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ORIGINAL ARTICLE – OPEN ACCESS

Parents' Postoperative Pain Measure: Turkish Validity and Reliability

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ABSTRACT

Objective: This study aimed to test the reliability and validity of the Turkish version of the Parents' Postoperative Pain Measure.

Materials and Methods: The permission was obtained via email from the creator of the measure, Christine T. Chambers. A sample of 150 children aged 7–12 years (48.7% girls, 51.3% boys) was recruited for this methodological study. The instrument consisted of 15 items. A "Sociodemographic Questionnaire," the "Parents' Postoperative Pain Measure," and the "Wong–Baker Faces Pain Rating Scale" were utilized as data collection instruments. The study consisted of language and content validity testing (the technique of translation-back translation, Lawshe's technique), construct validity (exploratory and confirmatory factor analyses), and reliability testing (Kuder–Richardson 20 test, Pearson product moment correlation between parallel forms). Measurements were taken on postoperative days 1, 2, and 3.

Results: The results of the factor analysis for validity demonstrated acceptable levels. The factor analysis produced a single factor with a total variance of 69%. The Parents' Postoperative Pain Measure and the Wong–Baker Faces Pain Rating Scale exhibited positive correlations on postop days 1, 2, and 3 ($r=0.67/p<0.01$, $r=0.74/p<0.05$, $r=0.79/p<0.05$). The internal consistency coefficient (Kuder–Richardson 20) was 0.851.

Conclusion: The Parents' Postoperative Pain Measure, originally developed by Chambers et al. in the English language, is a valid and reliable instrument that is suitable for use in Turkish and the Turkish culture.

Keywords: Child, postoperative, pain, reliability, validity

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INTRODUCTION

Although many studies exist in the literature on the assessment of postoperative pain in children, pain still continues to be a source of anxiety for children (1, 2). Several complications including pneumonia, deep vein thrombosis, and urinary and fecal retention are reported to develop in children as a result of postoperative pain (3, 4). These conditions delay postoperative recuperation and present a burden for both the child and the family (5). The child's return to normal routine becomes a challenge, worsening the child's current status. This is why the postoperative goal is to achieve recovery in the shortest time possible (3, 4, 6).

When pain is considered as one of the most important factors that have an adverse impact on postoperative recovery, pain control is clearly essential. The first step of effective pain management is making an accurate pain assessment (7, 8). Besides the age factor, gender, fear, anxiety, and previous experience with pain or making an incorrect pain assessment can also cause children to experience severe postoperative pain (3, 9).

Postoperative care aims at protecting the child from hospital-acquired infections and at planning for discharge as soon as possible so that the child can return to his/her accustomed routine at an early stage (3, 9). A child's care is overseen at home by the child's parents following discharge from the hospital. The postoperative care of the child also includes pain assessment and management (10, 11). Studies have shown that parents expect support in assessing and reducing their child's postoperative pain (5, 12). When pain assessment is not accurate, pain-related complications may arise and sometimes necessitate rehospitalization. Because of this, parent's ability to accurately and effectively assess their child's pain in the home setting is important (12). No measuring tool in the Turkish language exists with which parents can assess their child's postoperative pain. This study to carry out reliability and validity study of the Turkish version of the Parents' Postoperative Pain Measure. The research questions to be answered in line with this aim were the following:

- Is the Turkish version of the Parents' Postoperative Pain Measure a valid instrument?
- Is the Turkish version of the Parents' Postoperative Pain Measure a reliable instrument?

Table 1. Statistical tests to be used for validity and reliability

Methods used to test validity	Language validity	Translation-back translation method
	Content validity	Lawshe's technique
		Content validity ratios/index
	Exploratory factor analysis	Bartlett's test of sphericity
		Kaiser–Mayer–Olkin Test
	Confirmatory factor analysis	Factor loadings
		Goodness-of-fit criteria
Methods used to test reliability	Internal consistency	Kuder–Richardson 20 Test
	Test–retest	Pearson Moments Multiplication Correlation
	Parallel forms reliability test	Pearson Moments Multiplication Correlation
	Additivity test	Tukey's test

MATERIALS and METHODS

Type of Research

This study used a methodological design.

