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Turkish adaptation of the catheter assessment, management and performance scale for nurses: Validity, measurement invariance and reliability study

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ABSTRACT

Background: Indwelling urinary catheter use is common in hospital settings, and its proper management is essential to prevent complications.
Aim: To evaluate the Turkish cultural and psychometric properties of the Catheter Assessment, Management, and Performance (CAMP) Scale for Nurses.
Methods: This methodological study was conducted in two stages: (1) translation and cultural adaptation of the original scale into Turkish; and (2) evaluation of validity, reliability, and measurement invariance. Data were collected from 460 nurses in two state hospitals in eastern Turkiye (January–April 2025). Psychometric testing included exploratory and confirmatory factor analyses, internal consistency, and test–retest reliability.
Results: The four-factor structure was confirmed with factor loadings >0.40 and a total explained variance of 65.27 %. The Kaiser-Meyer-Olkin value was 0.902. Confirmatory factor analysis showed all item t-values >1.96, indicating acceptable model fit. Cronbach's alpha was 0.927, item–total correlations were >0.30, and test–retest correlation was 0.783 ($p < 0.001$).
Conclusions: The Turkish version of the scale is valid and reliable for assessing nurses' performance in urinary catheter care.
Practice implications: This tool can be used in clinical practice and nursing education to evaluate and improve nurses' knowledge and skills in urinary catheter care, contributing to enhanced patient safety and reduced catheter-related complications.

Introduction

The most important factor in the relationship between nurses and patients is trust, which is a basic requirement for accurate communication. The trust a patient has in nurses can lead to an increased willingness to share their concerns and worries and to an increased satisfaction with the treatment process. A previous study has shown that patients who trust their nurses cooperate more to improve their healthcare, feel more secure, and are more willing for trusted relationships (Hong et al., 2018). The International Council of Nurses emphasizes the importance of nursing care that goes beyond treating patients who need acute care, training patients, and supporting their self-management (International Council of Nurses (ICN), 2023).

Catheters are preferred by individuals who cannot regularly empty their urine and, for this reason, must use a catheter continuously. This may be because of various physical disabilities or diseases that prevent them from being able to catheterize. However, catheter use is often associated with some healthcare issues and complications (Wilde et al., 2015). Catheterization is necessary for many patients for a variety of reasons, including chronic urinary retention, neurological dysfunction, and maintenance of continence (Royal College of Nursing, 2021). However, catheterization is also associated with complications such as infection, obstruction, and leakage, as well as body image and comfort issues. Catheter-associated urinary tract infections are a significant morbidity factor, often associated with the duration of catheterization (Letica-Kriegel et al., 2019).

Nurses must be competent and motivated to recognize and use effectively unstructured, opportunistic “teaching moments” in routine care to support and equip patients with self-management capabilities (Oswald et al., 2020). The COM-B Theoretical Model (Capability, Opportunity, Motivation-Behavior) is beneficial for comprehending the roles and functions of nurses who care for patients who have urinary catheters within the community (Phillips et al., 2019). The model has 3 components (Capability, Opportunity, and Motivation) and assumes that behavior is formed by the interaction of these components

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(i.e., behavioral resources). Capability is generally referred to as the psychological and physical talent of an individual, including knowledge, necessary mental processes, and physical abilities to perform a target behavior. Opportunity is all external factors that activate or encourage behavior and is defined as the brain processes employed to stimulate and navigate behaviors, intentions, beliefs regarding capabilities, emotional reactions, desires, habitual actions, and analytical assessments (Huynh et al., 2024). The COM-B can be employed to diagnose nurses' abilities, motivation, and triggers or opportunities in their practice settings (Michie et al., 2011; Slattery et al., 2020).

The study emphasizes the need for validity and reliability of the CAMP Scale so that nurses can effectively evaluate, manage, and monitor the performance of urinary catheters. The scale will allow nurses to better understand the difficulties they encounter in clinical settings and to develop intervention strategies for these situations. Also, this scale will contribute to the provision of safer and more effective care as a tool to evaluate nurses' knowledge and capabilities in catheter management. Furthermore, it is thought that the scale will improve patient safety and quality of care by increasing nurses' competence in preventing catheter-related complications. The study aimed to assess the validity, measurement invariance, and reliability of the Turkish CAMP Scale (CAMP-TR) developed by Alex et al. (2024) for Turkish nurses (Alex et al., 2024).

Research questions

1. Is CAMP-TR a valid measurement tool?
2. Is CAMP-TR a reliable measurement tool?
3. Does CAMP-TR have measurement invariance?

