Agri 2022;34(4):278–291
doi: 10.14744/agri.2021.92195

ORIGINAL ARTICLE

Preliminary validation of the Turkish version of the pain catastrophizing scale for children and parents (PCS-C and PCS-P) in primary childhood headache

Primer çocukluk çağı baş ağrısında çocuklar ve ebeveynler için ağrı felaketleştirme ölçeğinin (AFÖ-Ç, AFÖ-E) Türkçe versiyonunun ön validasyonu

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Summary

Objectives: The aims of this study were to translate the pain catastrophizing scale for children and parents (PCS-C and PCS-P) into Turkish (TurPCS-C and TurPCS-P) and evaluate the psychometric properties in children with primary headache.

Methods: Exploratory factor analysis was used to test the construct validity. Reliability was measured using item-total score correlation, internal consistency (Cronbach α coefficient), Cronbach α if the item was deleted, and test-retest correlation. Concurrent validity and convergent validity of the scales were correlated with other scales (Revised Children's Anxiety and Depression Scale [RCADS], RCADS Parent RCADS-P, Quality of Life Scale for Children [PedsQL], and PedsQL-Parents [PedsQL-P]) and some related features (pain intensity, mobile phone usage time, and headache duration).

Results: Of the 80 children participating in the study, 55 (68.8%) were girls and 25 (31.2%) were boys. It was determined that the original three-factor structure was not supported for TurPCS-C and TurPCS-P. Cronbach α value was 0.871 for TurPCS-C consisting of 12 items, and Cronbach α value was 0.890 for TurPCS-P consisting of 12 items. As the PedsQL score increased, there was a negative correlation ($p<0.05$, $r=-0.575$) in all three areas of TurPCS-C, and there was a positive correlation ($p<0.05$) among the scores from the RCADS scale and TurPCS-C. Similarly, there was a negative correlation with PedsQL-P and TurPCS-P and positive correlation with RCADS-P and TurPCS-P ($p<0.05$ for each).

Conclusion: TurPCS-C and TurPCS-P are an evaluation instrument with sufficient validity and reliability, and it can be reliably used to examine pediatric patients with primary headache.

Keywords: Anxiety; childhood headaches; depression; pain catastrophizing scale.

Özet

Amaç: Bu çalışmanın amacı, çocuklar ve ebeveynler için ağrı felaketleştirme ölçeğini Türkçeye (AFÖ-Ç, AFÖ-E) çevirmek ve primer baş ağrısı olan çocuklarda psikometrik özellikleri değerlendirmektir.

Gereç ve Yöntem: Yapı geçerliliğini test etmek için açıklayıcı faktör analizi kullanıldı. Güvenilirlik: madde-toplam puan korelasyonu, iç tutarlılık (Cronbach α katsayısı), madde silinmişse Cronbach α ve test-tekrar test korelasyonu kullanılarak ölçüldü. Ölçeklerin eş zamanlı geçerliliği ve yakınsak geçerliliği, diğer ölçekler [revize edilmiş çocukların anksiyete ve depresyon ölçeği (RÇADÖ), RÇADÖ-E, çocuklar için yaşam kalitesi ölçeği (ÇİKYO), ÇİKYO-E] ve ilgili bazı özellikler (ağrı yoğunluğu, cep telefonu kullanım süresi, baş ağrısı süresi) ile ilişkilendirildi.

Bulgular: Çalışmaya katılan 80 çocuğun 55'i (%68,8) kız, 25'i (%31,2) erkekti. AFÖ-Ç, AFÖ-E için orijinal üç faktörlü yapının desteklenmediği belirlendi. On iki maddeden oluşan AFÖ-Ç için Cronbach α değeri 0,871, 12 maddeden oluşan AFÖ-E için Cronbach α değeri 0,890 olarak bulundu. ÇİKYO puanı arttıkça AFÖ-Ç'nin her üç alanında da negatif korelasyon ($p<0,05$, $r=-0,575$) ve RÇADÖ ölçeği ile AFÖ-Ç puanları arasında pozitif korelasyon ($p<0,05$) vardı. Benzer şekilde, ÇİKYO-E ve AFÖ-E ile negatif korelasyon ve RÇADÖ-E ve AFÖ-E ile pozitif korelasyon vardı (her biri için $p<0,05$).

Sonuç: AFÖ-Ç, AFÖ-E yeterli geçerlilik ve güvenilirliğe sahip bir değerlendirme aracıdır ve primer baş ağrısı olan çocuk hasta çalışmalarında geçerli ve güvenilir bir şekilde kullanılabilir.

Anahtar sözcükler: Anksiyete; çocukluk çağı baş ağrıları; depresyon; ağrı felaketleştirme ölçeği.

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Submitted ***(Başvuru):*** **01.09.2021 Accepted** ***(Kabul):*** **08.12.2021 Available online** ***(Online yayımlanma)*** **28.10.2022**

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Introduction

Approximately 60% of the children may experience a headache at some time in the childhood period.[1] While the prevalence of migraine is 5% in children by the age of 10 years, its incidence increases with age. At these ages, headaches can have significant effects on physical development, academic success, and quality of life. Childhood migraines are associated with psychiatric comorbidities such as depression, anxiety, and behavioral problems.[2] Pain catastrophizing is the tendency to overfocus and exaggerate the response to painful stimuli and their threat values and to feel more helpless about the experience of pain.[3]

