33}

Depression symptoms. Symptoms of depression were assessed using the Patient Health Questionnaire-8 (PHQ-8^{34,35}). Participants indicate how often they have been bothered by eight depressive symptoms over the past two weeks on a 0 (*not at all*) to 3 (*nearly every day*) scale. Scores on the PHQ-8 are summed to indicate the severity of depressive symptoms. The PHQ-8 is well validated and has previously been used to assess depression during inpatient SCI rehabilitation.³⁶ The PHQ-8 internal consistency for the current sample was $\alpha = 0.77$.

Post-traumatic stress symptoms. Symptoms of post-traumatic stress were assessed via the 4-item Primary-Care PTSD screen (PC-PTSD^{37,38}). Scores range from 0 to 4, with higher scores indicating greater post-traumatic stress symptomatology. Among trauma samples, PC-PTSD has demonstrated diagnostic validity comparable to full-length PTSD assessments.³⁹ Internal consistency for the current sample was $\alpha = 0.72$.

Anger. Participants completed the state (15 items; $\alpha = 0.95$), trait (10 items; $\alpha = 0.93$), anger expression (8 items; $\alpha = 0.79$) and anger inhibition (8 items; $\alpha = 0.79$) subscales of the State-Trait Anger Expression Inventory—II (STAXI—II).⁴⁰ Patients endorsed each item on a 4-point Likert scale. The state subscale reflects the intensity of an individual's feelings of anger at the time of testing; the trait subscale assesses a person's general predisposition to become angry. Anger inhibition items reflect the frequency with which individuals attempt to suppress feelings of anger, whereas anger expression items gauge how often anger is outwardly expressed. The STAXI—II has shown good psychometric properties across use with medical outpatient, inpatient and rehabilitation populations.^{41,42} The distinction between anger intensity (state and trait) and anger regulation style (inhibition and expression) has also been empirically supported.⁴³

Data analytic plan

Descriptive statistics were calculated for perceived injustice, psychological outcome variables, anger variables, demographic variables and injury-related variables. Bivariate correlations and one-way analyses of variance (in the case of categorical variables) were conducted to examine associations between participants' IEQ scores, psychological outcomes and anger variables, as well as among all psychological variables, demographic and injury-related variables. Separate multiple linear regression analyses were conducted to examine the

unique/incremental contribution of injustice perception (IEQ) to patients' report of depression and post-traumatic stress. For each dependent variable, demographic or injury-related variables that showed significant associations with the outcome variable in bivariate analyses were entered into the first block. Depression was controlled for in analyses of post-traumatic stress.

We examined whether associations between perceived injustice and outcome variables (that is, depression or PTSD) were mediated by anger variables (that is, trait anger, state anger, anger inhibition, or anger expression) using a bootstrapping method (that is, a nonparametric resampling procedure with 5000 bootstrap resamples and 95% bias-corrected bootstrapped confidence intervals) following the path-analytic procedure described by Preacher & Hayes.⁴⁴ Using this method, mediation is assessed by calculating the indirect effect of the predictor (that is, perceived injustice) on the outcome through the mediator (for example, trait anger). Specifically, the total effect of injustice on the psychosocial outcome variable consists of (1) a direct effect of perceived injustice on the psychological outcome variable (that is, depression or PTSD) that is independent of its effect through the mediator and (2) an indirect effect of perceived injustice on the psychological outcome variable through a proposed mediator (that is, anger variable). The unstandardized indirect effect is equal to the product of the two unstandardized path coefficients for the paths from the predictor to the mediator and from the mediator to the outcome. If a significant amount of variance between the independent variable and the dependent variable is explained by the proposed mediator, the indirect effect is significant. Bootstrapping produces sampling distributions of the indirect effect and produces point estimates that are considered significant if the 95% bias-corrected bootstrapped confidence intervals do not include zero. Results of these analyses with relevant standardized path coefficients were plotted in Figures 1 and 2.

