ISSN: 1607-8322, e-ISSN: 2220-5799 **Anaesthesia, Pain & Intensive Care**
Vol 28(5); October 2024 DOI: 10.35975/apic.v28i5.2552

ORIGINAL RESEARCH **PAIN MANAGEMENT**

Reliability of the Revised Neurophysiology of Pain Questionnaire-Turkish in patients with neck pain: a cross-validation study

Ozden Yasarer [1], Zubeyir Sari [2], Ozge Baykan Copuroglu [3], Tugba Akguller Eker [4], Onur Aydogdu [5]

Author affiliations:

1. Ozden Yasarer, Department of Physiotherapy and Rehabilitation, Institute of Health Science, Marmara University, Istanbul, Turkey; E-mail: ozdenyasarer@gmail.com
2. Zubeyir Sarı, Department of Physiotherapy and Rehabilitation, Faculty of Health Science, Marmara University, Istanbul, Turkey; E-mail: fztzubeyir@yahoo.com
3. Ozge Baykan Copuroglu, Physiotherapy Program. Therapy and Rehabilitation Department, İncesu Ayşe and Saffet Arslan Health Services Vocational School, Kayseri University, Kayseri, Turkey; E-mail: ozgebaykancopuroglu@gmail.com
4. Tugba Akguller Eker, Department of Physiotherapy and Rehabilitation, Institute of Graduate Studies, Istanbul University-Cerrahpaşa, Büyükcekmece / Istanbul, Turkey; E-mail: tugbaakguller@gmail.com
5. Onur Aydogdu, Department of Physiotherapy and Rehabilitation, Faculty of Health Science, Marmara University, Istanbul, Turkey; E-mail: fztonuraydogdu@hotmail.com

Correspondence: Ozden Yasarer, **E-mail:** ozdenyasarer@gmail.com

ABSTRACT

Background & Objectives: The Neurophysiology of Pain Questionnaire (NPQ) measures the level of knowledge of patients and healthcare professionals regarding the neurophysiology of pain. The revised Turkish (Tr) version has low reliability for patients with chronic spinal pain. In this study, we investigated the reliability of the Revised NPQ-Tr in patients with neck pain.

Methodology: The Revised NPQ-Tr was administered to 219 participants suffering from neck pain for at least 3 months, who were between the ages of 25 and 60 y and native Turkish speakers. Correct responses were awarded one point, while undecided or incorrectly marked responses were awarded 0 points. In order to analyse the validity of the test, the high-scoring and low-scoring groups were compared. Using the percentage of correct responses in the high and low scoring groups, we calculated the difficulty of the item (P-value) and the discrimination power of the item (r).

Results: Responses to the questionnaire were highly correlated. Items 1 and 2 had high discrimination power ($r > 0.40$), and items 3 and 5 had very good item quality ($0.30 < r < 0.39$). Among the items ranked between 1-7 and 9-12 in terms of difficulty of the item and discrimination power, only item 8 was found to be a difficult yet discriminating item ($P < 0.60$). According to Cronbach's alpha (0.81) and Kuder-Richardson-20 (0.81) coefficients, the questionnaire had a high internal consistency and reliability, and a split-half correlation coefficient (0.802) determined its internal consistency and reliability.

Conclusion: We conclude that the Neurophysiology of Pain Questionnaire-Turkish can be used on neck pain, and it is reliable and highly valid.

Keywords: Chronic Pain, neck pain, pain knowledge, pain education, pain beliefs, Turkish language, reliability, validity.

Citation: Yasarer O, Sari Z, Copuroglu OB, Eker TA, Aydogdu O. Reliability of the Revised Neurophysiology of Pain Questionnaire-Turkish in patients with neck pain: a cross-validation study. Anaesth. pain intensive care 2024;28(5):859−865; **DOI:** 10.35975/apic.v28i5.2552

Received: August 04, 2024; **Reviewed:** August 14, 2024; **Accepted:** August 17, 2024

1. INTRODUCTION

In terms of spine pain, the neck pain is the second most common, with a prevalence of between 22-30%.[1] There are 50-80% patients with neck pain, who experience chronic pain. Chronic neck pain negatively impacts the quality of life of the individuals in the long term.[2] The pain also results in a severe reduction in the productivity.[3]

