Psychometric properties of the Dutch version of the revised neurophysiology of pain questionnaire

Peer-reviewed author version

Reynebeau, Iris; van Buchem, Bart; Jager, Karin; Lexmond, Wendy; Leysen, Laurence; Munneke, Wouter; Nijs , Jo; ROOSE, Eva; LAHOUSSE, Astrid & De Kooning, Margot (2024) Psychometric properties of the Dutch version of the revised neurophysiology of pain questionnaire. In: Journal of bodywork and movement therapies, 40 , p. 777 -785.

DOI: 10.1016/j.jbmt.2024.05.024
Handle: http://hdl.handle.net/1942/43378

PSYCHOMETRIC PROPERTIES OF THE DUTCH VERSION OF THE REVISED NEUROPHYSIOLOGY OF PAIN QUESTIONNAIRE IN CANCER SURVIVORS AND PATIENTS WITH CANCER

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Background: Understanding pain and its mechanisms can play an important role in (post-) cancer rehabilitation. In order to test patient's knowledge of pain, the Revised Neurophysiology of Pain Questionnaire was developed and translated into Dutch (RNPQ-NL). However, its psychometric properties have not been examined yet.

Objective: The goal is to examine the psychometric properties of the RNPQ-NL as a tool to measure the knowledge of pain; in addition, its cross-cultural validity between Belgian and Dutch participants is examined.

Methods: 277 persons from Belgium and the Netherlands participated in this study. Cancer patients and survivors (CPaS) (n=115) were compared to a group of experts with medical training (n=97). Highly educated individuals without medical background (n=65) served as control group. The RNPQ-NL was filled out twice and scores analysed in accordance with the COSMIN-recommendation for assessing the methodological quality of studies on measurement properties of health status instruments.

Results: The RNPQ-NL was able to distinguish between high and low knowledge of pain. The CPaS group scored significantly lower on the RNPQ-NL compared to the expert group (p<0.001), but not in comparison to the control group (p=1.00). The Belgian CPaS scored lower than the Dutch CPaS (p=0.001), with a medium effect size (d=0.481), showing acceptable cross-cultural validity. The Cronbach's α was 0.625, showing some heterogeneity of the items. The test-retest reliability was adequate (ICC=0.794).

Conclusion: This study supports the interpretability, test-retest reliability, discriminative, and cross-cultural validity of the RNPQ-NL. Internal consistency is suboptimal but acceptable for measuring the knowledge of pain in CPaS.

Keywords: Neurophysiology of Pain Questionnaire (NPQ), pain mechanisms, pain education, cancer.

Word count: 4097

INTRODUCTION

Cancer has become one of the world's fastest-growing diseases. Worldwide, 19.3 million individuals got diagnosed with cancer in 2020 (Sung et al.,, 2021). Concomitant, almost 10 million cancer deaths occurred in 2020 (Ferlay et al.,, 2019; IKNL, 2016; Sung et al., 2021). Improved treatment options and better screening options led to substantial progress in the curative treatment of cancer, which contributed to an increase in cancer survivors. In the Netherlands, the 10-year survival rate has increased from 30% to 59% when comparing numbers from 1961 to 1970 with numbers from 2011 to 2019 (IKNL, 2016). Despite cancer survival, up to two-thirds of them will develop comorbidities as side effects of their original cancer (Fu et al.,, 2015). As a result, health-related quality of life and symptom management become more important to cancer survivors (Aaronson et al.,, 2014; Carreira et al.,, 2021; Park et al.,, 2021; Schmidt et al.,, 2012). Pain is one of the symptoms cancer survivors experience the most, following fatigue (Huang, Hudson, Robison, and Krull, 2017). About 20-75% of cancer patients experience pain at the time of diagnosis, and up to 40% of cancer survivors suffer from chronic pain after completing cancer treatment (Glare et al.,, 2022).

