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Evaluating the Predictive Validity of Objective Structured Clinical Examination (OSCE) Scores for Future Clinical Performance Among Final-Year Medical Students in Pakistan

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ABSTRACT

The Objective Structured Clinical Examination (OSCE) is widely used in medical education to assess students' clinical skills. However, its ability to predict future clinical performance, known as predictive validity, remains debated. **Objectives:** To evaluate the predictive validity of OSCE scores for subsequent clinical performance among final-year medical students. **Methods:** This retrospective cohort study was conducted at a tertiary medical college in Pakistan. Data were collected for 80 final-year MBBS students, including total OSCE scores and domain-wise performance. Subsequent clinical performance was assessed using clerkship scores in Internal Medicine and Surgery, along with Mini-CEX, DOPS, 360-degree evaluations, and supervisor ratings. Pearson's correlation and multiple linear regression were used to examine associations. **Results:** The mean OSCE score was 72.7 ± 7.8. Only the Internal Medicine Clerkship Score showed a statistically significant negative correlation with OSCE performance ($r = -0.224$, $p=0.046$). However, the effect size was small, and the clinical significance of this finding is questionable. The association may reflect random variation or unmeasured confounding and should be interpreted with caution. No other clinical outcomes showed significant correlations. Regression analysis revealed that none of the OSCE domains significantly predicted final clerkship scores. **Conclusions:** OSCE scores showed limited predictive value for subsequent clinical performance in this cohort. The results highlight the need to interpret statistically significant but weak associations with caution. Multimodal assessments combining OSCEs with workplace-based tools may offer a more comprehensive evaluation of clinical competence.

INTRODUCTION

The process of assessing clinical competence in undergraduate medical education has evolved significantly over recent decades [1]. As the focus shifts from traditional knowledge-based evaluations to performance-based assessments, institutions are increasingly adopting structured tools like the Objective Structured Clinical Examination (OSCE) to evaluate essential clinical skills [2]. The OSCE is designed to simulate real-life clinical scenarios in a controlled environment, allowing examiners to assess students' proficiency in history taking, physical

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examination, communication, clinical reasoning, and procedural tasks using standardized stations and checklists [3]. The widespread use of the OSCE is largely due to its perceived objectivity, reproducibility, and versatility in evaluating a broad range of clinical competencies [4]. It has become a cornerstone in many medical curricula globally and is often used as a high-stakes examination for promotion or graduation. While the OSCE offers a more structured and standardized alternative to traditional oral or long-case exams, concerns remain regarding its ability to predict how students perform in real clinical settings. Clinical competence in the workplace involves not only technical skill but also adaptability, time management, interpersonal communication, and professional judgment elements that may not be fully captured within the time-constrained, station-based format of an OSCE [5]. A key concept in evaluating the effectiveness of such assessments is predictive validity, which refers to the extent to which performance on an assessment (e.g., OSCE) can accurately forecast future performance in a related real-world context, such as clinical clerkships or postgraduate training. Previous research on the predictive validity of OSCEs has produced mixed results. Some studies have reported moderate correlations between OSCE performance and future clinical achievements, while others have found little to no association. These inconsistencies raise questions about whether OSCE performance can be reliably used to forecast students' clinical effectiveness during clerkships or postgraduate training [6, 7]. Additionally, much of the existing literature originates from high-income, Western academic settings, with relatively limited data from local or regional contexts in South Asia, where cultural, curricular, and assessment practices may differ significantly [8]. Despite the routine reliance on OSCEs in undergraduate medical education, there remains a lack of clear evidence regarding their ability to predict actual clinical performance across diverse clinical rotations and evaluative settings. This gap is particularly relevant in institutions where OSCEs are used as gatekeeping tools for advancement or licensure. Without sufficient evidence of predictive validity, there is a risk that assessment-driven decisions may not accurately reflect a student's real-world competence. By analyzing the relationship between OSCE scores and subsequent clerkship evaluations, this research aims to provide insight into the strengths and limitations of the OSCE as a predictive tool, offering data-driven recommendations for assessment practices in undergraduate medical education.

Despite the widespread use of OSCEs as high-stakes assessments in undergraduate medical education, evidence regarding their predictive validity for future clinical performance remains inconsistent, particularly in low- and middle-income countries. Most existing research originates from Western academic settings, with limited data from Pakistani medical institutions where curricular structures and workplace-based assessments may differ. Furthermore, few studies have examined domain-wise OSCE performance in relation to multiple clinical evaluation tools within the same cohort. This gap underscores the need for context-specific evidence to determine whether OSCE scores meaningfully predict real-world clinical competence. This study aims to evaluate whether OSCE scores correlate with and can predict future clinical performance among final-year medical students in a real clinical environment.

