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Reliability and Validity of the Turkish Version of the Revised American Pain Society Patient Outcome Questionnaire in Postoperative Patients

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BACKGROUND/AIMS
The aim of the present study was to evaluate the psychometric properties of the Turkish version of the Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) in postoperative patients.

MATERIAL and METHODS
A descriptive, cross-sectional psychometric study design was used to examine the psychometrics of the Turkish APS-POQ-R among a convenience sample of 218 adult postoperative patients treated by five surgical departments in two hospitals. The 23-item English version of the questionnaire was translated into Turkish according to international guidelines. For the questionnaire, construct validity was analyzed with confirmatory factor analyses and known group validity. Cronbach's alpha was used to examine the questionnaire internal consistency reliability.

RESULTS
The Cronbach's alpha of the questionnaire was .91. Cronbach's alpha coefficients for the subscales were pain severity and sleep interference .87, activity interference .92, affective .95, adverse effects .91, and perception of pain care .50.

CONCLUSION
The Turkish APS-POQ-R was found to have confirmatory factor structure and internal validity and construct reliability similar to the original instrument. The questionnaire appears to be useful to evaluate the quality of pain management in postoperative patients and can be used to guide the implementation of nursing interventions. Further investigation is warranted on the perceptions of care subscale.

Keywords: Patient outcomes, postoperative pain, psychometrics, reliability, revised American pain society patient outcome questionnaire

INTRODUCTION

Acute postoperative pain is a common clinical condition requiring an evidence-based, planned, and multimodal approach (1). Despite the increase in knowledge on the physiology and control of pain, most of the patients do not receive sufficient analgesia or pain control during the surgical period (2).

Data collected by the World Health Organization from 194 countries reveal that approximately 312.9 million major surgical operation occurred in 2012 (3). In the case of Turkey, the annual number of surgical operation is >8.6 million (4). According to the literature, the percentage of patients who suffer from severe pain during the first postoperative day ranges between 20% and 80% worldwide (5, 6) and between 60% and 77% in Turkey (7). Inadequately treated postoperative pain delays recovery and discharge, which in turn decreases patient satisfaction (2).

Whenever possible, postoperative pain should be prevented and controlled. The aim of acute pain management is to prevent postoperative complications, speed up the recovery period, minimize the side effects of analgesics, and prevent

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acute pain from becoming chronic (1, 8). Effective pain management is a central concern of nursing. Inadequate pain management decreases patient satisfaction and may prolong the length of the recovery period and the risk of re-hospitalization (9-11).

Pain management is an important indicator of healthcare quality. Quality pain management is a multidimensional issue that starts with the proper evaluation of pain of the patients and their response to the treatment. Monitoring and evaluation of pain management quality by using the appropriate measurement tools are essential for the improvement of patient outcomes and pain management quality (10, 12).

Gordon et al. (12) identified measurable patient reported outcome domains to evaluate acute pain management quality. These include pain severity and relief; impact of pain on activity, sleep, and negative emotions; side effects of treatment and perceptions of the patients, such as helpfulness of the information received about pain treatment; ability to participate in pain treatment decisions; and satisfaction with the results of the treatment. To develop a standard measurement tool for quality improvement purposes that includes these dimensions, the researchers revised the American Pain Society Patient Outcome Questionnaire (APS-POQ) developed by the American Pain Society in 1991 (American Pain Society Quality of Care Committee, 1995). In the revised questionnaires, APS-POQ-R has been used to evaluate the impact of acute postoperative and medical condition-related pain in hospitalized adults and has been translated into 12 different languages (12-16), for example, Chinese, Australian, and Icelandic versions (13, 15, 16).

Although there are various questionnaires in Turkish used to identify pain sources and severity (17-19), there is no measurement tool to evaluate the quality of pain management using patient reported outcomes together with pain treatments. Such a tool may aid the health professionals to evaluate the postoperative pain management quality, effects of pain on patient outcome, patients' activity and mood, and side effects of pain and pain management. This methodological study has been conducted to evaluate the reliability and validity of the Turkish version of the APS-POQ-R.

Research Questions

1. What is the reliability coefficient of the Turkish version of the APS-POQ-R?
2. Isw the confirmatory factor analysis in harmony with the preliminary factor structure?

MATERIAL and METHODS

This methodological study was conducted at the general surgery and orthopedics, urology, gynecology, and neurosurgery wards of two state hospitals in the Turkish Republic of Northern Cyprus. The study included participants aged >18 years, who underwent minor and major surgical operations, and who stayed at the hospital for at least 24 h.