Emotions, stress, and patients' attitudes and beliefs appear to be negatively correlated with pain intensity and its impact on daily life (Bushnell, Ceko, and Low, 2013; Heathcote and Eccleston, 2017; Villemure and Bushnell, 2002). Most cancer patients do not have any knowledge of neurophysiological pain mechanisms (Bennett, Bagnall, and Jose Closs, 2009; Binkley et al.,, 2012). Consequently, many cancer patients and survivors associate pain with damage or possible cancer recurrence, leading to more stress and avoidance (Heathcote and Eccleston, 2017). This biomedical point of view on pain further maintains their negative beliefs and, therefore the experienced chronic pain.

To tackle this important issue, pain neuroscience education (PNE) has been developed as an innovative strategy to improve cancer patients' and survivors' knowledge about pain, and hence facilitate them to decrease helplessness and rumination about pain and improve pain beliefs and consequent active coping and daily functioning (Louw et al.,, 2021; Nijs et al.,, 2019).

In order to assess the knowledge of pain neurophysiology in patients, the Neurophysiology of Pain Questionnaire (NPQ) was developed by Moseley et al. (2003) (Moseley, 2003). The NPQ is mainly used in academic settings to investigate the knowledge of pain neurophysiology. It has also been used extensively in clinical practice to identify gaps in patient knowledge and to effectively target education-based interventions, such as PNE.

The original English version of the NPQ consisted of 19 questions. In 2013, Catley et al. suggested excluding seven items from the original questionnaire based on a Rasch analysis in a sample of chronic spine pain patients. These items scored low for psychometric properties, or scores differed between patients with higher and lower abilities (Catley, O'Connell, and Moseley, 2013). This resulted in the revised NPQ (RNPQ), which comprises 12 items and shows acceptable internal consistency and test-retest reliability in spinal pain patients (Catley, O'Connell, and Moseley, 2013). Ever since, the RNPQ has been translated into French, Turkish, German and Spanish, all those versions scored well for psychometric properties in different chronic pain populations, including patients with spinal pain and breast cancer (Demoulin et al.,, 2017; Richter et al.,, 2019; Torres-Lacomba et al.,, 2021; Yurdakul et al.,, 2019). Meeus et al. (2010) translated the original NPQ (Meeus M et al.,, 2010), but the RNPQ has not been translated yet. The primary aim of this present study is to investigate the main psychometric properties of the newly translated Dutch version of the RNPQ among cancer patients and survivors (CPaS). The second aim is to assess the cross-cultural validation of the revised Dutch Neurophysiology of Pain Questionnaire (RNPQ-NL) between CPaS from the

Netherlands (referred to as Dutch patients) and from Belgium, speaking Flemish (referred to as Belgian patients). To the best of our knowledge, this is the first study reporting psychometric testing of the RNPQ-NL as a self-reported tool for assessing pain knowledge in the oncology field.

MATERIALS AND METHODS

This cross-sectional study aims to investigate the main psychometric properties of the RNPQ-NL. Therefore, an online survey was sent to three different groups of participants in the Netherlands. This study was conducted in compliance with Dutch law and the principles of the Declaration of Helsinki. Therefore, no specific ethical clearance was needed
In addition to the results of this survey, data from another study with Belgian, Flemish-speaking participants, was used to answer additional research questions about cross-cultural differences in the questionnaire (Leysen et al.,, 2021). For this study, the protocol B.U.N. 143201524229 was approved by the Medical Ethics Committee of the University Hospital of Brussels. Written and signed consents were obtained from all patients.

Experimental procedure

A research team from the Erasmus University of Rotterdam (EUR) translated the RNPQ from English into Dutch. The translation process followed the protocol described by Wild et al. 2005 (Wild et al.,, 2005). The entire process consisted of 10 steps. Momentarily, we will perform the 10th step, where the final version of the RNPQ-NL is validated. The steps taken in Rotterdam during the translation of the NPQ are listed as Appendix II.

During the period December 9th, 2017, to February 19th, 2018, the RNPQ-NL was sent to a patient group consisting of CPaS, an expert group composed of physiotherapists and physicians with an in-depth knowledge of pain neurophysiology, and a group of highly educated people without any medical knowledge. The RNPQ-NL is assumed to distinguish between groups with and without knowledge of pain neurophysiology.
The participants received an e-mail with information about the study and a link to the online

survey. This survey contained the informed consent, a demographic questionnaire, and the RNPQ-NL. Seven days after the completion of the first survey, all responders were invited to fill out the RNPQ-NL again to investigate the test-retest reliability. Participants were instructed not to look up information specific to the questionnaire during the 7-day interval.