METHODS

This was a retrospective cohort study conducted among final-year medical students at Rawal Institute of Health Sciences, Islamabad. The study aimed to evaluate whether prior performance in the Objective Structured Clinical Examination (OSCE) could reliably predict subsequent clinical competence during clerkships. As the study utilized pre-existing institutional records to compare earlier OSCE scores with later clerkship outcomes, a retrospective design was considered methodologically appropriate. The study duration for 6 months from October 2024 to March 2025. Before data collection, ethical approval was obtained from the Institutional Review Board (IRB) of Rawal Institute of Health Sciences, under reference number RIHS/IRB/15/2024. Data were collected from April to October 2024. This approval confirmed adherence to institutional and ethical guidelines for human subject research. All participants provided written informed consent, and the principles of confidentiality, anonymity, and voluntary participation were strictly upheld throughout the study. A sample size of 80 students was determined based on anticipated effect sizes from prior literature [8], using a confidence level of 95% and statistical power of 80%. Non-probability consecutive sampling was used to include all eligible final-year MBBS students who had completed both the institutional OSCE and at least one full clerkship rotation. Inclusion criteria were final-year MBBS students enrolled in the current academic session, who had completed the institutional OSCE and undergone formal clinical clerkship evaluations in Internal Medicine and Surgery. Exclusion criteria were students who did not provide informed consent, those with incomplete data due to absenteeism or missing evaluations, and students with deferred or supplementary OSCE assessments. Data were collected in two distinct phases. OSCE scores were retrieved from the institutional examination department. The OSCE comprised multiple

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stations evaluating History Taking, Physical Examination, Communication Skills, Clinical Reasoning, and Procedural Skills. Each domain was scored independently using locally validated standardized rubrics, developed by a panel of senior clinical faculty and aligned with institutional learning objectives. These rubrics included detailed checklists with behavioural anchors and domain-specific criteria to minimize scoring subjectivity. Faculty assessors received prior training and participated in calibration exercises to ensure inter-rater reliability. Clinical performance data were obtained from clerkship evaluation forms and logbooks. The following outcomes were included: Final Clerkship Score (aggregated from Internal Medicine and Surgery), Individual Internal Medicine and Surgery Clerkship Scores, Mini-Clinical Evaluation Exercise (Mini-CEX), Directly Observed Procedural Skills (DOPS), Supervisor or Preceptor Ratings, 360-Degree Feedback Scores, Patient Interaction Ratings, and Post-OSCE Written Examination Scores. Mini-CEX and DOPS evaluations were scored out of 10 using institutionally approved rating forms. Two independent assessors conducted evaluations whenever possible, and discrepancies were resolved through consensus. Supervisor and peer feedback were collected using structured 360-degree feedback forms incorporating Likert-type response scales. All data were anonymized and double-entered into SPSS version 25 to minimize entry errors and ensure accuracy. To ensure content validity, OSCE stations were developed by experienced faculty and mapped against institutional curriculum objectives. Construct validity was established by designing stations to assess distinct clinical competencies, avoiding domain overlap. Internal consistency was confirmed through pilot testing, yielding an acceptable Cronbach's alpha ($\alpha > 0.70$). Inter-rater reliability was strengthened through assessor workshops and rubric alignment. Predictive validity was assessed by examining the strength and direction of associations between OSCE scores and subsequent clinical performance outcomes. Descriptive statistics (mean and standard deviation) were used for demographic and score summaries. Pearson's correlation coefficient (r) was used to evaluate associations between total OSCE scores and individual clinical outcomes. Multiple linear regression analysis was performed to determine whether any specific OSCE domain scores significantly predicted Final Clerkship Scores. A p-value of less than 0.050 was considered statistically significant.

RESULTS

The study included 80 final-year medical students. The mean age was 22.85 ± 1.15 years, with a nearly equal gender distribution: 41 male (51.2%) and 39 female (48.8%). All participants were enrolled in their final year of the MBBS program. Academic consistency was evident, with a mean cumulative GPA of 75.90 ± 6.13%, and the most recent professional exam scores averaged 75.47 ± 6.59%. Students achieved a mean total OSCE score of 72.70 ± 7.80 (out of 100). Among the component domains, the highest score was in Physical Examination (15.15 ± 1.46), followed by Communication Skills (14.67 ± 1.54) and History Taking (14.02 ± 2.25). Scores were relatively lower in Clinical Reasoning (12.78 ± 2.16) and Procedural Skills (13.37 ± 1.68). The post-OSCE written examination score was 72.26 ± 6.70%, closely aligned with the total OSCE score. While the OSCE was scored out of 100, each domain was scored independently on variable subscales and then standardized by the examination committee to compute the final composite OSCE score (Table 1).

