Original Article

Measuring the Affective Domain in Medical Education: A Psychometric Study of Undergraduate Students in Pakistan

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ABSTRACT

OBJECTIVE: To identify the change in attitude and behavior of medical students and to analyze the factor structure and psychometric properties of the scale used.

METHODOLOGY: This descriptive, cross-sectional, quantitative, student self-reported study was conducted from August to October 2025 at Muhammad Medical College, Ibn-e-Sina University, Mirpurkhas, Pakistan, after institutional approval. Five hundred medical students (100 from each academic year, 1st to final year) were invited to complete the questionnaire.

RESULTS: Of 500 questionnaires, 293 were found complete and used for statistical analysis. The mean Ibn-e-Sina University Mirpurkhas Scale of Affective Domain (ISUMSAD) score was 59.98±21.1 out of a possible 84. A Cronbach's alpha of 0.958 with a positive item-total correlation (mean 0.645) was found. The Kaiser-Meyer-Olkin (KMO) value was 0.96, indicating excellent reliability and sampling adequacy. Pearson correlations were strong except for item 3. Academic year and hostel residence were significantly associated, whereas no significant differences were observed by gender. It is recommended that Pakistan's medical curriculum incorporate more extensive initiatives to support the affective domain and other humanistic principles throughout MBBS education.

CONCLUSION: A simple, convenient 12-item ISUMSAD showed high validity and reliability and has the necessary qualities to evaluate the affective domain of medical students. Compared to day scholars and students from earlier academic years, 4th-year medical students living in hostels performed better. The score was not significantly influenced by gender.

KEYWORDS: Affective domain, emotions, psychometrics, medical education, assessment tool.

INTRODUCTION

Traditionally, undergraduate medical education has emphasized the acquisition of knowledge and clinical skills, often overlooking the affective domain, which encompasses attitudes, emotions, values, and professional behaviors. In recent years, increasing attention has been directed toward integrating the affective domain into medical curricula, given its critical role in shaping empathetic, ethical, and patient-centred physicians.

However, assessment of the affective domain is debatable because no single tool is universally accepted — disputes arise because the domain is inherently fluid and context-dependent. Most of the tools available are self-reported and are criticized for being too subjective; on the other hand, an observational method is liable to disputes over inter-rater reliability. Assessment tools may not translate well across cultures, raising concerns about fairness and inclusivity. It is also noted that personal interests and attitudes can change rapidly, raising the question of whether the tool(s) measure long-lasting characteristics or only transient situations. Few researchers still believe affective tools reliably predict academic or professional success, while others see them as essential to holistic education[1]. Krathwohl DR 1964[2] argues that affective skills can be learned and continuously developed, much like cognitive and psychomotor skills. Krathwohl DR[3] created a taxonomy of the affective domain, outlining five stages of development: Receiving, Responding, Valuing, Organizing, and Characterizing. The ultimate goal was full integration and internalization, resulting in consistent attitudes, beliefs, and behaviors[4]. Various methods can enhance teaching these stages, such as online discussions, video narratives, and reflective exercises[5-8].

The recently developed ISUMSAD[9] scale provides a tool for assessing the affective domain. However, as with other measures of the affective domain[10], establishing the assessment instrument's "construct validity and internal consistency" is of paramount. Assessment of the affective domain has become more relevant, as there is now greater consensus that it can indeed be taught [11].

Muhammad Medical College admits 100 students annually into a five-year undergraduate medical program. Students are drawn from diverse regions of Pakistan, with a substantial proportion residing in on-campus hostels. This setting provides an appropriate context to examine whether affective domain outcomes differ by gender, academic progression, and

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residence status.

The purpose of the study was to test the impact of learning activities known to stimulate the affective domain, such as emotion and attitude, and to examine differences between genders and hostellers and day scholars. It will also help determine the reliability of the ISUMSAD scale.