Subject recruitment

All participants had to be at least 18 years of age and have a good understanding of Dutch. Subjects of the experimental group needed to be identified as CPaS; cancer patients are individuals, who are diagnosed with cancer and currently receiving treatment with curative intent, and cancer survivors are individuals who have completed their primary cancer treatment (with the exception of maintenance therapy) and have no evidence of active disease (Council, 2005). They were recruited during their oncological rehabilitation program. Exclusion criteria consisted of having received medical education or more than 30 minutes of pain education in the past. The expert group consisted of physiotherapists and physicians who received neurophysiology of pain throughout their education. Other paramedic professions were excluded. The control group, which consisted of highly educated people, was recruited among friends and acquaintances of the researchers. These participants completed a non-medical bachelor's or master's education. People were excluded if they did not meet the criteria described in Table 1.

We aimed to recruit at least 50 persons per group to follow the recommended sample size for construct validity (Terwee et al.,, 2007). In addition, an adequate sample size for internal consistency contains a minimum number of 100 subjects (Terwee et al., 2007).

Questionnaires

All the participants received an e-mail invitation to complete three questionnaires: a demographic questionnaire, the Numeric Rating Scale (NRS) and the RNPQ-NL. The demographic questionnaire included questions about the characteristics of the participants (e.g., gender, age, education level, work status, the presence of pain, cancer-related pain, pain duration, and pain intensity). The final question assessed whether the participant had received any form of pain education.

The pain intensity was measured using the NRS. The NRS allows people to rate their pain within a range from 0 to 10, 0 meaning "no pain at all" and 10 meaning "the worst imaginable pain". The NRS is a recommended tool to measure unidimensional pain intensity, applicable in most settings, including cancer patients (Hjermstad et al.,, 2011).

The RNPQ-NL consists of 12 questions about pain and is designed to test the knowledge of pain neurophysiology (Catley, O'Connell, and Moseley, 2013). Each question is scored with True / False / I don't know, every correct answer is scored one point, and false answers and "I don't know" are given no points. Total RNPQ-NL scores range from 0 to 12 (sum of all the correct items). After completing the RNPQ-NL, the participants had the possibility to leave their comments on the questionnaire. The RNPQ-NL questionnaire can be found as Appendix I.

Psychometric properties

Psychometric properties were determined following the recommendations of the COSMIN-checklist for assessing the methodological quality of studies on measurement properties of health status (Mokkink et al.,, 2010).

Interpretability

Score distribution, percentage of missing items, and floor and ceiling effects were analysed. For the floor and ceiling effects, the percentage of participants with the highest or lowest score was analysed by calculating the frequency of the lowest and highest possible scores. If a certain number of patients scored the highest or lowest possible scores, limited changes in time were measured for those particular patients (Bolarinwa, 2015). Floor and ceiling effects of less than or equal to 15% were considered acceptable (Terwee et al., 2007).

Construct validity

Construct validity is the extent to which a particular instrument measures the concepts that the instrument allegedly measures (DeVon et al.,, 2007). The *discriminant validity (as part of construct validity)* was examined by testing a pre-defined hypothesis of an expected difference between the group of experts and the group of CPaS determine if the construct does not correlate with unrelated variables (Bolarinwa, 2015; Terwee et al., 2007).

Known-group validity

Known-group validity measures the differences in the mean scores between two groups already known to differ in a specific property (Spilker, 1996). The control group consisting of highly educated people was added to exclude education level as a confounding factor.

Cross-cultural validation

Cross-cultural validation was assessed to evaluate possible cross-cultural differences in the understanding of the questions between Dutch people and Flemish speaking Belgians. The scores of the RNPQ-NL of a group of Belgian CPaS were compared to the Dutch CPaS. The

data of this group were extracted from a Belgian study about the effect of pain on health-related quality of life in CPaS (Leysen et al., 2021). The Belgian participants received different questionnaires about pain and health-related quality of life. From this data, only the answers of the RNPQ-NL were used.

