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Objective Structured Clinical Examination Perception Scale (OSCEPS) for Health Sciences Students: A Psychometric Evaluation Study

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ABSTRACT

Objective Structured Clinical Examinations (OSCE) is an objective assessment approach that enables the evaluation of students' practical skills by simulating real clinical scenarios. This scale is specifically designed to evaluate the attributes and characteristics of the OSCE from the perspective of health sciences students, thereby filling a crucial gap in the existing assessment methods. This research conducted a methodological design involving 220 students from the faculties of medicine and nursing between 2022 and 2023. Data were gathered using a "Descriptive Form" and "OSCEPS." Factor analyses were performed for research and validation to ascertain the scale's factorial structure. The factorial analysis was used to test the structural validity of the scale. A structure consisting of 19 items was developed. The Cronbach's alpha coefficient was 0.943. Fit indices resulting from the study were RMSEA = 0.084; GFI = 0.839; CFI = 0.902; IFI = 0.902; RFI = 0.824; NFI = 0.843; TLI = 0.889. This study proves that the OSCEPS is a highly reliable and valid scale with strong psychometric properties. It effectively assesses health sciences students' perceptions of OSCE, thereby enhancing the credibility and usefulness of this assessment tool.

1 | Introduction

Assessing the clinical competencies of future healthcare professionals is important to ensure safe and effective patient care (Fleckner and Rowe 2015). Various methods, such as written exams, multiple-choice questions, oral examinations, and checklists, are utilized to evaluate students' clinical competencies. However, these traditional methods are subjective and have low levels of validity and reliability (Siddiqui 2011). The Objective Structured Clinical Examination (OSCE), introduced by Harden (Harden and Gleeson 1979), is widely used to assess the clinical competencies of health science students and evaluate their communication, medical history-taking, and physical examination skills (Sheen et al. 2015). In the fields of nursing (Lee et al. 2020) and medicine (Tudiver et al. 2009; Al-Dabbag and Rekany 2010), OSCE has been demonstrated as a valid and reliable method for assessing clinical competencies with positive impacts on healthcare education.

2 | Background

The OSCE structure usually comprises several circuit stations, each assessing a specific skill or domain and students must

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Summary

- This study fills a significant gap in the current assessment methods in the literature, presenting a highly reliable and valid scale for effectively evaluating health sciences students' perceptions of OSCE.
- OSCEPS provides valuable feedback on students' perceptions of OSCE, helping to improve the design and implementation of this assessment method.
- Although a limited number of existing scales in the literature evaluate some aspects of OSCE, OSCEPS is the first scale designed to comprehensively and psychometrically validly measure the quality and characteristics of OSCE from the student perspective.

complete each station to determine their clinical competence comprehensively (Müller, Dahmen, and Settmacher 2016). Clinical skills are evaluated by using standardized patients or mannequins to create real-life circumstances in stations (Stockmann et al. 2019). OSCE needs a well-organized team and preparation. However, it is expensive, considering the resources, and time-consuming (Rao and Rao 2021). Exploring students' perceptions of OSCEs is very valuable for several reasons. First, understanding students' perceptions of the characteristics, quality, and organization of OSCEs helps to improve the design and implementation of assessments (Maa et al. 2019). Thus, OSCE can be restructured to take into account students' perceptions. Studies are identifying the health science students' perceptions regarding OSCE (Fouad et al. 2019; Nasir et al. 2014). Some studies have shown that students perceive OSCEs positively, considering them as standardized exams that assess a wide range of clinical skills and allow them to address their gaps in specific areas (Jaiswal and Mehta 2019; Fouad et al. 2019). Although students provided positive feedback regarding OSCE, some stated that they feel anxiety and find OSCE stressful due to its atmosphere (Ahmed et al. 2015; Sarı and Mıranı 2021) or lack of time to understand the instructions (Omu et al. 2016; Nazzawi 2018). By exploring students' perceptions, instructors can address issues that may prevent students' performance and well-being during OSCEs. Furthermore, students' perceptions of OSCEs can provide valuable feedback on the validity and reliability of these assessments. While students report "subjective validity" based on their own experiences, their feedback can provide insights into the general effectiveness of OSCEs as an assessment tool (Puryer 2016). A recent systematic analysis emphasized that OSCE is a more reliable assessment format for evaluating nursing students' clinical competencies than the traditional clinical examination method (TECM) (Vincent et al. 2022). This finding suggests that OSCE can measure student performance more effectively. Upon reviewing the literature, we conclude that there is a necessity to integrate OSCE into educational assessment methods; however, despite the existence of some OSCE scales, they are not comprehensive (Ameh et al. 2014; Ahmed et al. 2015; Vincent et al. 2022). Therefore, this study aimed to develop a comprehensive assessment scale with psychometric properties, which was developed for the first time, evaluating the quality and characteristics of OSCE from a student perspective, filling the gap in the literature.