RESULTS

Participant sample

A total of 53 participants (35 men) were interviewed for the study. See Table 1 for participant demographics and injury-related variables, presented for the entire sample and separately for men and women. The mean age of participants at the time of the study was 47.62 years (*s.d.* = 15.83 years). Average age at the time of injury was 47.02 years (*s.d.* = 16.18 years; Median = 51, Range = 20–79). On average, participants were 204.51 (*s.d.* = 410.67) days from injury occurrence (Median = 56 days, Mode = 16 days). Average length of current hospitalization at the time of interview was 48.64 days (*s.d.* = 21.40; Median = 46). Mean current pain intensity across participants was 1.49 (*s.d.* = 0.91). Forty participants (75.5%) had a traumatic injury resulting in SCI. Level of injury was as follows: 30 Cervical (61.2%), 17 Thoracic (34.7%) and 2 Lumbar (4.1%). AIS scores were as follows: 13A (28.9%), 10 B (22.2%), 12 C (26.7%) and 10 D (22.2%). Several significant gender differences emerged. A greater proportion of women were married and a greater proportion of men were never married. Analysis of variance revealed that women reported significantly higher pain intensity than men did, $F(1, 52) = 4.76$, $P = 0.03$, as well as significantly more depression, $F(1, 52) = 6.00$, $P = 0.02$. No significant differences were observed between men and women on any other study variables.

Figure 1 Anger inhibition mediates the association between perceived injustice and depression. Note. Standardized Beta coefficients are reported for all paths; ** $P < 0.01$; †Standardized Beta coefficient when anger inhibition is included in the model.

Bivariate analyses

Correlation analyses are presented in Table 2. Briefly, perceived injustice was positively associated with all psychological variables and negatively associated with age. Depression was positively associated with pain intensity, post-traumatic stress symptoms, state anger, anger inhibition and anger expression. Post-traumatic stress symptoms were positively associated with all anger variables and negatively associated with education. Anger variables were significantly intercorrelated, with state anger positively correlated with pain, anger inhibition negatively correlated with length of stay and anger expression negatively correlated with age. In terms of demographic variables, age was negatively correlated with time since injury and positively correlated with education. Income was negatively correlated with time since injury and positively correlated with education. No associations emerged between psychosocial variables and type of injury (traumatic or nontraumatic), level of injury, or AIS score.

Prediction and mediation of depression ratings

For analysis of depression ratings as the dependent variable, participant gender and pain intensity were entered into the first step of a multiple linear regression analysis, and accounted for 15.2% of the variance in depression scores, $F\Delta = 3.95$, $P = 0.026$. However, neither gender nor pain intensity was found to make a significant unique contribution to depression scores in the final regression equation (Beta = 0.22, $t = 1.52$, $P = 0.14$ and Beta = 0.26, $t = 1.72$, $P = 0.08$, respectively). When entered into the second block of the analysis, perceived injustice scores uniquely accounted for an additional 14.6% of the variance in depression scores, $F\Delta = 8.96$, Beta = 0.39, $t = 2.99$, $P = 0.005$.

In a second regression analysis, perceived injustice was a significant predictor of anger inhibition (Beta = 0.44, $t = 3.05$, $P = 0.004$). As noted above, in a multiple linear regression controlling for gender and pain intensity, perceived injustice was a significant predictor of depression scores. However, when anger inhibition was added to the model, the effect of perceived injustice on depression was no longer significant (Beta = 0.21, $t = 1.49$, $P = 0.14$), whereas the effect of anger inhibition was significant (Beta = 0.40, $t = 2.92$, $P = 0.006$). Analyses of mediation supported anger inhibition as mediating the relationship between perceived injustice and participant ratings of depression (see Figure 1). The indirect effect of perceived injustice through anger inhibition was significant ($B = 0.06$, $SE = 0.04$, 95% confidence interval (CI) [0.01, 0.16]). Analyses did not support mediation by anger expression, state anger or trait anger.

