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Test-Retest Reliability and Construct Validity of the Dutch Injustice Experience Questionnaire in Patients with Chronic Pain

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Abstract

Perceived injustice is defined as an appraisal of the severity of loss, blame, a sense of unfairness, and irreparability of loss related to pain. It has a negative impact on health and is associated with poor recovery outcomes in pain rehabilitation programs. In order to measure, the Injustice Experience Questionnaire (IEQ) was developed, but the reliability and validity of the Dutch version of the IEQ had not been studied. This study aimed to investigate construct validity and test-retest reliability of the Dutch IEQ. Included patients were 281 adults with multi-factorial chronic pain (> 3 months) from two health care settings. All patients filled out questionnaires that measured perceived injustice, pain characteristics, central sensitization, disability, pain catastrophizing, pain acceptance, depression, anxiety, PTSD symptoms, anger, and perceived illness threat. Thirteen hypotheses on the strength of the correlations between the IEQ and the other measurements were formulated a priori. Correlations were calculated using Pearson correlation coefficients. To evaluate test-retest reliability, the IEQ was assessed 2 weeks later and intra-class correlations were computed. All measurements, apart from pain duration and number of pain sites, were significantly correlated with the IEQ. Eleven out of 13 hypotheses were confirmed. Intra-class correlation between the first and second assessments of the IEQ was 0.87. The results support the construct validity of the Dutch IEQ and suggest that test-retest reliability is good.

Keywords Perceived injustice · Chronic pain · Injustice Experience Questionnaire · Validity · Reliability

Introduction

In the Netherlands, about 20% of the population suffers from chronic pain (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006; Demyttenaere et al., 2007). Many of these patients also experience loss, such as the loss of employment, financial security, independence, control over their lives, and

sense of identity (Harris, Morley, & Barton, 2003; Lyons & Sullivan, 1998; Sullivan, Sullivan, & Adams, 2010). Consequently, patients may feel that their situation is unfair (McParland, Hezsetine, Serpell, Eccleston, & Stenner, 2011). This feeling of unfairness, called perceived injustice, has been defined as “an evaluation of the severity of pain-related loss, blame and a sense of unfairness” (Sullivan et al., 2008). Perceived injustice has a negative impact on health and is associated with greater pain intensity, disability, and mental health problems, both among patients with chronic pain and among individuals with acute pain (Jackson, Kubzansky, & Wright, 2006; Sullivan, Scott, & Trost, 2012; Trost et al., 2014). It is also associated with poor recovery outcomes in pain rehabilitation programs, possibly resulting from a negative effect on the therapeutic working alliance (Scott, Milioto, Trost, & Sullivan, 2016; Sullivan et al., 2008). Hence, perceived injustice appears to have a substantial impact on chronic pain, making it an important factor to take into consideration when studying or treating chronic pain, even though the mechanism of how perceived injustice influences chronic pain still remains unclear.

In order to assess the degree to which individuals with pain experience injustice, Sullivan et al. (2008) developed the

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Injustice Experienced Questionnaire (IEQ). The IEQ consists of 12 items on which patients are asked to indicate the frequency to which they have various injustice-related thoughts about their pain. After the English version, the IEQ has been translated to Spanish, Japanese, German, Persian, and Danish, and has been studied in various patient groups. The results support the construct validity of the English, German, Danish, and Persian versions by correlating the IEQ with various pain-related measures (e.g., anxiety, depression, disability) and suggest that the Spanish, Persian, and Japanese versions have good to excellent (test-retest) reliability (la Cour, Smith, & Schultz, 2017; Rahbari, Dehestani, & Baharlouei, 2019; Rodero et al., 2012; Scott, Trost, Milioto, & Sullivan, 2013; Steiger et al., 2019; Sullivan et al., 2008; Yakobov et al., 2014; Yamada et al., 2016).