3 | Methods

3.1 | Study Design

This study aimed to develop the "Objective Structured Clinical Examination Perception Scale (OSCEPS)" to thoroughly evaluate OSCE characteristics from the viewpoint of health sciences students. The research methodology followed the guidelines for observational cross-sectional studies outlined in the STROBE checklist (Vandenbroucke et al. 2007). The results are drawn from data collected in the period 2022–2023.

3.2 | Study Setting, Participants

The research was conducted from 1 January 2023 to 31 May 2023 with students enrolled in the faculties of medicine and nursing at a private foundation university with prior experience with OSCE. During the scale adaptation and development process at the end of the research, it was targeted to include about 250 students, approximately ten times the number of items on the application form, to reach sufficient data. However, the sample size was limited due to the requirement for OSCE experience in the data collection group. The study sample consists of 220 students. The study was conducted with the participation of all students, and no student withdrew during the research. The research was completed by reaching approximately nine times the total number of items.

Inclusion criteria: being a student in the health sciences departments, having previously experienced the OSCE exam, and volunteering to participate in the research.

Exclusion criteria: having no experience with the OSCE, filling out the data forms incompletely, persons with visual, auditory, or mental health impairments, and wanting to leave at any point in the research.

3.3 | Study Procedure

3.3.1 | Phase 1: Item Generation

The review mainly focused on checklists/surveys used to assess students' perceptions of health sciences towards OSCE (Hall et al. 2015; Hunt et al. 2020; Lawrence and Selvan 2019). A literature review was conducted between October 2022 and December 2022 regarding the OSCE Evaluation forms (Lawrence and Selvan 2019; Rodriguez and Sánchez-Ismayel 2021; Yap et al. 2021). Pubmed, Cochrane Library, Medline (OVID), Scopus, Web of Science, and CINAHL databases were used to search the relevant literature. While exploring the data, the words "Students, #1 Medical"[Mesh] OR "Medical Student" OR "Students, Nursing"[Mesh] OR "Nursing Student" #2 "Objective Structured clinical examination" OR "Objective Structure clinical examination" #3 "student satisfaction" OR assessment OR response OR feedback OR "Development testing" OR "psychometric testing" were used. Items for the scale were developed based on the conceptual framework and existing literature. A pool of 32 items deemed appropriate for the scale was compiled. The scale items were formulated in Turkish. The scale is scored in a five-point Likert type from "Strongly Disagree=1 point" to

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"Strongly Agree=5 points". There are no reverse items in the scale. An increase in the scale score indicates an increase in students' positive opinions towards OSCE.

3.3.2 | Phase 2: Expert Review

The Content Validity Index (CVI) assesses items' relevance, clarity, and representativeness in a test or questionnaire, ensuring that these items accurately reflect the construct they are intended to measure (Yusoff 2019). There are two types of CVI: item-level CVI and scale-level CVI. Item-level CVI is calculated for each item on the test, while scale-level CVI is calculated for the entire test (Shi, Mo, and Sun 2012). To test the CVI, eight experts who used the OSCE practice in their lessons were asked for their opinions. Four of the eight specialists were from the nursing faculty, and four were from the medical faculty. The experts were asked to score each item between 1 and 4 points (1 = not relevant; 2 = somewhat relevant; 3 = quite relevant; 4 = highly relevant) (Polit and Beck 2014). As a result of the evaluations and analyses made in line with the experts' suggestions, the scale was modified, and the number of items was reduced from 32 to 19. After this evaluation, a total of 13 items were removed from the scale due to low content validity and similarity of meaning with other items. For the remaining 19 items, the scale-level CVI was 0.97, and the item-level CVI was 0.91.

3.3.3 | Phase 3: Pilot Testing

Generally, a pilot test should include 10–30 participants (Johanson and Brooks 2010). The pilot application of the scale was conducted with 24 students studying at the faculty of health sciences. The scale form was reapplied to the students at a 2-week interval. As a result of pilot testing, the comprehensibility of each item was evaluated, and necessary corrections were made. The scale was finalized and made ready for application. The data of the pilot study group were not included in the study.