Methods

The study had a descriptive methodological design. Data were collected in two public hospitals in eastern Turkiye between January and April 2025. The setting included internal medicine, surgery, intensive care, emergency services, and palliative care units where nurses provide direct patient care and perform urinary catheterization. Inclusion criteria were being employed in these units, having prior experience with urinary catheterization, and volunteering to participate. The sample was selected by simple random sampling among nurses who met the inclusion criteria to ensure equal representation and minimize selection bias. A survey was administered face-to-face to nurses who agreed to participate. The survey forms were completed in approximately 5–10 min. Standard good practice guidelines for scale development and adaptation were followed throughout the study (Boateng et al., 2018; Carpenter, 2018; Cheung et al., 2023).

In validity and reliability studies, it is recommended to include 5–10 times the number of participants relative to the number of scale items and to increase the sample size by 20 % to account for possible attrition or missing data (Boateng et al., 2018). For this reason, the minimum required sample size was calculated as 105–210 participants. However, literature suggests that sample sizes of 300 or more are considered 'good' for psychometric evaluations (DeVellis, 1997; Field, 2018; Tabachnick & Fidell, 2018). Questionnaires were distributed to 500 nurses working in different units of the two hospitals. Incomplete questionnaires or those with uniform responses were excluded (n = 40). Ultimately, 460 fully completed questionnaires were analyzed.

Data collection tools

The data were collected with the Socio-Demographic Form, CAMP-TR for Nurses. The Socio-Demographic Form prepared by the researcher consisted of questions including information such as the nurses' age, gender, educational background, and years of experience working in hospitals and clinics.

The CAMP-TR for Nurses was developed by Alex et al. (2024) and consisted of 23 statements in a 5-point Likert scale format. Scale items are assessed with the Likert-type scaling method (1 = I strongly disagree, 5 = I strongly agree). The assessment is based on the mean scores of the scale items. Cronbach's α of the overall CAMP-TR for Nurses (0.93) and its sub-dimensions (0.92, 0.87, 0.85, and 0.86) indicate good internal consistencies.

Language and content validity

Wild et al.'s (2005) Good Practice Guide was followed in the evaluation of the Turkish language and content validity of CAMP-TR (Wild et al., 2005). In line with this guide, CAMP-TR was reviewed by the researcher during the preparation stage, and permission was received from the scale owner to adapt it to the Turkish population. In the forward translation stage, four independent translators who were fluent in both languages performed the process. In the consensus stage, the translations of the expert linguists were reviewed by the researcher, who was fluent in both languages, and brought to a single Turkish form. In the back translation stage, the Turkish form accepted by the researcher was sent for translation again. The back translation was provided by four independent experts who were familiar with both languages and unfamiliar with the original scale. The back translation was reviewed by the researcher, the translated form was examined, and a consensus was reached. In the adaptation stage, the original scale was compared with the back translation, on which a consensus was reached, and it was seen that the semantic integrity of the items was preserved. In this way, it was accepted that CAMP-TR provided linguistic validity. During the cognitive debriefing stage, the content validity of the CAMP-TR was assessed by experts, and the understandability and response times of the items were evaluated through a pilot implementation.

Fifteen experts who had PhD degrees, were fluent in both languages, and were familiar with the scale development-adaptation processes took part in the evaluation of the content validity of CAMP-TR. Item Content Validity Index (I-CVI) and Scale Content Validity Index (S-CVI) were employed to evaluate the content validity. Polit et al. (2007) accepted the I-CVI value of 0.78 and the S-CVI value of 0.90 as the lower limit (Polit et al., 2007). Experts employed a 4-point Likert scale (1: not relevant, 2: somewhat relevant, 3: relevant, 4: very relevant). The I-CVI values of all items in CAMP-TR were higher than 0.78, and the S-CVI value was calculated as 0.94. A pilot implementation was conducted with 60 participants in the presence of the researcher to see the understandability and response times of the CAMP-TR items. The data from the pilot implementation were not included in the main study.

Pilot implementation

A 23-item CAMP-TR for nurses was created after Content Validity Analysis. The form was administered face-to-face to 60 nurses in two public hospitals (30 in one hospital and 30 in the other public hospital) (Yusoff et al., 2021). During the pilot implementation, nurses indicated if the contents were understandable and made recommendations. When more than 20 % of participants rated an item as non-clear, it was re-evaluated (Sousa & Rojjanasrirat, 2011). No items were removed after the pilot implementation, resulting in a 23-item CAMP-TR for nurses.