Sullivan et al.[4] developed the pain catastrophizing scale (PCS) for adults, and it was adapted for use in children by Crombez et al.[5] Consisting of 13 items, PCS for children (PCS-C) include three subscales that measure different aspects of pain catastrophizing: Rumination, magnification, and helplessness. The rumination subscale consists of four questions (questions 8–11) and measures ruminative thoughts, anxiety, and inability to prevent thoughts about pain. The magnification subscale consists of three questions (questions 6, 7, and 13) and reflects the intensity of discontent from pain and anticipation of negative consequences. The helplessness subscale consists of six questions (questions 1–5 and 12) and reflects the inability to cope with pain.[4,5] Validated versions of PCS-C have been published in languages other than English.[6–9]

Goubert et al.[10] developed the PCS for parents (PCS-P) in 2006. It is a 13-item scale consisting of three subscales (rumination, magnification, and helplessness) like PCS-C. It was developed because of the need to correlate the extent of parents' catastrophization of pain of their children and their effect on their children's well-being and behavior.[10] Like PCS-C, validated versions of PCS-P other than English have been published.[11,12]

With this study, we aimed to examine the psychometric properties of the Turkish (TurPCS-C/AFÖ-Ç and TurPCS-P/AFÖ-E) version of PCS-C and PCS-P and also to enable their use in future studies with Turkish-speaking children.

Material and Methods

Permissions

To confirm the validity and reliability of PCS-C and PCS-P in Turkish, Prof. Liesbet Goubert, who developed the original scale, was contacted, and written permission was obtained. The study was initiated after the approval of the Clinical Research Ethics Committee of Istanbul Kanuni Sultan Süleyman Training and Research Hospital (KAEK/2018.7.09).

Translation and intercultural adaptation

The translation procedure was made in accordance with the recommendations of Beaton et al.[13]

Forward translation and synthesis phase

The scales were translated into Turkish by two independent researcher-academy medical doctors (MD_1 and MD_2 who are neither pediatric psychiatrist, nor pediatric neurology, nor algologist, and had not participated in childhood chronic pain studies before) and an independent translator (T_1) who is proficient in English. The new scale was synthesized by evaluating the original scale and data from these three translators (MD_1+MD_2+T_1), a second independent translator (T_2), and researchers (MCT, EU, and MKE).

Back-translation phase

The synthesized Turkish texts were back-translated from Turkish to English by two independent researcher-academy medical doctors (MD_3 and MD_4 who are neither pediatric psychiatrist, nor pediatric neurology, nor algologist, and had not participated in childhood chronic pain studies before and did not participate in the first phase) and an independent translator (T_3) who is proficient in English. The back-translated English texts were compared with the original scale by an independent translator (T_4) and study manager (IAS). The pilot testing phase was initiated for the texts that were found to have no significant difference with the original scale in terms of meaning.

lot testing phase

The scales were tested on 10 children (younger than 18 years, boys and girls, with headaches for at least 3 months and their parents). Unclear or inconsistent questions were reviewed and revised by the whole study team (MD_1, MD_2+MD_3+MD_4+T_1+T_2+T_3+T_4+MCT+EU+MKE+IAS).

Final agreement

The revised questionnaires were sent to Dr. Liesbet Goubert, and her suggestions were followed. Turkish scales (Appendixes 1, 2) were created within the last agreement.

Participants

The sample size required for exploratory factor analysis (EFA) was determined to be at least 65 participants (at least 5- or 10-fold samples per question) according to suggested criteria.[14] In the end, 80 children with primary headache (55 [68.8%] girls and 25 [31.2%] boys) and 80 parents (77 [96.2%] mothers and 3 [3.8%] fathers) completed the study. The data were collected from children, adolescents, and their families who consulted a doctor with a complaint of headache for the 1st time had headaches for at least 3 months and presented to the pediatric neurology and algology departments of Istanbul Kanuni Sultan Süleyman Training and Research Hospital. Neurological and fundoscopic examinations and cranial neuroimaging (MR) of all patients were evaluated. Primary childhood headache diagnosis was made based on the *International Classification of Headache Disorders, Third Edition* diagnostic criteria.[15] Other inclusion criteria were being able to read, write, and speak in Turkish and age between 8 and 18 years. Participation in the study was on a voluntary basis. Detailed information was given to each participant, and written consent was obtained from his/her parents.

Sociodemographic and descriptive information

Age, gender, presence of medical or psychiatric illness, socioeconomic level, school marks, daily time spent on watching television and using the mobile phone (MP), hours of sleep per day, presence of psychiatric illnesses in the family, presence of headache in the mother or father, and education level of parents were recorded. In addition, the following information was collected with regard to the headaches in the past 3 months: Information on the location, frequency, intensity, duration, and character of the pain, presence of aura, the factors that trigger the headache, and the symptoms and signs that accompany the headache.

Measurement instruments

PCS-C

It consists of 13 items that describe the different thoughts and emotions that children may experience when they feel pain. It evaluates three domains: Rumination (e.g., "When I am in pain, I keep thinking about how much it hurts" [item 10]), magnification (e.g., "When am in pain, I keep thinking of other painful events" [item 7]), and helplessness (e.g., "When I am in pain, I feel I cannot go on" [item 2]). All items are evaluated by means of a 5-point Likert scale ranging from 0 (not at all) to 4 (a lot). Higher scores indicate more catastrophic pain beliefs (scores range from 0 to 52).[4,5] In our study, PCS-C were readministered to a subgroup of 40 randomly selected patients after 1 month for test-retest analysis.

PCS-P

Just like PCS-C, the PCS-P is evaluated by means of a 5-point Likert scale ranging from 0 (not at all) to 4 (a lot) and consists of 13 items. Likewise, it evaluates three domains: Rumination (e.g., "When my child has pain, I can't keep it out of my mind" [item 4]), magnification (e.g., "When my child has pain, I keep thinking of other painful events" [item 3]), and helplessness (e.g., "When my child has pain, I feel like I cannot go on" [item 6]). Items from subscales are added to obtain a total score between 0 and 52; higher scores reflect a higher level of catastrophic thinking in parents.[4,10] In our study, PCS-P scales were read ministered to a randomly selected sub parent group together with their children at the same time, after 1 month for test-retest analysis.

