The Lighthouse Journal of Social Sciences, Vol. 02, Issue 2, Winter 2023, pp. 46-59

Predictability of Medical Colleges' Entrance Test in Khyber Pakhtunkhwa, Pakistan

Jehanzeb Khan[1], Arshad Ali[2], Muhammad Shahzeb Gul[3]

ABSTRACT

The purpose of this study was to determine the predictability of the medical college entrance test in Khyber Pakhtunkhwa, conducted by the Educational Testing and Evaluation Agency (ETEA). Predictability was evaluated as an index of the relationship between the predictors (F.Sc Marks, Entrance test marks, and aggregate score) and the criterian (MBBS 1st-year Score to final-year score). The population of the study consists of 5500 students enrolled in the 10 public-sector medical colleges of Khyber Pakhtunkhwa, whereas 2765 (50%) of the students were taken as a sample of the study from five cohorts (2012-2016) of 10 public-sector medical colleges affiliated with Khyber Medical University, Peshawar. The scores of both the predictors and criterion were entered in SPSS version 25 for analysis. Descriptive statistics, regression, and correlation were used to find the statistical relationship between the predictors and criterion. The results obtained showed moderately high correlations between the predictors and criterion. The regression analysis reveals that the F.Sc score was found to be the best predictor with a first-year score of medical colleges. It is concluded from the study that the current criterion for selecting students for medical colleges are good, and the entrance test for KP medical colleges was found to be valid. It is suggested that non-cognitive factors should also be incorporated into the admission practices to further assess the personal dimension of a student.

Keywords: *ETEA, Predictive validity, Admission Test, MBBS, Khyber Pakhtunkhwa*

INTRODUCTION

The aim of the selection process for any academic program is to select from a group of candidates who have the greatest potential to complete their particular education and graduate as dedicated professionals for the type of work they are expected to perform with the required professional standards (Wood, 1999). When in an institute, if the capacity is less than the exceeding number of candidates, it needs to be decided which students are more proficient and capable of success in these institutions. It is a complex task to decide

[1]Assistant Professor, Qurtuba University of Science & Information Technology, Peshawar, KP, Pakistan, **Corresponding Author's Email**: jehanzebpk@outlook.com
[2] Professor, Institute of Education & Research, University of Peshawar, KP, Pakistan
[3] PhD , Institute of Education & Research, University of Peshawar, KP, Pakistan

Manuscript Submitted: Nov 20, 2023
Manuscript Accepted: Dec 27, 2023

the most accurate criterion for predicting academic success in educational institutions because selection criterion differ from country to country and institution to institution in the same country. In most post-secondary institutions, cognitive, non-cognitive characteristics, and demographic characteristics are considered to be major criterion for the admission process. Nevertheless, only cognitive abilities are used as a predictive criterion for academic success (Al-Hattami, 2012).

The admission process is one of the most dynamic situations in any educational institution. Admissions board members are especially concerned about whether they have made the most effective decisions as the admission process continues, i.e. whether the candidates they selected for admission are indeed suitable for their program of study (Kyei-Blankson, 2005).

One of the aims of medical schools is to select students who will successfully complete medical education and make a positive impact on national, regional, and global medicine (Gohara, Shapiro, Jacob, Khuder, Gandy, Metting and Kelshinski, 2011; Kleshinski, Khuder, Shapiro and Gold, 2009; Salem et al., 2013). The selection of appropriate health professionals who are not only intelligent but also caring, passionate, motivated, and having social values is becoming a difficult task (Wood, 2014). The selection process in medical schools is very selective, competitive, and difficult (Arzuman, Ja′afar and Fakri, 2012). It is crucial to analyze those factors that predict candidates' potential academic performance (Haist, Wilson, Elam, Blue and Fosson, 2000). Student selection procedures play a pivotal role in their educational career. Therefore, this procedure must be validated through concrete fundamental criterion that are workable and realistic (Kyei-Blankson, 2005).

One area under which such problems fall is predictive validity. The predictive value is synonymous with predicting future performance based on existing performance (Gay, Mills, and Airasian, 2012). Traditionally, tests have aimed to measure differences between individuals or between different reactions of the same individual (Aiken & Groth-Marnat, 2006). In the field of education, standardized tests were first used mainly to categorize students into different educational abilities, identify mentally disabled students on one side, and talented students on the other, evaluate progression from one grade to the next, diagnose academic deficiencies, and grant high school diplomas (Anastasi & Urbina, 1997; Miller, Linn, and Gronlund, 2009).