Prediction and mediation of post-traumatic stress ratings

For analysis of post-traumatic stress ratings as the dependent variable, participant education and depression entered into the first step of a multiple linear regression analysis, accounting for 23.2% of the variance in post-traumatic stress scores, $F\Delta = 7.38$, $P = 0.002$. Both participant education and depression made significant unique contributions to post-traumatic stress ratings (Beta = -0.26, $t = -2.06$, $P = 0.049$ and Beta = 0.35, $t = 2.75$, $P = 0.008$, respectively). When entered into the second block of the analysis, perceived injustice scores uniquely accounted for an additional 18.5% of the variance in post-traumatic stress symptom scores, $F\Delta = 15.24$, Beta = 0.49, $t = 3.90$, $P < 0.001$.

In a second regression analysis, perceived injustice was a significant predictor of anger expression (Beta = 0.35, $t = 2.29$, $P = 0.027$). As noted above, in a multiple linear regression controlling for education and depression, perceived injustice was a significant predictor of post-traumatic stress scores. When anger expression was added to the

Figure 2 Anger expression mediates the association between perceived injustice and post-traumatic stress. Standardized Beta coefficients are reported for all paths; ** $P < 0.01$; * $P < 0.05$; †Standardized Beta coefficient when anger expression is included in the model.

model, the effect of perceived injustice on post-traumatic stress became less significant ($Beta = 0.37$, $t = 2.66$, $P = 0.01$), whereas the effect of anger expression remained significant ($Beta = 0.34$, $t = 2.62$, $P = 0.01$). Analyses of mediation supported anger expression as mediating the relationship between perceived injustice and participant ratings of post-traumatic stress (see Figure 2). The indirect effect of perceived injustice through anger expression was significant ($B = 0.01$, $SE = 0.01$, 95% CI [0.0004, 0.0320]).

Subsequent analyses of mediation also supported trait anger as mediating the relationship between perceived injustice and post-traumatic stress (see Figure 3). Perceived injustice emerged as a significant predictor of trait anger ($Beta = 0.56$, $t = 3.90$, $P < 0.001$). When trait anger was added to the model in which perceived injustice predicted post-traumatic stress ratings, the effect of perceived injustice on post-traumatic stress became less significant ($Beta = 0.32$, $t = 2.19$, $P = 0.05$), while the effect of trait anger remained significant ($Beta = 0.32$, $t = 2.02$, $P = 0.04$). The indirect effect of perceived injustice through trait anger was significant ($B = 0.02$, $SE = 0.01$, 95% CI [0.0002, 0.0339]), suggesting that trait anger also mediated the effect of perceived injustice on post-traumatic stress symptoms. Analyses did not support mediation by anger inhibition or state anger.

DISCUSSION

The current study examined the association between perceived injustice and psychological outcomes (depression, post-traumatic stress symptoms) among individuals undergoing inpatient rehabilitation following SCI, the unique contribution of perceived injustice to psychological outcomes and the mediating effects of anger variables. This is the first investigation of perceived injustice among individuals with SCI or within an inpatient rehabilitation setting following physical trauma. Findings can be summarized as follows: perceived injustice was significantly associated both with depression and post-traumatic stress symptoms and accounted for unique variance in depression and post-traumatic stress symptoms when controlling for relevant demographic and injury-related variables. Anger inhibition mediated the relationship between perceived injustice and depression; trait anger and anger expression mediated the relationship between perceived injustice and post-traumatic stress symptoms.

The relationship between injustice perception and depression has been demonstrated across a number of patient groups. Previous studies have looked primarily at longstanding physical conditions such as persistent musculoskeletal pain² and fibromyalgia,¹⁰ with symptom duration ranging from 8.3 to 18.3 years. The current findings are most appropriately compared to those addressing more recent injury. For instance, Trost *et al.*⁴⁵ found that perceived injustice uniquely predicted depression 12 months after participants were admitted to a Level-I trauma center. Association between perceived injustice and depression has likewise been documented across samples of individuals with whiplash, with typically shorter time since injury.^{5,12} One study identified perceived injustice as a unique predictor of

maintained clinical depression over the course of multidisciplinary rehabilitation for whiplash.¹¹ The current findings extend previous research as the unique physical and psychological challenges facing individuals with SCI have not yet been represented in literature on perceived injustice.