Pain intensity

The numerical rating scale (NRS) is one of the most commonly used and simplest tools in clinical practice to measure pain intensity in children 8 years or older. On this scale, children score pain intensity from "0" (no pain) to "10" (worst pain possible).[16] Scores between 50 and 70 are considered moderate, whereas scores between 80 and 100 are considered severe. Participants were asked to rate the most intense pain they could remember in the past 3 months using a 0-to 100-point NRS.

Pain frequency and duration

Headache frequency and duration were evaluated in relation to the past 6-month period. For frequency, a five-category response scale was used: "None" (0), "<3 days a month" (1), "3–10 days a month" (2), "10–21 days a month" (3), and "every day a month" (4). For duration, a five-category response scale was used: "None" (0), "2–30 min" (1), "30 min 1 h" (2), "1–4 h" (3), and "more than 4 h" (4).

Children's anxiety and depression scale

The Revised Children's Anxiety and Depression Scale (RCADS) was developed to evaluate depression as well as clinical anxiety syndromes in childhood[17]

and has been validated in Turkish, and the Cronbach α score (reliability) for the Turkish version was 0.95.[18] This scale consists of 47 items, and this scale includes six subscales based on the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*. Scores are summed into two total areas as the Total Anxiety Scale (the sum of the five anxiety subscales) and the Total Internalization Scale (the sum of six subscales) and are scored on a 4-point scale (0=never, 1=sometimes, 2=often, and 3=always).[17]

Child anxiety and depression scale-parents

The RCADS-Parent Version (RCADS-P) is a self-report questionnaire that evaluates the extent of DSM-based anxiety and depressive disorders in children and adolescents and was developed to complement the child version.[19] The scale is validated in Turkish, and the Cronbach α score for the Turkish version was 0.95.[20]

Quality of life scale for children (PedsQL)

The PedsQL and PedsQL-Parents (PedsQL-P) were developed to measure health-related quality of life of children and adolescents aged 2–18 years. It was developed as a Likert-type scale with three choices for children between the ages of 5 and 7 years and five choices for children and adolescents between the ages of 8 and 18 years. The items score between 0 and 100, and the higher the total score, the better perceived health-related quality of life.[21] Its Turkish validity and reliability study have been reported. For children between 8 and 12 years old, the Cronbach α coefficients of the Turkish version of the scale were 0.86 for the child self-report and 0.88 for the parent proxy report. For children between 13 and 18 years old, the Cronbach α coefficients of the Turkish version of the scale were 0.82 for the child self-report and 0.87 for the parent proxy report.[22,23]

Psychiatric evaluation

A clinical interview was conducted by a child and adolescent mental health specialist (MCT) to children and their parents according to DSM-V[24] criteria, and psychiatric disorders accompanying headache were evaluated. Participants were included in the study after the psychiatric interview.

Statistical analysis

Statistical analyses were performed using the IBM Statistical Package for the Social Sciences statistics software version 25.[25] Descriptive data were evaluated using mean, standard deviation (SD), skewness, and kurtosis. EFA was used to test the construct validity of the scales. (For Kaiser-Meyer-Olkin [KMO] test, a value of >0.9 is considered marvelous and 0.80 ≤ KMO ≤0.89 meritorious, and $p<0.01$ was considered significant for Bartlett test of sphericity.) The reliability of the scales was measured using the item-total score correlation (values ≥0.4 indicate good discrimination), internal consistency (Cronbach α), and Cronbach α if the item was deleted. Intraclass correlations (ICCs) (0.75 ≤ ICCs ≤1.00 considered excellent) were calculated to assess the test-retest reliability. Correlations of the scales with other scales that related to pain, anxiety-depression, and quality of life used in the study (PedsQL, PedsQL-P, RCADS, RCADS-P, and NRS) and with some associated features (MP usage time and headache duration) were evaluated to test the concurrent and convergent validity of scales. Data were evaluated at a 95% confidence interval, and $p<0.05$ was considered statistically significant.[14,26–28]

Results

Clinical Sample

Of the 80 children participating in the study, 55 (68.8%) were female and 25 (31.2%) were male. The mean age of the children was 13.42±2.60 years (age range, 8–18 years). Eighty parents (77 [96.2%] mothers and 3 [3.8%] fathers) also participated in the study. Table 1 summarizes the sociodemographic characteristics of the participating children.

Table 2 shows the headache character, headache triggers, and also the headache and psychiatric diagnoses. (Participants did not have pediatric neurology and psychiatric applications before the study.) The mean duration of headache was 2.25±2.12 days, and headache frequency was 2.65 per month.

Statistical analysis results

Descriptive statistics

While it was observed that the skewness values of the items were generally within the normal distribution limits (between +1 and −1 values), the skewness value of item 8 was evaluated as −2 or less in both scales, and it was determined that it followed a distribution skewed to the right. The kurtosis value of the same item has been determined >5 in both scales, and it has been determined that it shows a sharp dispersion feature. Because the kurtosis values of the

Table 1. Sample demographic information

	n	%
Gender		
Girls	55	68.8
Boys	25	31.2
Age, mean±SD	13.42±2.60	
School success		
Bad	3	3.75
Intermediate	34	42.5
Good	43	53.75
MP* (hours)	2.62 (2.12)	
TV** (hours)	2.67 (2.07)	
Sleep time (hours)		
≤6	9	11.25
7–9	51	63.75
≥9	20	25

*: Average daily mobile phone usage times; **: Average TV viewing times per day. n: Number; SD: Standard deviation; MP: Mobile phone; TV: Television.

items were generally <−1, contrary to the eighth item, it was determined that the scores obtained from the scale generally showed a flat distribution. The mean, SD, kurtosis, and skewness values calculated for TurPCS-C and TurPCS-P are presented in Table 3.