Studies on scale development, reliability, and validity suggest that the sample size should be at least 200 and 10 times the number of items (20). Based on these criteria, a total of 230 voluntary participants were included to our research. However, owing to the shortcomings in the data collection form of 12 patients, the study was conducted with the participation of 218 voluntary patients.

Data were collected between February 26, 2017 and June 22, 2017. Gordon et al. (12) collected data from patients who received treatment for at least 24 h in a hospital 72 h after the surgical operation. Patients answered a questionnaire on postoperative day 3. Patients who met the inclusion criteria were informed about the aims of the research. Written and verbal consents were obtained from the voluntary participants.

The researchers read the questions to the participants and recorded their responses. Descriptive data on age, gender, clinic, type and location of surgery, type of analgesics, and route of analgesics administration were obtained from the patient files and recorded to the Descriptive Characteristics Form. Data on pain management quality and patient outcome were collected by using the APS-POQ-R.

The APS-POQ-R is composed of 23 items that aim to measure the five dimensions of the pain management quality. Five subscales, which consisted of a total of 18 items, include pain severity and sleep interference (five items), activity interference (two items), affective (four items), adverse effects (four items), and perceptions of care (three items) subscales. Overall, the Cronbach's alpha of the original questionnaire was .86. Additional items in the questionnaire, including information about pain treatment options, the use of non-medication methods, and how often a doctor or nurse encouraged the use of non-medication methods, were evaluated from the subscales.

The responses to the two items on the estimate of percentage of time in severe pain and the pain relief in the first 24 h were measured according to their percentages that ranged between 0% and 100%. The responses to the remaining 16 items of the five subscales were measured by the 0–10 numeric rating scale, which was treated as a continuous scale. Additional items on the use of non-medication methods and receiving information about pain treatment options involved dichotomous yes/no responses. A "yes" response was followed by a request for a more specific response.

The APS-POQ-R was translated and retranslated according to international guidelines (21). It was first translated into Turkish by two experts on the English and Turkish languages. Translation validity of the APS-POQ-R was evaluated by using a retranslation technique. The APS-POQ-R was translated back to English by two experts of the English language who did not see the original APS-POQ-R. Items in the retranslated APS-POQ-R were compared with those in the original scale, and expert opinion was used for evaluating translation validity. To maintain content validity, the scale was evaluated in line with the suggestions of nine clinicians and academicians from the clinics and departments of surgical nursing, basics of nursing, psychiatric nursing, anesthesiology, psychology, and internal medicine. Based on the suggestions, changes were made in three questions. For the "how much pain interfered or prevented you from" question, the expressions were changed from "did not intervene" and "completely intervened" into "did not prevent" and "completely prevented." In the questions "In the first 24 hours, how much pain relief have you received? Please circle the one percentage that

best shows how much relief you have received from all of your *pain treatments* combined" and "Did you use any non-medicine methods to relieve your pain?," the expressions "analgesic" and "ice bag" were replaced with "pain treatment methods" and "cold application," respectively. The APS-POQ-R was modified based on expert opinion, and the questionnaire was finalized.

To evaluate expert opinion, Content Validity Index (CVI) was used (22). While assessing expert opinion, CVI was used, which was evaluated by calculating Item-Content Validity Index (I-CVI) and Scale-Content Validity Index (S-CVI). The I-CVI for each item and the S-CVI for the whole questionnaire were calculated. The I-CVI and S-CVI scores on nine expert opinions were .82 and .84, respectively. I-CVI and S-CVI are suggested to be higher at .80 and .78, respectively (22). The I-CVI and S-CVI scores for this research were .82 and .84, respectively. This finding suggests that there is a consensus among the experts, and that the APS-POQ-R has a clear and intelligible content. Following the evaluation of expert opinion, the suggestions of an expert in the Turkish language were taken to adapt the scale into Turkish.

After maintaining translation and content validity, the APS-POQ-R was administered on 50 voluntary participants to evaluate the extent to which the questions were clear and intelligible. Additionally, an evaluation form was prepared to receive feedback from the participants. The evaluation form consisted of statements, such as "explanations in the APS-POQ-R were clear," "it was easy to follow the APS-POQ-R," "questions in the APS-POQ-R were clear," and "questions in the APS-POQ-R were boring." The participants were asked to express their opinions on these statements by using a five-point Likert scale with categories that ranged from "strongly agree" to "strongly disagree." The analysis of the responses of the participants of the pilot study reveals that 99% of the participants found the Turkish version of the APS-POQ-R as clear and intelligible. Participants in the pilot study were excluded in the final sample.