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) and Linear Structural Relations (LISREL) 8.80 software were employed to evaluate the data. Within the scope of descriptive statistics, number, percentage, minimum and maximum values, mean, and standard deviation were

calculated. The Davis Technique was employed to determine the content validity. Kaiser-Meyer-Olkin (KMO) and Bartlett tests, Principal Component Analysis, and Varimax rotation method were employed for Exploratory Factor Analysis (EFA). In Confirmatory Factor Analysis (CFA), fit indices such as χ^2/df, Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) were employed, and a Path Diagram was created. The internal consistency was evaluated with Cronbach's α, item-total correlation, split-half method, and time invariance analysis.

Ethical issues

Permission was received via e-mail from Alex, who developed the scale before the adaptation of the scale. Also, ethical permission was received from Muş Alparslan University Scientific Research and Publication Ethics Committee (decision no: 06.12.2024 and number: 171400). Institutional permissions were received to conduct the research. The participants provided written and verbal consent before the study started. The Declaration of Helsinki Principles were followed throughout the study.

Results

A total of 74.1 % of the participants were under 30 years old, 68.9 % were female, 60.7 % were single, 65 % had bachelor's degrees, 66.7 % had less than 5 years of experience, and 25.2 % worked in internal diseases units.

Results regarding content validity

After the translation process was completed for the CAMP-TR for Nurses, whose validity and reliability were evaluated, the scale was presented to 15 experts for an evaluation, including cultural equivalence for its content validity. The content validity of all items of the CAMP-TR Scale, which was assessed with the Davis Technique (Davis, 1992), ranged between 0.80 and 1.0 in terms of content validity. For this reason, no item was removed.

Results regarding construct validity (n = 460)

Factor analysis was made to see the construct validity of CAMP-TR for Nurses to obtain clearer results. KMO and Bartlett's tests were employed to see the adequacy of the sample and the suitability of the data. It was evaluated with the KMO test (KMO > 0.80), and the suitability of the sample data for factor analysis was assessed with the Bartlett Sphericity Test ($p < 0.05$) (Bartlett, 1954).

As seen in Table 1, the KMO value was 0.902, and this value shows that the scale is suitable in terms of sample adequacy for principal component analysis. Bartlett test results ($x^2 = 6929.475$, $p = 0.000$) showed that the data were interrelated and were suitable for factor analysis.

In Table 2, when CAMP-TR is examined with 4 factors in the same way as the original structure, the factor loads of items were bigger than 0.40, and the explained variance was 65.269 %. For this reason, no item was removed, and the 4-dimensional structure was approved (Şencan, 2005) (Table 2 and Fig. 1). The Scree Plot Graph for sub-dimensions is given in Fig. 1. Sub-dimensions were named Capability, Opportunity, Behavior, and Motivation, as in the original scale. After the EFA, CFA, and structural equation modeling were established to obtain more precise results.

Table 3 shows that many indices were employed to see the fit of the CAMP-TR for Nurses model. Of these, the x^2/SD value was 3.87, GFI 0.98, AGFI 0.98, CFI 1.00, RMSEA 0.079, and SRMR 0.058. Therefore, the model was accepted in its current state (Byrne, 2014).

As given in Fig. 2, the model was accepted without any changes. The factor loads of the model ranged from 0.38 to 0.87. The t-value of all items was bigger than 1.96 (6.58–21.77). No changes were made in the model (Kimberlin & Winterstein, 2008; Reichardt & Coleman, 1995).

Results regarding internal validity

As given in Table 4, the Cronbach α of CAMP-TR for Nurses is 0.927, the item-total correlation for all items is bigger than 0.30, and no item was removed (Şencan, 2005). The Cronbach α for the Capabilities sub-dimension was 0.887, the Cronbach α for the Opportunity sub-dimension was 0.835, the Cronbach α for the Behavior sub-dimension was 0.916, and the Cronbach α for the Motivation sub-dimension was 0.873.

When Table 5 is examined, it is seen that the split-half reliability values related to the internal consistency of CAMP-TR for Nurses were at an acceptable level (0.884 for the first half of the scale, consisting of twelve items, and 0.888 for the second half, consisting of 11 items). Based on the results, the correlation between the two halves was 0.685, the Spearman-Brown Coefficient was 0.813, and the Guttmann Split-Half Coefficient was 0.813, and it was found that the internal consistency reliability of the scale was good. These results show that the internal consistency reliability of CAMP-TR for Nurses is high (Şencan, 2005).