EFA of the TurPCS-C

Principal component analysis (PCA) of the TurPCS-C scale showed that the stable three-factor structure in the original study[4,5] was not supported. Item 8 was excluded because of its no compatible descriptive statistics (kurtosis and skewness). In the model with a two-factor structure, which was evaluated with the varimax rotation method, 52.79% of the total variance was provided. The first factor explained 42.89% of the total variance and the second factor explained 9.90% of the total variance. The KMO value of the scale was 0.872, and Bartlett test value was p<0.001. Factor loadings in the model fictionalized were >0.59. In addition, communality values were found to be >0.3 in all items for the two-factor model. In the scale, items 5, 2, 9, 1, 10, 6, 4, 11, and 3 were included in the first factor (five items in helplessness subscale, one item in magnification subscale, and three items in rumination subscale), whereas items 7, 12, and 13 (two items in magnification subscale and one item in helplessness scale) were included in the second factor.[5,6] Factors, items, factor loads, and communality values for the TurPCS-C scale are presented in Table 4.

Table 2. Headache characteristics of the participants, primary headache, and psychiatric diagnoses

	n	%
Headache duration (years), mean±SD	2.25±2.12	
Headache frequency (in 1 month)	2.65	
NRS*, mean±SD	78.81±18.42	
Pain character		
Throbbing	67	83.7
Tightening	30	37.5
Pressing	22	27.5
Stabbing	10	12.5
Explosive	8	10
Conditions that increase headache		
Stress (school)	59	73.8
Noise or noisy environment	59	73.8
Fasting or skipping meals	41	51.3
Windy weather	22	27.5
Change of temperature	20	25
Physical activity or exercise	12	15
Headache diagnoses		
EM (MO)	46	57.5
TTH	18	22.5
Mixed**	13	16.2
MA	3	3.75
Psychiatric diagnoses		
AD	4	5
ADHD	2	2.5
Stuttering	1	1.25
Stuttering and AD	1	1.25
Phobia and ADHD	1	1.25
ADHD and ODD	1	1.25

*: Pain intensity is calculated with using NRS; **: Patients with mixed-type headache, EM and TTH headaches together. n: Number; SD: Standard deviation; NRS: Numeric rating scale, between 50 and 79 points: Moderate, between 80 and 100 points: severe, EM: Episodic migraine; MO: Migraine without aura; TTH: Tension-type headache; MA: Migraine with aura; AD: Anxiety disorder; ADHD: Attention-deficit/hyperactivity disorder; ODD: Oppositional defiant disorder.

EFA of the TurPCS-P

In the PCA analysis of the TurPCS-P scale, it was observed that the stable three-factor structure in the original study[4,10] was not supported. Item 8 was excluded because of its non-compatible descriptive statistics (kurtosis and skewness). Without item 8, the analyses revealed a two-factor structure and accounting for 46.48% and 10.07% of the variance, respectively. The KMO value of the scale was 0.874, and Bartlett test value was p<0.001. Factor loadings were 0.40 or greater. Communality values were found to

Table 3. Item descriptive statistics for TurPCS-C and TurPCS-P

TurPCS-C	Mean	SD	Kurtosis	Skewness
Item 1	2.1250	1.22604	−0.759	−0.244
Item 2	2.2750	1.27264	−1.012	−0.234
Item 3	1.5500	1.25183	−1.141	0.122
Item 4	2.1625	1.39115	−1.237	−0.096
Item 5	2.5000	1.24270	−1.079	−0.345
Item 6	2.1750	1.33857	−1.148	−0.069
Item 7	1.0000	1.16923	−0.925	0.682
Item 8	**3.5750**	**0.93829**	**5.450**	**−2.439**
Item 9	2.2750	1.38687	−1.210	−0.248
Item 10	2.0125	1.31682	−1.075	−0.092
Item 11	2.8875	1.26285	−0.313	−0.905
Item 12	1.5375	1.26234	−0.812	0.359
Item 13	2.3750	1.46153	−1.231	−0.383
TurPCS–P	**Mean**	**SD**	**Kurtosis**	**Skewness**
Item 1	2.3375	1.17940	−0.632	−0.406
Item 2	2.0750	1.42113	−1.250	−0.108
Item 3	1.5125	1.20120	−0.925	0.262
Item 4	2.0500	1.45741	−1.376	−0.039
Item 5	2.1625	1.35426	−1.320	0.042
Item 6	2.2750	1.43178	−1.313	−0.262
Item 7	1.3250	1.37588	−0.901	0.585
Item 8	**3.6125**	**0.78746**	**6.135**	**−2.377**
Item 9	2.4500	1.22112	−0.514	−0.587
Item 10	2.7375	1.22984	−0.252	−0.820
Item 11	3.0375	1.15225	0.542	−1.144
Item 12	1.6875	1.34629	−1.220	0.179
Item 13	3.1000	1.20757	0.827	−1.347

TurPCS-C: Turkish Pain Catastrophizing Scale-Child; TurPCS-P: Turkish Pain Catastrophizing Scale-Parents; SD: Standard deviation.

be >0.25 in all items for the two-factor model. Items 2, 3, 5, 4, 1, 6, 7, and 9 were included in the first factor (five items in helplessness subscale, two items in magnification subscale, and one item in rumination subscale), respectively. Items 10, 11, 12, and 13 were included in the second factor (two items in rumination subscale, one item in helplessness subscale, and one item in magnification subscale), respectively[5,6] Factors, items, factor loads, and communality values for the TurPCS-P scale are presented in Table 5.

