

Psychometric Validation of the Perceived Perioperative Competence Scale-Revised Short Form (PPCS-R-SF)

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Abstract

Aim: This study aims to linguistically adapt the Turkish version of the Perceived Perioperative Competence Scale-Revised Short Form (PPCS-R-SF) and to evaluate its validity and reliability. **Methods:** This methodological study was conducted with 90 nurses working in the surgical units of a university hospital. Data were collected using a Personal Information Form and the PPCS-R-SF, adapted to 18 items to represent clinical practices in Türkiye based on expert panel opinions. Translation-back translation was used for linguistic validity, and the content validity index (CVI) was used for content validity. Construct validity was tested with Confirmatory Factor Analysis (CFA), and reliability was tested with Cronbach's alpha internal consistency coefficients. **Results:** The total Cronbach's alpha coefficient of the scale was found to be .852; the reliability coefficients of the sub-dimensions ranged from .632 to .769. Sample adequacy (KMO=.786) and Bartlett test ($p<.001$) results showed that the data were suitable for factor analysis. According to the CFA results, the fit indices (CMIN/DF=1.489, RMSEA=.074, IFI=.901, CFI=.895) proved that the model is verifiable for the Turkish sample. In the gender comparison, female nurses had significantly higher scores than their male colleagues in the "Partnership" (12.18 ± 1.82) and "Empathy" (12.43 ± 2.22) sub-dimensions ($p<.05$). Education level and marital status did not appear to create a significant difference in the perception of competence. **Conclusions:** The Turkish version of the Perioperative Competency Scale-Revised Short Form is a valid and reliable tool for assessing the competencies of perioperative nurses.

Keywords: Operating room nursing, Validity, Reliability, Perioperative competence, Short form

1. Introduction

The perioperative environment is a high-risk and complex clinical setting that necessitates the management of intricate processes. Consequently, it is imperative for patients to receive evidence-based and high-quality care throughout the surgical continuum¹. Providing adequate and appropriate nursing care is essential to ensure that patients receive safe, patient-centered care in the operating theatre². Furthermore, the opportunity for self-assessment of competence allows nurses to gain significant insights into their strengths, weaknesses, and overall clinical practice³. Competence is inherently job-related, defining the actions, behaviors, or outcomes that must be demonstrated in one's

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performance. Simultaneously, it is person-oriented, describing the fundamental characteristics and qualities that enable an individual to perform effectively and exceptionally within a workplace⁴. It is defined as a combination of skills, knowledge, attitudes, values, and abilities that contribute to effective performance⁵. Within the field of nursing, competence encompasses the cognitive, social, and psychomotor skills required for nurses to perform their duties safely².

As nursing competence is foundational to clinical practice⁶. The assessment of clinical competence is vital for identifying specific areas where professional development and further education are required¹. Various measurement methods have been utilized to evaluate nursing competence^{1,5,7,8,9,19}. Competence scales are generally employed to assess broad nursing attributes, such as diagnostic reasoning, interventions, evaluations, decision-making, patient care, and professionalism¹. Perioperative competence specifically integrates both technical (practical) and non-technical skills, including cognitive and social abilities such as teamwork, communication, leadership, and coordination^{11,12}. The emergence of this concept led to the development of the Perceived Perioperative Competence Scale–Revised (PPCS-R), a robust and psychometrically tested instrument¹. This scale consists of 40 items across six dimensions and was adapted into Turkish by Sönmez and Ayoğlu (2019)¹³. However, systemic factors in Turkey, such as high-intensity workloads in operating rooms and staffing shortages, limit the time available for nurses to complete long-form scales, which may subsequently compromise data quality and participant engagement.

Short-form scales derived from psychometrically validated instruments are widely utilized to evaluate both clinical and non-clinical constructs, including performance, cognition (decision-making and/or perception), attitudes, and physical or psychological functioning^{14,15}. The primary motivation for developing short forms of existing measures is to reduce the time and cost associated with assessments. Short versions enable studies to be conducted more cost-effectively, allow for larger sample sizes, and mitigate participant fatigue, which can otherwise compromise data quality¹⁶. In accordance with these rationales, the Perceived Perioperative Competence Scale–Revised Short Form (PPCS-R-SF) was developed by Gillespie et al. (2023). Compared to the original 40-item version, this 15-item short form has been shown to reduce the completion time for nurses by approximately 60% while preserving structural validity¹⁷. Given the high operational pace and stress levels inherent in perioperative settings, long-form scales can lead to clinical data loss or diminished response quality. While the 40-item full version adapted into Turkish by Sönmez and Ayoğlu (2019) offers a theoretically comprehensive framework, its feasibility is limited within demanding shift schedules¹³.