Medical College Admission Test (MCAT) results and GPA marks for graduates are considered to be the two key parameters for the intended candidates (Mitchell, Haynes, and Koenig, 1994). Medical school admissions committees use MCAT scores to corroborate their judgment of applicants' intellectual ability, which is determined by the candidate's undergraduate GPA. The intelligent use of these two sources of information, therefore, can greatly strengthen the medical school admissions process. For this reason, empirical studies that examine their predictive validity are required to ensure the deserved and genuine entrance of students to these colleges (Sedlacek, 1967).

In the early 1920s in the US, a standardized test for the selection of health professionals was introduced, and later similar tests were introduced in various other parts of the world. It was during this time that several aptitude tests were developed (McGaghei, 2002). Specific measures are currently being used for the placement of medical graduates in various parts of the world. The entrance exam for the Medical College (MCAT) is used in Canada and the United States. Additionally, Australian medical schools use the admission test of the Graduate Australian Medical School (GAMSAT), and in the United Kingdom, the United Kingdom College Admission Test (UKCAT) is used. In Saudi Arabia, applicants for admission to medical programs are mandatory to sit for a College Aptitude Test (CAT). The Weill Cornell Medical College in Doha, Qatar, requires standardized tests, the SAT reasoning test or ACT with mathematics subject tests and two related sciences. The admission to the medical schools of Iran is solely based on the performance of candidates on the Konkoor examination (Akhund, 2016).

A similar test was started almost half a century ago in 1981, in a private medical school in Pakistan. It is now one of the obligatory standards in all of Pakistan's private and public health schools. The achievement in the entrance test weighs 50% in the calculation for the final admission scores. Unlike other medical college admission tests conducted in various other countries, the educational importance of the entry test in Pakistan's public medical schools is not investigated in depth (Akhund, 2016).

The study of the validity of selection decisions is easier in countries where national admissions and licensing examinations are centralized due to the availability of standardized assessment measures and a large pool of applicants in a variety of medical schools. The lack of a consistent universal nationwide test for entry to medical school or for licensing purposes poses a question as the research is restricted to one institution with various student samples and assessment methods. Pakistan is one of those countries without entry and licensing examinations at the national level for medical study. Typically, admission to medical schools has been dependent on high school grades (grade 12) in physics, chemistry, and biology, as well as non-scientific subjects like English.

The cut-off score for medical school selection would vary annually based on the highest percentage attained in the pre-medical science exams and the number of seats available. Entrance tests are now decided to be carried out by the respective provincial governments for the selection of candidates in medical schools of the public sector under their administrative control. Medical college entrance tests are constructed in Pakistan by institutions/organizations with varied technical skills in the creation of items. Written tests are mainly multiple-choice questions of the best answer type, without any systematic validity and reliability studies (Ali, 2010).

The government of Khyber Pakhtunkhwa, under the ordinance of 1998, has established an autonomous body named Educational Testing and Evaluation Agency KP. The Chief Minister of Khyber Pakhtunkhwa is the head of this entity, and it is supervised by the board of governors. ETEA was initially responsible for carrying out admission tests in medical and engineering colleges only. However, its circle of responsibilities and objectives was broadened beyond the ordinance statement. It performs multiple functions

in the evaluation and testing methods to catalyze improvements. It is responsible for providing training to accelerate reforms in the system of examination and testing. To bring objectivity, transparency, and efficiency, it is extending the use of electronic facilities to other institutions as well.

Objectives of the Study

1. To find out the best predictor for the 1st year score of the medical students
2. To explore the predictability of entrance test scores

Statement of the Problem

The selection of candidates who are capable of succeeding in the curriculum is a basic issue in the admission process. To ensure the credibility of these selections, the criterion on which these selection decisions are based must be accurate and reliable. Standardized test scores are used as a criterion by most colleges. The applicants' cognitive ability and their knowledge in the relevant field are based on the score of the test. It is also useful in predicting whether the student will be successful or not in the program of study.

Considering the significance of decisions based on admission tests, considerably more quantitative investigation is required. Therefore, the current study expands and offers a more detailed quantitative review and inquiry of the validity evidence for the KMU admission process. It can also help recognize components of the KMU medical college selection procedure that are more predictive of student performance during medical college and will help improve the selection process at Khyber Medical University.