3.3.4 | Phase 4: Revision and Finalization

As a result of the pilot test analyses, the scale's final form was created. There was no negative feedback from the students. The scale consists of 19 items in one dimension. As the score on the scale increases, it indicates a higher level of positive perception among students towards OSCE. The maximum score that can be obtained from the scale is 95, and the minimum score is 19.

3.4 | Data Analysis

The IBM SPSS Statistics 21.0 package (Chicago, IL) and IBM SPSS Amos version 25.0 (Corp, 2017) were employed for data analysis. Descriptive statistics entailed calculating the mean, median, mode, range, and standard deviation for scale scores to grasp the overall data distribution. Cronbach's alpha was utilized to assess the scale's internal consistency and reliability, with a generally accepted threshold for a reliable scale being an alpha of 0.70 or above. Validity analysis involved conducting a factor analysis to scrutinize the scale's construct validity, i.e., its ability to measure what it intends. Confirmatory Factor Analysis (CFA) is commonly used when testing a specific theoretical model, whereas Exploratory Factor Analysis (EFA) is employed when the underlying structure of the scale is unknown. Item Analysis examined the correlation between each item and the overall scale score (item-total correlations) to identify any problematic items requiring revision or removal. The data analysis was conducted with a set error margin of 0.05.

3.5 | Ethical Considerations

Initially, written approvals were obtained from the Social Sciences Ethics Committee of private foundation University (No:2022.185.IRB3.086) and the nursing and medical faculties of Koç University to conduct of the study. Institutional permissions were obtained from the faculties where the study was conducted. Informed consent was obtained from all study students, ensuring their confidentiality and anonymity. This study followed the ethical standards specified in the Declaration of Helsinki.

4 | Results

4.1 | Sample Characteristics

The mean age of students was 22.98 ± 1.29. Most of the students were female, 64%, 46% of them at the Faculty of Nursing, %54 of them at the Faculty of Medicine, and 46% in fourth grade.

4.2 | Results of Validity Analysis

In addition, the correlations of the items with the total scores were determined by Pearson correlation analysis and are presented in Table 3. The test–retest analyses of the scale were administered to 24 students at 2-week intervals, and the results of the test–retest analysis are presented in Table 4. In addition, there was no statistically significant difference between the mean scores of the two measurement results, which were applied at week intervals ($p > 0.05$, Table 1).

4.2.1 | Construct Validity

Construct validity for the Turkish version of the scale was analyzed using EFA and CFA. Before conducting these analyses, the Kaiser–Meyer–Olkin (KMO) test and Bartlett's test were conducted. Specifically, the adequacy of the sample size was determined using the KMO value; the result was 0.944, indicating that the sample size was suitable for EFA. Bartlett's Sphericity Test results were statistically significant ($\chi^2 = 2239.470$; $p < 0.001$). This result indicates the assumption of equal variances for the sample is true before running certain statistical tests (Table 2).

4.2.2 | Reliability Analysis

The scale's reliability was evaluated using an item–total correlation test and Cronbach's alpha coefficient test. The Cronbach's alpha value of the total scale was found to be 0.943. The EFA

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TABLE 1 | Test–Retest Score Mean Obtained from the Scale and Their Comparison ($n = 24$).

	Scale score mean		Analysis results			
	Pre-test	Post-test				
	X ± SD	X ± SD	*r*	*p*	*t*	*p*
Scale	76.45 ± 13.83	75.83 ± 13.53	0.799	< 0.001	27.442	< 0.001

Abbreviations: *r*, spearmen correlation; *t*, One sample test.

TABLE 2 | Results of Exploratory Factor Analysis.

Items		Factor
1	The general orientation held before the OSCE was in line with its purpose.	0.689
2	Practical training was provided on the OSCE method.	0.644
3	A standardized patient and/or simulation with a realistic patient scenario was used in the OSCE.	0.657
4	The written and/or verbal instructions given in the OSCE environment were clear and explicit.	0.721
5	OSCE provided an opportunity to utilize my theoretical knowledge.	0.814
6	The transition time between OSCE stations was sufficient.	0.628
7	The management/organization of the OSCE was successful.	0.756
8	The allocated time for skills/scenarios in the OSCE stations was sufficient.	0.694
9	The skill/scenario content in the OSCE was well-structured.	0.833
10	The personnel facilitating the flow in the OSCE environment managed the process effectively.	0.656
11	The number of stations in the OSCE was sufficient.	0.520
12	There were no distracting factors in the OSCE environment.	0.674
13	The lighting/sound/visual arrangement and structure of the OSCE environment were sufficient.	0.650
14	The materials prepared for the OSCE skills/scenarios were sufficient in quantity.	0.664
15	OSCE provided an opportunity to enhance my clinical skills.	0.732
16	OSCE was indistinguishable from a real clinical environment.	0.647
17	The existing materials in the OSCE stations were compatible with the scenario/skills.	0.805
18	The assessment system of OSCE was aligned with the learning objectives.	0.795
19	OSCE allowed me to discover my strengths and weaknesses.	0.697
Total explained variance		56.176
KMO coefficient		0.944
Barlett test		2239.470; < 0.001