In addition to conservative treatment practices, various biopsychosocial approaches have been underlined in the literature. Instead of explaining pain only with nociception due to tissue damage, the literature states that it has a more complex structure and the limitation of movement-activity to protect the body is associated with chronic pain.[4] Louw et al. aimed to reduce false beliefs, attitudes, and fears by increasing the level of knowledge of the patients about pain and developed the Pain Neuroscience Education (PNE).[5] In chronic pain management, PNE increases the level of knowledge of the patient about pain.[6] Moseley developed the Neurophysiology of Pain Questionnaire (NPQ) in 2003 to measure the level of knowledge of the patients and healthcare professionals about pain neurophysiology.[7] This questionnaire was revised by Catley et al. Rasch analysis was performed to assess its psychometric properties, and it was stated that it was suitable for use in patients with chronic spinal pain.[8] Cross-cultural adaptations of NPQ were made in French, Portuguese, German, Dutch, and Turkish.[9,10,11,12,13,14]

As PNE has become widespread in Turkey as well as all over the world in the recent years, the need for the use of a valid and reliable scale to measure the knowledge level of patients and healthcare professionals on pain neurophysiology has increased. In a recent Turkish cross-cultural adaptation study of the Revised NPQ-Tr, the internal validity of the revised version of the questionnaire was found to be acceptable, but its reliability was found to be poor. According to these data, it is stated that the Revised NPQ-Tr results should be carefully interpreted for clinical use. Therefore, they highlighted the need for further studies to understand how to use Revised NPQ-Tr more effectively in the Turkish clinic and to comprehensively evaluate PNE results in patients with chronic spinal pain.[13] Cross-cultural adaptation studies of the NPQ have been conducted on patients with spinal pain, a general population that also includes neck pain, back pain, and low back pain. However, studies investigating its applicability in a more specific spine pain population are lacking. Previous studies have shown that patients with chronic neck pain have inappropriate pain perceptions, such as fear of movement, hypervigilance, and pain catastrophizing, that are associated with pain intensity and disability.[15] Therefore, a comprehensive biopsychosocial assessment that questions patients' knowledge about pain through a valid and reliable questionnaire, as well as parameters such as pain catastrophizing, kinesiophobia, fear-avoidance beliefs, may be useful in people with chronic neck pain. In light of these data, this study aimed to determine the reliability of the Revised NPQ-Tr specifically for chronic neck pain.

2. METHODOLGY

This study was designed as a cross-validation study. The approval of the Ethics Committee certificate No. E-69396709-050.01.04-228515, dated August 25, 2022, was obtained from İstanbul Arel Üniversitesi Rektörlüğü in Turkiye, where the study was conducted. The study was carried out according to the Declaration of Helsinki.

2.1. Participants

This study was conducted between September and December 2022, with students and employees of the University who volunteered to participate. Participants with neck pain for at least three months, between 25 and 60 y of age and native Turkish speakers, were included in the study. An email was sent to 295 people to inform and invite them to study; 250 responses were received. Participants who had undergone any neck surgery, had suffered severe trauma, or had any neck-related diagnosis and regularly used painkillers were excluded from the study. 219 of the individuals reported experiencing neck pain and were screened by a workplace physician and diagnosed with chronic non-specific neck pain (NSNP) were included in the study (Figure 1).

The study was conducted with 219 participants. The sample size required for the validity and reliability studies was specified as 200.[16] All participants signed the informed consent form online and received a copy by email with the completed questionnaire.

2.2. Procedure

The participants participated in the study by completing an online questionnaire. They were asked about their demographic information, the length of pain, the frequency of pain, and the frequency of painkillers use. All participants completed the Revised NPQ-Tr.

The Revised NPQ-Tr consisted of 12 items, each item with three options: true, false, and undecided. Each response marked as correct scored 1 point; each response marked as incorrect or undecided scored 0 point.[8] The necessary permission was obtained by email from Mark J. Catley who evaluates the Rasch analysis of psychometric properties of NPQ.