In light of the above lines, this work examines the predictive value of the entry exam designed by the Educational Testing and Evaluation Agency (ETEA) for entry to medical colleges throughout Khyber Pakhtunkhwa, Pakistan.

RESEARCH METHODOLOGY

A longitudinal descriptive study was done on the five cohorts (2012 to 2016) of Medical Colleges. The target population for this study consisted of all students admitted to Public Sector Medical Colleges of KP (Pakistan) from the session 2012-13 to 2016-17. Every year, approximately 1260 students are admitted to Public sector medical colleges in Khyber Pakhtunkhwa (Department of Health, Government of Khyber Pakhtunkhwa, 2017).

The sample size for a correlation analysis will depend on the intent of the research, the population characteristics, and the intended accuracy of the results (Creswell, 2011; Neuman and Robson, 2011). Sampling errors are minimized in part by the sample size, with larger samples being more desirable than smaller samples (Creswell, 2011). 50% of students have been selected from the targeted population. The total number of 2765 students from 05 sessions constituted a sample size for the study.

RESULTS AND DISCUSSION

As this is a correlational study, the researcher used pre-admission data that were collected from the Educational Testing and Evaluation Agency, Admission office of Khyber Medical College and Ayub Medical College, as well as from the controller's office of Khyber Medical University Peshawar, and were entered into Excel spreadsheets and SPSS version 25 by the researcher.

Table 1. *Overall sample College wise*

S.NO	NAME OF COLLEGE	TOTAL SAMPLE SIZE	
		Number of the sample	%
1	AYUB MEDICAL COLLEGE	600	21.70
2	BACHA KHAN MEDICAL COLLEGE (BKMC)	150	5.42
3	BANNU MEDICAL COLLEGE	250	9.04
4	GAJJU KHAN MEDICAL COLLEGE (GKMC)	50	1.81
5	GOMAL MEDICAL COLLEGE (GMC)	235	8.50
6	INSTITUTE OF MEDICAL SCIENCES (IMS)	250	9.04
7	KHYBER GIRLS MEDICAL COLLEGE (KGMC)	190	6.87
8	KHYBER MEDICAL COLLEGE (KMC)	750	27.12
9	NOWSHERA MEDICAL COLLEGE (NMC)	50	1.81
10	SAIDU MEDICAL COLLEGE	240	8.68
TOTAL		2765	100

Table 1 shows the overall sample size, it is evident that Students were dominated by 27.125% in both the academic sample and the Khyber Medical College (KMC) overall sample, followed by (21.70 percent) of pupils from Ayub Medical College (AMC). It is worth mentioning that Nowshehra and Gajju Khan Medical College constitute (1.81%) of the students who were also part of the sample.

Table 2. *Mean and Standard Deviation of Predictors.*

S#	Colleges	F.Sc		Entrance Test		Merit Score	
		Mean	S.D	Mean	S.D	Mean	S.D
1	AMC	931.14	32.17	531.48	39.98	75.77	2.51
2	BKMC	930.96	29.24	508.94	28.27	74.32	1.25
3	BMC	922.09	32.05	492.1	32.36	72.74	1.633
4	GKMC	932.56	34.57	487.36	56.52	73.25	0.36
5	GMC	921.90	35.31	501.37	38.97	73.39	2.38
6	KIMS	918.12	29.97	481.14	26.25	72.21	1.12
7	KGMC	941.41	32.65	523.99	28.52	75.77	1.410
8	KMC	952.89	29.34	582.31	38.45	79.91	2.71
9	NMC	930.78	32.85	505.2	25.35	74.15	0.60
10	SMC	924.04	33.95	512.28	28.47	74.18	1.87
	Total	934.40	34.0	530.28	49.47	75.81	3.51
	Mean	930.59	32.21	512.61	34.31	74.56	1.58
	Median	930.87	32.41	507.07	30.44	74.16	1.52

Table 2 illustrates the mean and standard deviation for the overall sample college-wise. The overall mean score and standard deviation are as follows: F.Sc score 934.40 (SD,34.0), Entrance test Score 530.28 (SD,49.47) and Merit Score 75.81 (SD, 3.51), The table 4.4 shows that KMC has the highest mean for all the three predictors shown as F.Sc, 952.89 (SD,29.34), Entrance test score, 582.31 (SD, 38.45) and Merit Score 79.91 (SD,2.71) followed by the KGMC and AMC respectively having mean F.Sc score and standard deviation as 941.41 (SD,32.65) and 931.14 (SD,32.17).