Inter-correlations

According to the analysis results examining the relationship between the subdomains of the TurPCS-C and TurPCS-P scales and between the age values of the study group, it was observed that the TurPCS-C total scores were in a strong and positive correlation with the scores from the factors 1 and 2 subdomains ($p<0.05$ for each). Similarly, it was determined that both subdomains were correlated with each other. It was found that the scores obtained increased as the age increased in all three areas of the TurPCS-C scale ($p<0.05$ for each). It was observed that TurPCS-P total scores were in a strong and positive correlation with the scores obtained from factors 1 and 2 subdomains ($p<0.05$ for each). Furthermore, it was determined that both subdomains of the TurPCS-P scale were correlated with each other. It was found that only the total score of the TurPCS-P scale correlated with age ($p<0.05$ for each). Mean values, SD, and inter-correlations of all measures about TurPCS-C and TurPCS-P are given in Table 6.

Reliability of TurPCS-C and TurPCS-P

Item-total correlation coefficients of the items in the TurPCS-C scale were observed to range from 0.30 to 0.72. When any of the items in the scale was removed, no significant increase was observed in Cronbach α coefficient. Cronbach α coefficient of the TurPCS-C scale consisting of 12 items was calculated to be 0.871. Item-total correlation coefficients of the items in the TurPCS-P scale were observed to range from 0.42 to 0.74. When any of the items in the scale was removed, no significant increase was observed in Cronbach α coefficient. Cronbach α coefficient of the TurPCS-P consisting of 12 items was calculated to be 0.890.

Table 7 presents the item-total correlations of TurPCS-C and TurPCS-P scales, and Cronbach α coefficients obtained when the item was removed.

Test-retest reliability

TurPCS-C and TurPCS-P were applied to a subgroup of 40 randomly selected patients and their parents for test-retest analysis 1 month later. For both scales, it was observed that there was a sufficient correlation between the mean scores obtained in the first evaluations of the scales and the mean scores in the retest evaluation (correlation coefficients TurPCS-C: 0.836 and TurPCS-p=0.821). These values show test-retest reliability in both scales. TurPCS-C and TurPCS-P test-retest analysis results are given in Table 8.

Table 4. Factors, items, factor loadings, and communalities values about the TurPCS-C

	Items	Factor loadings	Communality
Factor 1 (42.89%)*			
	I5 I can't stand it anymore (H)	0.873	0.762
	I2 I feel I can't go on (H)	0.746	0.597
	I9 I can't keep it out of my mind (R)	0.720	0.565
	I1 I worry all the time whether pain will end (H)	0.693	0.523
	I10 I keep thinking about how much it hurts (R)	0.679	0.633
	I6 I am afraid that pain will get worse (M)	0.659	0.499
	I4 It's awful and I feel it takes over me (H)	0.620	0.398
	I11 I keep thinking about how much I want the pain to stop (R)	0.608	0.372
	I3 It's terrible and I think it's never going to be better (H)	0.596	0.422
Factor 2 (9.90%)**			
	I7 I keep thinking of other painful events (M)	0.797	0.638
	I12 There's nothing I can do reduce pain (H)	0.632	0.410
	I13 I wonder whether something serious will happen (M)	0.603	0.514
Total (52.79%)***			

*: First-factor variance according to TurPCS-C EFA; **: Second-factor variance according to TurPCS-C EFA; ***: Total variance of TurPCS-C. TurPCS-C: Turkish Pain Catastrophizing Scale-Child; I: Items of TurPCS-C; H: Helplessness; R: Rumination; M: Magnification.

Table 5. Factors, items, factor loadings, and communalities values about the TurPCS-P

	Items	Factor loadings	Communality
Factor 1 (46.48%)*			
	I2 I feel I can't go on (H)	0.804	0.716
	I3 It's terrible and I think it's never going to be better (H)	0.764	0.587
	I5 I can't stand it anymore (H)	0.763	0.637
	I4 It's awful and I feel it takes over me (H)	0.758	0.631
	I1 I worry all the time whether pain will end (H)	0.733	0.654
	I6 I am afraid that pain will get worse (M)	0.695	0.606
	I7 I keep thinking of other painful events (M)	0.412	0.288
	I9 I can't keep it out of my mind (R)	0.407	0.256
Factor 2 (10.07%)**			
	I13 I wonder whether something serious will happen (M)	0.830	0.689
	I10 I keep thinking about how much it hurts (R)	0.761	0.705
	I11 I keep thinking about how much I want the pain to stop (R)	0.757	0.710
	I12 There's nothing I can do reduce pain (H)	0.460	0.306
Total (56.55)***			

*: First-factor variance according to TurPCS-P EFA; **: Second-factor variance according to TurPCS-P EFA; ***: Total variance of TurPCS-P. TurPCS-P: Turkish Pain Catastrophizing Scale-Parents; I: Items of TurPCS-P; H: Helplessness; R: Rumination; M: Magnification.