Reliability

The *internal consistency* was determined with Cronbach's α, which is a measure of the extent to which items within a scale correlate with each other and measure the same construct (Kottner and Streiner, 2010). *Test-retest reliability* concerns the extent to which repeated measurements are stable in time and provide the same results of answers. This can be measured with an Intra-class Correlation Coefficient (ICC) for continuous measures (Terwee et al., 2007). ICC estimates and their 95% confident intervals were calculated using JASP (Team, 2022) based on a single measurement, consistency, 2-way mixed-effects model (Koo and Li, 2016). This correlates to type 3,1 (Shrout and Fleiss, 1979). *Measurement error* was calculated by the standard error of measurement (SEM), being the most thrust-worthy by professionals (Mokkink et al., 2010).

Qualitative analysis

Participants had the possibility to leave comments about the questionnaire at the end of the survey. These comments were analysed to get an impression of people's perceptions of the questionnaire.

Statistical analysis

All statistical analyses were performed with JASP (Team, 2022). Normality was controlled with the Shapiro Wilk test and equality of variances by Levene’s tests. Quantitative variables

that were normally distributed were expressed as mean ± standard deviation (SD) and median with IQR if not normally distributed. Non-parametric statistical tests were used in case variables were not normally distributed. Demographic characteristics were compared using the Independent Sample Kruskal Wallis or Chi-square test. A One-way ANOVA was used to compare the scores on the RNPQ-NL of the three groups in order to test validity. In case a significant result occurred post-hoc analyses were executed with a Bonferroni correction in order to account for type-I error. Cross-cultural validation was assessed by comparing the outcomes from the Belgian and Dutch participants with an independent sample t-test for the total score and contingency tables to compare individual questionnaire items. Cohen's d is used to describe effect size, 0.0 is considered a small effect, 0.4 medium and above 0.8 a large effect (Lee, 2016). Internal consistency was assessed by the Cronbach's α. Values between 0.7 and 0.95 are considered adequate, values lower than 0.7 indicate a larger heterogeneity between the items (Terwee et al., 2007). An ICC higher than 0.75 shows good to excellent reliability (37). The SEM was calculated as SD x $\sqrt{}$ (1 −ICC), where SD was the standard deviation of the mean of all observed scores and ICC was the reliability estimator reported (23). The level of significance was set at $p<0.05$ for all analyses.

RESULTS

A total of 274 persons responded to the survey. Fifty-six were excluded due to a medical degree or having received more than 30 min of pain education, resulting in total of 218 participants who were included in the Dutch online survey, see Figure 1. Ninety-seven (44,7%) of them were physiotherapists and physicians (expert group), 56 (25,6%) were CPaS and 65 (30,1%) were highly educated people without any medical background (control group). To examine cross-cultural validation, data from Belgian CPaS were included, encompassing a total of 52 patients without re-test after 7 days.

Demographic characteristics

The distribution of gender was significantly different between the three groups ($p=0.043$). Overall, more women than men participated in this study (156 women / 62 men). The distribution of gender between the expert and CPaS was similar ($p=0.166$). In the CPaS group, 82.1% of the participants were female, compared to 61.5% in the control group ($p=0.013$). The mean age in the expert group (41.68 ±11.74 years) and control group (42.37 ±14.10 years) was similar. The CPaS group was significantly older (56.71 ±10.14 years) ($p<0.001$) in comparison with the other groups.

The educational level between experts, highly educated people (control group) and CPaS was significantly different ($p<0.001$). The expert group and the control group demonstrated similar educational levels ($p=0.569$); the CPaS, however, showed a lower educational level compared to the control group ($p<0.001$) and the expert group ($p<0.001$). An important proportion of the expert and control groups were professionally active, respectively 96% and 85%. Within the CPaS, 41% were unemployed or retired, which is indicative of a significant difference in work status ($p<0.001$).

In the category of pain, 13% of the expert group reported pain, from which 70% experiencing chronic symptoms. Among the CPaS, 54% reported pain. In 74% of them, it lasted longer than 3 months, and in 76% of them, the pain was cancer-related. The control group reported less pain (25%) than the CPaS, with 56% of them being chronic. All participants characteristics are listed in table 2.