Study Population and Sample

The study was conducted in the pediatric surgery department of a state hospital in Turkey's Western Black Sea region with children who had undergone surgery. The children were aged 7–12 years, in keeping with the scope of screening in the original study. In studies involving measures, sample size is determined through the use of a principle that requires the number of participants to be 5–10 times the number of items on the measure. Consequently, 150 children were taken into the sample for the 15-item Parents' Postoperative Pain Measure.

Data Collection Tools

Sociodemographic Characteristics Form: This is a short form that queries the child's gender, age, and the type of surgery that the child had undergone.

Parents' Postoperative Pain Measure (PPPM): This instrument is a scale developed by Chambers et al. (1996) (13) to enable parents to assess their child's postoperative pain. The Parents' Postoperative Pain Measure allows for an evaluation of pain at three different time periods in the day: breakfast-lunch, lunch-supper, and supper-bedtime. The scale contains 15 items that each elicit a response of a "Yes" or "No." Questions receiving a "Yes" answer are scored, and the total possible score on the scale is a minimum of 15. Scores of 6–15 on the scale are interpreted to mean that "the child has pain of clinical significance," and 0–6 points for PPPM indicates that the child has pain that does not require intervention. The permission for adaptation of the original scale was obtained by email from Christine T. Chambers.

Wong–Baker Faces Pain Rating Scale: Developed in 1981 by Donna Wong and Connie Morain Baker (14) to assess the level of children's pain, this visual scale was revised in 1983. The scale has six facial expressions that are scored on a range of 0–6. The faces on the Wong–Baker scale express, from left to right, increasing degrees of pain severity.

Data Collection

The permissions necessary for the conduct of the study were obtained from the author of the scale, the relevant ethics committee, and the institution where the research was to take place. The study was conducted over the period from February 2016 to March 2017. Two instructors from the English Language and Literature Department and nine experts in the field were enlisted to assess the scale's language and content validity. Discussions were held with the children and their parents for testing the comprehensibility of the questionnaire and for the actual research. All the participants were informed about the purpose of the study and were invited to participate. Twenty children, aged 7–12 years, participated in the pretest, and the actual study was conducted with 150 children, aged 7–12 years, and their parents. Measurements were taken on postoperative days 1, 2, and 3. The parents were asked to evaluate their child's pain on the Parents Postoperative Pain Measure, while the children were asked to assess their own pain on the Wong–Baker Faces Pain Rating Scale.

Data Analysis

The SPSS for Windows 22.0 and SPSS AMOS 16.0 programs were employed in the data analysis. The confidence interval was 95%, and the level of significance was accepted as $p<0.05$. The methods used in the analysis are shown in Table 1.

Ethical Considerations

The documents related to the original scale and the permission for its adaptation into Turkish was received from Chambers via email. Ethical permission for the study was obtained from the Zonguldak Bülent Ecevit University Human Studies Ethics Committee (Decision No. 02.03.202/107). A written permission was received from the institution concerned. The purpose of the study was explained to the children and their parents, and a written informed consent was obtained from the parents.

RESULTS

Among the children enrolled into the study, 48.7% and 51.3% were girls and boys, respectively. The mean age of the children was 10.15±1.95 (7–12 years), and all had been hospitalized for an appendectomy. The results of the tests for the scale's validity and reliability can be seen in Tables 2, 3, 4, and 5.

The language and content validity of the scale was tested as a first step. Two graduates of the English Language and Literature De-

Table 2. Content validity and exploratory factor and confirmatory factor analysis results of the scale*

	Items	Content validity ratios	Factor loadings	
			Exploratory factor analysis	Confirmatory factor analysis
1	Whining or complaining more than usual?	100	0.750	0.910
2	Crying more easily than usual?	100	0.746	0.840
3	Playing less than usual?	100	0.736	0.880
4	Not doing the things he/she normally does?	100	0.724	0.790
5	Acting more worried than usual?	100	0.704	0.820
6	Acting more quiet than usual?	100	0.596	0.860
7	Having less energy than usual?	78	0.564	0.800
8	Refusing to eat?	100	0.501	0.790
9	Eating less than usual?	100	0.482	0.820
10	Holding the sore part of his/her body?	100	0.542	0.720
11	Trying not to bump the sore part of his/her body?	100	0.535	0.630
12	Groaning or moaning more than usual?	100	0.528	0.740
13	Looking more flushed than usual?	78	0.425	0.590
14	Wanting to be close to you more than usual?	100	0.403	0.650
15	Taking medication when he/she normally refuses?	78	0.465	0.620

