MAT®

MILLER ANALOGIES TEST®

Predictive Validity Study

general report

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Introduction

The purpose of this report is to examine a study conducted by The Psychological Corporation on the validity of the *Miller Analogies Test®* (MAT) for predicting the grade point averages (GPAs) of students in the first year of graduate study. For this study, nine graduate schools submitted data for students entering graduate programs in the fall of 2005, including undergraduate GPAs, previous graduate GPAs, MAT scaled scores, *Graduate Record Examinations®* (GRE®) scaled scores, demographic information, and GPAs for the first academic year in a graduate program. These data were analyzed to determine the validity of the MAT and other entering variables for predicting subsequent GPAs using correlation analyses and diagnostic accuracy analysis.

An essential question to ask with regard to the MAT, or any other admission test, is how well its scores predict subsequent indicators of successful performance. Many studies conducted over the years have suggested the predictive validity of the MAT by showing positive correlations between MAT scores and subsequent academic performance (Kuncel, Hezlett, & Ones, 2004; The Psychological Corporation, 2004).

Some studies have compared the predictive validity of the MAT to other predictor variables. In an early study, Platz, McClintock, and Katz (1959) considered previous GPA, doctoral examinations, faculty ratings, and MAT scores and found MAT scores to be the best predictor of graduate course grades and scientific contributions. Robertson and Hall (1964) found that using a combination of MAT scores, GRE scores, and undergraduate GPA was the most promising predictor of faculty ratings, peer ratings, and comprehensive examination scores. In a nine-year study, Furst and Roelfs (1979) found that both MAT and GRE scores showed moderate to low correlations with other criterion measures. In another study, DeCato (1982) suggested that MAT scores, GRE scores, and previous GPA could be useful in assessing a general factor of scholastic ability. One study found significant relationships between graduate GPA and both the MAT and *Graduate Management Admission Test®* (GMAT®) scores (Graham, 1991).

Other studies have considered the predictive validity of the MAT for specific majors. Littlepage, Bragg, and Rust (1978) used several variables to predict graduate school and professional performance in psychology and found that the MAT and an undergraduate major in psychology were significant predictors of graduate school performance, and that MAT scores, the undergraduate major, and faculty ratings were significant predictors of professional performance. Tyron and Tyron (1986) indicated that both MAT and GRE scores could be used to predict a psychologist-trainee's ability to engage clients. In another study, Huber (1999) used MAT scores, GRE scores, and previous GPA to predict GPA in a doctoral program in clinical psychology, and concluded that MAT scores were the most useful predictor. Other findings have suggested that students in master's of education programs with higher MAT scores were more imaginative, intuitive, and more abstract in their thinking (Hughes, Costner, & Douzenis, 1988). In a seven-year study of students in a master's of education program, House and Keeley (1993) found MAT scores to be significantly correlated with graduate student performance, with differential predictive effectiveness for different demographic groups.

The most comprehensive study of MAT predictive validity to date is a meta-analysis of 127 MAT studies involving more than 20,000 cases conducted by Kuncel, Hezlett, and Ones (2004). These researchers found the MAT to be a valid predictor of several aspects of graduate student performance, job performance, potential, and creativity. They found that the MAT correlated highly with the GRE-Verbal section, with other cognitive ability tests from educational and work settings, and with the acquisition and demonstration of knowledge and skill. The authors found that correlations between MAT scores and first-year GPAs were slightly higher than for overall graduate GPAs, that correlations with faculty ratings of graduate student performance were positive, and that correlations between MAT scores and comprehensive examination scores were the highest of the outcome variables considered. Concerning transitional situations between graduate school and work, they found the MAT to have positive correlations with internship and practicum ratings and with counseling work sample performance. The authors also found the MAT scores to moderately correlate with faculty and work supervisors' ratings of creativity, with the MAT most highly correlated with ratings of counseling potential. The authors concluded that the MAT is a valid measure of both general cognitive ability and verbal ability that it is useful for predicting performance in both academic and work settings.