Previous research reported significant correlations between perceived injustice and pain intensity among patients with several pain-related conditions (i.e., fibromyalgia (Rodero et al., 2012), musculoskeletal conditions (Sullivan et al., 2008), knee osteoarthritis (Yakobov, Scott, Tanzer, et al., 2014), and traumatic injury (Trost et al., 2015)). Perceived injustice was also found to be significantly correlated with the number of pain sites among patients with whiplash injuries (Sullivan et al., 2009, b), and with pain duration among patients with total knee arthroplasty (Yakobov et al., 2014). Self-reported levels of disability were found to be significantly correlated with perceived injustice among patients with musculoskeletal conditions (Sullivan et al., 2008) and among whiplash patients (Sullivan, Davidson, et al., 2009). Significant correlations between perceived injustice and pain catastrophizing were observed among patients with fibromyalgia (Rodero et al., 2012) and musculoskeletal conditions (Sullivan et al., 2008). In addition, Rodero et al. (2012) reported a significant correlation between perceived injustice and experiential avoidance among patients with fibromyalgia. Previous research also reported that perceived injustice is significantly correlated with depression among patients with musculoskeletal conditions (Sullivan et al., 2008) and with depression and anxiety patients with fibromyalgia (Rodero et al., 2012). Significant correlations between perceived injustice and symptoms of PTSD were observed among patients with traumatic injury (Trost et al., 2015) and whiplash patients (Sullivan et al., 2009, b). Intention to litigate appears to be related to perceived injustice as well, based on a study by Trost, Monden, Buelow, Boals, and Scott (2016).

Thus, while the IEQ has been translated to Dutch and has been in use in several clinical settings since 2014, the reliability and validity of the Dutch version of the IEQ are unknown and until now have not been tested. Therefore, this study aimed to investigate the test-retest reliability and construct validity of the Dutch IEQ, while also adding to previous findings about perceived injustice in chronic pain. Based on the findings of previous studies, perceived injustice appears to

have a negative impact on both physical health and mental well-being. Although the exact mechanisms by which perceived injustice impacts on health are still unknown, it has become clear that perceived injustice is related to various cognitive, affective, and physical constructs. The construct validity of the IEQ can therefore be investigated by testing it against various pain-related constructs.

Hence, in order to investigate the convergent construct validity of the Dutch IEQ, thirteen hypotheses on possible correlations and their strengths between the IEQ and other pain-related measures were formulated, based on previous research mentioned above and the availability of data. Given that one of the components of the IEQ is the appraisal of the “severity” of a patients’ pain or illness, it was expected that the IEQ is related to pain intensity, number of pain sites, pain duration, central sensitization, and disability. There were no prior studies investigating the relationship between perceived injustice and central sensitization. However, Nijs and colleagues (Nijs, Goubert, & Ickmans, 2016) argued that perceived injustice might play a role in the development of central sensitization. In addition, one study observed a moderately positive correlation between pain catastrophizing and central sensitization (Caumo et al., 2017). Given that strong correlations between pain catastrophizing and perceived injustice were found in previous research, we expected a moderate relationship between central sensitization and perceived injustice as well (Rodero et al., 2012; Sullivan et al., 2008).

As other components of the IEQ are the appraisal of “irreparability of loss,” “blame,” and “unfairness,” it was expected that the IEQ would also be correlated with pain catastrophizing, experiential avoidance (inability to accept one’s situation), depression, anxiety, symptoms of post-traumatic stress disorder (PTSD), anger, perceived illness threat, and engagement in litigation procedures. See Table 1 for the hypotheses. Previous research on the relationship between perceived illness threat and perceived injustice was lacking, but as these constructs seem theoretically similar, a moderate relationship was expected at least.

Methods

Study Design

This is a cross-sectional study involving the completion of self-report measures.