In this regard, a psychometrically robust and time-efficient measurement tool fills a critical gap, enabling nurse managers to monitor team competence without disrupting clinical workflow. Reflecting the advantages offered by shortened instruments, this study aims to adapt and validate the Perceived Perioperative Competence Scale–Revised Short Form (PPCS-R-SF) within the Turkish context while providing a methodological roadmap for non-English speaking settings. The specific objectives include ensuring linguistic and conceptual equivalence, evaluating the scale's psychometric properties including internal consistency and construct validity and determining the baseline perioperative competence profiles of operating room nurses.

2. Materials and Methods

2.1. Study Design and Participants

This methodological study was conducted to evaluate the psychometric properties of the Turkish version of the Perceived Perioperative Competence Scale–Revised–Short

Form (PPCS-R-SF). The study population consisted of nurses working in operating rooms. Data were collected between January 6 and June 6, 2025, from a sample of operating room nurses who met the inclusion criteria. Following the recommendation that validation studies should include 5 to 10 participants per scale item, the study reached a sample size of 90 nurses, which was sufficient for the psychometric analysis of the 18-item scale.

2.2. Data Collection Instruments

Personal Information Form: This section included seven questions regarding the participants' demographic and professional backgrounds, such as age, gender, marital status, education level, years of experience, and specific roles in the operating room.

Perceived Perioperative Competence Scale–Revised–Short Form (PPCS-R-SF): Developed by Gillespie et al. (2023)¹⁷, this 18-item instrument utilizes a 5-point Likert-type scale ranging from 1 (never) to 5 (always). Total scores range from 18 to 90, with higher scores indicating a higher level of perceived competence. The scale consists of six subdimensions: Core Knowledge and Skills (Items 1–3) and Proficiency (Items 10–12), representing technical skills; and Leadership (Items 4–6), Partnership (Items 7–9), Empathy (Items 13–15), and Professional Development (Items 16–18), representing non-technical skills.

2.3. Translation and Cultural Adaptation

The adaptation process followed a standard translation-back translation protocol after obtaining formal permission from the original authors. Initially, three independent bilingual faculty members from Selçuk University translated the scale into Turkish. A synthesis version was subsequently presented to a panel of 10 nursing experts to assess content validity. The experts evaluated the items based on their relevance and clarity using a 4-point scoring system (1: not appropriate to 4: completely appropriate).

Content Validity Ratio (CVR) analysis was performed to ensure that the items—particularly those regarding surgical instrument recognition, technological equipment familiarity, and clinical guidance were clinically relevant to Turkish perioperative nursing practice. Following expert feedback, the finalized Turkish form was back-translated into English by three different faculty members and approved by the original author. A final linguistic review was conducted by a faculty member from the Department of Turkish Language and Literature.

2.4. Data Collection and Ethical Considerations

The data collection forms were administered electronically via Google Forms on a voluntary basis. Participants were informed about the study's purpose, and it took approximately 15 minutes to complete the instrument. The study was conducted in a single stage, where the internal consistency, item analysis, and factor structure of the 18-item Turkish version were evaluated. Statistical significance was determined using Cronbach's alpha and construct validity tests to ensure the scale's reliability within the Turkish clinical context.

Inclusion criteria for volunteers:

- Being over 18 years of age
- Working as a nurse in the operating room
- Individuals with serious cognitive impairments or language barriers that prevent effective participation in the study

2.5. Ethical Considerations

Permission was obtained from the non-intervention clinical research ethics committee (Date/No. 17.12.2024/654), the chief physician of the university hospital (Date/No. 06.02.2025/E-40195783-108.99-938839-E-30292447-108.99-940142), and the participants for

the conduct of the study. Furthermore, the study was conducted in accordance with the principles of the Helsinki Declaration 2008.

2.6. Data Analysis

Statistical analyses were conducted using SPSS version 21.0 and AMOS version 23.0 software packages. The normality of data distribution was assessed via the Kolmogorov-Smirnov test. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were employed to summarize the demographic and professional characteristics of the participants.

For the psychometric evaluation of the PPCS-R-SF, linguistic validity was established through the translation-back translation method, while content validity was assessed using the Content Validity Index (CVI) based on the consensus of a 10-member expert panel. Construct validity was tested using Confirmatory Factor Analysis (CFA), with model fit evaluated through CMIN/DF, RMSEA, CFI, IFI, and GFI indices. Reliability was examined using Cronbach's alpha internal consistency coefficients for both the overall scale and its subdimensions.