As in Table 6, the difference between the lower and upper 27 % slice scores of CAMP-TR for Nurses was statistically significant ($p < 0.05$), which points to the distinctive feature of the scale (Şencan, 2005).

As in Table 7, there was a positive, significant relationship between the CAMP-TR test-retest measurements for nurses at the level of $r = 0.783$ ($p < 0.05$). The correlation value between the two measurements was at the desired level (Şencan, 2005). Based on the results of the test-retest analyses conducted with 30 participants who were not included in the main study at four-week intervals, the Intraclass Correlation Coefficient (ICC) was 0.783 ($p < 0.001$).

As seen in Table 8, the participants received an average score of 31.34 ± 5.39 from the Capabilities sub-dimension, 25.25 ± 5.22 from the Opportunity sub-dimension, 29.91 ± 7.50 from the Behavior sub-dimension, and 102.05 ± 16.49 from the total CAMP-TR for Nurses.

Participants received the highest score of 4.21 ± 0.75 from the item "I believe that providing evidence-based catheter care is very important to minimize catheter-related complications", and the lowest score of 2.94 ± 1.21 from the item "In the unit where I work, nurses always initiate discussions about catheter self-management".

Table 1
KMO and Bartlett test values of scale items.

KMO	0.902
Bartlett	*x2* = 6929.475, p = 0.000

Note. KMO measure of sampling adequacy; Bartlett's test of sphericity.

Discussion

In Turkiye, no tool evaluates the knowledge, skills, attitudes, and behaviors of nurses in supporting the self-management of patients who have urinary catheters. This study filled this gap by adapting and validating the CAMP-TR scale, which demonstrated strong psychometric properties in assessing nurses' competence to prevent catheter-related complications and perform effective interventions in clinical settings. The results show that the scale is a reliable tool for evaluating the competence of nurses to prevent catheter-related complications and to make effective interventions in clinical settings. Thus, it is thought that the scale will contribute to nursing practices aimed at improving patient safety and quality of care.

Table 2
Factor analysis results for CAMP-TR.

Item No	Items	Factor Load			
		1	2	3	4
1.	I know I can teach patients how to manage their catheters.	0.756	0.079	0.185	0.138
2.	I know how to teach patients to self-manage their catheters.	0.753	0.109	0.162	0.166
3.	I have received sufficient training to understand the importance of incorporating urinary catheter self-management into my clinical practice.	0.716	0.224	0.117	0.248
4.	I can easily manage common catheter-related complications (e.g., urine leakage, catheter blockage, urinary tract infection, catheter dislodgement, etc.).	0.712	0.144	0.043	0.241
5.	I have sufficient knowledge to appreciate the importance of incorporating urinary catheter self-management into my clinical practice.	0.694	0.245	0.168	0.335
6.	I know the indications for urinary catheterization.	0.757	0.164	0.023	0.141
7.	I discuss catheter self-management with patients without thinking.	0.550	0.391	0.050	−0.180
8.	I know when to remove the catheter early.	0.612	0.404	0.194	0.196
9.	In my unit, nurses always initiate discussions about catheter self-management.	0.253	0.548	0.159	−0.344
10.	In the unit where I work, there are notices reminding staff to include patients in discussions about catheter self-management.	0.164	0.749	0.077	0.145
11.	In the unit where I work, nurses always discuss proper catheter care practices with patients (e.g., good hygiene at the catheter site, adequate fluid intake, and avoiding constipation).	0.088	0.695	0.090	0.490
12.	In the unit where I work, nurses are provided with adequate support to provide appropriate nursing care to patients living with catheters.	0.191	0.710	0.104	0.464
13.	In the unit where I work, procedures regarding urinary catheterization are clear.	0.292	0.662	0.182	0.210
14.	I usually have enough time to talk to patients about catheter self-management.	0.375	0.535	0.286	0.103
15.	In the unit where I work, doctors always initiate discussions about catheter self-management	0.122	0.609	0.244	−0.140
16.	I provide information and support to patients to successfully adapt to life with a catheter.	0.151	0.196	0.833	0.175
17.	I encourage patients to ask questions about how to self-manage their catheters.	0.114	0.209	0.864	0.205
18.	In every patient meeting, I talk about the patient's problems with catheters.	0.064	0.257	0.814	0.214
19.	I take advantage of the opportunities offered to me and participate in training to improve my knowledge and capabilities to provide evidence-based catheter care practices.	0.198	0.078	0.834	0.153
20.	Nurses need to know how to help patients manage their catheters.	0.249	−0.007	0.346	0.708
21.	I believe it is very important to provide evidence-based catheter care to minimize catheter-related complications.	0.305	0.054	0.248	0.759
22.	I always try to explain correct catheter care practices to my patients (good hygiene around the catheter site, adequate fluid intake, and avoiding constipation).	0.365	0.244	0.214	0.673
23.	I enjoy teaching patients how to self-manage their catheters.	0.390	0.196	0.336	0.563
Variance Explained (%)		20.803	16.052	15.251	13.163
Total Variance Explained (%)		65.269			