Setting

Patients were recruited at two samples from two outpatient health care settings in order to achieve the maximum sample size possible. A total of 228 patients were recruited at TC: a multidisciplinary center for patients with chronic pain and

Table 1 A priori hypotheses

Variable	Instrument	Construct validity is confirmed when the overall score on the IEQ correlates with:	<i>r</i> cut-off values
Pain intensity	Numeric rating scale	Higher levels of pain	$< .20$ $ r \leq .40$
Number of pain sites	Widespread Pain Index	Higher number of pain sites	$< .40$ $ r \leq .60$
Pain duration	Self-constructed question	Longer duration of pain	$< .20$ $ r \leq .40$
Central sensitization	Central Sensitization Inventory	Higher levels of central sensitization	$< .40$ $ r \leq .60$
Levels of disability	Pain Disability Index and Disability Rating Index	Higher levels of disability	$< .40$ $ r \leq .80$
Pain catastrophizing	Pain Catastrophizing Scale	Higher levels of catastrophizing	$< .60$ $ r \leq .80$
Pain acceptance	Pain Acceptance Questionnaire-II	Higher levels of experiential avoidance	$< .60$ $ r \leq .80$
Depression	Symptom Checklist-90	Higher levels of depression	$< .60$ $ r \leq .80$
Anxiety	Symptom Checklist-90	Higher levels of anxiety	$< .40$ $ r \leq .60$
Post-traumatic stress disorder	Symptom Checklist-90	Higher levels of PTSD symptoms	$< .60$ $ r \leq .80$
Anger	Numeric rating scale	Higher levels of anger	$< .40$ $ r \leq .60$
Perceived illness threat	Brief Illness Perception Questionnaire	Higher levels of perceived illness threat	$< .40$ $ r \leq .60$
Engagement in litigation procedure	Self-constructed question	Patients engaged in litigation procedure perceive higher levels of injustice	

chronic fatigue in Groningen, the Netherlands; 53 patients were recruited at PR-UMCG: a pain rehabilitation department in a university-based rehabilitation center in Groningen, the Netherlands. Both health care settings already used the IEQ as a part of their standard intake procedure; therefore, a medical ethical approval was not mandatory. This study was conducted in compliance with Dutch law and the principles of the Declaration of Helsinki.

Participants

All 281 participants were adults with multi-factorial chronic pain lasting longer than 3 months. Inclusion criteria were as follows: age between 18 and 70 years and chronic pain lasting longer than 3 months. Exclusion criteria were as follows: cancer-related pain, neurological diseases, insufficient knowledge of Dutch language, and current severe psychiatric problems.

Variables

At both treatment centers, patients filled out questionnaires prior to the intake assessment. In both health care settings, the standard intake procedure also included filling out other pain- and health-related questionnaires. At TC, the following measures were used: Injustice Experience Questionnaire, Numeric Pain Rating Scale, Widespread Pain Index, Central Sensitization Inventory, Disability Rating Index, Pain Catastrophizing Scale, Symptom Checklist-90, and Brief Illness Perception Questionnaire. At PR-UMCG, patients filled out the Injustice Experience Questionnaire, Pain Numeric Rating Scale, Pain Disability Index, Pain Catastrophizing

Scale, Acceptance and Action Questionnaire-II, Symptom Checklist-90, and a self-constructed numeric rating scale for anger (see the “[Measurement](#)” section below). A written informed consent form was also included in the questionnaires in which patients could indicate whether they object to the use of their data for research or not. When patients indicated they did not object to the usage of their data for research purposes, their questionnaires were included in this study. To investigate test-retest reliability, patients of the PR-UMCG sample were asked to fill out the IEQ a second time with an interval of approximately 2 weeks.

Measurement

Perceived Injustice

The 12-item Injustice Experience Questionnaire was used to measure perceived injustice (Sullivan et al., 2008). On the IEQ, participants have to rate the frequency they experience 12 different pain-related statements, using a 5-point Likert scale ranging from 0 (not at all) to 4 (all the time). The final score comprises the sum of all items, with higher values indicating higher levels of perceived injustice. A cut-off score of 30 is suggested to indicate clinically relevant cases of perceived injustice, but a more recent study showed that a cut-off score of 19 is optimal for predicting employment status at 1-year follow-up (Scott, Trost, Milioto, & Sullivan, 2015; Sullivan et al., 2008). For this study, the Dutch version of the IEQ was used (<http://www.paininmotion.be/IEQ-Dutch.pdf>). The Dutch IEQ was back-translated with consensus by two independent researchers from English to Dutch and vice versa. The construct validity of the IEQ has been confirmed

for the English (Kennedy & Dunstan, 2014), Spanish (Rodero et al., 2012; Sullivan et al., 2008), Japanese (Yamada et al., 2016), Persian (Rahbari et al., 2019), and Danish (la Cour et al., 2017) language versions and the (test-retest) reliability has been confirmed for the Spanish, Japanese, and Persian versions. The IEQ was filled out by both samples.

