

# The Pain Injustice Experience Questionnaire: Measurement Invariance Across Gender and Racial/Ethnic Minority Status

Shinye Kim<sup>1</sup>, Yuki Shigemoto<sup>2</sup>

<sup>1</sup>Department of Counseling Psychology, University of Wisconsin-Madison, Madison, WI, 53706, USA; <sup>2</sup>Department of Psychology, University of Florida, Gainesville, FL, 32611, USA

Correspondence: Shinye Kim, Department of Counseling Psychology, University of Wisconsin-Madison, 335B Education Building 1000, Bascom Mall, Madison, WI, 53706, USA, Email shinye.kim@wisc.edu

Understanding the complex interplay between psychosocial factors and chronic pain outcomes is pivotal in the development of effective pain management strategies. Among these factors, the perception of injustice related to pain stands out as a significant predictor of pain-related outcomes, influencing the severity of chronic pain, its impact on daily functioning, and the psychological distress associated with it.<sup>1</sup> The Injustice Experience Questionnaire (IEQ) emerges as a critical tool in this context, designed to capture the multifaceted nature of perceived injustice by evaluating the severity of injury, irreparability of loss, and associated blame.<sup>1</sup> This nuanced understanding of pain perception is crucial for tailoring treatment approaches that address not only the physical but also the psychological dimensions of chronic pain.

Despite the acknowledged importance of perceived injustice in the realm of chronic pain, the literature reveals a gap in our understanding of how different demographic groups, specifically gender and racial/ethnic minorities (REM), experience and report these perceptions. Gender differences in the experience of perceived injustice have been documented, yet the evidence remains inconclusive regarding whether men or women report higher levels of injustice.<sup>2</sup> Furthermore, REM individuals, notably those identifying as Black, have been found to report greater levels of perceived injustice compared to their White and Hispanic counterparts, highlighting potential disparities in chronic pain care and the impact of systemic bias.<sup>2</sup> These discrepancies underscore the necessity of examining the measurement invariance of the IEQ across these demographic categories. Without confirming that the IEQ performs consistently across gender and REM status, there is a risk that differences observed in research findings might reflect measurement artifacts or biases inherent in the questionnaire's design rather than genuine differences in perceived injustice. Establishing measurement invariance is therefore essential to ensure that the IEQ can be reliably used to assess perceived injustice in diverse populations, thereby contributing to more equitable pain care by identifying and addressing the unique psychosocial needs of each demographic group.

The current study aims to fill this critical gap by testing the measurement equivalence of the IEQ across gender and racial/ethnic minority status. This investigation is not only pivotal for validating the use of the IEQ in diverse populations but also holds significant implications for the development of targeted interventions. By ensuring that the IEQ accurately reflects the experiences of all individuals, regardless of gender or racial/ethnic background, researchers and clinicians can better understand the role of perceived injustice in chronic pain. This, in turn, facilitates the creation of more inclusive and effective pain management strategies, promoting improved outcomes and addressing the disparities currently observed in chronic pain care.

## Methods

This study on psychosocial functioning in chronic pain collected data via Amazon Mechanical Turk (MTurk). Informed consent was obtained from all individual participants included in the study. Participants were adults aged

20 to 75 years (mean age = 31.36, SD = 9.11), recruited from a diverse population of MTurk users. MTurk is an online platform that allows researchers to collect data from a broad and varied sample, including individuals from different age groups, ethnic backgrounds, and educational levels.<sup>3,4</sup> All participants reported experiencing chronic pain and met the inclusion criteria: being 18 years or older, having chronic pain, and correctly answering attention checks embedded in the survey. The final sample consisted of 316 participants, with 71% identifying as male and 29% as female. Additionally, 35% of the participants self-identified as White, and 65% as members of racial/ethnic minority groups, including Asian American, African American, Latina/o, Native American, Biracial, and Other.