Abbreviation: KMO, Kaiser-Meyer Olkin coefficient.

analysis revealed one dimension of the scale. A principal component analysis was used as the extraction method, and the item loadings were between and after rotation (varimax). The one structure was found to explain 56.176% of the total variance.

The model fit of the item–CFA assured factor relationship derived by EFA. CFA fit indices were used to reveal the adequacy of the model in this study, namely the chi-square fit, goodness-of-fit index (GFI), root mean square error of approximation (RMSEA), comparison of model fit indices (CFI), and normed fit index (NFI). The scale's fit indices were significant after modification (χ^2 =; df = 152, $p < 0.001$). The fit index values were as follows: (RMSEA = 0.084; GFI = 0.839; CFI = 0.902; IFI = 0.902; RFI = 0.824; NFI = 0.843; TLI = 0.889) (Table 3).

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TABLE 3 | Model fit indices of the scale.

	X^2	DF[a]	X^2/DF	RMSEA[b]	GFI[c]	CFI[d]	IFI[e]	RFI[f]	NFI[g]	TLI[h]
Model		152	2.395	0.084	0.839	0.902	0.902	0.824	0.843	0.889

Abbreviation: TLI (NNFI), Trucker-lewıs Index.
[a]Degree of Free.
[b]Root Mean Square Error of Approximation.
[c]Goodness of Fit Index.
[d]Comparative Fit Index.
[e]Incremental Fit Index.
[f]Relative Fit Index.
[g]Normed Fit Index.

TABLE 4 | Results of the reliability analyses of the scale and correlations of the item total score.

Items	Cronbach α	X ± SD	Item-total score correlation	Test-re test correlations of items ($n = 24$)
1	0.943	3.92 + 1.0	0.729	0.727
2		3.98 + 0.96	0.687	0.735
3		4.17+ 0.87	0.744	0.567
4		3.89 + 0.95	0.743	0.853
5		3.97 + 0.95	0.781	0.735
6		3.87 + 1.01	0.653	0.506
7		3.70 + 1.11	0.725	0.635
8		3.67 + 1.11	0.705	0.538
9		4.00 + 0.95	0. 804	0.622
10		4.18 + 0.83	0. 639	0.774
11		4.05 + 0.93	0. 593	0.450
12		4.01 + 1.03	0. 690	0.479
13		4.31 + 0.77	0. 600	0.780
14		4.11 + 0.97	0. 664	0.829
15		4.10 + 0.94	0. 722	0.720
16		3.17 + 1.6	0.619	0.653
17		4.08 + 0.84	0.786	0.683
18		4.00 + 0.94	0.800	0.585
19		4.00 + 1.02	0.724	0.615
Total Cronbach Alpha (α) Value			0.943	

As a result of CFA, it was revealed that the scale confirmed its one-dimensional structure. CFA results of the scale are given in Table 2 and Figure 1. The total and subdimension Cronbach's alpha coefficient results of the scale are given in Table 4.

5 | Discussion

5.1 | Content Validity

This study aimed to develop a valid and reliable measurement scale to evaluate the OSCE characteristics perceived by health science students comprehensively. In the study, the item pool of the scale was presented for the opinions and suggestions of eight experts in the fields of measurement and evaluation with OSCE from the departments of nursing and medicine. After this evaluation, a total of 13 items were removed from the scale due to the low content validity rate and the similarity in meaning with other items. The coverage validity rate was above 0.87 for the remaining 19 items. Consequently, the content validity index of the scale was calculated as 0.97, and the content validity index of the item was calculated as 0.91. The content and item validity index is determined by assessing whether the items of a measurement scale accurately reflect the phenomenon it intends to measure (Yusoff 2019; Shi, Mo, and Sun 2012). Therefore, it is crucial to ensure that the items of the measurement scale effectively capture the phenomenon's essence (Yusoff 2019; Shi, Mo, and Sun 2012). Due to the high CVI value, experts have a

