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Research Article

Cross-cultural adaptation, and validation of the Turkish version of the Nonarthritic Hip Score

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ABSTRACT

Objective: The aim of this study was to translate and cross-culturally adapt the Nonarthritic Hip Score (NAHS) into Turkish and determine the validity and reliability of the translated version in physically active patients with hip pain.

Methods: Sixty young to middle-aged and physically active patients (34 women and 26 men; mean age=35 years; age range: 18-40 years) with hip pain were included in the study. The original version of the NAHS was first translated into Turkish and back-translated into English by two bilingual translators each. The back-translated version was compared with the initial English version by a committee of the four translators. The Turkish version was then tested with 15 patients with hip pain and 15 healthy individuals. The participants were asked whether they had difficulties in understanding the questions. Subsequently, the questionnaire was accepted for use in the study population. Test–retest reliability and internal consistency were assessed using Intraclass Correlation Coefficient (ICC) and Cronbach's alpha, respectively. The construct validity was determined via the Pearson correlation coefficient between the NAHS and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), modified Harris Hip Score (mHHS), and Short Form-12 (SF-12). Floor and ceiling effects were analyzed. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to test construct validity.

Results: An ICC of 0.994 and Cronbach's alpha value of 0.908 were obtained; thus, the Turkish version of the NAHS was reliable. Neither floor nor ceiling effects (15%) were found in the sub-parameters (8.3-1.7%) and the total score (1.7%) of the NAHS. The EFA test showed that this questionnaire had four factors. Model fit indices in CFA were $\chi 2/df=2.23$, Tucker–Lewis index=0.90, comparative fit index=0.91, goodness of fit index=0.63, root mean square error of approximation=0.14 (90% CI: 0.12-0.16). The NAHS total score showed an excellent correlation with WOMAC (r=-0.909), mHHS (r=0.850), and SF-12 (r=0.811) scores.

Conclusion: The Turkish version of the NAHS is a valid and reliable questionnaire for young and physically active patients with hip pain.

Level of Evidence: Level II, Diagnostic study

Hip pain is a health problem that affects physical function and health-related quality of life (1-3). The prevalence of hip pain in the young adult population is significant (4-6). In recent years, there have been significant advances in the diagnosis and treatment of different pathologic conditions that affect the young adult hip such as femoroacetabular impingement, athletic pubalgia, snapping hip syndrome, labral tears, muscle and ligament injuries, cartilage damage, and hip instability (7-10). In the diagnosis and assessment of the efficacy of treatment, it is important to determine the patient's functional status and quality of life in addition to objective assessments (11). However, there is a lack of high-quality intervention studies for this population and only a few intervention studies use specific patient-reported outcome questionnaires (PROs) (12, 13).

PROs are currently considered the gold standard in the assessment of musculoskeletal conditions where the patients' perspective and health-related quality of life are of main interest (11). A large number of PROs have been developed for the evaluation of individuals with hip problems. The vast majority of these questionnaires such as the modified Harris Hip Score (mHHS), West-

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ern Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Oxford Hip Score (OHS), and Hip Disability and Osteoarthritis Outcome Score (HOOS) are designed for patients over the age of 50 and with hip osteoarthritis (OA), or for patients with post-traumatic hip problems accompanied by severe physical limitation, and their usefulness for young and physically active patients is limited (14-18). However, the new questionnaires such as the Nonarthritic Hip Score (NAHS), Hip Outcome Score (HOS), International Hip Outcome Tool-33, and Copenhagen Hip and Groin Outcome Score have been designed for use in young and physically active patients with hip problems (19-22).

Most of these PROs have been developed in English-speaking populations, and, therefore, they must be translated and culturally adapted before being used in populations different from the ones in which they were developed. To our knowledge, among these surveys developed for young and physically active patients, only the HOS has been translated into Turkish and validated (23).

The NAHS is a simple, short, and self-administered questionnaire, which consist of four main topics including pain, mechanical symptoms, physical function, and activity level (19). This scale has been designed for assessing hip pain and function in young active patients and not specifically for patients undergoing hip arthroscopy. The HOS has been specifically developed for patients with labral tears or undergoing hip arthroscopy (20, 24). Therefore, in a systematic review, it was stated that the NAHS may have wider use in patients with hip pain. It was also recommended that a combination of the NAHS and the HOS should be used as outcome measures for patients undergoing hip arthroscopy (13). Therefore, in another systematic review, it was also reported that NAHS was one of the most frequently used standardized Hip Outcome Scores following hip arthroscopy (29.4%) (25).