Comparative analyses of competence scores were performed using Independent Samples t-tests for binary variables and One-Way Analysis of Variance (ANOVA) for variables with more than two groups. Relationships between variables were examined using Pearson correlation analysis, with a statistical significance level set at $p < 0.05$ for all tests.

3. Results

3.1. Findings Related to Validity and Reliability Analysis

In the analysis results, it was observed that the GFI (.828) and CFI (.895) values were slightly below the ideal threshold (.90). This situation may be attributed to the limiting effect of the sample size ($N=90$) on the model's absolute fit indices. However, the fact that the RMSEA (.074) and χ^2/df (1.489) values are within the excellent and good fit range supports that the overall structure of the model is at a confirmable level for the Turkish sample. Data related to the internal consistency analyses of the scale are presented in Table 1. The total internal consistency coefficient of the "Perceived Perioperative Competence Scale - Revised - Short Form" was determined as .852. The reliability coefficients of the subdimensions ranged from .632 to .769, indicating that the items are consistent with each other and that the scale is reliable in measuring perceived competence.

Table 1. Internal Consistency Coefficients of the Scale and Subdimensions

Scale and Sub-Dimensions	Number of Items	Cronbach's Alpha (α)
Basic Knowledge and Skills	3	.769
Leadership	3	.684
Partnership	3	.632
Competence	3	.763
Empati	3	.659
Professional Development	3	.707
Total Scale (PPCS-R-SF)	18	.852

The results of the analyses performed to determine the suitability of the data for factor analysis are presented in Table 2. Accordingly, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was determined as .786, indicating that the sample size was "good" and competence for analysis. The result of Bartlett's Test of Sphericity was found to be statistically significant ($p < .001$), demonstrating that the data are suitable for factor analysis.

Table 2. Construct Validity: KMO and Bartlett's Test Results

Test	Value
Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy	.786
Bartlett's Test of Sphericity (Approx. Chi-Square)	105.00
Degrees of Freedom (df)	105
Significance (p)	.000

Note: X²/df: Chi-square/degrees of freedom; RMSEA: Root Mean Square Error of Approximation; CFI: Comparative Fit Index; IFI: Incremental Fit Index; GFI: Goodness of Fit Index. References for thresholds: Hu and Bentler (1999)¹⁸; Schermelleh-Engel et al. (2003)¹⁹.

The results of the Confirmatory Factor Analysis (CFA) performed to confirm the six-factor structure of the scale are presented in Table 3. According to the analysis, the CMIN/DF (1.489) and RMSEA (.074) values demonstrated excellent and good fit, respectively. Although the GFI value (.828) was slightly below the ideal threshold in the literature, the high values of all other fit indices and strong item-total correlations support the overall acceptability of the model. The CFI (.895) and IFI (.901) values indicated that the model generally demonstrated an acceptable fit.

Table 3. Confirmatory Factor Analysis (CFA) Fit Indices

Fit Index	Measured Value	Acceptable Threshold *
CMIN/DF	1.489	≤3 (Excellent)
RMSEA	.074	≤ .08 (Good)
CFI	.895	≥.90 (Acceptable)
IFI	.901	≥.90 (Good)
GFI	.828	≥.85-.90 (Weak/Acceptable)

Table 4. Comparison of Proficiency Scores According to Gender Status

Sub-dimensions/Total	Gender	N	Mean ±SD	t	p
Basic Knowledge and Skills	Female	76	11.78±2.13	0.549	.585
	Male	14	11.42±2.90		
Leadership	Female	76	10.30±2.38	0.024	.981
	Male	14	10.28±2.43		
Partnership	Female	76	12.18±1.82	2.124	.036*
	Male	14	11±2.38		
Competence	Female	76	12.22±2.23	-0.200	.842
	Male	14	12.35±2.59		
Empathy	Female	76	12.43±2.22	2.194	.031*
	Male	14	11±2.38		
Professional Development	Female	76	11.13±2.02	-0.372	.711
	Male	14	11.35±2.40		
Total Score	Female	76	70.06±8.69	0.992	.324
	Male	14	67.42±11.39		

The comparison of competence scores by gender among nurses is presented in Table 4. According to the analysis results, there was no statistically significant difference in the overall perceived competence scores between female and male nurses ($p > .05$). However, when examined by subdimensions, it was found that female nurses had significantly higher scores in "Partnership" (12.18±1.82) and "Empathy" (12.43±2.22) compared to male nurses ($p < .05$). This finding suggests that the gender factor may have a potential impact on the distribution of roles within the team and the culture of patient safety, particularly in the development of non-technical skills.