Anger inhibition was found to mediate the relationship between perceived injustice and depression. The relationship between depression and anger inhibition has been previously demonstrated^{18–23} and is in concert with characterization of depression as an internalizing disorder.⁴⁶ The current finding is in line with previous work by Scott *et al.*⁹ showing that anger inhibition partially explained the association between perceived injustice and depression in a sample of individuals with chronic musculoskeletal pain conditions. However, it is noteworthy that the Scott *et al.*⁹ study also found partial mediation for state and trait anger, as well as anger inhibition, obscuring the specific role of anger inhibition. In accounting for the link between anger and depression, Scott *et al.*⁹ suggested a number of potentially underlying physiological similarities, such as alterations in serotonergic and dopaminergic function^{47–49} as well as several behavioral mechanisms. For instance, anger suppression may encourage social isolation,⁵⁰ and consequent depletion of social resources may exacerbate depressive symptomatology.^{51,52} Among individuals with SCI, anger suppression may be related to associated changes in level of independence and social relationships (for example, individuals who were largely independent may need to rely more on others, in turn straining their social relationships). The role of social factors may be particularly salient in light of recent findings that perceived injustice is associated with poorer perception of working alliance with one's rehabilitation clinician among people with chronic musculoskeletal pain attending a rehabilitation program.²⁴ This relationship was found to be mediated by anger expression.²⁴ Given the central role of working alliance in rehabilitation outcomes,^{53,54} its potential relationship with perceived injustice and anger is of particular importance and should be explored in future SCI research (for example, looking at the healthcare provider as a potential target of blame).

This is the first study to identify a relationship between perceived injustice and post-traumatic stress symptoms following SCI. Among individuals undergoing rehabilitation for whiplash injury, Sullivan *et al.*¹² found that injustice perception uniquely predicted persistence of post-traumatic stress symptoms. Trost *et al.*⁷ likewise found that, in a varied trauma sample, perceived injustice was associated with greater post-traumatic stress symptom severity 12 months following admission to a Level-1 Trauma Center. There is also indirect evidence that pursuit of litigation following injury—which can be viewed as a proxy for perceived injustice—may contribute to persistence of post-traumatic stress symptoms.⁵⁵ It is possible that the relationship between perceived injustice and post-traumatic stress symptoms may be explained by shared cognitive content regarding the severity and irreparability of loss, which has been associated with post-traumatic stress symptoms.^{56,57} Indeed, the cognitive model of post-traumatic stress disorder⁵⁷ suggests that individuals with PTSD are unable to view the trauma as a time-limited event and conceive of the trauma as having global negative implications for their future.⁵⁷

The current findings suggest that trait anger and anger expression comprise vehicles by which injustice perception relates to post-traumatic stress symptomatology. The relation between anger and post-traumatic stress symptoms is well established in existing literature, suggesting that anger expression often accompanies and may be a characteristic of post-traumatic stress disorder.^{25,58,59}

Existing literature offers a number of explanations regarding the relationship between anger and post-traumatic stress, including the notion that anger provides a 'preferred' emotional outlet for

fear/trauma-based thoughts and emotions and accompanying fight-or-flight responses.^{58,60,61} As such, anger is thought to provide a sense of mastery or control over an unwanted sense of helplessness/