Participants' Characteristics

Age, gender, marital status, education, and employment status were all recorded using questionnaires. Patients were also asked whether or not they were currently engaged in a legal procedure (i.e., damage claim, litigation).

Pain Intensity

Pain intensity was measured in both samples using a 10-point numeric rating scale (NRS) ranging from 0 (no pain) to 10 (severe pain) (Boonstra et al., 2016; Downie et al., 1978).

Number of Pain Sites

At TC, the extensiveness of the pain was measured using the Widespread Pain Index (WPI) with a score ranging from 0 (no pain sites) to 20 (the entire body is painful) (Wolfe et al., 2017).

Pain Duration

Patients in both health care settings were also asked about the duration of their pain in months.

Central Sensitization

The Central Sensitization Inventory (CSI) was used to screen whether patients' symptoms indicate the presence of central sensitization (Mayer et al., 2012). The total score ranges from 0 to 100. Test-retest reliability and internal consistency are good and the CSI is proven to be a valid instrument in measuring central sensitization symptoms (Cuesta-Vargas et al., 2018; Neblett et al., 2013). For this study, the Dutch version of the CSI was used (Kregel et al., 2015). The CSI was filled out by patients of the TC sample.

Disability

Disability was measured using two questionnaires, specifically the Pain Disability Index (PDI) used at PR-UMCG (Pollard, 1984), and the Disability Rating Index (DRI) used at TC (Salen, Spangfort, Nygren, & Nordemar, 1994). On the PDI, patients rate their level of disability on a 10-point Likert scale ranging from 0 (no disability) to 10 (total disability) in seven areas of activity/participation. By calculating the sum of the

seven categories, a general disability score can be computed (0–70). A higher score means higher levels of disability. The reliability and validity of the PDI are confirmed (Tait, Pollard, Margolis, Duckro, & Krause, 1987). The DRI consists of 12 items using a visual analogue scale (VAS) ranging from 0 to 100. The items are grouped into three categories: basic activities of daily life, daily physical activities, and work-related/more vigorous activities. The total score is represented by the average of all 12 questions (0–100). Higher scores indicate more disability. The DRI has shown to be a valid instrument (Grotle, Garratt, Krogstad Jenssen, & Stuge, 2012; Parsons, Bruce, Achten, Costa, & Parsons, 2015).

Pain Catastrophizing

Pain catastrophizing is measured using the Dutch version of the Pain Catastrophizing Scale (PCS), which was filled out by both samples (Sullivan, 2003). A higher score means higher levels of pain catastrophizing. Previous research showed that the PCS is a reliable and valid measurement of catastrophizing (Sullivan, Bishop, & Pivik, 1995). The PCS was filled out by both samples.

Pain Acceptance

Pain acceptance was measured using the Dutch version of the Acceptance and Action Questionnaire-II (AAQ-II), which has shown to be a reliable and valid instrument in measuring acceptance, experiential avoidance, and psychological inflexibility (Bond et al., 2011). It consists of 10 items on which patients indicate how true each statement is to them on a 7-point Likert scale ranging from 1 (never true) to 7 (always true). A higher score on this questionnaire stands for lower levels of experiential avoidance and higher levels of acceptance. The AAQ-II was filled out by patients in the PR-UMCG sample.

Depression, Anxiety, and PTSD

Depression, anxiety, and PTSD symptoms were measured using the Symptom Checklist-90 (SCL-90), which was filled out by both samples (Derogatis, 1992). The SCL-90 is a 90-item questionnaire designed to screen for various psychological problems. Patients have to indicate on a 5-point Likert scale ranging from 0 (not at all) to 5 (extremely) how often they experience each symptom.