## Measures

### Injustice Experience Questionnaire

Participants completed a survey that assessed perceived injustice using the Injustice Experience Questionnaire (IEQ). The IEQ assesses perceived injustice through participants' appraisal of loss consequent to chronic pain that includes blame, sense of unfairness, and irreparability of loss.<sup>1</sup> Participants responded to items on a 5-point scale, with higher scores reflecting greater perceived injustice. Sample items include "Most people don't understand how severe my condition is", "I am suffering because of someone else's negligence", and "I just want to have my life back". Please note that the IEQ is a licensed scale. For those interested in reviewing the full scale, we encourage you to refer to the original publication by Sullivan et al.<sup>1</sup> The internal consistency of the IEQ in the present study was excellent ( $\alpha = 0.93$ ). Confirmatory factor analyses (CFA) were conducted to examine if the unifactorial or two-factor IEQ model fit the data well. Multigroup CFAs were conducted to test for measurement invariance across groups. As recommended by Svetina et al,<sup>5</sup> the current study treated scale responses as ordered categorical data. Therefore, all model comparisons were conducted using the DIFFTEST option in Mplus and used Delta parameterization to handle its categorical nature. The pattern of missing data was detected by Little's missing completely at random (MCAR) tests, which suggested that the proportion of missing responses was 1.16%.

## Results

All IEQ items revealed a normal distribution where both kurtosis and skewness ranged between  $-1.00$  and  $+1.00$ . The results from CFA demonstrated adequate fit for the unifactorial model—( $\chi^2(54) = 204.41, p < 0.001$ ; RMSEA = 0.094; CFI = 0.971) and two-factor ( $\chi^2(53) = 203.20, p < 0.001$ ; RMSEA = 0.095; CFI = 0.971)—while in the two-factor model, factors of severity/irreparability and blame/unfairness were highly correlated ( $r = 0.977$ ). As a result, we have collapsed these factors and examined only the unifactorial model for measurement invariance.

### Measurement Invariance by Gender

According to the DIFFTEST, there were significant differences among configural, threshold, and threshold and loading invariance models (see Table 1). As a result, we freely estimated the fourth intercept of Item 2 ("It all seems so unfair"), the fourth intercept of Item 12 ("I worry that my condition is not being taken seriously"), and the factor loading for Item 11 ("I feel that this has affected me in a permanent way") between groups. After adding theoretically-justifiable modifications, all DIFFTEST results were non-significant ( $p > 0.05$ ), indicating partial measurement invariance across groups. Discrepancies between men and women in the value items and factor loadings of Items 2, 11, and 12 indicate possible variations in the meanings attributed to perceived injustice.

### Measurement Invariance by Racial Minority Status (White vs REM)

When comparing all models (ie, configural invariance, threshold invariance, threshold and loading invariance) using the DIFFTEST, all results were non-significant ( $p > 0.05$ ), indicating measurement invariance across groups (see Table 1). This warrants further examination into how the sociocultural and contextual factors may contribute to perceptions of injustice.

## Discussion

The findings from this study provide a pivotal step forward in understanding the measurement of perceptions of injustice among individuals suffering from chronic pain across diverse demographic groups. Demonstrating partial measurement

**Table I** Measurement Invariance Summary Fit Statistics for Unifactorial Model (N = 316)

Model	df	CFI	RMSEA	DIFF TEST	
				$\chi^2$ (p value)	Comparison
White vs People of Color					
1a. Configural invariance	108	0.954	0.112		
1b. Threshold invariance	132	0.953	0.103	29.38 (0.206)	1a
1c. Threshold and loading invariance	143	0.959	0.092	12.08 (0.358)	1b
Male vs Females					
2a. Configural invariance	108	0.967	0.100		
2b. Threshold invariance	132	0.964	0.094	45.55 (0.005)	2a
2c. Threshold invariance <sup>a</sup>	131	0.965	0.093	37.10 (0.032)	2a
2d. Threshold invariance <sup>a,b</sup>	130	0.966	0.093	31.62 (0.084)	2a
2e. Threshold and loading invariance <sup>a,b</sup>	141	0.966	0.089	27.55 (0.004)	2d
2f. Threshold and loading invariance <sup>a,b,c</sup>	140	0.969	0.086	15.73 (0.108)	2d

**Notes:** A traditional chi-square difference test was not appropriate given the use of weighted-least-squares variance and mean estimation and therefore not reported. <sup>a</sup>Freely estimated the fourth intercept of question 2 across groups. <sup>b</sup>Freely estimated the fourth intercept of question 12 across groups. <sup>c</sup>Freely estimated the factor loading for question 11 across groups.