When the comparison results according to marital status, as presented in Table 5, were examined, it was observed that whether nurses were married or single did not have a statistically significant effect on the total competency score and sub-dimension scores

($p>.05$). It was determined that the competency perception levels of both groups were quite similar.

The differences in competence scores according to the educational status of nurses are evaluated in Table 6. According to the results of the ANOVA test, there was no statistically significant difference in perceived perioperative competence levels among secondary education, undergraduate, and postgraduate education levels ($p > .05$). All subdimension and total mean scores of the scale showed a similar distribution among nurses with different educational backgrounds.

Table 5. Comparison of Proficiency Scores According to Marital Status

Sub-dimensions / Total	Marital Status	N	Mean $\pm$ SD	t	P
Basic Knowledge and Skills	Married	51	11.50 $\pm$ 2.19	-1.078	.284
	Single	39	12.02 $\pm$ 2.32		
Leadership	Married	51	10.19 $\pm$ 2.25	-0.471	.639
	Single	39	10.43 $\pm$ 2.56		
Partnership	Married	51	12.13 $\pm$ 1.67	0.760	.449
	Single	39	11.82 $\pm$ 2.28		
Competence	Married	51	12.07 $\pm$ 2.10	-0.788	.433
	Single	39	12.46 $\pm$ 2.50		
Empathy	Married	51	12.27 $\pm$ 2.23	0.298	.766
	Single	39	12.12 $\pm$ 2.39		
Professional Development	Married	51	10.92 $\pm$ 1.71	-1.287	.201
	Single	39	11.48 $\pm$ 2.44		
Total Score	Married	51	69.11 $\pm$ 7.83	-0.636	.526
	Single	39	70.35 $\pm$ 10.68		

Table 6. Comparison of Proficiency Scores According to Educational Status

Sub-dimensions / Total	Education Level	N	Mean $\pm$ SD	F	p
Basic Knowledge and Skills	Secondary Education	3	12.00 $\pm$ 1.73	0.310	.734
	Undergraduate	60	11.60 $\pm$ 2.30		
	Postgraduate	27	12.00 $\pm$ 2.21		
Leadership	Secondary Education	3	9.33 $\pm$ 2.08	0.553	.577
	Undergraduate	60	10.46 $\pm$ 2.41		
	Postgraduate	27	10.03 $\pm$ 2.36		
Partnership	Secondary Education	3	10.33 $\pm$ 2.88	1.175	.314
	Undergraduate	60	12.01 $\pm$ 1.99		
	Postgraduate	27	12.14 $\pm$ 1.74		
Competence	Secondary Education	3	12.00 $\pm$ 2.64	0.569	.568
	Undergraduate	60	12.41 $\pm$ 2.26		
	Postgraduate	27	11.88 $\pm$ 2.32		
Empathy	Secondary Education	3	12.66 $\pm$ 1.15	0.609	.546
	Undergraduate	60	12.40 $\pm$ 2.11		
	Postgraduate	27	11.74 $\pm$ 2.72		
Professional Development	Secondary Education	3	12.33 $\pm$ 2.30	0.684	.507
	Undergraduate	60	11.26 $\pm$ 2.13		
	Postgraduate	27	10.81 $\pm$ 1.92		
Total Score	Secondary Education	3	68.66 $\pm$ 10.01	0.231	.794
	Undergraduate	60	70.16 $\pm$ 9.25		
	Postgraduate	27	68.62 $\pm$ 9.06		

4. Discussion

This study was conducted to establish the validity and reliability of the “Perceived Perioperative Competence Scale-Revised-Short Form” (PPCS-R-SF) for Turkish culture, aiming to rapidly and effectively assess the competence perceptions of perioperative nurses. The total Cronbach’s alpha coefficient of .852 found in the reliability analysis indicates that the instrument has a high level of internal consistency²⁰. This result is similar

