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Psychometric Properties of the Gujarati Version of the Revised Neurophysiology of Pain Questionnaire (RNPQ-G) in Individuals with Chronic Musculoskeletal Pain

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Abstract

Background: Pain Neuroscience Education (PNE) aims to improve understanding of pain mechanisms and influence clinical outcomes. The Revised Neurophysiology of Pain Questionnaire (RNPQ) is commonly used to assess pain-related knowledge. Following translation and cross-cultural adaptation of the Gujarati version (RNPQ-G), evaluation of its psychometric properties is necessary.

Objective: To determine the test–retest reliability, construct validity, measurement error, and floor–ceiling effects of the Gujarati RNPQ.

Methods: A cross-sectional psychometric study was conducted among 100 individuals with chronic musculoskeletal pain. Participants completed the RNPQ-G, Pain Self-Efficacy Questionnaire (PSEQ), and Beck Depression Inventory (BDI). Test–retest reliability was assessed over a 48-hour interval using Intraclass Correlation Coefficient (ICC2,1). Construct validity was examined using Spearman's correlation. Measurement error was assessed using Standard Error of Measurement (SEM) and Minimal Detectable Change (MDC95). Floor and ceiling effects were evaluated.

Results: Test–retest reliability was excellent (ICC2,1 = 0.978; 95% CI: 0.964–0.987). Convergent validity showed a moderate positive correlation with PSEQ (r = 0.535), while divergent validity demonstrated a strong negative correlation with BDI (r = −0.707). SEM was 0.33 and MDC95 was 0.91. No floor or ceiling effects were observed.

Conclusion: The Gujarati RNPQ is a reliable and valid tool for assessing pain neurophysiology knowledge in Gujarati-speaking individuals with chronic musculoskeletal pain.

Keywords: Pain neuroscience education, RNPQ, Gujarati validation, psychometric properties, chronic pain

Introduction

Chronic musculoskeletal pain is influenced by complex biopsychosocial interactions that contribute to disability, psychological distress, and reduced quality of life. Pain Neuroscience Education (PNE) aims to reconceptualize pain by improving understanding of neurophysiological mechanisms, thereby reducing maladaptive beliefs and improving coping strategies.

Assessment of pain knowledge is important for evaluating the effectiveness of PNE interventions. The Revised Neurophysiology of Pain Questionnaire (RNPQ) is a concise instrument designed to measure knowledge of pain neurophysiology. To facilitate use among Gujarati-speaking populations, the RNPQ was previously translated and cross-culturally adapted.

However, evaluation of reliability and validity is necessary before widespread clinical and research application. Therefore, this study aimed to examine the psychometric properties of the Gujarati RNPQ.

Methods

Study Design

A cross-sectional psychometric validation study was conducted.

Participants

Adults aged 18–65 years with chronic musculoskeletal pain (>3 months) able to read Gujarati were included. Individuals with neurological disorders, cognitive impairment, or severe psychiatric illness were excluded.

Outcome Measures

RNPQ-G: Assesses knowledge of pain neurophysiology (0–12).
PSEQ: Measures confidence in performing activities despite pain.
BDI: Assesses depressive symptoms.

Procedure

Participants completed questionnaires at baseline. RNPQ-G was re-administered after 48 hours without therapeutic intervention.

Statistical Analysis

Test–retest reliability was assessed using ICC (2,1). Construct validity was evaluated using Spearman correlation. Measurement error was calculated using SEM and MDC95. Floor and ceiling effects were considered present if >15% achieved minimum or maximum scores.

Results

Table 1. Descriptive statistics

Variable	Mean	SD
RNPQ-G T1	6.21	2.21
PSEQ	33.4	8.6
BDI	20.3	7.4

Table 2. Test–retest reliability

Measure	ICC (2,1)	95% CI
RNPQ-G	0.978	0.964–0.987

Table 3. Construct validity

Variables	Correlation (r)	Interpretation
RNPQ-G vs PSEQ	0.535	Moderate positive
RNPQ-G vs BDI	−0.707	Strong negative
PSEQ vs BDI	−0.439	Moderate negative

Table 4. Measurement error

Parameter	Value
SEM	0.33
MDC95	0.91

Table 5. Floor and ceiling effects

Effect	Percentage
Floor	0%
Ceiling	0%

Discussion

The present study evaluated the psychometric properties of the Gujarati version of the Revised Neurophysiology of Pain Questionnaire (RNPQ-G) in individuals with chronic musculoskeletal pain. The findings indicate that the RNPQ-G demonstrates excellent temporal stability, acceptable construct validity, minimal measurement error, and adequate score distribution without floor or ceiling effects. Collectively, these results support the use of the RNPQ-G as a clinically meaningful tool for assessing pain neurophysiology knowledge in Gujarati-speaking populations.