Note. Factor 1 = Capability sub-dimension; Factor 2 = Opportunity sub-dimension; Factor 3 = Behavior sub-dimension; Factor 4 = Motivation sub-dimension. EFA = Exploratory Factor Analysis.
Total variance explained = 65.27 % (Factor 1 = 20.80 %; Factor 2 = 16.05 %; Factor 3 = 15.25 %; Factor 4 = 13.16 %).

In this section, the results regarding the language validity, construct validity, measurement invariance, and reliability of the scale adapted to Turkish to evaluate nurses' knowledge, capabilities, attitudes, and behaviors were discussed in light of the literature data.

Language validity

Internationally accepted standards of Wild et al. (2005) were employed in the language and content validity of CAMP-TR. No negative

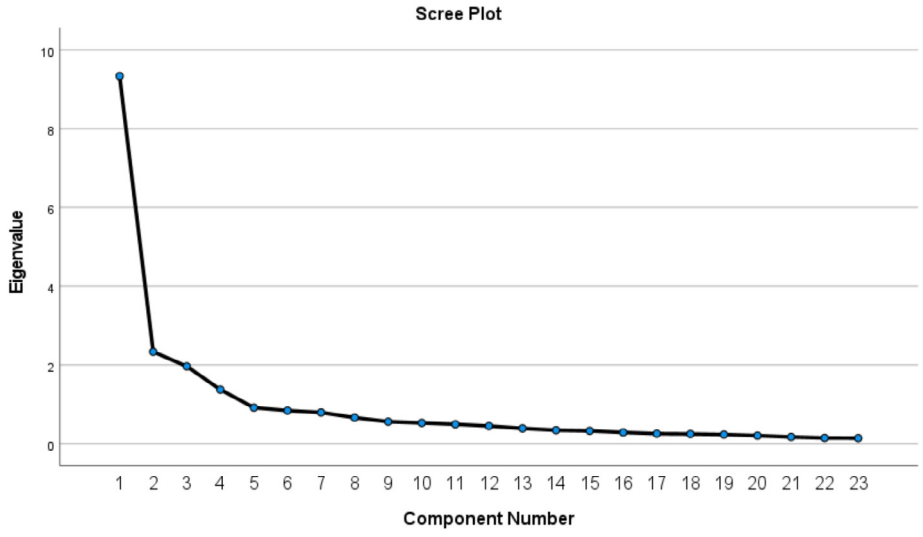

Fig. 1. Eigenvalues of the items.

Table 3
Fit index values for CAMP-TR for nurses, normal and acceptable values ($n = 460$).

Index	Normal value	Acceptable value	Found value
x^2/SD	<2	<5	3.87
GFI	>0.95	>0.90	0.98
AGFI	>0.95	>0.90	0.98
CFI	>0.95	>0.90	1.00
RMSEA	<0.05	<0.08	0.079
SRMR	<0.05	<0.08	0.058

Note. GFI; AGFI; CFI; RMSEA; SRMR.

feedback was reported in the pilot implementation after the language and content validation. This indicates that the translation of CAMP-TR was successful and has sufficient content validity. Similar findings were reported in other scale adaptation studies where forward–backward translation and expert review ensured high-quality language adaptation (Gjersing et al., 2010; Sousa & Rojjanasrirat, 2011).

Validity

Polit et al. (2007) accepted the I-CVI value of 0.78 and the S-CVI value of 0.90 as the lower limit (Polit et al., 2007). The I-CVI and S-CVI values of CAMP-TR were between the reference values of Polit et al. In the EFA employed for CAMP-TR, KMO = 0.902 and Bartlett's Test of Sphericity ($x^2 = 6929.475$, $p = 0.000$) the results were found to be excellent in determining the suitability of the data for factorization and were also found to agree with the literature and the original scale (Alex et al., 2024; Carpenter, 2018; Lim & Jahng, 2019).