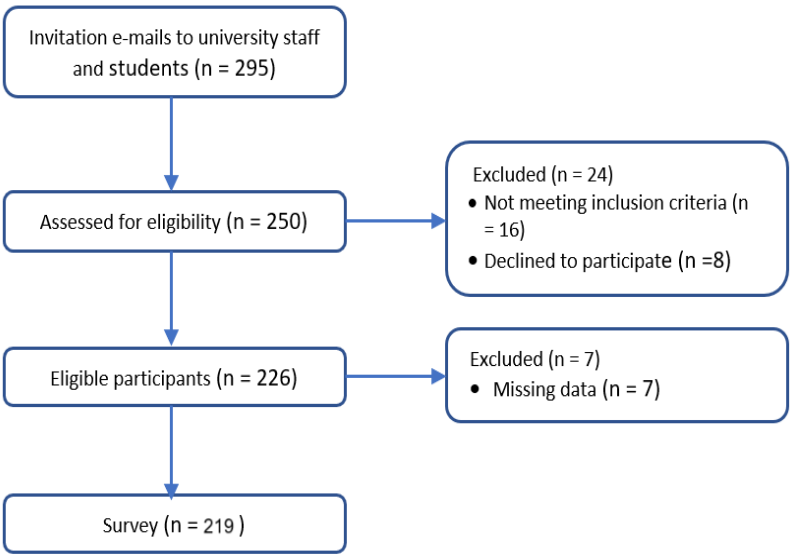

Figure 1: Study flow diagram

2.3. Data analysis

Descriptive statistics were expressed as mean ± standard deviation, median, minimum and maximum to summarize numerical variables. Categorical variables were specified as frequency and percentage.

2.4. Validity analysis

Item Difficulty Index and Item Discrimination Index

A 27% high- and low-scoring group comparison was performed for validity analysis. The difficulty of the item (P) and the discrimination power of the item (r) were found using the percentages of correct responses in the high and low scoring groups.[16]

The item discrimination index refers to the level of discrimination between participants with high (high scoring group) and poor (low scoring group) levels of success. According to the item discrimination index criteria, values of 0.40 and greater refer to a very good item (high discrimination power), values between 0.30 and 0.39 refer to a reasonably good item, values between 0.20 and 0.29 refer to an item with moderate power that needs to be worked on and corrected (moderate discrimination power), and values of 0.19 and less refer to a very weak item (low discrimination power).[17,18]

The item difficulty index is the ratio of the number of individuals who responded correctly to an item to the total number of participants.[19] As the difficulty (P) value of an item, in other words, the percentage of individuals who responded correctly to the item, increases, it is understood that the question is easy. As it decreases, it is concluded that the question is difficult. The P-value is valued between 0 and 1. As item difficulty approaches 1, the question becomes easier. As item difficulty approaches 0, the question becomes more difficult. The item difficulty below 0.60 means that the question is difficult.[20]

1.5. Reliability analysis

1.5.1. Cronbach's alpha

Cronbach's alpha, is one of the most popular statistical approaches to test reliability. A Cronbach's alpha coefficient value above 0.7 is usually considered high for internal consistency and reliability. However, 0.80 and above are preferred for the psychometric quality of the scales.[21]

1.5.2. Split-half Reliability

The analysis was divided into two halves, The *Spearman–Brown coefficients* were then used to determine the values of equal and unequal lengths. If the two values are equal, it is an indication that the questions in the reference numbers are consistent. As the test score approaches 1, it also means that there is greater consistency between the content of the two parameters. The internal consistency scores within the parameters are all > 0.80, and the high internal consistency represents a consistent relationship with the Cronbach alpha results.[16]

1.5.3. Kuder-Richardson-20 (KR-20)

The KR-20 varies between 0.0 and 1.0 in theory. The approximation of the value to 1 indicates a perfectly consistent measurement. According to Thompson, it is sufficient for the KR-20 values to be 0.7 and above.[22]

3. RESULTS

The invitation email was sent to 295 people. 250 of them were assessed for eligibility. Thirty-one individuals were excluded from the study due to not meeting the study criteria, refusal to participate, and missing data (Figure 1). Demographic data for the 219 participants were included in the study. Demographic data of the participants is presented in Table 1.