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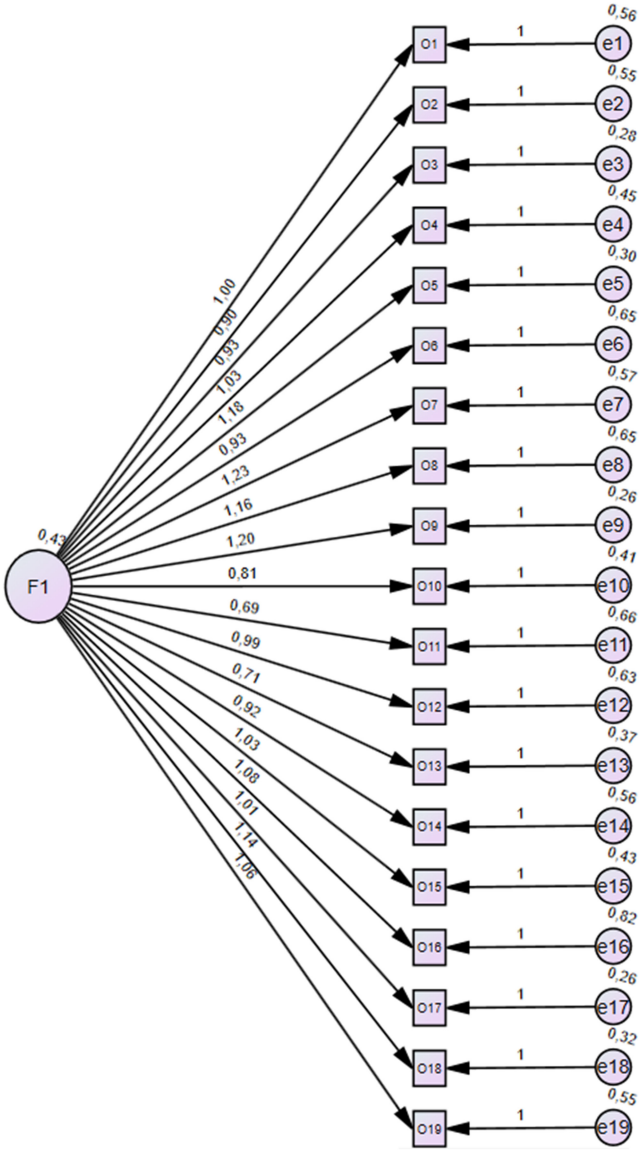


FIGURE 1 | Path Diagram and Factor Loads of the One Factor Models of the Scale.

consensus, and content validity is ensured. In line with the results obtained in the study, it can be concluded that the OSCEPS form is a suitable measurement for both language and content validity, accurately representing the measured area. In addition to these findings, similar results regarding the effective administration of OSCE have been observed in studies conducted by Pierre et al. (2004), Bartfay and Rombough (2004), and Fidment (2012). Generally, most students agreed with the organizational aspects of OSCE assessments, emphasizing the comprehensiveness of the evaluation criteria. Moreover, they articulated that the examination environment is technologically equipped, as reported in the aforementioned studies.

5.2 | Construct Validity

In studies, most research focusing on the evaluation of OSCE tends to be qualitative (Fidment 2012; Ameh et al. 2014; Ahmed et al. 2015). These studies explore various criteria, including students' perceptions of OSCE, the internal consistency of its items, how the examination is administered, and its impact on student stress. Consequently, beyond the psychometric analyses conducted on a scale, there are also studies assessing the proficiency level of specific skills. Unfortunately, this circumstance does not allow for comparing the discussion findings of our developed scale, particularly its construct validity, and reliability, with scales available in the literature (Fidment 2012; Ameh et al. 2014; Ahmed et al. 2015; Awad, Alshamandy, and Abolwafa 2017; Hunt et al. 2020). The construct validity of the Turkish version of the scale was assessed through EFA and CFA, as described in the methodology section (Brown 2015; Esin 2015). Before conducting these analyses, preliminary tests were performed to ensure the appropriateness of the data. The KMO test assessed sample adequacy, yielding a high KMO value of 0.944. This indicates that the sample size was sufficient for conducting EFA, implying that the data captured the underlying construct well (Yaşlıoğlu 2017). Furthermore, Bartlett's test of sphericity yielded a statistically significant result, supporting the assumption of equal variances in the sample before running specific statistical tests. These initial findings provide a strong foundation for exploring the construct validity of the Turkish version of the scale.