Anger

In addition, patients of the PR-UMCG sample were asked to rate their levels of anger on a self-constructed numeric rating scale (NRS) ranging from 0 (not angry at all about my situation) to 10 (very angry about my situation).

Perceived Illness Threat

The Brief Illness Perception Questionnaire (IPQ-B) consists of 9 items and was filled out by patients in the TC sample (Weinman, Petrie, Moss-morris, & Horne, 1996). The first 8 items ask about a patients' perceptions of consequences, timeline, personal control, treatment control, identity, coherence, emotional representation, and illness concern. The 9th item is the causal item, which is an open question on which patients are asked about what they think are the three most important causes of their pain/illness. An overall score can be computed which represents the degree to which the illness is perceived as threatening or benign (Broadbent, 2002). The overall score is represented by the sum of the first 8 items, resulting in a score ranging from 0 to 80, with a higher score reflecting a more threatening view of the illness. To our knowledge, the use of an overall score has not yet been studied in patients with chronic pain.

Bias

As this study is a cross-sectional study, it is susceptible to selection bias; this is mentioned as a limitation in the discussion. In addition, to help avoid information bias, validated and standardized questionnaires were used where possible.

Statistical Methods

All statistical analyses were performed using SPSS software version 25 for Windows (IBM Corp., Armonk, NY, USA). Patient characteristics were described using descriptive statistics. The assumption of normality was tested using P-P plots and tests. Normality tests found that, apart from the Central Sensitization Inventory, none of the measurements was normally distributed. However, as the scores on the IEQ were approaching normality and sample sizes were large, the central limit theorem indicates that parametric tests can still be executed. Construct validity analysis is used to assess the relationships between one questionnaire and other measures of related constructs. To assess construct validity, correlations with other measurements were calculated using Pearson correlation coefficients for bivariate analyses. The strength of the relationships was interpreted as follows: $r \leq 0.19$ is very weak, $r = 0.20$ – 0.39 is weak, $r = 0.40$ – 0.59 is moderate, $r = 0.60$ – 0.79 is strong, and $r = 0.80$ – 1.0 is very strong (Evans, 1996). The strength of the relationship is expressed in the absolute value of the correlation coefficient. As the correlation coefficients were merely used for informational purposes, a correction of p values (e.g., Bonferroni) was deemed not necessary.

In addition, it was investigated using independent t tests whether patients engaged in a legal procedure perceived more injustice about their situation compared with patients not engaged in a legal procedure. The validity of the IEQ was

considered confirmed when $\geq 80\%$ (at least 11) of the 13 a priori hypotheses were confirmed (Terwee et al., 2007).

To evaluate test-retest reliability, intra-class correlations (ICCs) and their 95% confidence interval were computed, based on a mean-rating ($k = 2$), absolute-agreement, two-way mixed-effects model. A value < 0.5 was interpreted as poor reliability, < 0.75 as moderate reliability, < 0.9 as good reliability, and > 0.90 as excellent reliability (Koo & Li, 2016). In addition, a Bland-Altman plot was computed to analyze the limit of agreement (Bland & Altman, 1986). Patients who reported that a relevant change had occurred between the two time-points were excluded.

Results

Descriptive Data

In Table 2, characteristics of all participating patients are listed. The average age of all patients combined was 42.2 years old ($SD = 14.7$). Patients in the TC sample were significantly older than patients in the PR-UMCG sample (on average 4.80 years older, $t = 2.12$, $p = .03$).

Outcome Data

In Table 3, the test scores for every variable are displayed. The mean score on the IEQ for both samples was 21 points in both samples. Clinically relevant levels of perceived injustice (score ≥ 30) were present in 24.6% of the TC sample and in 24.5% of the PR-UMCG sample.

Construct Validation: Hypothesis Testing

Correlations between the IEQ scores and the other measures are presented in Table 4. All correlations, except for the correlations between the IEQ and pain duration and number of pain sites, were significant.