Table 1 Participant Characteristics

Variable	Frequencies and Means (s.d.)	Range	Male	Female	Gender Difference
			Frequencies and Means (s.d.)	Frequencies and Means (s.d.)	P value
Gender	53		35	18	
Ethnicity					0.54
White	32		21	11	
Black/African American	8		7	1	
Hispanic/Latino	6		3	3	
Asian	3		2	1	
American Indian/Alaska Native	1		1	0	
Native Hawaiian/Pacific Islander	1		0	1	
Biracial	2		1	1	
Education					0.15
K-8th grade	1		0	1	
9th-11th grade	4		4	0	
12th grade, no diploma	1		0	1	
12th grade, degree	9		6	3	
Some college	16		11	5	
Associate's degree	5		2	3	
Bachelor's degree	10		8	2	
Master's degree	4		2	2	
Professional degree	1		0	1	
Doctorate degree	2		2	0	
Income					0.52
<\$10 000	4		3	1	
\$10 000-\$19 999	3		1	2	
\$20 000-\$29 999	7		6	1	
\$30 000-\$39 999	3		1	2	
\$40 000-\$49 999	5		4	1	
\$50 000-\$59 999	2		1	1	
\$60 000-\$69 999	3		2	1	
\$70 000-\$79 999	4		3	1	
\$80 000-\$89 999	2		0	2	
\$90 000-\$99 999	2		2	0	
\$100 000-\$149 999	11		7	4	
>\$150 000	4		3	1	
Marital status					0.03
Married	27		15	12	
Widowed	2		0	2	
Divorced	7		5	2	
Never Married	17		15	2	
Age	47.62 (15.83)	20-79	45.94 (17.41)	50.89 (11.95)	0.29
Age at Injury	47.02 (16.18)	20-79	45.26 (17.95)	50.44 (11.74)	0.27
Time Since Injury (days)	204.51 (410.67)	9-1865	240.71 (474.64)	134.11 (239.46)	0.38
Length of Stay (days)	48.64 (21.40)	8-95	48.11 (19.45)	49.67 (25.36)	0.81
Pain (MPQ-SF-PPI)	1.49 (0.91)	0-3	1.29 (.97)	1.88 (.62)	0.03
Perceived Injustice (IEQ)	15.37 (12.35)	0-42	14.53 (12.43)	17.00 (12.38)	0.50
Depression (PHQ-8)	5.06 (4.71)	0-21	3.97 (3.88)	7.17 (5.53)	0.02
PTSD Screen (PC-PTSD)	0.71 (1.13)	0-4	0.79 (1.20)	0.56 (0.98)	0.47
Anger State	18.91 (8.32)	15-46	18.84 (8.42)	19.06 (8.39)	0.93
Anger Trait	15.54 (6.83)	10-38	15.67 (6.65)	15.31 (7.38)	0.87
Anger Inhibition	13.89 (4.48)	8-28	14.47 (4.88)	12.81 (3.51)	0.24
Anger Expression	13.85 (4.75)	8-27	14.13 (4.77)	13.31 (4.81)	0.58
Injury Type					0.29
Traumatic	40		28	12	
Nontraumatic	13		7	6	
Injury Level					0.59
Cervical	30		21	9	
Thoracic	17		11	6	
Lumbar	2		2	0	
Sacral	0		0	0	
AIS					0.82
A	13		10	3	
B	10		7	3	
C	12		9	3	
D	10		6	4	

Abbreviations: IEQ, Injustice Experience Questionnaire; MPQ-SD-PPI, McGill Pain Questionnaire-Short Form-Present Pain Intensity Index; PHQ-8, Patient Health Questionnaire; PC-PTSD, Primary Care PTSD screen.

Table 2 Bivariate Associations Among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Age	—	−0.29*	0.32*	0.22	−0.10	0.05	−0.30*	−0.05	−0.26	0.02	−0.26	0.08	−0.34*
2 Time since injury		—	−0.20	−0.30*	−0.21	0.08	−0.03	−0.22	0.13	−0.08	0.21	−0.13	0.03
3 Education			—	0.50†	−0.10	−0.13	−0.24	−0.22	−0.34*	0.18	−0.02	0.16	−0.05
4 Income				—	0.01	0.10	−0.16	0.00	−0.02	0.12	0.02	−0.05	0.12
5 Length of stay					—	−0.03	0.02	−0.09	0.12	−0.14	−0.19	−0.36*	0.10
6 Pain						—	0.18	0.33*	0.03	0.33*	0.13	−0.01	0.06
7 Perceived injustice (IEQ)							—	0.44†	0.60†	0.58†	0.55†	0.42**	0.42**
8 Depression (PHQ-8)								—	0.41†	0.33*	0.24	0.43**	0.32*
9 PTSD screen (PC-PTSD)									—	0.39**	0.50†	0.33*	0.50†
10 Anger state										—	0.35*	0.62†	0.20
11 Anger trait											—	0.44**	0.81†
12 Anger inhibition												—	0.31*
13 Anger expression													—