to the reliability values obtained in the original short-form development study¹⁷. Furthermore, the high reliability levels identified in the Turkish adaptation of the 40-item long form of the scale support that the short form also preserves its structural integrity¹³. In the literature, it is highlighted that short forms offer the advantage of collecting higher-quality data by reducing participant fatigue, especially in high-paced operating room environments¹⁶. The findings obtained regarding the construct validity of the scale in this study indicate that the six-factor structure defined in the original scale was also preserved in the Turkish nurse sample¹. The fit indices obtained from the confirmatory factor analysis (CMIN/DF = 1.489, RMSEA = 0.074) fall within acceptable limits, demonstrating that the model has a good fit to the data². In particular, a CMIN/DF value below 2 and an RMSEA value below 0.08 support that the model possesses strong structural validity. These findings suggest that the theoretical structure of the scale remains valid in a different cultural context and that the construct being measured is represented consistently. The results are consistent with those of the original study in which the short form of the scale was developed, supporting the cross-cultural stability of the factor structure. In this respect, the study provides important evidence that the scale is a valid measurement tool for use among Turkish perioperative nurses.

One of the notable findings of this study is that female nurses scored significantly higher than male nurses in the “Collaboration” and “Empathy” subdimensions¹. This finding can be interpreted within the context of the historical association of the nursing profession with women in Türkiye and the attribution of caregiving roles to women within prevailing gender norms. Indeed, recent literature indicates that nursing care is often characterized as a “female-associated” attribute, with qualities such as compassion, altruism, and emotional labor being closely linked to feminine identity²¹. Studies conducted in the Turkish context similarly demonstrate that nursing is perceived as a female-dominated profession and that gender stereotypes shape role expectations in both educational and clinical settings²². This sociocultural framework may contribute to female nurses reporting higher levels of perceived self-efficacy in non-technical skills such as empathy and collaboration. Furthermore, it has been reported that female students and nurses tend to demonstrate higher levels of expressive caring behaviors compared to their male counterparts²³. In line with this, female nurses reporting higher scores on items related to interpersonal skills, such as comforting the patient (Item 12) and active listening (Item 14), underscores the importance of the psychosocial dimension of surgical care. Moreover, in high-technology operating room environments (Item 3), the integration of technical skills with non-technical competencies such as empathy and the ability to provide reassurance (Item 13) emerges as a critical requirement for ensuring patient safety. In this regard, the findings suggest that nursing education and clinical training should not focus solely on technical competencies but also prioritize the systematic development of empathy, communication, and collaboration skills among all nurses, in a manner that helps balance gender-based differences.

A noteworthy finding of the study is that female nurses scored significantly higher than their male counterparts in the “Partnership” and “Empathy” subdimensions¹. Similarly, the literature indicates that female nurses may exhibit greater sensitivity in patient-centered care and intra-team communication processes²⁴. The fact that female nurses reported higher perceptions in items focusing on interpersonal skills, such as making the patient feel comfortable (Item 12) and active listening (Item 14), highlights the importance of the psychosocial dimension of care in the surgical process. In the high-technology environment of the operating room (Item 3), the ability of female staff to integrate these technical competencies with non-technical skills such as “empathy” and “providing appropriate reassurance” (Item 13) offers a holistic advantage in terms of patient safety. This finding demonstrates that clinical education planning should focus not only on

instrumental familiarity but also on standardizing these emotionally demanding competencies among all team members.

The lack of a significant difference in perceived competence based on educational level can be explained by the highly specialized nature of perioperative nursing². In Turkey, operating room nursing is carried out in a clinical environment characterized by advanced technology, the need for rapid decision-making, and intensive multidisciplinary teamwork. In this context, it is known that the competencies of operating room nurses are shaped not only by academic education but also by clinical experience and practice-based learning processes²⁵. It is thought that clinical experience gained in the operating room environment and in-service training bring nurses' perceptions of competence to similar levels, regardless of their academic education level. This situation reveals that professional competence has a dynamic and practice-based structure.

Limitations

In addition, the use of a self-report data collection method may introduce bias, as participants might have overestimated or underestimated their own competence perceptions. The cross-sectional design of the study did not allow for the evaluation of the scale's temporal stability (test-retest reliability). Furthermore, the insufficient representation of nurses from different hospital settings (public, private, and university hospitals) and varying levels of clinical experience limited a comprehensive assessment of the scale's validity and reliability across diverse working environments.

Conflict of Interest: The authors declared no potential conflicts of interest.

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Ethical Approval: Permission was obtained from the non-intervention clinical research ethics committee (Date/No. 17.12.2024/654), the chief physician of the university hospital (Date/No. 06.02.2025/E-40195783-108.99-938839-E-30292447-108.99-940142), and the participants for the conduct of the study. Furthermore, the study was conducted in accordance with the principles of the Helsinki Declaration 2008.

Data Availability: The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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