In addition, thirty-four patients (12.1% of the total sample) indicated they were engaged in a legal procedure and/or litigation procedure at the time of data collection (15 patients were in a damage claim procedure, six in an appeals procedure, four in a benefit procedure, and nine in other/unspecified legal procedures). An independent sample t test ($t = -2.8$, $p < .05$) revealed that patients currently engaged in a legal procedure scored on average 5.6 points higher on the IEQ ($M = 26.0$, $SD = 11.1$) compared with patients not engaged in a legal procedure ($M = 20.4$, $SD = 11.2$).

These results indicate that the number of pain sites and pain duration were the only constructs not significantly related to perceived injustice, which means that 11 out of the 13 hypotheses (84.6%) were supported by the results.

Table 2 Participants' demographic characteristics

	TC (<i>N</i> = 228)	PR-UMCG (<i>N</i> = 53)
Age in years (mean $\pm$ SD)	43.1 $\pm$ 14.9	38.3 $\pm$ 13.3
Female sex/male sex	149/79 (65.4/34.6)	38/15 (71.7/28.3)
Marital status		
Married	105 (46.1)	18 (34)
Single	56 (24.6)	15 (28.3)
Living together unmarried	48 (24.6)	14 (26.4)
Divorced	15 (6.6)	2 (3.8)
Widowed	4 (1.8)	3 (5.7)
Employment status		
Working	67 (29.3)	15 (28.3)
Working, receiving additional benefit/social assistance	17 (7.5)	3 (5.7)
Not working, receiving sickness/invalidity benefit	53 (23.2)	17 (32.1)
Not working, receiving other benefit (welfare/social assistance)	35 (15.4)	7 (13.2)
Unemployed	22 (9.6)	3 (5.7)
Studying	20 (8.8)	4 (7.5)
Retired	14 (6.1)	0
Unknown	0	3 (5.7)
Education level		
Less than lower secondary education	17 (7.5)	1 (1.9)
Lower general secondary education	123 (53.9)	6 (11.3)
Higher general secondary education	61 (26.8)	10 (18.9)
Pre-university education/university	19 (7)	3 (5.7)
Unknown	11 (4.8)	33 (62.3)

Except where mentioned otherwise, values are the number (percentage) of participants

TC Transcare Pain Rehabilitation Center, Groningen, the Netherlands; PR-UMCG Rehabilitation Department UMCG, Haren, the Netherlands

Test-Retest Reliability

Forty patients of the PR-UMCG sample filled out the IEQ a second time with an interval of approximately 15 days. Test-

retest reliability was ICC = .86 ($p < .001$; $n = 40$). However, 11 patients indicated that an important event had happened between the two time-points, which could influence their physical and psychological well-being (e.g., new medication,

Table 3 Mean scores and standard deviations of all measurements

Instrument (range)	TC mean $\pm$ SD (<i>N</i> = 228)	PR-UMCG mean $\pm$ SD (<i>N</i> = 53)	Total mean $\pm$ SD (<i>N</i> = 281)
Injustice Experience Questionnaire (0–48)	21.0 $\pm$ 11.3	21.0 $\pm$ 11.5	21.0 $\pm$ 11.3
Central Sensitization Inventory (0–100)	25.5 $\pm$ 12.4	—	—
Pain Disability Index (0–70)	—	39.5 $\pm$ 12.3	—
Disability Rating Index (0–12)	5.1 $\pm$ 2.1	—	—
Acceptance and Action Questionnaire-II (0–49)	—	39.4 $\pm$ 8.9	—
Pain Catastrophizing Scale (0–52)	25.5 $\pm$ 12.4	23.2 $\pm$ 12.9	25.0 $\pm$ 12.5
Symptom Checklist-90-Depression (16–80)	37.5 $\pm$ 14.0	33.3 $\pm$ 14.8	36.4 $\pm$ 14.3
Symptom Checklist-90-Anxiety (10–50)	19.9 $\pm$ 9.1	16.6 $\pm$ 6.6	19.1 $\pm$ 8.7
Symptom Checklist-90-PTSD (28–140)	56.7 $\pm$ 19.3	—	—
Brief Illness Perception Questionnaire (0–80)	51.7 $\pm$ 9.3	—	—
Widespread Pain Index (0–19)	6.8 $\pm$ 4.7	—	—
Anger Numeric Rating Scale (0–10)	—	5.1 $\pm$ 2.8	—
Pain duration	65.2 $\pm$ 74.3	85.3 $\pm$ 104.2	69.3 $\pm$ 81.5
Pain Numeric Rating Scale (0–10)	7.2 $\pm$ 1.7	6.4 $\pm$ 1.7	7.0 $\pm$ 1.7