Test–retest reliability

The RNPQ-G demonstrated excellent test–retest reliability (ICC = 0.978), indicating high stability of knowledge scores across the 48-hour interval. This finding is consistent with previous investigations of the original RNPQ, which reported good to excellent reliability in chronic pain populations [5,11]. The short retest interval used in the present study minimized both recall bias and the likelihood of true change in knowledge, thereby strengthening the reliability estimates [10,14]. High temporal stability suggests that observed changes in RNPQ-G scores following intervention are likely to reflect genuine learning rather than measurement inconsistency.

Construct validity

Construct validity was supported through hypothesis testing using convergent and divergent measures. The moderate positive association between RNPQ-G and pain self-efficacy ($r = 0.535$) aligns with theoretical models suggesting that improved understanding of pain neurophysiology contributes to enhanced confidence in activity participation despite pain [3,4]. However, the moderate magnitude of this relationship indicates that knowledge represents only one component influencing self-efficacy, with behavioral, emotional, and contextual factors also playing important roles [18].

The strong negative correlation between RNPQ-G and depressive symptoms ($r = -0.707$) further supports construct validity. Pain neuroscience education aims to reduce maladaptive interpretations of pain threat, which are closely linked with emotional distress and depressive symptomatology [1,19]. Similar negative associations between pain knowledge and psychological distress have been reported in prior PNE research [17]. These findings collectively suggest that improved reconceptualization of pain may be associated with reduced emotional burden in chronic pain populations.

Measurement error and interpretability

Measurement error analysis demonstrated a low SEM (0.33) and MDC95 (0.91), indicating high precision of the RNPQ-G. Given the limited scoring range of the questionnaire (0–12), an MDC of approximately one point suggests that even small improvements in score may represent meaningful change. This level of precision is comparable to other educational outcome measures used in pain rehabilitation research [14]. The availability of MDC values enhances interpretability and facilitates clinical decision-making when evaluating the effectiveness of pain education interventions.

Floor and ceiling effects

No floor or ceiling effects were observed, indicating that the RNPQ-G possesses adequate measurement range to capture both low and high levels of pain knowledge. The absence of extreme score clustering suggests that the instrument is capable of detecting improvement following educational interventions and can discriminate across varying levels of baseline knowledge [8]. Similar findings have been reported in previous RNPQ validation studies, supporting the questionnaire's suitability for clinical and research use [5].

Comparison with original RNPQ validation

The findings of the present study are consistent with the psychometric properties reported for the original English RNPQ. Catley et al. reported acceptable reliability and construct validity, with moderate associations between pain knowledge and psychological constructs [5]. The magnitude and direction of correlations observed in the Gujarati version closely mirror these findings, suggesting successful conceptual equivalence following translation and cross-cultural adaptation. Furthermore, the absence of floor and ceiling effects aligns with earlier validation work demonstrating adequate score variability across chronic pain samples [5]. These similarities indicate that the Gujarati RNPQ maintains the measurement characteristics of the original instrument while extending its applicability to a new linguistic and cultural population.

Clinical implications

The RNPQ-G can be used to assess baseline knowledge, guide individualized education, and evaluate the effectiveness of PNE interventions in Gujarati-speaking individuals with chronic musculoskeletal pain. The strong reliability and low m

easurement error further support its use for monitoring knowledge change over time in both clinical and research settings

Limitations

This study did not evaluate responsiveness to intervention or predictive validity, which may be explored in future longitudinal research. Additionally, factor analysis was not performed, as the RNPQ is conceptualized primarily as a knowledge assessment rather than a multidimensional latent construct.

Future research

Future studies should examine responsiveness following structured PNE interventions, investigate known-group validity across educational levels, and evaluate applicability in diverse pain conditions and community settings.

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