*: Values represent results of measurements on day 1

Table 3. Validity and reliability results of the scale*

Tests	Values
Kuder–Richardson 20	0.851
Kaiser–Meyer–Olkin Test	0.708
Bartlett's test of sphericity	0.000
Explained variance	69% (Single factor)
Content validity index	0.95
Goodness-of-fit indexes	Chi-square/SD=184.48/137=1.37
	RMSEA=0.005
	NFI=0.91
	CFI=0.96
	IFI=0.94
	RFI=0.86
	GFI=0.89
	SRMR=0.013

SD: Standard deviation; RMSEA: The root mean square error of approximation; NFI: Normed Fit Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; RFI: Relative Fit Index; GFI: Goodness of Fit Index; SRMR: Standardized root mean square residual

partment were asked to assess the scale's language validity. Two instructors translated the scale from English into Turkish. After the authors incorporated the two translations into a single form, two specialists in the field fluent in English and Turkish translated the text back into English. The English original and the English form produced by the two translators exhibited no difference regarding its meaning. The Turkish version of the scale was sent to nine experts in the field to confirm content validity. The content validity ratios and the content validity index calculated in line with the views of the experts are presented in Table 2. The nine experts agreed that CVI>CVR (0.95>0.78). Lastly, the scale was applied to 20 parents as a pretest. No negative feedback was received from the parents about the questions asked. The language and content validity of the scale was thus confirmed.

For construct validity, an exploratory (EFA) and a confirmatory factor analysis was performed. The Kaiser–Meyer–Olkin (KMO) value of 0.708 was a valid and acceptable KMO calculation. Bartlett's value was found to be less than 0.05, representing a statistically significant result. According to the EFA results, factor loadings varied between 0.40 and 0.75 (Table 3). The EFA produced a single factor with a total variance of 69%. For construct validity, confirmatory factor analysis (CFA) was performed to confirm the factors found in the original scale. The goodness-of-fit criteria in the CFA were at acceptable levels (Table 3). The factor loadings appearing in the CFA are shown in Table 2.

The results of Turkey's test for nonadditivity showed that the difference between the measurements ($p<0.05$) and the property of additivity $p<0.05$) were statistically significant (Table 4). Thus, the items on the scale were seen to have achieved additivity.

To test the reliability of the scale, the Kuder–Richardson 20 (KR-20), item-total correlations, and the correlation between the scale and Wong–Baker Faces Pain Ratings were investigated. The findings were that KR-20 was 0.85 (Table 3). The Parents' Postoperative Pain Measure and the Wong–Baker Faces Pain Rating Scale exhibited positive and statistically significant correlations on postop days 1, 2, and 3 ($r=0.67/p<0.01$, $r=0.74/p<0.05$, $r=0.79/p<0.05$) (Table 5).

Table 4. The ANOVA TEST (together with the Tukey's test) for the scale's additivity*

		ANOVA with Friedman's test and Tukey's test for nonadditivity				
		Sum of squares	**df**	**Mean square**	**Friedman's chi-square**	**Sig**
Between individuals		110.265	149	0.740		
Among individuals	Between items	4.958	14	0.354	3.003	0.000
	Residual nonadditivity	0.964[a]	1	0.964	8.200	0.004
	Balance	245.011	2085	0.118		
	Total	245.975	2086	0.118		
	Total	250.933	2100	0.119		
Total		361.198	2249	0.161		
Grand mean=0.80						

a. Tukey's estimate of power to which observations must be raised to achieve additivity =2.591

*: Values represent results of measurements on day 1.