Table 1: Demographic Characteristics of Medical Students, and Performance on OSCE Component (n=80)

Variables	Mean ± SD / n (%)
Age (years)	22.85 ± 1.15
Male	41 (51.2%)
Female	39 (48.8%)
Academic Year (Final)	80 (100%)
Cumulative GPA (%)	75.90 ± 6.13
Previous Exam Score (%)	75.47 ± 6.59
OSCE Component	
History Taking Score	14.02 ± 2.25
Physical Examination Score	15.15 ± 1.46
Communication Skills Score	14.67 ± 1.54
Clinical Reasoning Score	12.78 ± 2.16
Procedural Skills Score	13.37 ± 1.68
Total OSCE Score (/100)	72.70 ± 7.80
Post-OSCE Written Score (%)	72.26 ± 6.70

Clinical performance was assessed through clerkship scores and evaluator ratings. The Final Clerkship Score averaged 74.09 ± 6.68, with Internal Medicine at 77.48 ± 6.32, and Surgery at 75.11 ± 7.24. Additional evaluations were favorable: Supervisor Rating (8.22 ± 1.06), Mini-CEX (7.53 ± 1.10), DOPS (7.87 ± 0.93), 360-Degree Feedback (7.75 ± 0.90), and Patient Interaction Score (8.55 ± 1.07), all out of 10. Only the Internal Medicine Score showed a statistically significant negative correlation with OSCE score ($r = -0.224$, $p=0.046$). However, the effect size was small ($R^2 = 0.050$) and, according to Cohen's classification, represents a weak correlation. This suggests limited clinical relevance, and the finding should be interpreted cautiously, as it may reflect random variation or unmeasured confounders. No other correlations between OSCE and clinical variables were statistically significant ($p>0.050$) (Table 2).

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Table 2: Clinical Outcomes and Correlation with OSCE Score (n=80)

Clinical Outcome Variables	Mean ± SD	Pearson r	p-Value
Final Clerkship Score (%)	74.09 ± 6.68	−0.083	0.467
Internal Medicine Clerkship (%)	77.48 ± 6.32	−0.224	0.046
Surgery Clerkship (%)	75.11 ± 7.24	−0.122	0.281
Supervisor/Preceptor Rating (/10)	8.22 ± 1.06	−0.035	0.756
Mini-CEX Score (/10)	7.53 ± 1.10	0.006	0.959
DOPS Score (/10)	7.87 ± 0.93	0.120	0.287
360-Degree Feedback Score (/10)	7.75 ± 0.90	0.020	0.860
Patient Interaction Score (/10)	8.55 ± 1.07	0.033	0.770
Post-OSCE Written Score (%)	72.26 ± 6.70	0.058	0.611

To assess whether specific OSCE domains could predict overall clinical performance, a multiple linear regression model was constructed using the five OSCE components as independent variables and the Final Clerkship Score as the outcome. Pearson's correlation analysis revealed a statistically significant but weak negative correlation between the Total OSCE Score and the Internal Medicine Clerkship Score ($r = -0.224$, $p = 0.046$). According to Cohen's guidelines, this reflects a small effect size and likely lacks clinical relevance. The result may represent a Type I error due to random variation or uncontrolled confounding factors and should therefore be interpreted with caution. All other clinical outcomes showed non-significant correlations with OSCE scores, suggesting limited predictive value (Table 3).

Table 3: Multiple Linear Regression – OSCE Domains as Predictors of Final Clerkship Score (n=80)

Predictors	B Coefficient	Std. Error	t-Value	p-Value	95% CI (Lower, Upper)
Constant	82.70	14.69	5.63	<0.001	53.43, 111.96
History Taking Score	−0.263	0.345	−0.764	0.447	−0.951, 0.424
Physical Exam Score	−0.179	0.532	−0.337	0.737	−1.239, 0.880
Communication Skills	0.068	0.506	0.135	0.893	−0.940, 1.077
Clinical Reasoning Score	−0.027	0.359	−0.075	0.940	−0.743, 0.689
Procedural Skills Score	−0.213	0.459	−0.465	0.644	−1.128, 0.702