As a result, the Turkish version and validation of the NAHS would be beneficial for Turkish-speaking populations with hip pain. This study aimed to determine the cultural adaptation, validity, and reliability of the Turkish version of the NAHS in young and physically active patients with hip pain.

HIGHLIGHTS

- The Nonarthritic Hip Score (NAHS) translated and cross-culturally adapted into Turkish.
- Test-retest reliability, internal consistency, and construct validity were assessed.
- The Turkish version of the NAHS is a valid and reliable questionnaire for young and physically active patients with hip pain.

Materials and Methods

Translation and cross-cultural adaptation

Translation and cultural adaptation of the NAHS were performed according to the method described by Beaton et al. (26).

In the first stage, forward translation of the English version of the NAHS into Turkish was performed by two independent, bilingual translators (one medical health care professional and one non-medical translator).

In the second stage, all two versions were discussed and combined in a consensus meeting to provide a preliminary Turkish version.

In the third stage, the preliminary Turkish version was translated back to English by two independent, native English bilingual translators (non-medical translators). Both translators had no knowledge of the research concepts and no access to the original English version.

In the fourth stage, the back-translated version of the NAHS was compared with the initial English version of the NAHS by a committee consisting of the four translators. After discussing the discrepancies, the committee approved the Turkish version of the NAHS (NAHS-TR).

In the final stage, the Turkish version of the NAHS was tested with 15 patients with hip pain and 15 healthy individuals. Following the completion of the questions, the participants were asked whether they had difficulties in understanding the questions. After this process, the questionnaire was accepted by the translation committee without any modifications to be used in the study population (Appendix 1).

Subjects

A total of 69 patients with hip pain who were examined at Department of Orthopedics and Traumatology, Gazi University were recruited in the study. Nine patients were excluded from the study because they either did not meet the inclusion criteria or refused to participate in the study, and, thus, the final number of subjects was 60 patients (Figure 1). The inclusion criteria were as follows: (1) being 18-40 years of age, (2) being diagnosed with hip problems including femoroacetabular impingement, acetabular dysplasia, labral tears, chondral lesions, loose bodies, tendon or muscle injuries, (3) being active (Tegner activity score of 3 or greater), and (4) being literate in Turkish. The exclusion criteria were as follows: (1) patients with advanced hip OA (grade > 2 according to the *Tönnis* classification), (2) rheumatic diseases, potentially responsible for a secondary OA, and (3) previous or additional lower extremity surgeries that may affect the functional evaluation.

The required permission has been obtained from the original author of the scale (Christensen CP) via e-mail. This study was approved by the local ethics committee of Gazi University (77082166-302.08.01-02). Informed consent was obtained from each patient before participation. The demographic characteristics of the patients were noted. Tegner Activity scores were used to evaluate current and pre-injury activity levels. All patients completed the NAHS-TR and the Turkish version of the WOMAC, mHHS, and Short Form-12 (SF-12), respectively, at the first assessment by themselves in a room under the custody of the researcher. Sub-groups of 24 patients were asked to complete the NAHS-TR again 2 days after their first completion to determine the test–retest reliability. To minimize the risk of short-term clinical change, no treatment was provided during this period.

Outcome measures

Nonarthritic Hip Score

The NAHS consists of 20 items distributed in four domains of pain (5 items), mechanical symptoms (4 items), physical function (5 items), and activity level (6 items). Each of the answers corresponds to a particular numerical value (from 0 to 4) and the values are added at the end of the test and multiplied by 1.25 to arrive at a final score. The maximum score is 100 indicating the best hip function (19).

Western Ontario and McMaster Universities Arthritis Index

The WOMAC, a disease-specific, self-administered questionnaire, comprises 24 items divided into 3 sub-scales: pain (5 items), stiffness (2 items), and physical function (17 items). Each of these items is rated on a 5-point Likert scale.