METHODOLOGY

This descriptive, cross-sectional, quantitative study was conducted from August to October 2025 at Muhammad Medical College, Ibn-e-Sina University, following institutional approval. Five hundred medical students (100 from each academic year, 1st to final year) were invited to complete the questionnaire. Using consecutive convenience sampling, 500 questionnaires were distributed; however, only complete questionnaires (i.e. those that addressed all aspects) were included; incomplete questionnaires were excluded.

Participants

The undergraduate medical curriculum in Pakistan consists of a five-year modular program with vertical integration. All medical students of Muhammad Medical College, from the first through fifth years enrolled in 2025, were eligible to participate. Five hundred students from the five academic years were asked to participate. Of the 500 questionnaires, 293 (59%) were complete and used for analysis, as shown in **Table I**.

Instrument

Responses to the ISUMSAD scale were recorded on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). As each item is positively worded, no reverse scoring was necessary. A participant could score from 12 to 84. The scale's reliability and validity were assessed using Cronbach's alpha, Principal Component Analysis (PCA), item-total correlations, and comparisons across gender, academic year, and residence. Variables: The dependent variable was the total ISUMSAD score (12 –84). Independent variables included gender, academic year, and residence status.

Procedure

Before administering the study, researchers informed students from all five years in their regular classes that the questionnaire would assess their personal beliefs and opinions and that the results would be used for research purposes. Participants were assured anonymity; no identifying information was collected, so they did not need to respond in ways that might suggest socially acceptable behavior. Returning the form was interpreted as consent; therefore, participation was entirely voluntary. There were no incentives for participation, nor penalties for non-participation. While respondents were not required to provide their names, they were asked to indicate their gender, academic year, and hostel residence. Students were given one day to complete the questionnaire individually.

RESULTS

The descriptive statistics are shown in **Table I**; the mean item score was 4.998. The overall scale demonstrated excellent reliability (Cronbach's alpha = 0.958). Sampling adequacy was confirmed by a KMO value of 0.96 and a highly significant Bartlett's test of sphericity (χ^2 = 3905.024, df = 66, p < 0.001). The summary of the 12-item "ISUMSAD" scale is shown in **Table II**. The item (I like to discuss my emotions, behaviors, and judgment with others) has a low mean (3.78), weak item-total correlation (0.092), low correlations with other items, and its own factor in PCA. Yet, it was retained because, despite weak statistical performance, it assesses a unique and important aspect of the construct that would otherwise be missing from the test. The variable of interest, attitude and behavior of the students across gender, academic year and hostelers vs day scholars, is shown in **Table III**. The Pearson correlation matrix for all 12 items is displayed in **Table IV**.

Table I: Descriptive statistics for the ISUMSAD

Statistics	Value
Range	3.778 to 5.416
Item Mean	4.998
Total Mean +/- SD	59.98 +/- 21.1
25th Percentile	448.0
50th Percentile	68.0
75th Percentile	75.0
Reliability (Cronbach's alpha coefficient)	.958
Validity	
KMO	.96
Bartlett's test of sphericity- App. Chi Square	3905.024
Degree of freedom	66
Significance	.0001

Table III: Socio-demographic characteristics, mean and Group differences of the ISUMSAD

	Total	Responders			Statistical Difference	
Group				Mean ±SD	F value	p value
Gender*						
Male	217	80	37%	59.99±21.06	.000	.995
Female	283	213	75%	59.97±21.16		
Academic year**						
First	110	80	73%	53.06±23.89	3.172	.014
Second	94	50	50%	62.40±20.08		
Third	96	67	67%	61.52±19.72		
Fourth	99	55	55%	64.20±16.80		
Fifth	101	41	41%	62.32±21.64		
Residence***						
Hostel	290	165	57%	62.03±20.33	3.613	0.05
Day Scholar	210	128	61%	57.33±21.84		
Total	500	293	59%	59.98±21.10		