The Belgian group consisted of 52 female participants. The mean age was 60.8 ±10.14 years, significantly older than the Dutch CPaS (p=0.046). Educational level was similar to the Dutch CPaS (p=0.062). Work status was not questioned in the Belgian CPaS. The pain status was similar to the Dutch CPaS, with 42% presenting pain complaints in Belgian patients to 54% in Dutch patients (p=0.242).

Interpretability

No floor and ceiling effects were observed, with the highest score (12 points) only achieved in 0,5% of the experts. The other groups did not reach either the lowest or the highest scores.

Discriminant validity

The discriminative validity analysis indicated a difference in test results between the groups ($p<0.001$). The expert group had significantly higher scores on the RNPQ-NL than the CPaS, respectively (9.02 ± 1.39) compared to (6.04 ± 1.95) ($p<0.001$), with a large effect size (d=1.632).

The analysis also showed that the expert group scored significantly higher than the control group, respectively (9.02 ± 1.39) compared to (6.26 ± 1.85) ($p<0.001$), with a large effect size d=1.77. There was no significant difference (p=1.00) between the control (mean score: 6.26 ±

1.85) and the CPaS (6.04 ± 1.98), with a small effect (d=0.134). A detailed description of the answers given by each group is listed in table 3.

Some questions demonstrated extreme percentages in the answers, and questions 1 and 2 show extremely low scores in all three groups. On the other hand, questions 3, 8 and 12 are answered correctly in all groups, and question 9 scores relatively well in the expert group compared to both patient groups.

Cross-cultural validation

A significant difference was observed when comparing the total scores of both groups (p=0.001). The Dutch CPaS reached higher scores (mean ± SD: 6.04 ± 1.95) on the RNPQ-NL than the Belgian group (5.05 ± 2.18), with a medium effect size (d=0.481). The scores of both groups are listed per item in Figure 2. As shown in this table, the individual scores of the Belgian group were similar to the Dutch CPaS, except for item 12. Again, questions 2 and 9 showed extremely low scores.

Reliability

Internal consistency

The Cronbach's α coefficient was 0.625, slightly lower than the recommended range of the scores (0.70 and 0.95). According to Terwee et al., a lower score can indicate too much heterogeneity among the items (Terwee et al., 2007). Removing specific items did not lead to big changes in internal consistency.

Test-retest reliability

Out of the 218 respondents, 164 people (75.2%) completed the RNPQ-NL for the second time one week later to investigate the test-retest reliability. The intra-class correlation coefficient

with the data of the combined group was ICC=0.794 (95% CI 0.749 – 0.832), which indicates a good agreement between the total scores of the test and the retest.

Qualitative evaluation

Of the 218 participants, 145 (67%) gave some feedback on the questionnaire. The majority (47 persons, 32%) reported no problems or comments on the RNPQ-NL. Some respondents (27, 19%) mentioned that they lacked knowledge about pain to answer the questions. Others (40, 28% of respondents) complained about difficulties in understanding the questions. In three questions, the choice of words led to confusion or misunderstanding. This was the case in questions one, nine, and eleven. The terms that were misunderstood most were “descending neurons” in question nine and “injure yourself” in question 11. And finally, question one “It is possible to have pain and not know about it” was said to be subject to different interpretations.

DISCUSSION

The results of this study suggest that the RNPQ-NL is a reliable and valid tool for measuring the knowledge of pain among CPaS. Different psychometric properties were investigated to examine the reliability and validity of this translation of the RNPQ-NL.

The RNPQ-NL had a favorable discriminative validity and was able to differentiate between people with and people without knowledge of pain neurophysiology regardless of their educational level. Belgian and Dutch CPaS results varied hardly, suggesting a good cross-cultural validity. The interpretability of the scores obtained with the RNPQ-NL was also good, with no floor or ceiling effects observed. The test-retest reliability of the scores obtained with the RNPQ-NL was adequate, however, internal consistency was slightly lower than the recommended range. This study's results suggest that the RNPQ-NL has appropriate psychometric properties and, therefore, can be used to test pain knowledge in patients with cancer and cancer survivors.