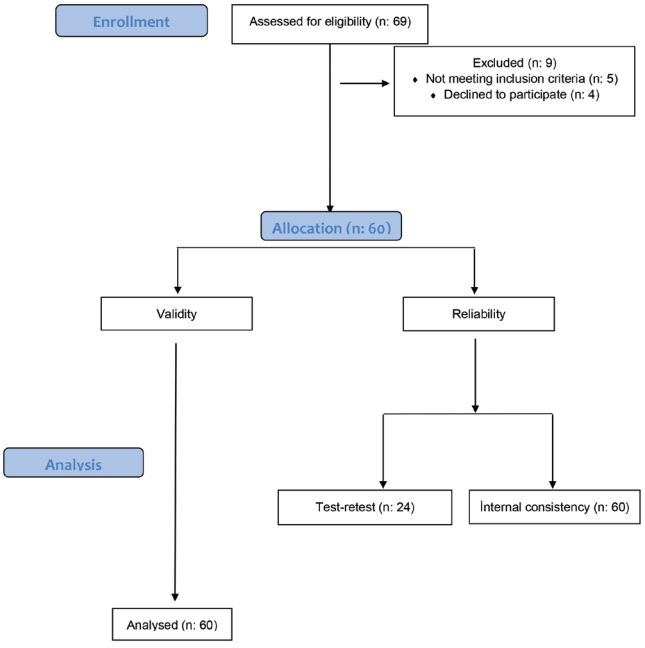


Figure 1. Flow diagram of the patients

The sub-scale scores were obtained by summing each item for pain (range 0-20), stiffness (range 0-8), and physical function (range 0-68). The total score was obtained by summing the three sub-scale scores (range 0-96), with higher scores reflecting more pain, stiffness, and poorer physical function (14, 27).

The Modified Harris Hip Score

The mHHS is a modification of the Harris Hip Score, which was originally developed for use in total hip arthroplasty patients. The mHHS consists of two domains: pain (1 item, 44 points) and function (7 items, 47 points). The maximum score of 91 is multiplied by 1.1 to give a total score out of 100 (*<70=poor*; *70-80=fair*; *80-90=good*; *90-100=excellent*) (17, 28).

Short Form-12 health survey

The SF-12 is a shorter version of the SF-36 and uses only 12 items to measure functional health and well-being from the patients' perspective. The instrument includes eight domains: physical functioning (2 items), role physical (2 items), bodily pain (1 item), general health (1 item), vitality (1 item), social functioning (1 item), role emotional (2 items), and mental health (2 items). The SF-12 summary scores range from 0 to 100, with higher scores representing better health (29, 30).

Statistical analysis

All the analyses were performed with Statistical Package for the Social Sciences version 22.0 (IBM SPSS Corp.; Armonk, NY, USA) and Linear Structural Relations (LISREL 8.8, Chicago: Scientific Software International) computer software. All variables were tested for normality of distribution using the Kolmogorov-Smirnov test. Mann-Whitney U test was calculated to find if differences were statistically significant when showing a non-normal distribution. Chi-square test was used to compare two independent groups in terms of categorical variables. Test-retest and internal consistency analyses were conducted to determine the reliability of the NAHS-TR. Test–retest reliability was evaluated by the Intraclass Correlation Coefficient (ICC) score. Cronbach's alpha coefficient was used to evaluate the reliability of the questionnaire in terms of internal consistency. As for the test–retest reliability, the ICC score of > 0.75 and the Cronbach's alpha value of > 0.80 were considered acceptable (31). The distribution of floor and ceiling effects of the Turkish NAHS was determined by calculating the proportion of individuals obtaining the lowest and highest scores, respectively (32). This indicates the proportion of patients for whom it would not be possible to measure a meaningful improvement (i.e., even lower score) or deterioration (i.e., even higher score) of their condition because they are already at the extreme of the range. For the validity of the questionnaire, the NAHS-TR total score and its sub-scales were correlated by Pearson correlation coefficient with the total scores of the WOMAC,

mHHS, and SF-12, and related sub-scales. Pearson correlation coefficient values were interpreted as bad (<0.20), weak (0.21-0.40), good (0.41-0.60), very good (0.61-0.80), and excellent (0.81-1.00) (33, 34). The significance level was set at 0.05.