Table II: Summary of all items of ISUMSAD- 12 items

Item	Item mean	SD	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Communalities	Factor 1 Empathy, Communication & Skills	Factor 2 Openness	Skewness	Kurtosis
"I greet and introduce myself before starting any communication"	4.83	2.28	55.14	368.44	.818	.737	.953	.727	.852		-.641	-1.16
"I listen actively to others when they talk to me"	5.22	2.18	54.76	365.50	.896	.849	.951	.857	.923		-.982	-.609
"I like to discuss my emotions, behaviors and judgement with others"	3.78	1.91	56.20	434.09	.092	.105	.972	.972		.981	.157	-1.062
"I understand and respect people from different cultures and religions"	5.42	2.25	54.56	361.88	.912	.875	.950	.885	.937		-1.15	-.342
"I feel enthusiasm for learning and improvement"	5.02	2.11	54.95	371.42	.850	.745	.952	.771	.876		-.785	-.835
"I understand the importance of, and follow the procedures, protocols, rules and the guidelines".	5.16	2.10	54.82	370.36	.868	.788	.952	.815	.900		-.897	-.664
"I display kindness and respect to others".	5.17	2.22	54.81	371.22	.805	.688	.954	.711	.843		-.913	-.724
"I always strive to master and refresh skills".	5.08	1.99	54.90	375.13	.859	.794	.952	.794	.890		-.820	-.682
I am motivated to participate actively in the class and in the wards.	4.95	2.06	55.03	374.07	.840	.747	.953	.761	.872		-.690	-.865
"I like communicating with others to resolve problems"	4.88	2.16	55.10	380.69	.726	.589	.956	.632	.758		-.626	-1.003
"I respect others right to self-determination and consent"	5.24	2.12	54.74	366.83	.910	.852	.950	.871	.933		-.9644	-.547
"I serve others by offering help and support when needed"	5.24	2.17	54.74	365.95	.896	.858	.951	.853	.923		-.960	-.625
Total	4.998				.645							

Extraction Method: Principal Component Analysis.
2 Components extracted.

Table IV: Pearson correlation

		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
T1	"Pearson Correlation"	1	.827**	.086	.779**	.753**	.734**	.660**	.674**	.741**	.607**	.764**	.742**
	Sig. (2-tailed)		0.0001	.143	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
T2	"Pearson Correlation"	.827**	1	.042	.878**	.795**	.814**	.743**	.776**	.768**	.647**	.846**	.860**
	Sig. (2-tailed)	.000		.476	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
T3	"Pearson Correlation"	.086	.042	1	.043	.140*	.039	.079	.054	.079	.215**	.067	.056
	Sig. (2-tailed)	.143	.476		.464	.016	.501	.178	.355	.178	.000	.252	.342
T4	"Pearson Correlation"	.779**	.878**	.043	1	.803**	.843**	.781**	.832**	.785**	.635**	.867**	.882**
	Sig. (2-tailed)	0.0001	0.0001	.464		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
T5	"Pearson Correlation"	.753**	.795**	.140*	.803**	1	.762**	.726**	.766**	.726**	.598**	.807**	.764**
	Sig. (2-tailed)	0.0001	0.0001	0.016	0.0001		0.0001	0.0010	0.0001	0.0001	0.0001	0.0001	0.0001
T6	"Pearson Correlation"	.734**	.814**	.039	.843**	.762**	1	.731**	.776**	.766**	.642**	.817**	.850**
	Sig. (2-tailed)	0.0001	0.0001	.501	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
T7	"Pearson Correlation"	.660**	.743**	.079	.781**	.726**	.731**	1	.749**	.689**	.565**	.797**	.744**
	Sig. (2-tailed)	0.000	0.0001	.178	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001
T8	Pearson Correlation	.674**	.776**	.054	.832**	.766**	.776**	.749**	1	.810**	.676**	.803**	.788**
	Sig. (2-tailed)	0.000	0.0001	.355	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001
T9	Pearson Correlation	.741**	.768**	.079	.785**	.726**	.766**	.689**	.810**	1	.658**	.784**	.750**
	Sig. (2-tailed)	0.000	0.0001	.178	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001
T10.	Pearson Correlation	.607**	.647**	.215**	.635**	.598**	.642**	.565**	.676**	.658**	1	.692**	.693**
	Sig. (2-tailed)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001
T11	Pearson Correlation	.764**	.846**	.067	.867**	.807**	.817**	.797**	.803**	.784**	.692**	1	.873**
	Sig. (2-tailed)	0.000	0.0001	.252	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001
T12	Pearson Correlation	.742**	.860**	.056	.882**	.764**	.850**	.744**	.788**	.750**	.693**	.873**	1
	Sig. (2-tailed)	0.000	0.0001	.342	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	