To evaluate the potential influence of gender and academic performance on assessment outcomes, subgroup analyses were performed using independent samples t-tests. Gender-wise comparisons showed that female students achieved a slightly higher mean OSCE score (73.56 ± 7.43) compared to male students (71.88 ± 8.15), but this difference was not statistically significant ($t = -0.963$, $p=0.339$). Similarly, in terms of Final Clerkship Scores, female students had a marginally higher mean (74.62 ± 7.64) than males (73.58 ± 5.68), yet the difference did not reach statistical significance ($t = -0.692$, $p=0.491$). These findings suggest that gender did not significantly impact either OSCE or clerkship performance in this cohort. GPA-based comparisons revealed a reverse trend. Students with a lower cumulative GPA (<75%) scored slightly higher on the OSCE (73.78 ± 7.50) than those with a higher GPA (≥75%), who averaged 71.81 ± 8.02. However, this difference was not statistically significant ($t = 1.125$, $p=0.264$). Final Clerkship Scores were also comparable between the low GPA (73.85 ± 7.28) and high GPA groups (74.29 ± 6.23), with no significant difference observed ($t = -0.291$, $p=0.772$). These results indicate that prior academic performance, as measured by GPA, did not predict OSCE or clerkship outcomes in a meaningful way (Table 4).

Table 4: Gender- and GPA-Based Comparison of OSCE and Final Clerkship Scores

Grouping Variables	Outcome Measure	Group	Mean ± SD	t-Value	p-Value
Gender	Total OSCE Score	Male	71.88 ± 8.15	−0.963	0.339
		Female	73.56 ± 7.43		
	Final Clerkship Score	Male	73.58 ± 5.68	−0.692	0.491
		Female	74.62 ± 7.64		
GPA Group	Total OSCE Score	Low GPA (<75%)	73.78 ± 7.50	1.125	0.264
		High GPA (≥75%)	71.81 ± 8.02		
	Final Clerkship Score	Low GPA (<75%)	73.85 ± 7.28	−0.291	0.772
		High GPA (≥75%)	74.29 ± 6.23		

A summary of the subgroup comparisons was presented. None of the differences observed across gender or GPA groupings reached statistical significance. The comparisons of OSCE scores by gender ($t(78) = -0.963$, $p=0.339$) and clerkship scores by gender ($t(78) = -0.692$, $p=0.491$) both yielded non-significant results, reinforcing that performance in both domains was independent of gender. Likewise, comparisons based on GPA showed no significant effect on OSCE scores ($t(78) = 1.125$, $p=0.264$) or clerkship scores ($t(78) = -0.291$, $p=0.772$). These findings provide further evidence that demographic and academic variables such as gender and GPA did not act as confounding factors in assessing clinical competence in this study (Table 5).

Table 5: Summary of Subgroup Analysis Results

Subgroup Comparison	Outcome Measure	Statistical Result	Interpretation
Gender vs. OSCE Score	$T(78) = -0.963$, $p=0.339$	Not significant (NS)	No significant difference
Gender vs. Clerkship Score	$T(78) = -0.692$, $p=0.491$	Not significant (NS)	No significant difference
GPA vs. OSCE Score	$T(78) = 1.125$, $p=0.264$	Not significant (NS)	No significant difference
GPA vs. Clerkship Score	$T(78) = -0.291$, $p=0.772$	Not significant (NS)	No significant difference

Scatter plot depicting the linear relationship between Internal Medicine Clerkship Scores and Total OSCE Scores. The line of best fit demonstrates a weak negative association ($R^2 = 0.050$), indicating that only 5% of the variance in OSCE scores is explained by performance in internal medicine. The trend is statistically significant but clinically negligible, with considerable data spread around the fit line (Table 5).

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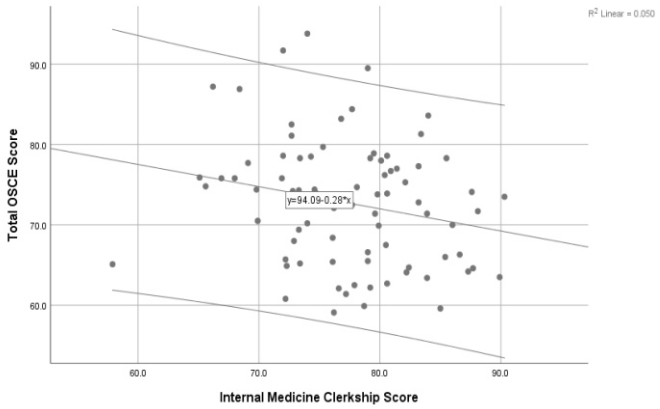