3.1. Construct validity for the Revised NPQ-Tr Item Difficulty Index and Item Discrimination Index

There was a good-perfect correlation between the responses to the questionnaire ($r = 0.79$, $P < 0.05$).

Table 1: Descriptive values

Parameter		Value
Gender n (%)	Female/Male	129 (58.9) / 90 (41.1)
Weight (kg)	Mean ± SD	20.55 ± 0.32
Age (y)	Mean ± SD	20.74 ± 4.75
Height (cm)	Mean ± SD	171.43 ± 10.61
Smoking	○ Yes ○ No	62 (28.3) 157 (71.7)
Chronic disease	○ Yes ○ No	18 (8.2) 201 (91.8)
Symptom duration	○ > 3 months ○ < 3 months	95 (43.4) 124 (56.6)
Frequency of experiencing pain	○ Very often ○ Often ○ Occasionally ○ Rarely	14 (6.4) 49 (22.4) 99 (45.2) 57 (26)
Defined pain threshold	○ High ○ Middle ○ Low	45 (20.5) 139 (63.5) 35 (16)
Daily duration of pain	○ > 4 h ○ 2-4 h ○ 1-2 h ○ <1 h ○ A few sec-min	16 (7.3) 16 (7.3) 30 (13.7) 41 (18.7) 23 (10.5)
Intensity of pain felt	○ Mild ○ Middle ○ Severe ○ Very severe	27 (12.3) 126 (57.5) 56 (25.6) 10 (4.6)
Description of pain	○ A condition that reduces the quality of life ○ A condition that makes it difficult to perform activities of daily living ○ An uncomfortable situation ○ An obstacle to work	69 (31.5) 78 (35.6) 68 (31.1) 4 (1.8)
Use of painkillers	○ I'll take painkillers right away ○ First I wait for the pain to pass, if not, I take painkillers. ○ First, I wait for the pain to go away, if not, I resort to a non-drug pain reliever method. ○ I just wait for the pain to pass, nothing more.	18 (8.2) 114 (52.1) 40 (18.3) 47 (21.5)
Frequency of use of painkillers	○ Almost every day ○ Once/several times a month ○ Once/several times a week ○ None	5 (2.3) 130 (59.4) 34 (15.5) 50 (22.8)

Data presented as n (%) or mean ± SD; cm - Centimeters; kg - Kilograms.

Questionnaire items were analysed in terms of their discrimination power. Items 1, 2 and items 6-12 had a high discrimination power ($r > 0.40$). Items 3-5 had very good quality of the item qualities ($0.30 < r < 0.39$).

In terms of difficulty and discrimination of items, it was found that items 1-7 and 9-12 were qualified as typical good items ($0.60 < P < 0.90$). Item 8 was a difficult but distinctive item ($P < 0.60$) (Table 2).

3.2. Reliability analysis- internal consistency

Revised NPQ-Tr was found to have a psychometrically high internal consistency and reliability according to Cronbach's alpha coefficients (0.81) and KR-20 (0.81).

Table 2: Item difficulty and item discrimination power.

Question	Item Difficulty (P)	Item Discrimination Power (r)	Evaluation According to the Item Discrimination Power	Evaluation on Item Difficulty and Item Discrimination
1	0.697	0.588	A very good item - High discrimination power	A typically good item
2	0.628	0.636	A very good item - High discrimination power	A typically good item
3	0.727	0.364	A reasonably good item	A typically good item
4	0.644	0.364	A reasonably good item	A typically good item
5	0.632	0.398	A reasonably good item	A typically good item
6	0.727	0.727	A very good item - High discrimination power	A typically good item
7	0.698	0.511	A very good item - High discrimination power	A typically good item
8	0.591	0.654	A very good item - High discrimination power	A difficult but discriminating item-If you have high standards, this question is good
9	0.628	0.636	A very good item - High discrimination power	A typically good item
10	0.674	0.533	A very good item - High discrimination power	A typically good item
11	0.636	0.545	A very good item - High discrimination power	A typically good item
12	0.727	0.545	A very good item - High discrimination power	A typically good item

Revised NPQ-Tr was found to have internal consistency and reliability between the contents of the questionnaire, which was divided into two, according to the split-half (odd-even) correlation coefficient (0.802) (Table 3).