** "Correlation is significant at the 0.01 level (2-tailed)".
* "Correlation is significant at the 0.05 level (2-tailed)".

DISCUSSION

During the validation phase of the current study, we found an overall response rate of 59%. The Cronbach's alpha of the current scale was 0.958, which is considered sufficient, reflecting excellent reliability of the scale[12]. The principal component analysis was performed using the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity, as shown in **Tables I & II**.

The Kaiser-Meyer-Olkin index was 0.96, and Bartlett's test of sphericity was highly significant (0.0001 at 66 df and X2 = 3905.024). These results indicate that the data are most appropriate for PCA.[13] However, PCA found two factors with eigenvalues ≥1.042 responsible for 80% of the total variance. As shown in **Table II**, the 11 items with factor loadings ≥0.70 were included in the first factor, which was named Empathy, Communication, and Skills and accounted for 71.72 percent of the total variance. The second factor (openness to others) comprised only one item (item 3), with a factor loading of ≥0.981, and explained 8.680 percent of the variance. Although it explains just 8.68% of the variance, this factor may still represent a

distinct and meaningful dimension of the construct that would otherwise be lost. The Kaiser-Guttman rule (eigenvalue > 1) is a guideline, not an absolute law, so we retained it. Incidentally, item 3 had the lowest mean (3.78), while the remaining items had means of 4.83 or above. In this item, most students chose the option of 4 (neither agree nor disagree), followed by 3 (mildly disagree). For all other items, most students chose the option of 7 (very strongly agree), followed by 6 (strongly agree). Deletion of this item would raise the scale mean, scale variance and Cronbach's alpha to higher levels than deletion of any other item. Item 3 had the lowest "Corrected Item-Total Correlation" at .092 and "Squared Multiple Correlation" of any other item. This was also the only item with a positive skewness. It was also the only item for which the female score (3.52) was significantly lower than the male score (4.46) (p = .000).

Skewness indicates the extent of the range of larger and smaller values. With larger values, data is considered negatively skewed, while smaller values lead to positive skewness[14]. The data of the current study fall within the range of -1 to +1, which is considered excellent, while skewness between -2 and +2 is generally acceptable. Similarly, asymmetry and kurtosis values between -2 and +2 are considered acceptable and indicate a normal univariate distribution of the data [15]. Data are usually considered normal if skewness is between -2 and +2 and kurtosis is between -7 and +7 [16,17]. Keeping these points in mind, the data in the current study showed excellent skewness for a normal univariate distribution.

Differences across academic years suggest that affective attributes develop progressively with increased clinical exposure and maturity. Higher scores among hostel residents may reflect greater peer interaction, shared learning experiences, and more opportunities for social and professional development. The absence of significant gender differences aligns with previous research indicating comparable affective competencies among male and female medical students. Overall, these findings support the use of ISUMSAD as a practical tool for evaluating affective learning outcomes in medical education settings.

CONCLUSION

The simple, convenient 12-item ISUMSAD showed high validity and reliability and has the necessary qualities to evaluate the affective domain of medical students. Compared to day scholars and students from earlier academic years, 4th-year medical students living in hostels performed better. The score was not significantly influenced by gender.

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Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publicly.

AUTHOR CONTRIBUTION

Muhammad SR: Review of the literature, Writing Introduction, Data Collection, Data Analysis
Rampal KG: Conception, Methodology
Rahim HJA: Writing draft, Bibliography
Final version read and approved by all contributing authors before submission

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