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to create evidence of the construct validity of the scale. SPSS 22.0 package program was used for EFA, and in this analysis, it was revealed which factors related to the items in the scale were related. At this stage, Kaiser-Meyer-Olkin test (KMO) and Barlett sphericity tests were used to determine whether the data were suitable for the analysis of the principal components. Varimax vertical rotation technique was used to obtain the factors. The factors that emerged as a result of the analysis were named and interpreted. To test the EFA, a CFA was performed using the Lisrel 8.8 package program, the evaluated model was fit with the following parameters: the penalizing function (Chi-square/*df*), which is indicative of good fit with values less than 3; root mean square error of approximation (RMSEA) and confidence intervals (CI 90%), taking the value 0.05 as cut-off of good fit; Tucker–Lewis index (TLI), the comparative fit index (CFI), and goodness of fit index (GFI) with a minimum value of good fit of 0.90 (35).

Results

Translation and cultural adaptation processes were completed following with the method outlined above and no problems were encountered at these stages.

Of the 60 patients, 34 were women (56.67%) and 26 were men (43.33%). The demographic and clinical characteristics of the patients as gender sub-groups were summarized in Table 1. A total of 24 patients who did not receive treatment were included in the test–retest reliability analysis and an interval of 2 days' time period was given for this analysis. Test–retest ICC values ranged from 0.972 to 0.988 and the ICC value of the total score of the questionnaire was found to be 0.994 (Table 2). On the basis of the ICC values, the NAHS-TR test–retest results were found to be fairly high. Cronbach's alpha coefficient value of the NAHS-TR was recorded as 0.908, which indicates that the questionnaire has a high internal consistency. When each sub-parameter of the questionnaire was computed, the Cronbach's alpha value of the questionnaire ranged from 0.756 to 0.818 (Table 2). No floor and ceiling effects (15%) were observed in the sub-parameters (8.3-1.7%) and the total score (1.7%) of the NAHS-TR (Table 2).

The correlation of the NAHS-TR total score with the total score of WOMAC was r=-0.909, mHHS was r=0.850, and SF-12 was r=0.811. According to these results, the NAHS-TR was found to have an excellent correlation with the WOM-

Table 1. Demographic and clinical characteristics of the patients

	Female (n=34)	Male (n=26)	Total (n=60)	p
Age, years (X±SD)	36.1±11	34±8.1	35.2±9.9	0.649*
BMI[a] (kg/m^2) (X±SD)	25.1±4.4	25.9±3.3	25.1±4.4	0.329*
ADC[b] (months) (X±SD)	42.1±41.9	22.2±26.7	33.4±37.2	0.320*
Type of hip diseases, n (%)				**0.036****
FAI[c]	24 (70.6)	21 (80.8)	45 (75)	
Osteonecrosis	2 (5.9)	5 (19.2)	7 (11.7)	
Synovitis	5 (14.7)	-	5 (8.3)	
Isolated labral tears	3 (8.8)	-	3 (5)	
Employment status, n (%)				**0.001****
Employed	2 (5.8)	11 (42.3)	13 (21.6)	
Civil servant	8 (23.5)	11 (42.3)	19 (31.7)	
Housewife	16 (47.1)	-	16 (26.7)	
Retired	3 (8.8)	-	3 (5)	
Student	5 (14.7)	4 (15.4)	9 (15)	
Education, n (%)				**0.607****
Primary school	2 (5.9)	1 (3.8)	3 (5)	
Secondary school	2 (5.9)	2 (7.7)	4 (6.7)	
High school	22 (64.7)	13 (50)	35 (58.3)	
University	8 (23.5)	10 (38.5)	18 (30)	
Questionnaires scores (X±SD)				
NAHS[d]	31.6±13.5	42.3±13.1	36.3±14.3	0.003*
WOMAC[e]	61.3±23	41.5±19	50.1±20.7	0.005*
mHHS[f]	51.9±15.6	69.1±17.8	59.3±18.5	0.001*
SF-12[g] (Total score)	21.4±5.8	25.2±6.3	23.1±6.3	0.015*

*Mann-Whitney U test
**Chi square test
[a]BMI: body mass index
[b]ADC: average duration of complaints
[c]FAI: Femoroacetabular impingement
[d]NAHS: Nonarthritic Hip Score
[e]WOMAC: Western Ontario and McMaster Universities Arthritis Index
[f]mHHS: Modified Harris Hip Score
[g]SF-12: Short Form-12

AC, mHHS, and SF-12 (Table 3). Similarly, a good-excellent correlation was observed between the sub-parameters of the NAHS-TR and the WOMAC, mHHS, and SF-12 (0.507-0.916; Table 4).