Concurrent and convergent validity

Concurrent and convergent validity of the TurPCS-C was evaluated with PedsQL, RCADS, NRS, MP usage time, and headache duration. As the total score increases in the PedsQL scales where the quality of life is examined, the scores obtained from factor 1, factor 2, and total areas on the TurPCS-C scale decrease ($p<0.05$, $r=-0.575$). There is a positive correlation between the scores obtained from the RCADS scale, which examines childhood anxiety and depression, and the scores

Table 6. Means, SD, and inter-correlations of all measures about TurPCS-C and TurPCS-P

	Mean±SD	Min-max	Boys mean±SD	Girls mean±SD	2	3	4
TurPCS-C Total	24.87±10.04	2–46	24.00±8.79	25.27±10.61	0.965**	0.677**	0.340*
TurPCS-C (Factor 1)	19.96±8.35	2–36	20.00±7.47	19.95±8.79		0.482**	0.319*
TurPCS-C (Factor 2)	4.91±2.79	0–11	4.00±2.23	5.32±2.93*			0.254*
Child age years	13.42±2.60	8–18	11.96±2.35	14.08±2.45			
	Mean±SD	**Min-max**	**Boys Mean±SD**	**Girls Mean±SD**	**2**	**3**	**4**
TurPCS-P total	26.75±10.51)	3–48	20.16±9.34)	29.74±9.67)**	0.960**	0.781**	0.225*
TurPCS-P (Factor 1)	16.19±7.74)	1–32	12.08±7.02)	18.05±7.38)**		0.604**	0.215
TurPCS-P (Factor 2)	10.56±3.75)	0–16	8.08±3.62)	11.69±3.25)**			0.196
Child age years	13.42±2.60)	8–18	11.96±2.35)	14.08±2.45)			

*: p<0.05; **: p<0.001. TurPCS-C: Turkish Pain Catastrophizing Scale-Child; TurPCS-P: Turkish Pain Catastrophizing Scale-Parents; SD: Standard deviation; Min: Minimum; Max: Maximum.

Table 7. Item-total correlations of TurPCS-C and TurPCS-P and Cronbach α coefficients when item is removed

TurPCS-C	Corrected item-total correlation*	Cronbach α** if item deleted	TurPCS-P	Corrected item-total correlation	Cronbach α if item deleted
Item 1	0.631	0.857	Item 1	0.728	0.875
Item 2	0.678	0.854	Item 2	0.736	0.873
Item 3	0.570	0.860	Item 3	0.570	0.882
Item 4	0.523	0.863	Item 4	0.679	0.876
Item 5	0.688	0.853	Item 5	0.678	0.876
Item 6	0.611	0.858	Item 6	0.704	0.875
Item 7	0.328	0.874	Item 7	0.461	0.889
Item 9	0.653	0.855	Item 9	0.435	0.889
Item 10	0.722	0.850	Item 10	0.655	0.878
Item 11	0.480	0.866	Item 11	0.670	0.878
Item 12	0.295	0.876	Item 12	0.445	0.889
Item 13	0.527	0.864	Item 13	0.415	0.890

*: Values ≥0.4 indicate good discrimination; **: For α, 0.8≤ α <0.9 is good and 0.7≤ α <0.8 is acceptable. TurPCS-C: Turkish Pain Catastrophizing Scale-Child; TurPCS-P: Turkish Pain Catastrophizing Scale-Parents; α: α coefficient.

obtained from our scale (p<0.05 for each). There is a positive correlation between the scores obtained from the NRS scale, in which pain intensity is examined, and the scores obtained from the first-factor subgroup of our scale and the total scale, whereas it was found that there was no correlation with the second subdomain of the scale. It was found that as the duration of MP use increased in minutes, the scores in the two-factor area and the total area increased (p<0.05 for each). In addition, in our study, the longer the daily headache duration in minutes, the higher the scores from the second subdomain of the scale.

Table 8. Test-retest analysis results of the TurPCS-C and TurPCS-P

	Test	Retest	ICCs (r)*/p
TurPCS-C, mean±SD	24.87±10.04	27.47±11.84	0.842/<0.001
TurPCS-P, mean±SD	26.75±10.51	31.13±13.31	0.813/<0.001

*: For ICCs, 0.75≤ ICCs ≤1.00 excellent. TurPCS-C: Turkish Pain Catastrophizing Scale-Child; TurPCS-P: Turkish Pain Catastrophizing Scale-Parents; ICCs: Intraclass correlation coefficient; SD: Standard deviation.

Table 9. Spearman correlations between TurPCS-C and its subscales with PedsQL, RCADS, NRS, MP usage time, and headache durations and Spearman correlations of TurPCS-P and its subscales with PedsQL-P and RCADS-P

	TurPCS-C Factor 1	TurPCS-C Factor 2	TurPCS-C total
PedsQL total	r=–0.569**	r=–0.343**	r=–0.575**
RCADS total	r=0.477**	r=0.287**	r=0.466**
NRS	r=0.441**	r=0.075	r=0.386**
MP usage (min)	r=0.292**	r=0.238*	r=0.311**
Headache duration (min)	r=0.203	r=0.222*	r=0.212
	TurPCS-P Factor 1	**TurPCS-P Factor 2**	**TurPCS-P total**
PedsQL-P	r=–0.388**	r=–0.194	r=–0.378**
RCADS-P	r=0.382**	r=0.298**	r=0.391**

*: p<0.05; **: p<0.01. TurPCS-C: Turkish Pain Catastrophizing Scale-Child; TurPCS-P: Turkish Pain Catastrophizing Scale-Parents; PedsQL: Quality of Life Scale for Children; RCADS: Revised Children's Anxiety and Depression Scale; NRS: Numerical rating scale; MP: Mobile phone; PedsQL-P: Quality of life Scale for Children-parents; RCADS-P: Revised Child Anxiety and Depression Scale-Parent version.

PedsQL-P and RCADS-P scales were used to evaluate the concurrent and convergent validity of TurPCS-P. Similarly, as the scores obtained from the PedsQL-P scale increased, it was observed that the scores obtained from the TurPCS-P factor 1 domain and total scale decreased. There is a positive correlation between the scores obtained from the RCADS-P scale and the scores obtained from our scale (p<0.05 for each). Spearman correlations of TurPCS-C and its subscales, PedsQL, RCADS, NRS, MP usage time, and headache durations, and Spearman correlations of TurPCS-P and its subscales, PedsQL-P and RCADS-P, are given in Table 9.