5.3 | Reliability of the Scale

Two commonly used tests were employed to ensure the scale's reliability: The item-total correlation test and Cronbach's alpha coefficient test. The item-total correlation test examines the relationship between individual items and the total scale score. The results indicated strong correlations between each item and the total scale score, indicating that the items collectively measure the same underlying construct (Polit and Beck 2014). Furthermore, Cronbach's alpha coefficient test yielded a high value of 0.943, demonstrating excellent internal consistency of the scale. These results suggest that the scale items are reliable and consistently measure the intended construct among the participants. Additionally, the one-dimensional structure of the scale was confirmed through the EFA. A principal component analysis with varimax rotation was conducted, resulting in distinct item loadings ranging between and after rotation. The one-factor structure explained a significant portion of the total variance, accounting for 56.176% of the variability in the scale scores. This finding further supports the internal consistency and unidimensionality of the scale, indicating that it measures a single construct consistently across participants.

The model fit of the item-factor relationship derived from the EFA was further assessed and confirmed through CFA. Various fit indices were employed to evaluate the adequacy of the model in this study, including the chi-square fit, GFI, RMSEA, CFI, and NFI (Schreiber et al. 2006). After making the necessary modifications, the scale's fit indices were statistically significant. The fit index values obtained show that the proposed model fits the observed data sufficiently and provides more support for the scale's construct validity (Brown 2015). As a result of the CFA, the scale successfully confirmed its one-dimensional structure. The CFA results in Table 2 and Figure 1 further support the scale's validity. The observed data align well with the hypothesized one-factor structure, proving that the scale effectively captures the intended construct. These findings contribute to the overall robustness

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and validity of the scale, suggesting that it is a reliable measure for assessing the targeted dimension among the participants.

To evaluate the test–retest reliability of the scale, a subgroup of 24 students completed the scale at 2-week intervals. The results of the test–retest analysis are presented in Table 4. The findings revealed high consistency and stability of the scale over time, as evidenced by the high correlation coefficient between the two measurement results. Moreover, a paired samples t-test was conducted to examine whether there was a statistically significant difference between the mean scores of the two measurement occasions (Karakoç and Dönmez 2014), administered in 2-week intervals. The results indicated no significant difference between the mean scores, suggesting that the scale demonstrates stability and consistency over time.

6 | Limitations

This study has some limitations. The research was conducted only with medical and nursing students and within a single institution. Therefore, caution should be exercised when generalizing the findings to other health sciences students or different educational environments. On the other hand, since the study did not assess the impact of the scale on student performance, further research is needed to understand the practical implications and educational benefits of the scale.

7 | Conclusion

In this study, the OSCEPS has been developed to analyze the perspectives and experiences of medical and nursing undergraduate students during OSCE. To our knowledge, the OSCEPS is the first scale to comprehensively evaluate the attributes and features of OSCE from the student's viewpoint. Due to its strong validity and reliability, as evidenced by factor analysis and Cronbach's alpha coefficient, the OSCEPS can effectively measure students' opinions on OSCE.

8 | Relevance Of Clinical Practice

Based on the findings of this study, educators and administrators in medical and nursing schools can utilize the OSCEPS to gain valuable insights into students' perceptions of OSCE. This feedback can enhance the design and implementation of OSCEs, ensuring they align with students' needs and improving the overall educational experience. Furthermore, the comprehensive and psychometrically validated nature of the OSCEPS makes it a robust tool for continuous improvement in clinical assessments, ultimately leading to better preparedness of health sciences students for real-world clinical practice.

Author Contributions

Tuba Sengul: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review and editing. Remziye Semerci: Formal analysis, Investigation, Methodology, Writing – review and editing. Seda Guney: Formal analysis, Investigation, Methodology, Writing – review and editing. Seda Karakaya Çataldaş: Data curation, Investigation, Supervision, Writing – review and editing.

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Ethics Statement

In this study, ethical considerations were meticulously adhered to. Before to the research, ethical approval was obtained from the ethics board of a private foundation university (No: 2022. 185.IRB3.086). All participants were informed about the purpose of the study, potential risks and benefits, and their rights, including the right to withdraw at any stage without any repercussions, and informed consent was obtained. The researchers upheld the principles of confidentiality and privacy by anonymizing personal identifiers and using codes. This study was conducted and performed following the ethical rules stated in the Declaration of Helsinki.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

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