KMO and Bartlett test values showed that the sample was suitable and adequate for a factor analysis (Table 5). As a result of the factor analysis, the test was found to have a single factorial structure by the scree plot (Figure 2). According to the total variance analysis, the four-factor of NAHS constitutes 73.54% of the total variance and also this result supports that the test has a 4-factorial structure (Table 6).

The construct validity of the 4-factor model resulting from EFA was tested by applying CFA. The model fit indices in CFA were as follows: χ^2/df=2.23, TLI=0.90, CFI=0.91, GFI=0.63, RMSEA=0.14 (90% CI: 0.12-0.16). The structural model of the NAHS-TR is presented in Figure 3.

Table 2. Internal consistency, test-retest, and floor-ceiling effect analyses

NAHS[a]	Cronbach alpha	ICC[b] (95% Confidence interval) (lower–upper bound)	Floor-ceiling effect (worst–best status) (%)
Pain	0.804	0.972 (0.936-0.988)	1.7-1.7
Mechanical symptoms	0.818	0.985 (0.966-0.994)	3.3-1.7
Physical function	0.804	0.972 (0.934-0.988)	5-1.7
Activity level	0.756	0.988 (0.972-0.995)	8.3-1.7
Total score	0.908	0.994 (0.986-0.997)	1.7-1.7

[a]NAHS: Nonarthritic Hip Score
[b]ICC: Intraclass Correlation Coefficient

Table 3. Correlation values of NAHS with other questionnaires

NAHS[a] (n:60)	r	p
WOMAC[b]	-0.909	<0.001
mHHS[c]	0.850	<0.001
SF-12[d] (Total score)	0.811	<0.001

[a]NAHS: Nonarthritic Hip Score
[b]WOMAC: Western Ontario and McMaster Universities Arthritis Index
[c]mHHS: Modified Harris Hip Score
[d]SF-12: Short Form-12

Table 4. Pearson correlation analysis* of NAHS and WOMAC, mHHS, and SF-12 questionnaires' sub-parameters

	WOMAC[b]			mHHS[c]		SF-12[d]
NAHS[a]	Pain	Stiffness	Physical function	Pain	Function	Physical health sub-score
Pain	−0.916**	−0.754**	−0.860**	0.775**	0.805**	0.734**
Mechanical symptoms	−0.662**	−0.762**	−0.620**	0.507**	0.600**	0.710**
Physical function	−0.747**	−0.549**	−0.824**	0.687**	0.689**	0.693**
Activity level	−0.830**	−0.765**	−0.854**	0.788**	0.755**	0.830**

[a]NAHS: Nonarthritic Hip Score
[b]WOMAC: Western Ontario and McMaster Universities Arthritis Index
[c]mHHS: Modified Harris Hip Score
[d]SF-12: Short Form-12
*Values are r
**p<0.01

Discussion

This study aims to investigate the validity and reliability of the Turkish version of the NAHS in young and physically active patients with hip pain. Cross-cultural adaptation and the statistical results showed that the NAHS is an appropriate, valid, and reliable assessment tool for young and active patients with hip pain in the Turkish population.

Table 5. Kaiser-Meyer-Olkin and Bartlett Test

	Kaiser-Meyer-Olkin Test	Bartlett Test	
NAHS[a]		Chi-Square	p
	0.825	963.086	<0.001

[a]NAHS: Nonarthritic Hip Score

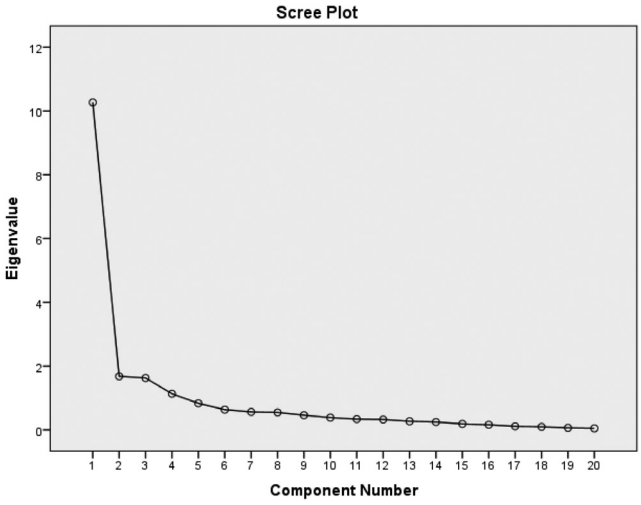


Figure 2. Scree plot graph of the Turkish version of NAHS

Table 6. Total variance analysis of NAHS[a]