Table 3. *Average and S,D of Criterion Variables*

S#		First Yr		Second		Third		Fourth		Final Yr	
		Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
1	AMC	431.7	42.21	470.44	48.67	554.43	43.97	671.42	49.04	1170.32	67.85
2	BKMC	440.18	48.66	487.17	52.43	564.44	41.00	708.78	48.02	1175.75	56.21
3	BMC	427.46	47.75	469.68	41.05	542.84	39.39	662.25	37.80	1147.16	62.41
4	GKMC	448.14	32.83								
5	GMC	419.75	50.75	450.96	48.46	554.82	39.11	685.63	47.42	1203.53	70.45
6	IMS	431.31	41.63	466.06	45.36	541.6	40.96	659.21	44.80	1173.44	64.06
7	KGMC	473.6	46.95	519.92	45.50	582.59	47.27	715.98	44.04	1228.92	58.93
8	KMC	445.78	51.40	481.94	45.78	579.91	49.97	723.60	44.74	1223.19	65.82
9	NMC	426.26	30.83								
10	SMC	430.8	45.63	466.45	42.72	538.04	35.81	659.53	43.47	1221.58	46.37
	TOTAL	437.56	48.36	475.58	48.78	560.44	46.89	689.56	52.52	1195.35	69.28
	MEAN	437.50	43.86	476.57	46.24	557.33	42.18	685.80	44.91	1192.98	61.51
	MEDIAN	431.54	46.29	470.06	45.64	554.62	40.98	678.52	44.77	1189.64	63.23

Table 3 demonstrates the mean & S deviation of the criterion variable of overall sample and college. The overall mean and standard deviation for the criterion variables are mentioned as follows. 1st year, 437.56 (SD: 48.36), 2nd year, 475.58 (SD: 48.78), 3rd year, 560.44 (SD: 46.89), 4th year, 689.56 (SD: 52.52) and final year, 1195.35 (SD: 69.28). Table 4.5 also shows that KGMC has the highest mean score in four out of five criterion variables 473.6, 519.2, 582.59 and 1228.92 followed by KMC 445.78, 481.94, 579.91 and 1223.19. In the fourth year, the KMC mean score is 723.60 followed by KGMC having a mean score of 715.98.

Table 4. *Pearson Correlation of overall sample.*

	1st Year	2nd Year	3rd Year	4th Year	Final Year
F.Sc Score	.279**	.133**	.331**	.369**	.230**
Entrance Test Score	.136**	.160**	.269**	.363**	.301**
Merit Score	.252**	.189**	.378**	.475**	.359**

Table 4 illustrates that all three predictors show a significant result with the criterion variables. The table also reveals that the merit score with median value 0.359 shows better performance with all professional exams except for first-year exam where fsc score shows a high value than merit score. The median score for all the predictors with the criterions are 0.359, 0.331, and 0.269 for merit score, fsc scores and entrance test scores respectively.

Table 5. *Pearson Correlation of overall sample college wise.*

College	Predictors	1st Year	2nd Year	3rd Year	4th Year	Final Year
AMC	F.Sc Score	.212**	.097*	.205**	.206**	0.168
	Entrance Test Score	.106**	0.069	.163**	.166*	.214*
	Merit Score	.254**	.111*	.274**	.289**	.311**
BKMC	F.Sc Score	.202*	0.121	.274**	.316*	0.046
	Entrance Test Score	-.206*	0.001	-.245*	-0.239	-0.15
	Merit Score	-0.05	0.098	-0.027	0.071	-0.307
BMC	F.Sc Score	.167**	-0.049	0.112	0.154	0.01
	Entrance Test Score	0.058	0.041	0.024	0.125	0.267
	Merit Score	.229**	0.013	0.114	.281**	.325*
GKMC	F.Sc Score	0.063				
	Entrance Test Score	0.005				
	Merit Score	0.221				
GMC	F.Sc Score	0.131	-0.021	0.113	0.18	0.219
	Entrance Test Score	.191*	.246*	0.096	.332*	.366*
	Merit Score	.227*	.202*	0.136	.345*	.398*
IMS	F.Sc Score	.191**	-0.029	.208*	0.088	-0.215
	Entrance Test Score	-0.101	0.017	-0.028	0.028	0.031
	Merit Score	0.088	-0.01	.257**	.217*	-0.135
KGMC	F.Sc Score	.307**	0.045	.291**	0.211	0.108
	Entrance Test Score	-.182*	0.14	0.023	0.016	0.112
	Merit Score	0.132	.222**	.374**	.278*	0.242
KMC	F.Sc Score	.296**	.178**	.330**	.374**	.381**
	Entrance Test Score	.196**	.183**	.183**	.192**	.194*
	Merit Score	.334**	.234**	.317**	.336**	.332**
NMC	F.Sc Score	0.216				
	Entrance Test Score	-0.118				
	Merit Score	0.261				
SMC	F.Sc Score	.264**	-0.009	.195*	0.163	0.136
	Entrance Test Score	-0.038	0.135	0.14	0.113	-0.075
	Merit Score	.182**	0.09	.262**	0.182	0.036
MEDIAN	F.Sc Score	0.139	0.007	0.122	0.163	0.046
	Entrance test Score	-0.016	0.055	0.024	0.705	0.031
	Merit Score	0.132	0.052	0.114	0.127	0.036