CAMP-TR showed a 4-factor structure, and the factor loads were found to be >0.5, similar to the original scale and consistent with the literature (Alex et al., 2024; Matsunaga, 2010). The total variance was observed to be >50 %, similar to the original scale in the current study (Alex et al., 2024; Carpenter, 2018). The 4-factor structure of CAMP-TR was confirmed by CFA. After CFA, the model fit goodness-of-fit indices of the 4-factor structure of CAMP-TR were found to have an acceptable

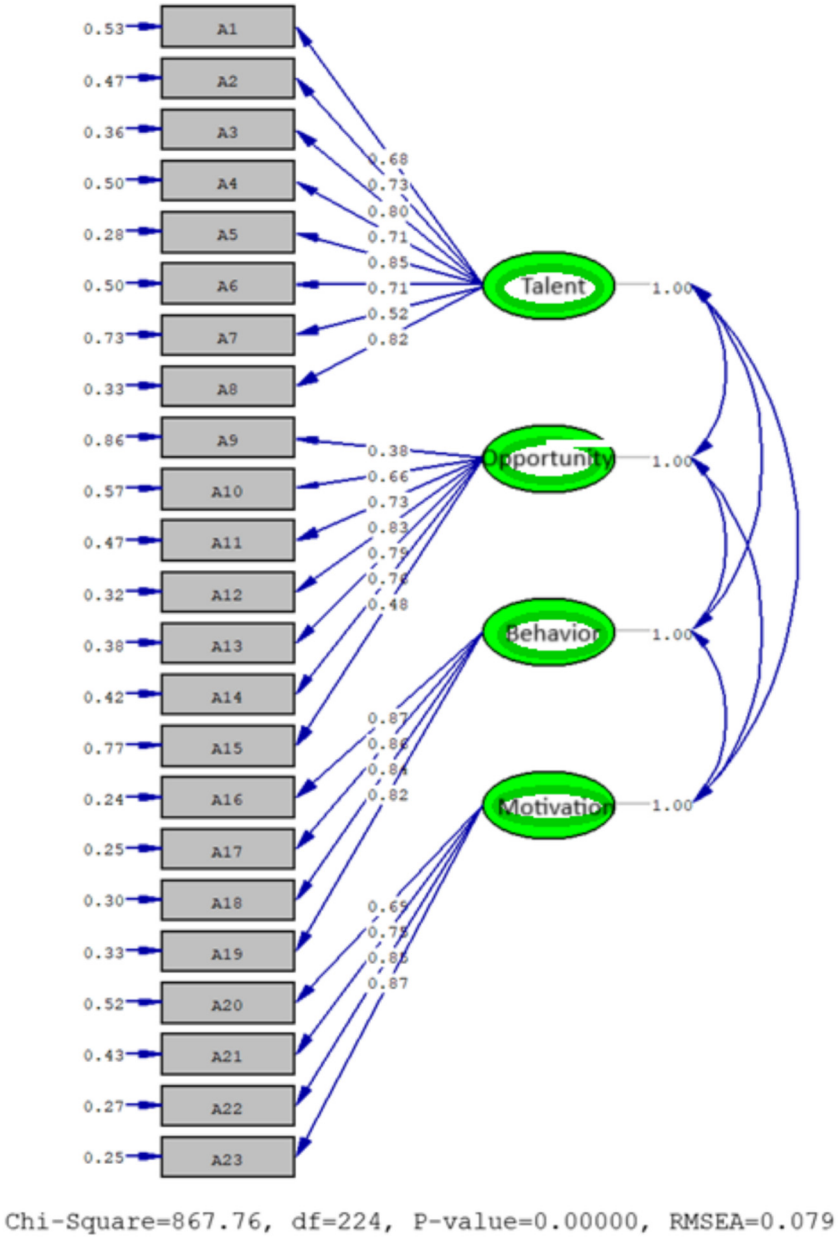

Fig. 2. CAMP-TR PATH diagram.

Table 4
Item-total correlations and Cronbach α of CAMP-TR.