Table 3: Internal consistency

Cronbach's Alpha	0.813
Split-Half (odd-even) Correlation	0.802
KR-20	0.813

4. DISCUSSION

Chronic neck pain is a complex condition influenced by biological, psychological, and social factors, underscoring the importance of the biopsychosocial model in its management. Within this framework, PNE has emerged as a pivotal therapeutic approach. PNE aims to enhance patients' understanding of pain mechanisms, thereby empowering them in self-management and improving treatment outcomes.[23]

Central to assessing the efficacy of PNE interventions is the development of valid and reliable outcome measures. Revised NPQ-Tr represents one such tool designed to evaluate patients' knowledge of pain neurophysiology. Initial studies highlighted its validity in assessing pain knowledge among patients with chronic spinal pain; however, concerns were raised regarding its reliability due to lower internal consistency.[13] Gul et al. stated that the questionnaire, which was adapted to Turkish by Rasch analysis and named the Revised NPQ-Tr, was valid in patients with chronic spinal pain; however, its reliability was low.[13] This study aimed to evaluate the reliability of the Revised NPQ-Tr in patients with neck pain. According to the study results, the reliability of the Revised NPQ-Tr was found to be valid and highly reliable in patients with neck pain. By focusing on this specific patient group, the study aims to validate the questionnaire's utility in a distinct pain population and contribute to the broader literature on pain assessment tools.

This questionnaire was designed primarily to measure the level of pain knowledge of healthcare professionals

and patients; however, a revised psychometric analysis was performed and it was reported to be suitable for spinal pain patients.[8] The literature contains studies measuring the level of knowledge about pain in patients with chronic migraine and breast cancer or patients with musculoskeletal pain.[11,21,24] The view on the suitability of NPQ in different disease groups was supported. In this study, we selected the neck pain group instead of all patients with spinal pain and performed a region-specific evaluation.

The item difficulty and discrimination indexes were evaluated for validity analysis, and the discrimination and difficulty indices of the items were found to be sufficient. The Revised NPQ-Tr is valid in Turkish. The results of our study supported the conclusions of Gul et al. Results of the questionnaire in patients with spinal pain were analyzed using Rasch analysis to measure the psychometric properties in their study.[13] This validates the reason why there was no need for re-translation procedures concerning validity and reliability analysis.

The study group had difficulty answering items 1 and 2. In the study carried out with patients with chronic migraine pain, the error rate was high in items 1 and 2.[25] Additionally, in the literature, patients with chronic spinal pain, healthcare professionals and students also reported having difficulty responding to item 2.[26,27] In cases where patients have not attended a specific PNE, it is understandable that patients do not know pain as an output mechanism rather than an input mechanism, or they may not know the items referring to specific pain receptors in the presence of injury at a certain part of the body. In this respect, the results were consistent with the literature.

The Cronbach's alpha coefficient concerning internal consistency of the Revised NPQ-Tr was 0.81. This result was acceptable (0.84) and fair (0.77) and had an approximate value with the two studies that reported internal consistency.[18,10] Cronbach's alpha, KR-20 (0.82), and split half correlations (0.80) indicated that the Revised NPQ-Tr had an acceptable internal consistency. This outcome was in line with the values obtained as a result of the reliability studies conducted for the English, French, Portuguese, German, and Dutch languages.[8,9,10,11,12]

The cross-cultural adaptation of the RNPQ-FI questionnaire was found to be suitable for use among Finnish physiotherapists (PTs) and physiotherapy students (PT-students). However, the questionnaire exhibited low internal consistency and moderate test-retest reliability (Cronbach's alpha was 0.44 and ICC was 0.70). Despite possessing comparable levels of knowledge, qualitative assessments revealed that many PTs and PT-students encountered challenges in comprehending the item statements. Specifically, items addressing detailed and specific information on pain neurophysiology were frequently misunderstood and incorrectly answered.[27]

In Turkey, there is a continued necessity for an outcome measurement tool to assess changes in knowledge levels about pain resulting from participation in PNE programs. Additional studies are needed to understand how to effectively utilize the Revised NPQ-Tr in clinical settings and to comprehensively evaluate the outcomes of PNE in patients with neck pain in Turkey.