Table 5 illustrate that correlation coefficient of all the predictors with the criterions. (Both at 0.05 and 0.01 level of significance) were found significant with majority of the cases. The results shows that merit score shows a higher association with all the criterion variables (0.254, 0.111, 0.274, 0.289, 0.311) followed by F.Sc Scores (0.212, 0.097, 0.205, 0.206, 0.168) for the first year to the last year respectively. Similarly, grades of merit were closely related to the criterion for all medical colleges and found to be the strongest

predictors except for KGMC and KMC, where F.Sc score shows a significant and higher correlation than merit score in the first year (r=0.307) and (0.330,0.374,0.381) third year to final year score respectively, followed by merit score (0.317,0.336,0.332). The tables also reveals the overall median for correlation coefficients of Merit score, F.sc score, and entrance test score (0.132, 0.052, 0.114, 0.127, 0.036), (0.139, 0.007, 0.122, 0.163, 0.046) and (0.016, 0.055, 0.024, 0.705, 0.031) for the first year to the last year respectively.

Table 6. ***Pearson Correlation of Predictors and Criterions of the overall sample (Session wise)***

Session	Predictors	1st Year	2nd Year	3rd Year	4th Year	Final Year
2012-13	F.Sc Score	.323**	.167**	.257**	.370**	.230**
	Entrance Test Score	.356**	0.059	.228**	.380**	.301**
	Merit Score	.445**	.120**	.306**	.483**	.359**
2013-14	F.Sc Score	.167**	.279**	.319**	.362**	
	Entrance Test Score	0.065	.183**	.254**	.335**	
	Merit Score	.128**	.286**	.365**	.458**	
2014-15	F.Sc Score	.316**	.330**	.380**		
	Entrance Test Score	.246**	.221**	.300**		
	Merit Score	.358**	.339**	.432**		
2015-16	F.Sc Score	.312**	.259**			
	Entrance Test Score	.171**	.296**			
	Merit Score	.290**	.384**			
2016-17	F.Sc Score	.329**				
	Entrance Test Score	.203**				
	Merit Score	.332**				

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

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

Table-6 indicates that the three predictor variables are significantly correlated (both at 0.05 and 0.01 levels) with the total medical sample students for all five professional examination results. The table also reveals that out of three predictors variables merit score were utmost strongly correlated with all the dependent variables followed by F.Sc scores and entrance test scores at 0.01 and 0.05 level of significance. The highest correlation coefficient for merit score, FSc score and entrance test score was 0.483 and 0.380 each respectively.

Table 7. *Regression Analysis for First-Year Students (Enter Method).*

Predictors	R	R^2	B	S. Error	Beta	P-value
F.Sc Score	0.279	.078	.397	.026	.279	.000
Entrance Test Score	0.136	.018	.133	.018	.136	.000
Merit Score	0.252	.063	3.464	.253	.252	.000