Item No	Items	n	Mean	SD	Item total correlation	If the item is deleted, Cronbach α
1.	I know I can teach patients how to manage their catheters.	460	3.90	0.93	0.587	0.924
2.	I know how to teach patients to self-manage their catheters.	460	3.91	0.92	0.600	0.923
3.	I have received sufficient training to understand the importance of incorporating urinary catheter self-management into my clinical practice.	460	3.97	0.85	0.648	0.923
4.	I can easily manage common catheter-related complications (e.g., urine leakage, catheter blockage, urinary tract infection, catheter dislodgement, etc.).	460	4.13	0.82	0.563	0.924
5.	I have sufficient knowledge to appreciate the importance of incorporating urinary catheter self-management into my clinical practice.	460	4.07	0.85	0.705	0.922
6.	I know the indications for urinary catheterization.	460	4.11	0.73	0.556	0.924
7.	I discuss catheter self-management with patients without thinking.	460	3.35	1.15	0.448	0.927
8.	I know when to remove the catheter early.	460	3.90	0.90	0.698	0.922
9.	In my unit, nurses always initiate discussions about catheter self-management.	460	2.94	1.21	0.346	0.929
10.	In the unit where I work, there are notices reminding staff to include patients in discussions about catheter self-management.	460	3.36	1.11	0.542	0.925
11.	In the unit where I work, nurses always discuss proper catheter care practices with patients (e.g., good hygiene at the catheter site, adequate fluid intake, and avoiding constipation).	460	3.88	0.97	0.600	0.923
12.	In the unit where I work, nurses are provided with adequate support to provide appropriate nursing care to patients living with catheters.	460	3.88	0.91	0.672	0.922
13.	In the unit where I work, procedures regarding urinary catheterization are clear.	460	3.73	0.96	0.647	0.923
14.	I usually have enough time to talk to patients about catheter self-management.	460	3.37	1.11	0.638	0.923
15.	In the unit where I work, doctors always initiate discussions about catheter self-management	460	3.09	1.06	0.415	0.927
16.	I provide information and support to patients to successfully adapt to life with a catheter.	460	3.81	1.02	0.602	0.923
17.	I encourage patients to ask questions about how to self-manage their catheters.	460	3.75	1.05	0.614	0.923
18.	In every patient meeting, I talk about the patient's problems with catheters.	460	3.68	1.08	0.586	0.924
19.	I take advantage of the opportunities offered to me and participate in training to improve my knowledge and capabilities to provide evidence-based catheter care practices.	460	3.72	1.05	0.556	0.924
20.	Nurses need to know how to help patients manage their catheters.	460	4.24	0.79	0.531	0.925
21.	I believe it is very important to provide evidence-based catheter care to minimize catheter-related complications.	460	4.21	0.75	0.569	0.924
22.	I always try to explain correct catheter care practices to my patients (good hygiene around the catheter site, adequate fluid intake, and avoiding constipation).	460	3.93	0.92	0.665	0.922
23.	I enjoy teaching patients how to self-manage their catheters.	460	4.14	0.79	0.658	0.923
Capability				0.887		
Opportunity				0.835		
Behavior				0.916		
Motivation				0.873		
CAMP-TR for Nurses				0.927		

Note. Sub-dimensions Cronbach's α: Capability = 0.887, Opportunity = 0.835, Behavior = 0.916, Motivation = 0.873; Total scale α = 0.927.

fit and an excellent fit, similar to the original scale (Alex et al., 2024; Hair et al., 2019).

After the test-retest analysis conducted to evaluate the consistency of CAMP-TR over time, it was found that the correlation coefficient between the two measurements ($r = 0.783$, $p < 0.05$) was significant and high. This result shows that the CAMP-TR for Nurses scale gives similar results over time and has measurement invariance (Clark, 2020; Rutkowski & Svetina, 2017), which shows that the scale exhibits a stable and reliable structure and supports its capacity to produce similar data when repeated in similar sample groups. Notably, measurement invariance was not reported by the original scale developers (Alex et al., 2024), whereas in this study, the observed stability of responses across administrations indicates that CAMP-TR possesses robust psychometric properties. This is in line with prior research emphasizing the importance of cultural adaptation and rigorous validation to preserve reliability across different populations (Gjersing et al., 2010; Sousa & Rojjanasrirat, 2011).

CAMP-TR was observed to meet construct validity and measurement invariance. In this context, Research Questions 1 and 3 were supported.

Reliability

Although the Cronbach's α coefficient of measurement tools theoretically ranges between 0 and 1, values above 0.70 are generally considered acceptable, while values exceeding 0.80 are indicative of good internal consistency (Yurdabakan & Çüm, 2017). In this study, the Cronbach's α coefficients for the overall scale and its subdimensions were found to be above 0.80, demonstrating strong reliability. These findings are consistent with the psychometric properties reported for

Table 5
CAMP-TR split-half reliability values for nurses.