Figure 1: Linear Regression Between Internal Medicine Clerkship Scores and Total OSCE Scores

DISCUSSION

This study investigated whether OSCE scores could predict future clinical performance among final-year medical students. The analysis revealed a statistically significant but weak negative correlation between total OSCE scores and performance in the Internal Medicine clerkship. However, no such associations were observed for Surgery clerkship scores, Mini-CEX, DOPS, or other clinical evaluations. This suggests that while OSCEs serve as structured assessments of core skills, their ability to predict broader clinical competence in real-world settings appears limited. The weak inverse correlation with Internal Medicine performance warrants careful interpretation. One possible explanation may lie in the differences in assessment frameworks. OSCEs are standardized and time-constrained, while clerkship evaluations often reward adaptability, continuity of care, and interpersonal skills that are difficult to capture in a simulated environment. The weak inverse correlation with Internal Medicine clerkship performance, although statistically significant, is unlikely to have practical importance. Given the small effect size and borderline significance, this association may represent a chance finding (Type I error) or the influence of uncontrolled confounding factors such as assessor judgment, student motivation, or variability in clinical exposure. Therefore, this result should be interpreted with caution and not overemphasized. Furthermore, Internal Medicine often demands integrative reasoning, longitudinal patient care, and team-based decision-making domains less emphasized in traditional OSCE formats. The negative direction of correlation may also reflect a statistical artifact or unmeasured confounding, such as varying levels of student engagement, assessor subjectivity, or clinical exposure. Although prior literature often supports the formative value of OSCEs, its predictive utility remains a matter of controversy [9]. Nasiri *et al.* found that OSCE scores moderately predicted third-year clinical performance in a setting with integrated mentorship and longitudinal follow-up [10]. However, the contextual differences, including evaluation culture and curriculum structure, may explain the stronger alignment in that setting. Conversely, Dewan *et al.* Chang *et al.* and and Paynte *et al.* reported minimal associations between OSCEs and clerkship outcomes, consistent with our findings [11-13]. Moreover, studies by Dewan *et al.* and McGown *et al.* emphasized that OSCEs primarily assess discrete skills under observation but may not translate into performance in dynamic clinical environments [11, 14]. This supports the lack of association between domains such as Clinical Reasoning and real-world clerkship scores in our data. It is also possible that OSCE high-performers rely on structured preparation and checklist behaviors, while clerkship success often hinges on adaptability, communication, and professionalism traits harder to measure in OSCE stations. Some researchers advocate incorporating OSCEs into a broader competency-based assessment system [15-17]. Vhora et al. argued that while OSCEs demonstrate good inter-rater reliability, their summative use should be supplemented with workplace-based assessments [18]. Entrustable Professional Activities (EPAs), multisource feedback, and narrative clinical assessments may offer more valid insight into a student's readiness for clinical responsibilities [19, 20]. Overall, while the OSCE provides a valuable snapshot of student performance under controlled conditions, it cannot replace the depth and context provided by longitudinal clinical evaluations. Our findings support a shift toward multimodal assessment models that balance structured exams with authentic performance-based measures.

This study has several limitations, including its single-center retrospective design and relatively small sample size, which may limit generalizability. The reliance on institutional clerkship evaluations may also introduce assessor variability and unmeasured confounding factors influencing performance outcomes. Additionally, the follow-up period was limited to undergraduate clerkships without extending into internship or residency performance. Future multicenter longitudinal studies incorporating standardized workplace-based assessments and postgraduate outcomes are recommended to better clarify the long-term predictive value of OSCE scores.

CONCLUSIONS

In this single-institution study of 80 final-year medical students, OSCE scores demonstrated limited predictive validity for subsequent clinical performance. A weak negative correlation was observed between total OSCE scores and Internal Medicine clerkship outcomes, while no significant associations were found for Surgery clerkships,

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Mini-CEX, or DOPS. These findings suggest that OSCEs, although structured and standardized, may not adequately capture the complex competencies required in clinical environments. Future research should explore longitudinal, multisite studies and consider integrating OSCEs with entrustable professional activities and narrative workplace-based evaluations to better assess clinical readiness.

Authors' Contribution

Conceptualization: MA
Methodology: MA, ZA, BH, SA, HG
Formal analysis: ZA, SA, SS, HG
Writing and Drafting: MA, ZA, BH, SA, SS, HG
Review and Editing: MA, ZA, BH, SA, SS, HG

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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