Table 8. *Stepwise Regression Analysis for First-year students.*

		B	Std. Error	Beta	t	Sig
1	(Constant)	66.968	24.305		2.755	.006
	F.Sc Score	.397	.026	.279	15.258	.000
2	(Constant)	1.755	25.552		.069	.945
	F.Sc Score	.293	.029	.206	10.065	.000
	Merit Score	2.135	.282	.155	7.580	.000
3	(Constant)	-4.281	25.476		-.168	.867
	F.Sc Score	-.158	.096	-.111	-1.637	.102
	Merit Score	12.268	2.085	.892	5.885	.000
	Entrance Test Score	-.643	.131	-.657	-4.906	.000
4	(Constant)	-10.804	25.170		-.429	.668
	Merit Score	8.978	.555	.653	16.184	.000
	Entrance Test Score	-.438	.039	-.448	-11.112	.000

Note: R^2 for Step1 is 0.078, for step 2 is 0.097, for step 3 is 0.104 and for step 4 is 0.103

Tables 7 and 8 demonstrate the outcomes to the first-year medical regression analysis and step-by-step regression analysis. From the statistics, it is clear that most of the predictors were significantly associated with the criterions. Furthermore, but Fsc was identified as a good predictor, accompanied by the merit score and the entrance exam. R^2 for Step-1 (F.Sc.) was 0.078, implying that variability in F.Sc was predicted at 8% of the

variation in the first year marks alone. Adding value of aggregate at Step-2, Step 3 and Step 4 raised the Coefficient of determination value by 0.097, 0.104 and 0.103 respectively.

DISCUSSION

The students scored relatively low on the MCAT compared to their results in F.Sc. That might be because the entrance examination is a fully objective test, based on 200 multiple-choice questions (MCQs). The predictor correlation coefficient (F.Sc. entrance test and merit score) statistics showed significant variability across the medical schools involved. Such variations might have been due to differences in each medical college's ability range (Kyei-Blankson, 2005; Willingham, Lewis, Morgan, & Ramist, 1990).

Overall, the three predictor variables proved to be significantly associated (both at the 0.05 and 0.01 levels) with all five professional exam scores of all ten medical colleges in almost all five sessions. Merit scores were the most significantly correlated with the criterion variables of the three predictor variables, followed by FSc and entrance examination. Merit scores in the 2012, 2013, 2014, 2015, and 2016 datasets were significantly associated with all five MBBS exam grades at 0.01 and 0.05, followed by FSc and entrance tests accordingly. The results are reliable with previous validity studies of Henriksson & Wolming (1998) and Kuo & Ghosh (1998), concluding that the students enrolled were somewhat more competitive than the standardized test scores based on their previous academic achievement (Grade Point Average). The admission test scores served a relatively minimal role in the admission process. These results, however, were incompatible with recent research by Ali and Ali (2013), Holt, Bleckmann & Zitzmann (2006), and Ting (2001).

CONCLUSION

A moderate to weak association between pre-admission achievement of students and their subsequent academic performance in medical college was observed in this study, while academic (cognitive) ability remains the main requirement for admission in most medical schools in the country. Descriptive data were provided on the three predictors and five criterion variables of the ten medical schools for both sexes. There was no proper order among all the medical colleges in all three predictors. The joint admission committee places the students on a merit-based basis in these colleges. There are certain recommendations to the readers for future research:

1. The admissions committee could benefit from conducting a similar study, but using the new ETEA scores to see if there is more specificity in correlating with the new scale.

2. No adjustments have been made in this study to limit the range. Future research may, therefore, investigate the impact of multivariate range restrictions on the validity of the entry test.

REFERENCES

Aiken, L. R., & Groth-Marnat, G. (2006). *Psychological testing and assessment*. Allyn & Bacon.

Akhund, S. A. (2016). *Predictive value of University entrance tests in Medical Schools of Pakistan for academic and professional performance* (Doctoral dissertation, University of Wollongong, Wollongong).

Al Hattami, A. A. (2012). *Differential Predictive Validity Of High School Gpa And College Entrance Test Scores For University Students In Yemen* (doctoral dissertation). University of Pittsburgh, Pittsburgh

Ali, A., & Ali, Z. (2013). Admission Policy of Medical Colleges: Evaluating Validity of Admission Test in Khyber Pakhtunkhwa, Pakistan. *Journal of Research and Refection in Education, 7*(1).

Ali, S. K. (2010). *Psychometric Analysis and Validity of the Medical College Admission Test at the Aga Khan University* (Doctoral dissertation, University of Calgary, Alberta, Canada)

Anastasi, A. A., & Urbina, S. (1997). *Psychological testing* (7th Ed.). Upper saddle River, N.J: Prentice Hall.