	Initial eigenvalues			Extraction sums of squared loading		
Component	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	10.267	51.337	51.337	10.267	51.337	51.337
2	1.680	8.402	59.739	1.680	8.402	59.739
3	1.629	8.144	67.883	1.629	8.144	67.883
4	1.133	5.665	73.547	1.133	5.665	73.547
5	0.835	4.175	77.722			
6	0.636	3.178	80.900			
7	0.563	2.815	83.715			
8	0.548	2.740	86.455			
9	0.462	2.310	88.766			
10	0.385	1.927	90.692			
11	0.339	1.697	92.389			
12	0.326	1.631	94.020			
13	0.271	1.357	95.376			
14	0.248	1.240	96.616			
15	0.189	0.944	97.561			
16	0.162	0.812	98.373			
17	0.113	0.567	98.939			
18	0.097	0.485	99.424			
19	0.066	0.330	99.755			
20	0.049	0.245	100.000			

[a]NAHS: Nonarthritic Hip Score

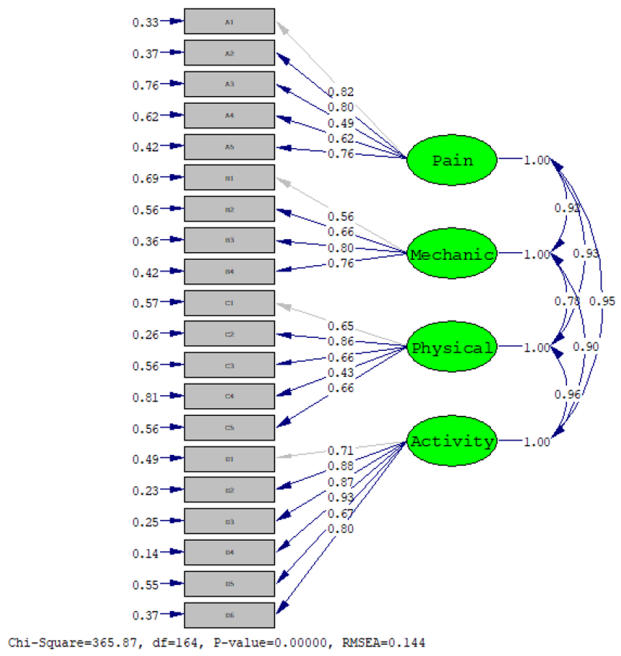


Figure 3. CFA of the structural model of the NAHS-TR

As aforementioned, hip pain is an important problem owing to its effect on physical function and health-related quality of life (1-3). In addition to the objective measurements performed by the clinician during the planning and application of treatment and rehabilitation, PRO measures are also used. The selection of a proper questionnaire is essential to plan a successful treatment program and for the follow-up of the results (11). There is no gold standard questionnaire for the evaluation of patients with hip pain (13). The most frequently used questionnaires are the WOMAC, OHS, mHHS, and HOOS, which are valid and reliable, and also have Turkish translations. Nonetheless, these questionnaires focus on hip pain and function among elderly people with OA. In this regard, NAHS, which is a disease-specific outcome measure for young and active patients with hip pain, will bring advantages in determining the quality of life in this population. Therefore, it was important to adapt this questionnaire into Turkish and test its validity and reliability in the target population.

The internal consistency analysis of the NAHS was evaluated by using the Cronbach's alpha coefficient and it was found as 0.908. This value indicates that the Turkish version of the NAHS is quite reliable. In previous studies, Cronbach's alpha values of the NAHS were analyzed and found as 0.690–0.920 by Christensen et al. and 0.944 by Del Castillo et al. (19, 36). The Cronbach's alpha value of the NAHS-TR was found to be very reliable, similar to the original and Brazilian version. As a result, it is possible to say that the Turkish version of the NAHS has a high level of internal consistency.