**Abbreviations:** df, degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation; DIFF TEST, chi-square difference testing.

invariance across gender and full measurement invariance across racial and ethnic minority (REM) statuses for the Injustice Experience Questionnaire (IEQ) underscores the tool's reliability in assessing perceived injustice in a wide array of populations. Importantly, these results affirm the IEQ's capability to facilitate meaningful comparisons of perceived injustice related to chronic pain between genders and among different racial and ethnic groups, thereby validating its utility in capturing the cognitive appraisals of injustice that are intrinsic to the chronic pain experience. Results highlight the nuanced complexity of perceived injustice as a psychosocial factor in chronic pain, indicating that although the IEQ's core elements are consistent across populations, subtle variations exist in how diverse groups perceive and articulate injustice in their pain experiences. This discrepancy is particularly relevant considering the mixed evidence regarding gender differences in perceived injustice and the documented disparities in chronic pain care for racial and ethnic minorities.<sup>6</sup> The ability of the IEQ to capture these nuanced perceptions across diverse groups offers a critical lens through which researchers and clinicians can examine the multifaceted nature of pain and its psychosocial underpinnings. Future studies with greater and more equal sample sizes of men and women should be conducted to detect potential differences in appraisals of key concepts captured by the IEQ. One of the study's key implications is its role in guiding the development of targeted interventions aimed at addressing pain injustice more accurately. By establishing the Injustice Experience Questionnaire's (IEQ) measurement invariance across diverse demographic groups, this study highlights the essential role of developing interventions that directly address the nuanced perceptions of injustice experienced by individuals with chronic pain. This specificity is crucial for crafting treatment plans that are sensitive to the distinct ways in which pain-related injustice impacts patients' experiences and outcomes, ensuring that care approaches are finely tuned to the varied contexts of individuals' lives.

This study is not without limitations. First, the reliance on a self-selected sample from Amazon's Mechanical Turk (MTurk) may raise concerns regarding the generalizability of the findings. MTurk populations often differ from broader community populations in significant ways, including higher levels of education and different exposure to chronic pain contexts.<sup>7</sup> This aspect could potentially skew the perceptions of injustice reported and affect the external validity of the study's conclusions. Additionally, the study's design does not account for the potential influence of socioeconomic status (SES) on perceptions of injustice related to chronic pain. SES could act as a confounding variable, influencing both the experience of chronic pain and the reporting of perceived injustice.<sup>8</sup> Future research should consider controlling for SES to parse out its effect and provide a clearer understanding of the IEQ's measurement invariance. A related limitation pertains to the age distribution of our sample. The age range of our sample was 20 to 75 years, with a mean age of 31.36 years (SD = 9.11). However, a significant majority of the sample—approximately 70% (69.8%)—was 30 years old or

younger. Given this relatively young age distribution, our ability to conduct meaningful comparisons of IEQ scores across different age groups within both racial and gender categories was limited. The concentration of younger participants likely impacted our capacity to explore age-related differences in IEQ scores across these demographic groups. Another limitation involves the binary approach to gender categorization, which overlooks the experiences of non-binary and transgender individuals. This oversight not only limits the study's inclusivity but also its applicability in understanding the full spectrum of gender-related experiences of injustice in chronic pain. Expanding future research to include a wider range of gender identities would enhance the relevance and applicability of the IEQ across all populations. Moreover, while the study found full measurement invariance across racial and ethnic minority statuses, the broad categorization of REMs could mask important differences in perceptions of injustice among specific racial and ethnic groups. The aggregation of diverse groups into a single category may overlook nuanced differences in chronic pain experiences and perceptions of injustice, suggesting a need for more granular analysis. Finally, although meeting recommendations for meaningful interpretation, the small sample size limited group comparisons to men/women and White/REM.<sup>9</sup> Future studies need to examine invariance across specific racial groups along with greater inclusivity in gender difference examinations.

## Conclusions

Overall, our findings suggest that the Injustice Experience Questionnaire (IEQ) demonstrates partial measurement invariance across gender and full measurement invariance across racial and ethnic minority (REM) statuses, indicating its potential utility in assessing perceptions of injustice in chronic pain across varied populations. However, it is important to note that the study's method of selecting participants may not have fully captured all segments of society, especially those groups that are more likely to face inequalities in pain management. As such, while the IEQ shows promise in enabling meaningful comparisons of perceived injustice, further research is necessary to validate its applicability in more diverse and representative populations. Our findings lay the groundwork for future research and interventions that aim to tailor chronic pain management strategies to the diverse experiences of patients. By considering nuanced perceptions of injustice in the management and treatment of chronic pain—such as differences in how various demographic groups experience and report injustice—there is significant potential to develop more personalized and equitable approaches in pain care, ultimately improving health care equity and outcomes in this field.

## Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Texas Tech University (IRB2018-257).

## Informed Consent

Informed consent was obtained from all individual participants included in the study.

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