Table 4 Correlations between the IEQ and other measurements

	IEQ ^a <i>r</i>	IEQ ^b <i>r</i>	Correlation strength	Hypothesis confirmed?
CSI ^c	.46**	—	Moderate	✓
PDI ^d	—	.47**	Moderate	✓
DRI ^e	.37**	—	Weak	X
AAQ-III ^f	—	.81**	Very strong	✓
PCS ^g	.65**	.61**	Strong	✓
SCL-90-D ^h	.69**	.62**	Strong	✓
SCL-90-A ⁱ	.65**	.66**	Strong	✓
SCL-90-PTSD ^j	.71**	.68**	Strong	✓
IPQ-B ^k	.51**	—	Moderate	✓
WPI ^l	.12	—	Very weak	X
Anger	—	.74**	Strong	✓
Pain duration	-.13	.02	Very weak	X
Pain intensity	.36**	.35*	Weak	✓

* $p < .05$ ** $p < .001$

^a TC; ^b PR-UMCG; ^c Central Sensitization Index; ^d Pain Disability Index; ^e Disability Rating Index; ^f Acceptance and Action Questionnaire-II; ^g Pain Catastrophizing Scale; ^h Symptom Checklist-90 Depression subscale; ⁱ Symptom Checklist-90 Anxiety subscale; ^j Symptom Checklist-90 PTSD symptoms subscale; ^k Brief Illness Perception Questionnaire; ^l Widespread Pain Index

financial troubles, or argument with spouse). When excluding these patients, the ICC became slightly stronger ($ICC = .87$, $p < .001$, $n = 29$; 95% CI [.74, .94]). These results indicate good test-retest reliability.

See Fig. 1 for the Bland-Altman plot of the differences between T1 and T2 on the IEQ and the upper and lower 95% limits of agreement (LOA). The results indicate that there is an average difference of 0.69 points ($SD = 6.12$, CI [-1.64, 3.02]) between the IEQ score on T1 and T2.

Discussion

The current study investigated the construct validity against thirteen other pain-related measures and test-retest reliability of the Dutch IEQ. The results support the construct validity of the Dutch IEQ and suggest that patients with chronic pain who perceive their situation as unfair and unjust have more pain, are more sensitized, experience more disability, have lower acceptance of their situation, are more depressed, experience more anxiety and anger, have more PTSD symptoms, perceive their condition as more threatening, and are more likely to be engaged in a litigation procedure. Furthermore, the results show that test-retest reliability is good. These results are similar to results from previous studies analyzing the psychometric properties of the IEQ. These results also underline the important role perceived injustice may play in chronic pain.

The results should be interpreted with caution, as this study has several limitations. As this is a cross-sectional study, selection bias could be present. Furthermore, correlational data

cannot provide information about the direction of the relationship between perceived injustice and other variables. Another possible limitation is the use of two cohorts from two separate health care settings, which make use of different sets of questionnaires. It is unknown how similar these two cohorts actually are. In addition, the test-retest data was only available in a small subgroup of the sample, which limits the power of the analysis. There might also be several variables that mediate the effect between perceived injustice and the other variables that were not controlled for (e.g., attribution, religion). In addition, there was little variation in pain scores and the sample consisted of patients who generally had high pain scores, which might influence the correlation between pain intensity and perceived injustice.