Discussion

TurPCS-C

The analysis results did not support the original three-factor construct presented by Crombez et al.;[5] however, according to the PCA results, a two-factor model, where item 8 ("When I am in pain, I want pain to go away") was excluded, was found to be the best model with the adaptive value. When the previous studies are examined, Tremblay et al.,[6] Solé et al.,[8] and Parkerson et al.[29] supported the original three-factor structure. The studies by Kröner-Herwig et al.,[7] Cederberg et al.,[9] and Pielech et al.[30] did not support the three-factor model. Although Solé[8] and Parkerson[29] supported the three-factor model, they found item 8 problematic because of low factor loading, and Solé[8] recommended the removal of item 8. As item 8 may negatively affect EFA modeling, we found it appropriate to exclude it from the analysis of the scale. Although the results of the confirmative factor analysis (CFA) were obtained in our study, they were not presented because of the fact that they were obtained through the same data set and the sample size was not sufficient. It is planned by our study team with a larger sample group evaluating CFA for TurPCS-C. Item-total correlation coefficients were determined to be between 0.30 and 0.72. Except for items 7 and 12, values were found to be >0.5. Similarly, Kröner-Herwing,[7] Solé,[8] and Pielech[30] found a lower item correlation coefficient for item 7 in their studies. Pielech[30] suggested that with the infrequent approval of the item, the positive response to this item might indicate the intrusive thoughts that the patient may have. Internal consistency was determined with Cronbach α method. In the original study,[5] internal consistency was found to be r=0.87. In the previous studies, the values ranged from 0.85 to 0.93.[6–9,29] TurPCS-C showed good internal consistency (α=0.871). Test-retest analysis showed an excellent correlation for TurPCS-C (ICCs=0.836). In the previous studies, it has been shown that there are consistent relationships between pain catastrophizing and quality of life, anxiety-depression, and pain severity.[5–8,31] In our study, it was determined that as the PedsQL total score increases, the scores obtained from factor 1, factor 2, and total fields in TurPCS-C decrease (p<0.05, r=–0.575). In line with the previous studies, as the quality of life score increased, there was a negative correlation in all three areas in our study. In addition, there is a positive correlation between the scores obtained from the RCADS scale and the scores obtained from our scale (p<0.05 for each). There was a positive correlation between the scores obtained from NRS scale, which evaluates pain inten-

sity and scores obtained from the first subscale and total scale, but no correlation was found in the second subscale. The consistency of these results with the findings reported in the previous studies[6–9,29,31] supports the validity of TurPCS-C construct.

Pain catastrophizing and the relationship between genders have been examined in the previous studies and reported that catastrophizing is higher in girls compared to boys.[6–9,32,33] In our study, a higher rate of catastrophizing thought was identified in female gender in accordance with these results. We think that the differences in answers of the items between the genders should be investigated more broadly with possible reasons. Inconsistent results were found when the previous studies were examined in terms of relationship between age and scale total scores. In the study of Crombez,[6] a negative relationship was found between age and total scores, and Kröner-Herwig[7] similarly found more catastrophizing tendencies in young children; on the other hand, no significant differences were found in the studies by Cederberg[9] and Parkerson.[29] We found that the scores obtained in all three areas of the TurPCS-C scale increased with increasing age ($p<0.05$ for each). In addition, we could not find any correlation between pain duration and scale scores. The relationships between MP use and headache severity have been studied.[34] In our study, we found a positive correlation with the two-factor area and the total area of the TurPCS-C scale as the duration of MP use increased in minutes ($p<0.05$ for each).

When all these results are evaluated, the first factor area of the two-factor TurPCS-C scale considers complaints about the severity of pain in the foreground, whereas the second part is thought to mostly evaluate the parts related to the duration and continuity of the pain.

TurPCS-P

The results did not support the original three-factor structure for TurPCS-P presented by Goubert et al.;[10] however, the model with the best adaptive values was determined as the two-factor model we created in our study, in which item 8 ("When my child is in pain, I want pain to go away") was excluded from the study. When the past studies were examined, it was seen that Cavalcante[12] supported the original[10] structure, whereas the studies by Pielech[30] and Cederberg[11] did not support the original[10] structure. Pielech[30] suggested removal of items 7 and 8. The EFA results of TurPCS-P were given in the Results section. Within our results, we think that item 8 should be excluded from the scale, but it would be more suitable to reach this suggestion on behalf of TurPCS-P with a different dataset and a larger sample group with CFA results.

Item-total correlation coefficients were found to be >0.40 (good discrimination) for all items. The TurPCS-P scale consisting of 12 items showed good internal consistency (Cronbach $\alpha=0.890$) and excellent temporal stability (ICCs=0.813). Convergent validity was evaluated with PedsQL-P and RCADS-P. As expected, there was a negative correlation with PedsQL-P (the higher the PedsQL-P total score, the better the health-related quality of life) and a positive correlation with RCADS-P (high RCADS-P scores indicate high anxiety-depression association) ($p<0.05$). It was determined that both subdomains of TurPCS-P were correlated with each other ($p<0.05$).

There were some limitations to our study. A sufficient number of samples for CFA could not be reached. The sample was composed of a group of patients with headache. To generalize TurPCS-C and P to pain conditions other than headache, a different sample including different chronic pain patients is needed. The children were invited to the study sequentially; because of the functioning of the outpatient clinic, randomization could not be achieved, which may have created a selection bias.

All patients were evaluated by the algologist, child neurology specialist, and the child psychiatrist; because of this, we believe that our study provides an advantage in terms of psychometric evaluation of scales and neuropsychiatric evaluation of the patients.