Table 5. Correlation between the Parents Postoperative Pain Measure and the Wong–Baker Faces Pain Rating Scales

Measurement day	**Correlation**
Day 1	r=0.67;p<0.01
Day 2	r=0.74;p<0.05
Day 3	r=0.79;p<0.05

DISCUSSION

The first step in carrying out a scale adaptation is to seek language and content validity. The translation/back translation method was used for language validity in this study. Lawshe's technique was used to test content validity; nine experts in the field were asked to provide their ratings. Raters are called on to assess whether or not the scale items actually relate to the characteristics to be measured and whether the items are as simple and clear as possible (15, 16). The views of the experts on the items were incorporated into a single questionnaire, and the content validity ratios of each question were calculated. An assessment was made as to whether the positive items in the Turkish adaptation of the measure displayed significance (since the number of experts was 9, CVR=75%), It was then decided that 15 of the choices that were statistically significant and where CVR α=0.05 would be included in the final form of the measure. The Content Validity Index (CVI) was calculated based on the mean of total CVR's; the value found was 0.95.

EFA was performed to test the construct validity of the items in the Turkish version. To evaluate the suitability of the sample size for factor analysis, the CVR was considered, after which Bartlett's test of sphericity was applied to investigate whether the data were normally distributed (15, 16). The value of 0.708 found for Kaiser–Meyer–Olkin (KMO) was determined to be valid and acceptable. Bartlett's value was found to be less than 0.05, which represented a statistically significant result. The measure was then seen to be subjected to factor analysis (15, 16).

The factor loadings indicate the weight of the relevant factor or its weight in the overall scale. A positive value that is greater than +0.30 for this coefficient is required (15). The result of the EFA indicated that factor loadings ranged between 0.40 and 0.75. According to the EFA result, no item was removed from the measure. Also, the EFA revealed a single factor model and a total variance of 69% in the Turkish version. CFA was performed for the scale's construct validity and in order to confirm the results of the EFA. Studies on scale adaptations stress that a CFA should definitely be performed (14, 15). The goodness-of-fit criteria of the scale's CFA model were found to be acceptable.

Reliability is the degree of consistency between independent measures on a scale or in terms of the property that the scale is assessing (15, 16). Parallel forms reliability is a method of testing reliability that can be used when the scale has an alternative or equivalent form or when such a form is created. The researcher uses this method to show the strength of the scale being tested (15, 17). The KR-20 coefficient was used to determine the scale's internal consistency. KR-20 is used to express the reliability of scales in which responses have two options such as "Yes or No" (17). The higher the KR-20 coefficient, the more in agreement are the scale items with each other, meaning that all the items can work together to assess the same feature (15, 16). In the original study, the internal consistency coefficient of the scale was a maximum of 0.88 (13). The internal consistency coefficient of the scale was 0.87 and 0.90 in the German (18) and Spanish adaptation, respectively (19). In the present study, the KR-20 value of the scale was 0.851. Saying that this value indicates that the scale is suitable for use in the Turkish language is possible.

The correlation between the parallel forms was examined in the process of testing the scale for reliability. In the original study of the scale by Chambers et al. (1996) (13), the correlations between the Parents Postoperative Pain Measure and the Wong–Baker Faces Pain Rating Scales were 0.58 and 0.37 on day 1 (p<0.001) and day 2 (p<0.001), respectively. A comparison was made in the German adaptation of the scale between the Faces Pain Ratings for postoperative days 1–5; the correlations were found to be between 0.66 and 0.44 (p<0.01). The correlations found in this study on day 1, r=0.87 (p<0.01); day 2, r=0.74 (p<005); and day 3, r=0.79 (p<0.05) were statistically significant. The high

correlation values found in the Turkish version are higher than in the original form of the scale and also as compared to other postoperative pain measures.

Limitations of This Study

One-center data collection of this study may be considered a limitation, but this study provides relevant and valuable information about the psychometric properties of the Turkish version of the scale.

CONCLUSION

The Parents' Postoperative Pain Measure, originally developed by Chambers et al. in the English language, is a valid and reliable instrument that can be used in Turkish and the Turkish culture. The scale can be used by Turkish parents for assessing their child's postoperative pain. A recommendation may be to conduct validity and reliability testing for scales to be applied to children of different age groups who have undergone surgery for different reasons.

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Informed Consent: Written informed consent was obtained from patients who participated in this study.

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