According to the literature, there is no definite time interval for test re-test analysis (37, 38). Marx et al. stated that there was no statistically significant difference between the test–retest results performed with a 2-day interval and 2-week interval. The test–retest analyses performed within this time interval could be sufficient (37). Therefore, following the study conducted by Marx et al., a 2-day test–retest interval was performed in this study (37). In the original study of the NAHS, Christensen et al. performed test–retest analysis on 17 patients and the test–retest interval ranged between 1 and 16 days (mean: 5.5 days) (19). Based on the statistical analyses performed in the study, Christensen et al. reported that the test–retest ICC value of the total score was 0.960 (19). Del Castillo et al. (36) performed test–retest analysis on 64 patients again within the 2 days after following the first questionnaire. The ICC value was 0.837 (0.732-0.90) (36). In the NAHS-TR, 24 patients were asked to complete the questionnaire again 2 days after their first completion to determine the test–retest reliability. According to the statistical analyses, the ICC value for each sub-parameters of the NAHS-TR varied between 0.972 and 0.988 and the total ICC value was found to be 0.994. This result revealed that the Turkish version of the NAHS is highly stable over time like the original and Brazilian versions.

Floor and ceiling effects are considered to be present if more than 15% of the subjects received lower or higher scores, respectively (32). No floor and ceiling effects were observed in this study, similar to the findings of the Brazilian version (36).

KMO and Bartlett test results showed that the sample was suitable and adequate for a factor analysis. The factor analysis reveals that the NAHS has a 4-factor model. The construct validity of this 4-factor model resulting from EFA was tested using CFA. When the CFA values obtained were analyzed, it was determined that the χ^2/df, TLI, and CFI values were in good fit. However, RMSEA and GFI values showed a weak fit. It can be said that the items in the scale represent the structure by looking at the values that fit well and that the model is compatible with the results revealed by EFA. This analysis is the first factorial content analysis of the NAHS.

In the original study of the NAHS, the validity analysis was performed on 48 young and active patients with hip pain. The authors determined the construct validity between the NAHS and the mHHS and SF-12 total scores for validity using the Pearson correlation coefficient and reported it as 0.820 and 0.590, respectively (19). In the Brazilian version, the authors analyzed the validity between the NAHS and WOMAC, and the total Lequesne scores. They were using the Pearson correlation coefficient and reported it as 0.907 and 0.734, respectively (36). The validity study of the NAHS-TR was performed on 60 young and active patients with hip pain. For the validity of the questionnaire, total scores from the NAHS-TR and total scores of the WOMAC, mHHS, and SF-12 were analyzed using the Pearson correlation coefficient. The Pearson correlation coefficient value of the NAHS-TR with the WOMAC was determined as -0.909 and 0.850 with

mHHS, and 0.811 with SF-12. When the Pearson correlation coefficient values were examined, it can be said that the correlation of the NAHS-TR with the WOMAC, mHHS, and SF-12 was at an excellent level. Additionally, a good–excellent correlation was found between the NAHS-TR and the related sub-parameters of the WOMAC, mHHS, and SF-12. These results are very similar to the correlation values recorded in the original and the Brazilian version study and the results support each other.

This study has several limitations. Responsiveness analysis is an important parameter in determining the sensitivity to clinical changes in the questionnaire. However, we did not perform the responsiveness analysis. Another limitation of this study was that the WOMAC and mHHS questionnaires were used for the convergent validity as there is no specific scale for nonarthritic pain in Turkish. Additionally, our sample size is small to test EFA and CFA in different datasets, factor structure, and measurement invariance across gender and specific age groups. Further research is warranted to investigate the factor structure and invariance across gender and specific age groups.

In conclusion, the NAHS was successfully adapted into the Turkish language, and it was shown that it presented acceptable psychometric properties of reliability and validity consistent with the original version. The Turkish version of the NAHS has high test–retest and internal consistency, sufficient test–retest reliability, and high convergent validity. Therefore, the Turkish version of the NAHS is found to be valid and reliable in young and physically active patients with hip pain.

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Informed Consent: Written informed consent was obtained from the subjects.

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