Statistical Analysis

Data obtained were evaluated by using Statistical Package for the Social Sciences version 18.0 (SPSS Inc.; Chicago, IL, USA). Descriptive statistics were used to evaluate sample characteristics and pain management results. While evaluating the psychometric characteristics of the Turkish version of the APS-POQ-R, confirmatory factor analysis and known group validity for validity analysis and Cronbach's alpha coefficient and item–total correlation for reliability analysis were used.

The study was approved by the Scientific Research and Publication Ethics Committee of the Eastern Mediterranean University (ET00-2016-0156), Ministry of Health (YTK.0.00-1/2013-16/7303). Written consent was obtained from the participant patients by using an "Informed Voluntary Consent" form. Written permission was also obtained from D.B. Gordon to translate the original APS-POQ-R into Turkish.

RESULTS

The average age of the participants in the sample of this research was 39.7±15.00 years. In the present study, 70.6% of the participants were female, and 39.0% received treatment at the gynecology clinic. Approximately 52.8% of the participants underwent minor surgical operation, 93.1% received non-steroidal anti-inflammatory drug (non-opioid), 80.0% were administered analgesics by intramuscular route, and 51.4% underwent prior operation (Table 1).

Construct validity of the Turkish version of the APS-POQ-R was analyzed, and the results of confirmatory factor analysis in the modified model were shown to be acceptable. Chi-square/p value was 328.41/0.000 ($p<.05$), chi-square degree of freedom was 2.67, root mean square error of approximation (RMSEA)/p value was .088 ($p<.05$), and standardized root mean square residual (SRMR) value was .12. Adjusted goodness of fit index (AGFI), comparative fit index (CFI), non-normed fit index (NNFI), and goodness of fit index (GFI) that were created to test the resultant model were .80, .96, .95, and .86, respectively, further supporting that the model was acceptable. When the factor loads of the items of the APS-POQ-R were analyzed, we found that the item "allowed to participate in decisions about pain treatment" had a factor load of .17, whereas the factor loads of the remaining 17 items ranged between .56 and .96 (Figure 1).

Construct validity of the APS-POQ-R was analyzed by using known group validity. Gender, age, prior surgical experience,

TABLE 1. Characteristics of the surgical patients (N=218)

Variables	N	%
Age		
≤60 years	193	88.5
>60 years	25	11.5
Gender		
Female	154	70.6
Male	64	29.4
Location of surgery		
Abdomen/anorectal	144	66.1
Orthopedics	58	26.6
Head/neck/lumbar	16	7.3
Type of surgery		
Minor surgery	115	52.8
Major surgery	103	47.2
Type of analgesic		
Opioid	7	3.2
NSAID	203	93.1
Opioid+NSAID	8	3.7
Route of administration of analgesics		
IV	43	13.0
IM	178	80.0
Oral	16	7.0
History of surgery		
Yes	112	51.4
No	106	48.6
Total	218	100.0