Cronbach α	First half	Value	0.884
		Number of items	12[a]
	Second half	Value	0.888
		Number of items	11[b]
	Total number of items		23
Correlation between the two halves			0.685
Spearman-Brown Coefficient	Equal length		0.813
	Unequal length		0.813
Guttmann Split-Half coefficient			0.813

Note. Split-half reliability was calculated by dividing the scale into two halves.
[a] The items are: I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11.
[b] The items are: I12, I13, I14, I15, I16, I17, I18, I19, I20.

Table 6
Comparison of lower and upper 27 % slice.

	n	Mean	SD	Materiality
Lower 27 %	124	81.24	10.96	$t = -32.002$, p = 0.000
Upper 27 %	124	120.97	8.42	

Note. Independent samples *t*-test was used to compare the top and bottom 27 % of scores.

Table 7
Test *Re*-Test evaluation.

		Test	Re-Test
Test	r	1	0.783
	p	–	0.000
Re-Test	R	0.783	1
	p	**0**.000	–

Note. Test-retest reliability assessed using Spearman's ρ.

the original CAMP-TR (Alex et al., 2024) and align with previous studies validating nursing competence instruments (Hair et al., 2019).

Corrected item-total correlations were calculated, and the lower limit of 0.20 was taken into account for this value. All items in the current study were bigger than 0.30 (Field, 2018). The ICC value of CAMP-TR was calculated as 0.783. Measurement invariance for the original scale was not reported by the scale developers (Alex et al., 2024). It is reported that ICC below 0.5 indicates poor reliability, between 0.5 and 0.75 indicates moderate reliability, between 0.75 and 0.90 indicates good reliability, and bigger than 0.90 indicates excellent reliability (Koo & Li, 2016).

The ICC value of CAMP-TR shows a good level of reliability, and this result supports Research Question 2.

The findings of this study demonstrate that the CAMP-TR scale is a valid and reliable tool to assess nurses' knowledge, attitudes, and behaviors regarding urinary catheter management. Effective prevention of catheter-related complications requires nurses to possess not only technical skills but also an approach that supports patients' self-care practices (Alex et al., 2024; Coventry et al., 2021). Practices such as ensuring adequate fluid intake, managing bowel function, and maintaining catheter site hygiene are critical in preventing catheter-associated urinary tract infections, blockages, and dislodgements (Ostaszkiewicz & Paterson, 2012).

CAMP-TR addresses a significant gap by measuring not only knowledge but also nurses' attitudes and behaviors, providing a comprehensive assessment approach highlighted as lacking in the literature (Michie et al., 2011; Phillips et al., 2019). Its foundation on the COM-B theoretical model supports the scale's capacity to understand and influence behavior change. Previous studies emphasize that such scales are essential tools for nurses to improve patient care quality (Paiva-Santos et al., 2023).

Limitations

The study had some limitations. Although the data were collected from two different institutions, the generalizability of the results is limited because the majority of the sample group consisted of nurses with similar characteristics. The fact that most of the participants worked in internal units has led to the views of nurses working in different units not being adequately represented. Collecting data with the self-report method may increase the risk of social bias and affect the objectivity of the responses.

Table 8
Distribution of CAMP-TR scores for nurses.

	n	Min	Max	Mean	SD
Capability	460	8.00	40.00	31.34	5.39
Opportunity	460	10.00	35.00	24.25	5.22
Behavior	460	8.00	40.00	29.91	7.50
Motivation	460	6.00	20.00	16.54	2.64
CAMP-TR for Nurses	460	46.00	135.00	102.05	16.49

Note. Minimum and maximum scores, mean, and standard deviation are presented.

Practice implications

The adaptation and validation of the Catheter Assessment, Management, and Performance Scale for Nurses into Turkish provides a culturally appropriate and psychometrically sound tool that can be used by nurses in clinical practice to assess catheter-related competencies. Its implementation in daily nursing care may support standardization in catheter use, improve patient safety, and reduce catheter-related complications. Furthermore, it contributes to evidence-based nursing practices by offering a structured approach to catheter management evaluation.

Conclusion

The Turkish adaptation of the CAMP Scale was found to be valid and reliable. It is recommended that the scale be employed as an effective tool in evaluating the knowledge, capabilities, and attitudes of nurses regarding catheter management in clinical practice.

CRediT authorship contribution statement

Cemal Özalp: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Ethical considerations

The Scientific Research Publication Ethics Committee of Muş Alparslan University granted ethical approval (decision no: 06.12.2024 and number: 171400) for the study.

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Declaration of competing interest

No potential conflict of interest was reported by the author(s).

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