Testing the level of knowledge about pain physiology is the main purpose of the RNPQ-NL. Within this study, the medical expert group scored significantly better than the CPaS, indicating favorable discriminative validity. With the addition of a control group consisting of highly educated people without any medical knowledge, we aimed to rule out bias with respect to the level of education. Considering the resemblance between scores on the RNPQ-NL of the CPaS and control group, no differences in scores could be found.

The results in the Dutch population were higher than the Dutch-speaking Belgian CPaS ($p=0.001$), with a medium effect size ($d=0.481$). Therefore, it is concluded that the RNPQ-NL shows adequate cross-cultural validity.

The test-retest interval of one week in this study proved to be solid. This time-period was long enough to avoid recall effects but too short of establishing profound knowledge of pain mechanisms. There was a good agreement between the total scores of the initial test and the retest (ICC=0.79). This test-retest reliability of the scores obtained with the RNPQ-NL is in line with study findings generated with the Spanish (ICC=0.82) (Torres-Lacomba et al., 2021) and German (ICC=0.88) (Richter et al., 2019) adaptation and higher than the French (ICC=0.64) translation (Demoulin et al., 2017).

Considering the lower internal consistency (Cronbach's α=0.63), comparisons should be made to other translations. Our questionnaire showed superior internal consistency than the French (Cronbach's α=0.30) (Demoulin et al., 2017) and German (Cronbach's α=0.52) (Richter et al., 2019) translations, but lower than the Spanish (Cronbach's α=0.90) (Torres-Lacomba et al., 2021) adaptation. Internal consistency means that items are interrelated, and they measure consistently (Mokkink et al., 2010). Considering this questionnaire does not attempt to measure interrelated items, the slightly lower internal consistency can be accepted. Still, the lower score in internal consistency might reflect a lack of one-dimensionality of the RNPQ-NL. However, the lack of marked changes in internal consistency, as observed when deleting individual items suggests that all items included in the RNPQ-NL contribute similarly to the fairly low internal consistency.

Our study has several strengths, such as the vast number of participants included, giving the required sample size for translations (Terwee et al., 2007). A strength of this questionnaire is the absence of floor and ceiling effects. The highest scores were only sporadically reached in the expert group, suggesting the ability to improve and measure the pain neuroscience knowledge in retesting. The group of CPaS and the highly educated people without medical knowledge did not achieve the maximum or minimum scores. None of these subjects scored

0, which could imply that the RNPQ-NL does not distinguish people based on achieved degree (Terwee et al., 2007). In concordance with these results, a lack of floor and ceiling effects were also reported in previous studies investigating the psychometric properties of the RNPQ (Catley, O'Connell, and Moseley, 2013; Demoulin et al., 2017).

A limitation to this study might be the study design. We only included CPaS, which could lead to different results in comparison to general population. Another limitation could be the translation process. As copied from another study, the translation was solely completed by Dutch experts, without including Flemish-speaking translators. However, the cross-cultural validity was adequate.

Contrary to our findings, medical professionals should be able to reach the highest level of knowledge in the RNPQ-NL. Some questions showed exceptionally low scores in all groups, such as items 1 and 2. Justification for these outcomes can circle back to the original revised questionnaire. In RNPQ, 29% answered question 2 correctly ("When part of your body is injured, special pain receptors convey the pain message to your brain."). Question 1 ("It is possible to have pain and not know about it") only had a correct answer in 22% of their population, scoring relatively low as well (Catley, O'Connell, and Moseley, 2013). Thus, when interpreting the results of these first questions, caution should be exercised.
Question 9 had a low score in the control, Dutch, and Belgian CPaS (respectively 3%, 2%, and 8% answered correctly) however, in the expert group, 57% responded well. Similar findings have been brought to our attention in the German study and could be related to the nature of the question (20).
When utilizing this questionnaire, lower scores can be expected on questions 1, 2 and 9. Resulting our qualitative evaluation, questions 1 and 9 were frequently misinterpreted

according to the subjects. In question 11, the phrase "injure yourself" was found difficult to understand.