The strongest correlation ($r = .81$) was found between experiential avoidance and perceived injustice, providing further

Fig. 1 Bland-Altman plot of T1 and T2 on the IEQ

evidence for the proposition of Rodero et al. (2012) that acceptance and perceived injustice might be opposing constructs in coping with chronic pain, as “something unjust is usually unacceptable.” Previous studies also found that pain acceptance is associated with lower pain intensity, less anxiety and depression, and less disability, making it plausible that the perception that something is unjust, and thus unacceptable, eventually leads to worse pain outcomes (McCracken, 1998; Vowles, McCracken, & Eccleston, 2007, 2008).

The relationship between perceived injustice and pain intensity was weak, suggesting that patients with high levels of pain not necessarily view their situation as unjust because of the intensity of their pain, but apparently, a more complex relationship is at play. While many studies on patients with chronic pain still use pain intensity as their primary outcome, this result indicates that pain intensity might not be the most suitable predictor for a patient’s emotional well-being. Although it should be noted almost all participants in the current study had high levels of pain, which probably influences the relationship with perceived injustice; central sensitization might be more suitable in predicting patients’ well-being. Central sensitization (CS) is a process in which the central nervous system eventually enters a persistent state of hypersensitivity (Meeus & Nijs, 2007). While this process consequently results in greater pain intensity, CS is more strongly related ($r = .46$) to perceived injustice than pain intensity ($r = .36$). This effect is not surprising as CS comprises several symptoms besides pain—i.e., anxiety, abdominal complaints, insomnia—making it a more complete representation of the complexity of chronic pain. Previous studies already linked CS to cognitive styles and personality traits such as somatization, pain catastrophizing, and hypervigilance, and the current study adds to this with the finding that it is also associated with perceived injustice (Turner, Jensen, & Romano, 2000; Vlaeyen & Crombez, 1999; Vlaeyen & Linton, 2000; Waddell, Newton, Henderson, Somerville, & Main, 1993).

A confusing finding was that the DRI was only weakly related to the IEQ, while the PDI had a moderate relationship with the IEQ. A possible explanation is the fact that the DRI only consists of items considering difficulties in physical activities, while the PDI also investigates problems in social activities and sexual relationships. It might be the case that the PDI represents a wider view of difficulties in a patients’ life and is therefore more strongly related to psychological constructs such as perceived injustice. Further research could focus on further investigating the relationship between perceived injustice and disability to shed light on this discrepancy. Lastly, it was observed that the Dutch version of the IEQ has good test-retest reliability, similar to other versions (Rahbari et al., 2019; Rodero et al., 2012; Sullivan et al., 1995; Yamada et al., 2016).

The findings in the current study have implications for clinical practice as well as for further research. Firstly, the

validity and reliability of the Dutch IEQ are supported by the findings. In addition, the results affirm the important role of perceived injustice in chronic pain outcomes and the importance of investigating a patients’ injustice experiences in therapy. Perceived injustice is known to have a negative impact on treatment outcomes and clinicians should aim to change or even prevent the formations of perceptions of injustice.

Cognitive behavioral therapy (CBT) embedded in multidisciplinary treatment programs is currently considered to be the treatment of choice for managing persistent pain conditions (Kerns, Sellinger, & Goodin, 2011). However, Sullivan et al. (2012) argued that CBT does not specifically target feelings of injustice and that forgiveness interventions, anger management interventions, or mindfulness meditation may be useful. Scott, McCracken, and Trost (2014) proposed that Acceptance and Commitment Therapy (ACT) might increase psychological flexibility and therefore address feelings of unfairness and anger. ACT’s usefulness and effectiveness have been supported by accumulating evidence (Hayes, Masuda, Bissett, Luoma, & Guerrero, 2004; Veehof, Oskam, Schreurs, & Bohlmeijer, 2011). Further research might focus on investigating the possible influence of mediating factors such as patient characteristics (e.g., gender, educational level) and psychological conditions (e.g., depression, anxiety) on levels of perceived injustice. In addition, a cut-off score in order to best predict outcomes such as disability, treatment success, or medication usage has never been identified for the Dutch IEQ and future studies may also focus on calculating this score.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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Significance The results of the current study support the validity of the Dutch version of the Injustice Experience Questionnaire and suggest that test-retest reliability is good.