5. LIMITATIONS

We excluded participants who had attended neuroscience education. Catley et al. included the NPQ scores of some participants and the published NPQ scores of other participants prior to NPQ education. Further studies may be necessary to evaluate Turkish speaking patients with neck pain after PNE.

6. CONCLUSION

Based upon the results of our study, we conclude that the Revised Neurophysiology of Pain Questionnaire-Turkish is reliable and highly valid in the assessment of patients with neck pain. It can sefely be used by clinicians and researchers.

7. Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

8. Data availability

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

9. Acknowledgments

The experiments comply with the current laws of Turkey. The authors like to thank our University students for their participation and cooperation during the study.

This study was presented online as an oral presentation at the International Conference on Medical Health and Science in London, UK on 9-10 February 2024.

10. Authors contribution

All authors took part in the concept, conduct of the study, data anlysis and the manuscript prepararation. All authors approve the final draft for publication.

11. REFERENCES

1. Fejer R, Kyvik KO, Hartvigsen J. The prevalence of neck pain in the world population: a systematic critical review of the literature. Eur Spine J. 2006;15(6):834-48. [PubMed] DOI: 10.1007/s00586-004-0864-4

2. Liu R, Kurihara C, Tsai HT, Silvestri PJ, Bennett MI, Pasquina PF, et al. Classification and treatment of chronic neck pain: a longitudinal cohort study. Reg Anesth Pain Med. 2017;42(1):52-61. [PubMed] DOI: 10.1097/AAP.0000000000000505
3. Côté P, van der Velde G, Cassidy JD, Carroll LJ, Hogg-Johnson S, Holm LW, et al. The burden and determinants of neck pain in workers: results of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders. J Manip Physiol Ther. 2009;32(2):70-86. [PubMed] DOI: 10.1016/j.jmpt.2008.11.012
4. Vlaeyen JW, Kole-Snijders AM, Boeren RG, Van Eek H. Fear of movement/(re) injury in chronic low back pain and its relation to behavioral performance. Pain. 1995;62(3):363-72. [PubMed] DOI: 10.1016/0304-3959(94)00279-N
5. Louw A, Zimney K, Puentedura EJ, Diener I. The efficacy of pain neuroscience education on musculoskeletal pain: a systematic review of the literature. Physiother Theory Pract. 2016;32(5):332-55. [PubMed] DOI: 10.1080/09593985.2016.1194646
6. Meeus M, Nijs J, Elsemans KS, Truijen S, De Meirleir K. Development and properties of the Dutch neurophysiology of pain test in patients with chronic fatigue syndrome. J Musculoskelet Pain. 2010;18(1):58-65. DOI: 10.3109/10582450903495908
7. Wood L, Hendrick PA. A systematic review and meta-analysis of pain neuroscience education for chronic low back pain: short- and long-term outcomes of pain and disability. Eur J Pain. 2019;23(2):234-49. [PubMed] DOI: 10.1002/ejp.1314
8. Moseley L. Unraveling the barriers to reconceptualization of the problem in chronic pain: the actual and perceived ability of patients and health professionals to understand the neurophysiology. J Pain. 2003;4(4):184-9. [PubMed] DOI: 10.1016/s1526-5900(03)00488-7
9. Catley MJ, O'Connell NE, Moseley GL. How good is the neurophysiology of pain questionnaire? A Rasch analysis of psychometric properties. J Pain. 2013;14(8):818-27. [PubMed] DOI: 10.1016/j.jpain.2013.02.008
10. Demoulin C, Brasseur P, Roussel N, Brereton C, Humblet F, Flynn D, et al. Cross-cultural translation, validity, and reliability of the French version of the Neurophysiology of Pain Questionnaire. Physiother Theory Pract. 2017;33(11):880-7. [PubMed] DOI: 10.1080/09593985.2017.1359865