NSAID: non-steroidal anti-inflammatory drug; IV: intravenous; IM: intramuscula

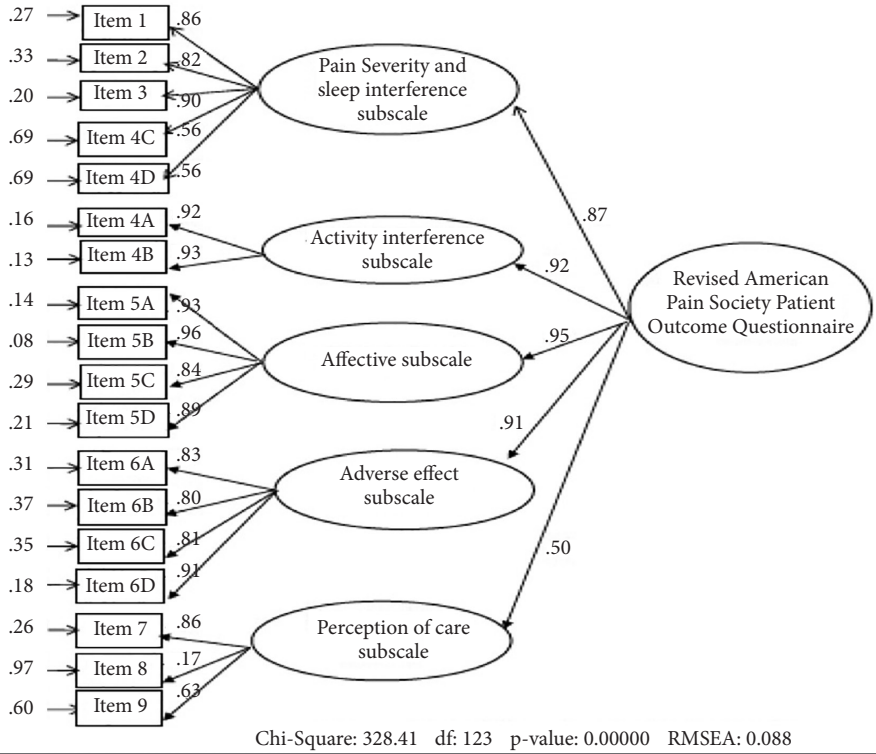

FIGURE I. Confirmatory factor analysis of APS-POQ-R: path coefficients and error variances (N=218)

TABLE 2. Mean differences of APS-POQ-R subscales in known group patients (N=218)

		APS-POQ-R Subscales				
Variables	**n**	**Pain severity and sleep interference M±SD**	**Interference with activity M±SD**	**Affective M±SD**	**Adverse effects M±SD**	**Perceptions of care M±SD**
Age						
≤ 60	193	6.86±1.99	7.14±2.23	5.67±3.14	4.47±3.11	5.33±1.96
> 60	25	6.88±1.97	6.80±2.50	5.19±3.50	4.41±3.29	6.09±2.06
Z		.113	.419	.552	.078	1.852
p*		.910	.676	.581	.938	.064
Sex						
Female	154	7.08±1.92	7.31±2.01	6.00±3.05	4.88±3.14	5.60±1.98
Male	64	6.32±2.03	6.59±2.73	4.71±3.31	3.46±2.88	4.97±1.93
t		2.633	1.902	2.774	3.225	2.152
p*		.009	.060	.006	.002	.033
Surgery type						
Minor	115	6.48±1.99	6.78±2.44	5.20±3.09	4.42±3.19	5.11±1.96
Major	103	7.28±1.89	7.46±2.00	6.08±3.23	4.50±3.07	5.77±1.96
t		3.031	2.247	2.052	.206	2.479
p*		.003	.026	.041	.837	.014
History of surgery						
Yes	112	6.87±1.96	7.22±1.98	5.58±3.24	4.76±3.13	5.38±2.08
No	106	6.85±2.01	6.98±2.53	5.66±3.12	4.14±3.10	5.46±1.89
T		.104	.790	.185	1.461	.267
p*		.917	.430	.853	.146	.790

M±SD: mean ± standard deviation
*p<.05

type of surgical operation (minor–major), and average scores of the subscales of the APS-POQ-R were evaluated (Table 2). The analysis of the relationship between gender and the average scores of the subscales reveals a significantly meaningful relationship between being female and the subscales of pain severity and sleep interference, affective, and adverse effects (p<.01). On the other hand, the average score obtained by the female participants from the perceptions of care subscale was meaningfully higher than that by all participants (p<.05). Although the average scores obtained by the female participants from the activity interference subscale are higher than those by the male participants, the relationship was not statistically meaningful (p>.05).

The analysis of the relationship between age and prior surgical experience of the participants and the average scores of the subscales of the APS-POQ-R reveals no meaningful relationship between these variables (p>.05). Compared with those who had minor surgical operation, participants who underwent major surgical operation had significantly meaningful scores from pain severity and sleep interference subscale (p<.01) and meaningful scores from activity interference, affective, and perceptions of care subscales (p<.05). On the other hand, the relationship between the type of surgery and adverse effects subscale was not statistically meaningful (p>.05).

The internal consistency reliability of the APS-POQ-R is shown in Table 3. Cronbach's alpha coefficient of the 18 items of the APS-POQ-R was .91. Cronbach's alpha coefficients for the subscales of the APS-POQ-R were .87 for pain severity and sleep interference, .92 for activity interference, .95 for affective, .91 for adverse effects, and .50 for perception of pain care. Cronbach's alpha if the item was deleted for the APS-POQ-R was between 90 and 92, whereas item–total correlation was between .27 and .83 and was positive and statistically highly meaningful (p<.01) (Table 3).