Conclusion

In this article, we presented the intercultural adaptation process of PCS-C and PCS-P to the Turkish language and evidence of their validity and reliability in a sample of pediatric patients with primary headache. Overall, this meticulously conducted study contributes to the literature and supports the use of TurPCS-C and TurPCS-P in studies of primary childhood headache in Türkiye.

Acknowledgment: The study team thanks all participating children and their families for their participation in the study. The entire study team thanks Prof. Liesbet Goubert for her encouragement and guidance throughout the entire study, from the initial permission phase to the evaluation of the data.

Ethical Approval: The study was approved by The Istanbul Kanuni Sultan Süleyman Training and Research Hospital Clinical Research Ethics Committee (Date: 02/08/2018, No: KAEK/2018.7.09).

Conflict-of-interest issues regarding the authorship or article: None declared.

Financial Disclosure: This study has no funding or sponsor.

Peer-review: Externally peer-reviewed.

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APPENDIX

Appendix 1. Ağrı felaketleştirme ölçeği-Çocuk (AFÖ-Ç)

Ağrı sırasında düşünceler ve duygular

Ağrı çektiğinizde ne düşündüğünüzü ve duygularınızın ne kadar güçlü olduğu ile ilgileniyoruz. Aşağıda ağrı çekerken yaşayabileceğiniz 13 farklı duygu ve düşünce cümlesi var. Her bir düşünceye ne kadar sahip olduğunuzu en iyi şekilde yansıtan cümlelerin altındaki kelimeleri daire içine alarak düşüncelerinizi ve hissettiklerinizi olabildiğince açık bir şekilde göstermeye çalışın.

1. Ağrı çektiğimde, ağrının geçip geçmeyeceği konusunda her zaman endişelenirim.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
2. Ağrı çektiğimde, bu şekilde daha fazla devam edemeyeceğimi hissederim.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
3. Ağrı çektiğimde, bunun çok kötü olduğunu ve hiçbir zaman daha iyi olmayacağını düşünürüm.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
4. Ağrı çektiğimde, bunun korkunç olduğunu ve beni mahvedeceğini hissederim.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
5. Ağrı çektiğimde, daha fazla katlanamayacak gibi hissederim.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
6. Ağrı çektiğimde, bu ağrının daha da kötüleşeceğinden korkarım.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
7. Ağrı çektiğimde, bu ağrı dışında diğer ağrı verici olayları düşünmeye devam ederim.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
8. Ağrı çektiğimde, bu ağrının sona ermesini isterim.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
9. Ağrı çektiğimde, bunu aklımdan çıkaramam.
   a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
10. Ağrı çektiğimde, bu ağrının bana ne kadar zarar verdiğini düşünmeye devam ederim.
    a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
11. Ağrı çektiğimde, ağrının hemen durmasını ne kadar isteğimi düşünmeye devam ederim.
    a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
12. Ağrı çektiğimde, ağrıyı durdurmak için yapabileceğim hiçbir şey yok.
    a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman
13. Ağrı çektiğimde, bunun ciddi bir şeyin işareti olup olmadığını merak ederim.
    a. Hiçbir zaman b. Nadiren c. Bazen d. Sıklıkla e. Her zaman

Appendix 2. Ağri felaketleştirme ölçeği-ebeveyn (AFÖ-E)

Ağrı sırasında düşünce ve duygular

Çocuğunuz ağrı çekerken ne düşündüğünüzü ve duygularınızın ne kadar güçlü olduğunu bilmek istiyoruz. Aşağıda duygu ve düşüncelerle ilgili 13 farklı ifade bulunmaktadır. Çocuğunuz ağrı çekerken sizin ne düşündüğünüzü ve hissettiğinizi mümkün olduğunca açık bir şekilde ifade etmek için, belirli bir düşünce veya duyguya ne sıklıkla sahip olduğunuzu en iyi temsil eden seçeneği işaretleyin.

1. Çocuğum ağrı çektiğinde, ağrının geçip geçmeyeceği konusunda her zaman endişelenirim.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
2. Çocuğum ağrı çektiğinde, bu şekilde daha fazla devam edemeyeceğimi hissederim.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
3. Çocuğum ağrı çektiğinde, bunun çok kötü olduğunu ve hiçbir zaman daha iyi olmayacağını düşünürüm.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
4. Çocuğum ağrı çektiğinde, bunun korkunç olduğunu ve beni mahvedeceğini hissederim.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
5. Çocuğum ağrı çektiğinde, daha fazla katlanamayacak gibi hissederim.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
6. Çocuğum ağrı çektiğinde, bu ağrının daha da kötüleşeceğinden korkarım.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
7. Çocuğum ağrı çektiğinde, bu ağrı dışında diğer ağrı verici olayları düşünmeye devam ederim.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
8. Çocuğum ağrı çektiğinde, bu ağrının sona ermesini isterim.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
9. Çocuğum ağrı çektiğinde, bunu aklımdan çıkaramam.
   a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
10. Çocuğum ağrı çektiğinde, bu ağrının ona ne kadar zarar verdiğini düşünmeye devam ederim.
    a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
11. Çocuğum ağrı çektiğinde, ağrının hemen durmasını ne kadar isteğimi düşünmeye devam ederim.
    a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
12. Çocuğum ağrı çektiğinde, ağrıyı durdurmak için yapabileceğim hiçbir şey yok.
    a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman
13. Çocuğum ağrı çektiğinde, bunun ciddi bir şeyin işareti olup olmadığını merak ederim.
    a. Hiçbir Zaman b. Nadiren c. Bazen d. Sıklıkla e. Her Zaman