11. Meeus M, Nijs J, Van Oosterwijck J, Van Alsenoy V, Truijen S. Pain physiology education improves pain beliefs in patients with chronic fatigue syndrome compared with pacing and self-management education: a double-blind randomized controlled trial. Arch Phys Med Rehabil. 2010;91(8):1153-9. [PubMed] DOI: 10.1016/j.apmr.2010.04.020
12. Nogueira LA, Chaves AD, Oliveira N, Almeida RS, Reis FJ, Andrade FG, et al. Cross-cultural adaptation of the Revised Neurophysiology of Pain Questionnaire into Brazilian Portuguese language. J Bras. 2018;67:273-7. DOI: 10.1590/0047-2085000000215
13. Schmerz D. Die deutsche Version des Neurophysiology of Pain Questionnaire. Medizinische Fakultät der Martin-Luther-Universität Halle-Wittenberg. 2021;33(3):27. DOI: 10.1007/s00482-019-0366-2
14. Gül H, Erel S, Demir P, Çubukçu Fırat S. Cross-cultural adaptation of the Revised Neurophysiology of Pain Questionnaire into the Turkish language based on Rasch analysis. Physiother Theory Pract. 2023;39(8):1753-61. [PubMed] DOI: 10.1080/09593985.2022.2048425
15. Thompson DP, Urmston M, Oldham JA, Woby SR. The association between cognitive factors, pain, and disability in patients with idiopathic chronic neck pain. Disabil Rehabil. 2010;32(17):1758-67. [PubMed] DOI: 10.3109/09638281003734342
16. DeVellis RF, Thorpe CT. Scale development: Theory and applications. Sage Publications; 2017. p. 190-1. [FreeFullText]
17. Gönen S, Kocakaya S, Kocakaya F. Dinamik konusunda geçerliliği ve güvenilirliği sağlanmış bir başarı testi geliştirme çalışması. Yüzüncü Yıl Üniv Eğit Fak Derg. 2011;8(1):40-57. [FreeFullText]
18. Büyüköztürk Ş, Kılıç Çakmak E, Akgün ÖE, Karadeniz Ş, Demirel F. Bilimsel Araştırma Yöntemleri. Ankara: Pegem Akademi; 2014.
19. Sefer DG, Koçyiğit BK. Klasik Sınavların Bilgisayarda Değerlendirilmesine İlişkin Bir Uygulama: KSDF, XIII. Ulusal Eğitim Bilimleri Kurultayı 6-9 Temmuz 2004, İnönü Üniversitesi Eğitim Fakültesi, Malatya, Türkiye; 2004.
20. Özgüven İE. Psikolojik Testler. Ankara: Nobel Yayınları; 2012.
21. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best practices for developing and validating scales for health, social, and behavioral research: a primer. Front Public Health. 2018;6:149. [PubMed] DOI: 10.3389/fpubh.2018.00149
22. Moseley GL, Butler DS. Fifteen years of explaining pain: the past, present, and future. J Pain. 2015;16(9):807-13. [PubMed] DOI: 10.1016/j.jpain.2015.05.005
23. Thompson NA. Classical item and test analysis with CITAS. Assessment Systems Corporation; 2009.
24. Torres-Lacomba M, Navarro-Brazález B, Bailón-Cerezo J, Vergarar-Perez F, de la Rosa-Diaz I, Prieto-Gomez V. Assessment tools of patient competences: the Spanish version of the R-NPQ and three practical cases in women with breast cancer and persistent pain. Int J Environ Res Public Health. 2021;18(9):4463. [PubMed] DOI: 10.3390/ijerph18094463
25. Dantas MI, Pereira TA, De Santana JM. Chronic migraine patients have low level of knowledge about pain neurophysiology. BrJP. 2021;26(4):339-43.DOI: 10.5935/2595-0118.20210064
26. Vaughan B, Mulcahy J, Fitzgerald K, Austin P. Evaluating patient's understanding of pain neurophysiology. Clin J Pain. 2019;35(2):133-9. [PubMed] DOI: 10.1097/AJP.0000000000000658
27. Ehrström J, Pöyhiä R, Kettunen J, Pyörälä E. What do Finnish physiotherapists and physiotherapy students know about the neurophysiology of pain? The Finnish version of the revised Neurophysiology of Pain Questionnaire. Physiother Theory Pract. 2024;40(4):828-42. [PubMed] DOI: 10.1080/09593985.2022.2154626