Descriptive statistics of additional items of the APS-POQ-R are shown in Table 4. Accordingly, 75.7% of the patients stated that they did not receive information about pain treatment options. For participants who expressed that they received information about pain treatment options, the average score for the additional item on the helpfulness of the information was 6.91±2.02. In addition, 56.4% of the participants stated that they did not

TABLE 3. Item to total correlations and Cronbach's alpha (N=218)

Item's No	Subscales and items	Cronbach's Alpha of subscale	Corrected item-total correlation		Cronbach's Alpha if item deleted
			r≠	p*	
	Total Scale	.91			
	Pain severity and sleep interference subscale	.87			
1	Least pain		.56	<.001	.91
2	Worst pain		.38	<.001	.91
3	Percentage of time in severe pain		.56	<.001	.91
4C	Pain interfered falling asleep		.75	<.001	.90
4D	Pain interfered staying asleep		.75	<.001	.90
	Activity interference	.92			
4A	Pain interfered activities in bed		.51	<.001	.91
4B	Pain interfered activities out of bed		.58	<.001	.91
	Affective	.95			
5A	Pain caused to feel anxious		.79	<.001	.90
5B	Pain caused to feel depressed		.83	<.001	.90
5C	Pain caused to feel frighten		.75	<.001	.90
5D	Pain caused to feel helpless		.77	<.001	.90
	Adverse effect	.91			
6A	Nausea		.70	<.001	.90
6B	Drowsiness		.72	<.001	.90
6C	Itching		.73	<.001	.90
6D	Dizziness		.76	<.001	.90
	Perception of care	.50			
7	Pain relief		.49	<.001	.91
8	Participate in decisions about pain treatment		.27	<.001	.92
9	Satisfied with the results of pain treatment		.35	<.001	.91

≠r: Pearson correlations
*p<.001

TABLE 4. APS-POQ-R descriptive statistics of other items (N=218)

Items	n	%
Did you receive information about pain treatment options?		
Yes	53	24.3
No	165	75.7
	Min-Max	M±SD
How helpful information was if received? (n=53) [a]	3-10	6.91±2.02
	n	%
Did you use any nonmedication methods?		
Yes	95	43.6
No	123	56.4
Used non pharmacological methods (n: 95)[b]		
Deep breathing	39	41.1
Walking	22	10.2
Praying	16	7.8
Cold pack	13	7.2
Listen to music	9	8.5
Heat	8	8.4
Distraction (Watching Tv, reading etc.)	19	20.3
Did a doctor or nurse encourage nonmedication methods?		
Never	191	87.6
Sometimes	18	8.3
Often	9	4.1
Total	218	100

Max: maximum score; Min: minimum score; M±SD: mean ± standard deviation

[a]The averages are calculated on 53 people (n=53)

[b]More than one option is marked. Percentages are calculated over 95 people (n=95)

use non-medication methods. For participants who expressed that they used non-medication methods (n=95), 41.1% stated that they used deep breath method, and 87.6% said that the doctor or nurses did not encourage non-medication methods.

DISCUSSION

The present study, which originated from the need for the development of a measurement tool in Turkish to evaluate pain management quality and include patient reported outcomes, adapted the APS-POQ-R into Turkish (12). The items of the APS-POQ-R were first translated into Turkish, and the translation and content validity of the Turkish version were evaluated. Next, the psychometric characteristics, internal consistency, item reliability, and construct validity of the APS-POQ-R were evaluated.

Studies that have been conducted to adapt the existing questionnaires into different cultures and languages suggest the use of confirmatory factor analysis to analyze construct validity (23, 24). In line with the suggestions in the literature, confirmatory factor analysis was conducted to evaluate the construct validity of the APS-POQ-R. Factor load of the item "allowed to participate in decisions about pain treatment" was .17, whereas the factor loads of the remaining 17 items ranged between .56 and .96 (Figure 1). Factor loads of the items in the subscales were suggested to be equal to the factor loads and at least .30 (23). With the exception of the eighth item, all of the items in the Turkish version of the APS-POQ-R had a factor load >.30. Low factor load for the eighth item on allowing the patients to participate in decisions about pain treatment indicates that the participation of the patients and their relatives in treatment procedures is not common in the Turkish hospitals included in the present study. An indication that the culture of healthcare in these hospitals needs to improve should include the patient in treatment decisions.