Abbreviations: IEQ=Injustice Experience Questionnaire; PHQ-8=Patient Health Questionnaire; PC-PTSD=Primary Care PTSD screen.
* $P \leq 0.05$; ** $P \leq 0.01$; † $P \leq 0.001$.

Figure 3 Trait anger mediates the association between perceived injustice and post-traumatic stress. Standardized Beta coefficients are reported for all paths; ** $P < 0.01$; * $P < 0.05$; †Standardized Beta coefficient when trait anger is included in the model.

vulnerability.⁶⁰ Although this literature draws heavily on veteran samples, it is reasonable to draw an analogy to patients with recent spinal cord injury, who have been exposed to bodily injury likely accompanied by strong feelings of helplessness and vulnerability. Similarly, perceptions of injustice are characterized by thoughts of irreparable loss and permanently altered life status, often at the hands of someone else. Thus, perceived injustice may contribute to post-traumatic stress symptomatology by activating unwanted thoughts of offense and vulnerability, possibly catalyzing anger and psychological/physiological responses characteristic of post-traumatic stress.

The current study is characterized by several limitations that may inform future research. Foremost, the cross-sectional nature of the data precludes any conclusions about directionality or causality; it is possible (even likely) that the relationship between study variables (for example, depression and perceived injustice) is bidirectional and mutually reinforcing. Similarly, caution should be exercised given the large number of bivariate associations performed (Type I error) and variance likely shared between constructs of interest. However, the cross-sectional associations identified in the current study replicate and extend existing research, creating a foundation for future longitudinal designs more equipped to address issues of causality and distal outcomes such as adjustment following rehabilitation completion (that is, daily function/return to work). In terms of mechanisms of action, future research should particularly attend to the possibly differential or overlapping roles played by dimensions of anger (trait anger, state anger, inhibition and expression) in psychological outcomes such as depression and post-traumatic stress following SCI. Given the relatively limited research in this domain and

potential differences between populations examined, there is need for further studies across populations to further explicate the role of various anger constructs. Further, the relatively small sample size of the current study may have limited power to detect significant multivariate relationships between other variables entered in the regression models, such as pain intensity and demographic and injury-related factors, in relation to depression and post-traumatic stress ratings. Finally, future studies may especially wish to address the potential role played by larger sociocultural factors (for example, comparison of fault vs no fault systems) in injustice-related outcomes as well as specific attributions/sources of injustice made by individuals with SCI. In the period of time following a SCI, individuals could experience greater levels of perceived injustice due to concerns about ability to function at home or level of physical deconditioning following the injury. On the other hand, others who have access to healthcare, disability compensation and/or a strong social support network may experience lower levels of perceived injustice.

Given that a substantial portion of individuals who sustain traumatic SCI will develop depression⁶² and post-traumatic stress symptoms,⁶³ recent research has focused on identifying modifiable psychosocial variables that may influence recovery trajectories following trauma.^{64,65} The current study suggests perceived injustice as one such psychosocial risk factor and implicates various dimensions of anger as potential vehicles by which perceived injustice may impact psychological outcomes among individuals with SCI. Specifically, perceived injustice accounted for unique variance in depression and post-traumatic stress symptoms reported by the current sample. In addition, anger inhibition mediated the relationship between perceived injustice and depression while both trait anger and anger expression mediated the relationship between perceived injustice and post-traumatic stress symptoms. Insofar as future prospective research with larger samples supports the associations between perceived injustice, anger and adverse psychological outcomes, the development and evaluation of intervention strategies for managing injustice perception and anger in people with SCI may be warranted.

DATA ARCHIVING

There were no data to deposit.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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