This present survey was conducted with cancer patients and cancer survivors. In this CPaS group, chronic pain is one of the symptoms that people suffer from, even long after they have finished medical treatment (Miaskowski C, 2005). This pain can consist of different aspects, possibly including nociplastic pain (Leysen et al.,, 2018; Nijs et al.,, 2021a; Nijs et al.,, 2016). As pain education has proven its value in other chronic pain populations like Chronic Fatigue Syndrome or Chronic Low Back Pain, pain education seems suitable for cancer patients and survivors (Nijs et al.,, 2018a; Nijs et al.,, 2014; Nijs et al.,, 2018b). A practical guideline for providing PNE to cancer survivors is available (Nijs et al., 2019), including applicable guidelines for using PNE to target perceived injustice in cancer patients and cancer survivors specifically (Nijs et al.,, 2021b). In this study, 54% and 42% of the Dutch and Belgian CPaS reported pain, with 38 to 40% describing pain longer than 3 months.
In this context, the RNPQ-NL can be used in the future to evaluate the knowledge of pain mechanisms and the effect of the provided pain education provided to cancer patients and cancer survivors with chronic pain. The therapist could then tailor the pain education sessions because they can complement the specific items that remain unclear to the patient.

Conclusion

The Dutch RNPQ is an understandable, valid, and reliable tool for assessing pain neurophysiology knowledge in patients with cancer. The translation of the RNPQ into the RNPQ-NL is acceptable and suitable for use in the Netherlands and Belgium. To the best of our knowledge, this is the first study reporting psychometric testing of a self-reported tool for assessing knowledge of pain in the field of oncology.

ACKNOWLEDGMENTS

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper. We would like to thank Dr. Annemerle Beerthuizen for her work in the translation of the RNPQ to Dutch.

Statements & Declarations

Funding: AL is a research fellow funded by the Research Foundation Flanders (FWO), Belgium (grant number 11B1920N). ER is funded by Stand Up To Cancer (Kom op tegen Kanker – KOTK), a Belgian cancer charity (project code ANI251). JN is holder of a chair on oncological rehabilitation funded by the Berekuyl Academy / European College for Decongestive Lymphatic Therapy, the Netherlands.

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Appendix I Revised Neurophysiology of Pain Questionnaire Dutch version

Neurofysiologie van pijn vragenlijst (NPQ)
Deze vragenlijst bevat 12 stellingen over pijn. Doel van deze vragenlijst is het toetsen van uw kennis over pijn. De stellingen kunnen ‘waar' of 'niet waar' zijn. Indien u twijfelt of het antwoord niet weet, vul dan ‘weet niet’ in. Het is niet de bedoeling dat u gaat gokken.

		Waar	**Niet waar**	**Weet niet**
1	Het is mogelijk om pijn te ervaren zonder dat je het door hebt		x	
2	Wanneer een lichaamsdeel beschadigd is, zijn er speciale pijnsensoren die het pijnbericht naar het brein overbrengen		x	
3	Pijn ontstaat slechts wanneer je geblesseerd raakt of mogelijk geblesseerd raakt		x	
4	Alarmberichten worden door speciale sensoren overgebracht naar het ruggenmerg	x		
5	Speciale zenuwen in het ruggenmerg brengen ‘alarm’ berichten over naar het brein"	x		
6	Zenuwen passen zich aan door hun gevoeligheid op te voeren	x		
7	Chronische pijn betekent dat het letsel niet goed is hersteld		x	
8	Groter letsel geeft meer pijn		x	
9	Dalende neuronen werken altijd remmend		x	
10	Pijn ontstaat zodra je je beschadigt		x	
11	Wanneer je jezelf beschadigt, heeft de omgeving geen invloed op de hoeveelheid pijn zolang de beschadiging onveranderd blijft.		x	
12	Het brein bepaalt wanneer je pijn ervaart	x		

Appendix II Steps taken to translate the NPQ

	Step	Description
1.	Preparation	The initiative for translation and setup of the process was organised by the research team from the EUR.
2.	Forward translation	Done by two researchers of the EUR who, independently of each other, translated the RNPQ into the Dutch language.
3.	Reconciliation	A consensus version was made by comparing the two versions and merging them into one.
4.	Back translation	A reversed translation was made by two people (one with a medical background and one without a medical background) both native English speakers.
5.	Back translation review	These different translations were compared to the original English RNPQ questionnaire in order to ascertain whether there was a loss of information or a contradictory message conveyed by the questions.
6.	Harmonization	Essential to ensure inter-translation validity across different translations.
7.	Cognitive debriefing	To ensure that the translation is comprehensible to the general patient population.
8.	Review of cognitive debriefing results and finalization	To assure the cultural relevance in both the original version and the translated version.
9.	Proofreading	To ensure that any minor errors are corrected before the translated instrument is approved for the use in the clinical practice.
10.	Final report	The final, definitive version of the translated RNPQ was developed.