While evaluating confirmative factor analysis, goodness of fit analysis is expected to be at normal levels. For a reasonable model, chi-square goodness of fit test should not be meaningful. This value may be achieved when the sample size is greater. Owing to this reason, in place of chi-square goodness of fit, chi-square value is divided by degree of freedom. The model is compatible if the value obtained is <2, whereas the model is considered to be at acceptable compatibility levels if the value is <5 (23). This value in the confirmatory factor analysis of the Turkish version of the APS-POQ-R was 2.67, indicating an acceptable compatibility level.

Another goodness of fit test that is frequently used is the RMSEA. This test suggests that an RMSEA score ≤.08 and a p value >.05 indicate goodness of fit (23, 24), and that an RMSEA score ≤.10 shows low levels of goodness of fit (23). The present study, which calculated the RMSEA value as meaningful and .088 (p<.001), found that the compatibility for the factorial structure was weak but at acceptable limits. A value of SRMR <.10 and the values of CFI and NNFI ≥0.90 indicate goodness of fit (23). A value >.95 indicates goodness of fit, whereas a value >.90 indicates acceptable goodness of fit (23, 24). The present study found that the CFI and NNFI values were .96 and .95, respectively, indicating goodness of fit. On the other hand, the SRMR value was close to but higher than the acceptable scores. This result may be related with the high factor load of the eighth item, which had low average and path coefficient. GFI and AGFI scores ≥.90 indicate an acceptable goodness of fit, whereas those scores ≥0.95 refer to perfect goodness of fit (24). The AGFI ≥.80 and the GFI ≥.85 indicate goodness of fit (25). The present study found that the GFI was .86, and that the AGFI was .80, which, in turn, indicated the construct validity of the Turkish version of the APS-POQ-R.

Internal consistency of the findings was analyzed by using Cronbach's alpha coefficient and item–total correlation. Cronbach's alpha coefficient, which measures the homogeneity of the items of a scale, is generally considered as the best indicator of reliability (22). Cronbach's alpha coefficient for the APS-POQ-R was .91 and ranged between .50 and .95 for the subscales of the APS-POQ-R (Table 4). This finding suggests that the internal consistency of the first four subscales of the APS-POQ-R is significantly high. The original APS-POQ-R had a Cronbach's alpha of .86, which ranged between .63 and .83 for its subscales (12). The analysis of the adaptations of the APS-POQ-R reveals that the Chinese version of the APS-POQ-R had a Cronbach's alpha coefficient of .73, with the values that ranged between .49 and .82 for the subscales (15). Cronbach's alpha coefficients of the scale and subscales of the APS-POQ-R were .13 and .86 for the Icelandic version (16) and .67 and .63–.74 for the Australian

version (13), respectively. Moreover, Cronbach's alpha coefficient for the perceptions of care of the Australian version of the APS-POQ-R was .72 (13). The review of the cross-cultural literature adaptation studies suggests that the coefficient for this subscale changed according to the sample and culture. Except for the perceptions of care subscale, the Turkish version of the APS-POQ-R had high Cronbach's alpha coefficients. Low reliability of the perceptions of care subscale is closely related with the fact that the eighth item in the APS-POQ-R is not widely practiced in Turkey so that it decreases internal consistency. Additionally, the characteristics of the sample, cultural differences, and differences in healthcare services may be other reasons.

The present study found that the Turkish version of the APS-POQ-R is a reliable and valid measurement tool to evaluate the patient scores and pain management quality for patients who underwent surgical operation and for nursing process planning. Further research is warranted to better understand the perceptions of care subscale using a larger sample size. Additionally, the Turkish version of the APS-POQ-R may be used to test the efficiency of the attempts to improve pain management quality.

Ethics Committee Approval: Ethics committee approval was received for this study from Eastern Mediterranean University ethics committee. (Approval Date: 04.11.2016, Approval Number: ETK00-2016-0156).

Informed Consent: Written informed consent was obtained from all individual participants included in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – A.K., G.S.D.; Design – A.K., G.S.D.; Supervision – G.S.D.; Resources – D.B.G.; Data Collection and/or Processing – A.K., G.S.D.; Analysis and/or Interpretation – A.K., G.S.D.; Literature Search – A.K., G.S.D.; Writing Manuscript – A.K., G.S.D., D.B.G.; Critical Review – G.S.D., D.B.G.

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