Arzuman, H., Ja′afar, R., & Fakri, N. (2012). The Influence of Pre-Admission Tracks on Students′ Academic Performance in a Medical Programme: Universiti Sains Malaysia. *Education for Health*, *25*(2), 124-127.

Creswell, J. W. (2011). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (4th Ed.). New York, NY: Pearson College Division.

Daniel T. Holt, Charles A. Bleckmann & Charles C. Zitzmann (2006) The Graduate Record Examination and Success in an Engineering Management Program: A Case Study. *Engineering Management Journal, 18(1),*10- 16

Department of Health, Government of Khyber Pakhtunkhwa. (2017). *Prospectus Khyber Pakhtunkhwa Medical /Dental Colleges. Peshawar, Pakistan: Government of Khyber Pakhtunkhwa*. Peshawar

Gay, L. R., Mills, G. E., &Airasian, P. (2012). *Educational Research: Competencies for Analysis and Application* (10th Ed.). New Jersey: Pearson.

Gohara, S., Shapiro, J. I., Jacob, A. N., Khuder, S. A., Gandy, R. A., Metting, P. J., ... & Kleshinski, J. (2011). Joining the Conversation: Predictors of Success on the United States Medical Licensing Examinations (USMLE). *Learning Assistance Review*, *16*(1), 11-20

Haist, S. A., Wilson, J. F., Elam, C. L., Blue, A. V., & Fosson, S. E. (2000). The Effect of Gender and Age on Medical School Performance: An Important Interaction. *Advances in Health Sciences Education*, *5*(3), 197-205.

Henriksson, W., & Wolming, S. (1998). Academic performance in four study programmes: a comparison of students admitted on the basis of GPA and SweSAT scores, with and without credits for work experience. *Scandinavian Journal of Educational Research, 42*(2), 135-150.

Kleshinski, J., Khuder, S. A., Shapiro, J. I., & Gold, J. P. (2009). Impact of preadmission variables on USMLE step 1 and step 2 performance. *Advances in Health Sciences Education, 14*(1), 69-78

Kuo, R., & Ghosh, S. (1998). A correlation-based study of the admissions criteria in a B.Sc. engineering program. *Int. J. Engineering Ed.,* Vol. *14, No. 2,* 95-104.

Kyei-Blankson, L. S. (2005). *Predictive Validity, Differential Validity, and Differential Predictions of the Subtests of the Medical College Admission Test* (Doctoral dissertation).

McGaghie, W. C. (2002). Assessing Readiness for Medical Education. *JAMA, 288*(9), 1085- 1089.

Miller, M. D., Linn, R. L., & Gronlund, N. E. (2009). *Measurement and Assessment in Teaching* (10th Ed.). New Jersey: Pearson.

Mitchell, K., Haynes, R., & Koenig, J. (1994). Assessing the validity of the updated Medical College Admission Test. *Academic Medicine, 69*(5), 394-401. Doi: 10.1097/00001888-199405000-00017

Neuman, W. L., & Robson, K. (2011). *Basics of Social Research: Qualitative and Quantitative Approaches*. Boston, MA: Allyn & Bacon.

Salem, R. O., Al-Mously, N., Nabil, N. M., Al-Zalabani, A. H., Al-Dhawi, A. F., &Al-Hamdan, N. (2013). Academic and socio-demographic factors influencing students' performance in a new Saudi medical school. *Medical Teacher, 35*(sup1), S83-S89. doi:10.3109/0142159x.2013.765551

Sedlacek, W. E. (1967). The study of applicants, 1965-66. *Academic Medicine, 42*(1), 28-46. Doi: 10.1097/00001888-196701000-00003

Ting, S. R. (2001). Predicting academic success of first-year engineering students from standardized test scores and psychosocial variables. *International Journal of Engineering Education,* 1 7 (1), 75-80.

Willingham, W. W., Lewis, C., Morgan, R., & Ramist, L. (1990). *Predicting college grades: An analysis of institutional trends over two decades*. New York: Educational Testing Service.

Wood D.F (1999). Medical school selection – fair or unfair? *Medical Education*, *33*(6), 399-401. doi:10.1046/j.1365-2923.1999.0432a.x

Wood, C. (2014). Choosing the 'right' people for nursing: can we recruit to care? *British Journal of Nursing*, *23*(10), 528-530.