Translation process described by Wild et al. (Wild et al., 2005)

Table 1. inclusion criteria and the number of participants per group

Group	Inclusion criteria	Exclusion criteria
All participants	≥18 years Dutch speaking and reading	
Expert group	Completed physiotherapy education or medical school	
Patient group	Cancer patient or cancer survivor	A medical or paramedical degree More than 30 min of pain education
Control group	Completed a non-medical bachelor's or master's degree	A medical or paramedical degree More than 30 min of pain education

Table 2. Demographic characteristics.

Variable	**Experts** (n=97)	**Dutch CPaS** (n=56)	**Control** (n=65)	**Belgian CPaS** (n=52)	**Group comparison**	**Bonferroni post hoc**
Age, median (IQR) years	41 (15)	55.5 (18.3)	40 (18)	61.5 (11.5)	$p<0.001^{(b)}$	Experts/control < Dutch CPaS/Belgian CPaS***
Gender: % female	72.2%	82.1%	61.5%	100%	$P<0.001^{(a)}$	
Highest diploma obtained					$p<0.001^{(b)}$	Experts/control > Dutch CPaS/Belgian CPaS***
- Primary school		7%		2%		
- Secondary school		21%		17%		
- Post-secondary vocational education (MBO)		41%		29%		
- Bachelor's degree	76%	23%	72%	29%		
- Master's degree	24%	7%	28%	15%		
Work status					$p<0.001^{(b)}$	Experts/control > Dutch CPaS***
- Full time	46%	18%	54%			
- Part-time	50%	36%	31%			
- Unemployed	1%	11%	3%			
- Retired	2%	30%	12%			
Presence of pain	13%	54%	25%	42%	$p<0.001^{(a)}$	
- Chronic pain (>3 months)	9%	40%	14%	38%	$p=0.017^{(a)}$	
- Cancer-related pain	0%	41%	0%	18%	$p<0.001^{(a)}$	

*Abbreviations: CPaS= cancers patients and survivors; MBO= middelbaar beroepsonderwijs or post-secondary vocational education; n= number; p = significance level; SD: standard deviation (a): χ^2 test, (b): Independent Sample Kruskal Wallis test, *= significant < 0.05, **=significant < 0.01, ***= significant < 0.001*

Table 3: Percentage of correctly answered items of the Revised Neurophysiology of Pain Questionnaire Dutch version per group

	Expert group N=97	**Dutch CPaS** N=56	**Control group** N=65	**Total** N=218
Item 1	38%	23%	22%	29%
Item 2	13%	7%	17%	13%
Item 3	97%	88%	91%	92%
Item 4	85%	50%	45%	64%
Item 5	80%	68%	65%	72%
Item 6	76%	43%	34%	55%
Item 7	97%	48%	45%	69%
Item 8	95%	80%	82%	87%
Item 9	57%	2%	3%	28%
Item 10	77%	57%	58%	65%
Item 11	97%	48%	75%	78%
Item 12	90%	89%	91%	90%
Mean total score (/12)	**9.02** (SD±1.39)	**6.04** (SD±1.95)	**6.26** (SD±1.85)	**7.00** (SD±2.38)

For each item, the percentage of correct answers is shown. The total score is the sum of correctly answered questions.
Abbreviations: CPaS= cancer patients and survivors; N = number; SD= standard deviation;

Figure captions (as a list).

Figure 1: Flowchart

Figure 2: Percentage of correctly answered items of the Revised Neurophysiology of Pain Questionnaire Dutch version (Belgian versus Dutch CPaS)

Legend figure 2*: For each item, the percentage of correct answers is shown, CPaS= cancer patients and survivors, *= significant $p < 0.05$*