This report is intended to add to previous research on the predictive validity of the MAT and to provide useful information to the schools that participate in this study. This findings described in this report not only support the findings of previous research, but add to MAT research by including a diagnostic accuracy analysis not conducted for previous predictive validity studies of the MAT.

Methods

This study collected data from the nine participating graduate schools for all candidates admitted for the fall 2005 term (Table 1). These data included entering MAT and GRE scores, entering undergraduate and previous graduate GPAs, undergraduate majors, various demographic characteristics, graduate majors, enrollment status information, and credits completed and GPAs for the 2005–06 academic year. The schools provided these data in spreadsheets that had been provided to them by The Psychological Corporation. The data were then analyzed using Statistical Analysis System (SAS, version 9.0).

Descriptive analyses provided *n*-counts and means for the entering and outcome variables (Tables 2 and 3). Pearson product-moment correlations coefficients were used to determine the degree to which MAT scaled scores and other entering variables related to subsequent first-year graduate GPAs (Table 4). Diagnostic accuracy (or signal detection) analysis was used to illustrate the degree to which MAT scaled scores can be used to predict percentages of students likely to earn among the lowest 5% (sensitivity) and highest 95% (specificity) of first-year GPAs in a graduate program (Table 5). This analysis was based on the entering mean MAT scaled score from the study sample (413), and defined "qualified" candidates (specificity) as those likely to be among the highest 95% of first-year graduate GPA earners (earning first-year GPAs of 3.30 or greater), and "unqualified" candidates (sensitivity) as those likely to be among the lowest 5% of GPA earners (earning first-year graduate GPAs lower than 3.30).

Following the data analyses conducted for this study, each participating institution was provided with an individualized report that included a summary of the results for the overall study and results for the data submitted by the individual school.

Results and Discussion

The analyses of the data collected showed MAT scores, entering GPAs, and GRE scores to be positively correlated with the GPAs of students in the first year of graduate study. The finding that both test scores and entering cumulative GPAs showed moderate predictive validity suggests that both of these predictor variables can, and should, be considered by graduate schools in selecting candidates likely to succeed in their programs.

The following results are included in this report: Descriptive data, including characteristics of the participating graduate schools (Tables 1), and characteristics of the students entering the participating schools in the fall of 2005 and completing the first year of graduate study (Tables 2 and 3); correlation analyses between entering variables and first year graduate GPA (Table 4); and a diagnostic accuracy analysis for data submitted by all participating graduate schools (Table 5).

Descriptive Data

Table 1 summarizes relevant characteristics of the nine universities that submitted data for one or more graduate programs. The participating schools represented three public and six private institutions, several Carnegie classifications, and the Middle Atlantic, South Atlantic, Midwest, Southwest, and Pacific regions of the United States.

Table 1 Characteristics of the Participating Universities

Schools	Valid Cases Submitted (*n* = 1,000)	State	Type of Institution	Carnegie Classifications	
				Basic Classification	Graduate Instructional Program
Bethel University	39	MN	Private	Master's/M	Postbac-A&S/Ed
Bradley University	18	IL	Private	Master's/L	Postbac-A&S/Bus
George Washington University	328	DC	Private	RU/H	CompDoc/MedVet
Gonzaga University	107	WA	Private	Master's/L	S-Doc/Other
Temple University	38	PA	Public	RU/H	CompDoc/MedVet
University of Dayton	25	OH	Private	RU/H	Doc/STEM
University of Houston	32	TX	Public	RU/H	CompDoc/NMedVet
University of South Carolina	131	SC	Public	RU/VH	CompDoc/MedVet
Xavier University	282	OH	Private	Master's/L	S-Doc/Other

Note. Carnegie Classifications of Institutions of Higher Education accredited, degree-granting colleges and universities in the USA: Master's/M=master's colleges and universities (medium programs); Master's/L=master's colleges and universities (larger programs); RU/H=research universities (high research activity); RU/VH=research universities (very high research activity); CompDoc/MedVet=comprehensive doctoral with medical/veterinary; CompDoc/NMedVet=comprehensive doctoral (no medical/veterinary); Doc/STEM=doctoral STEM (science, technology, engineering, mathematics) dominant; Postbac-A&S/Bus=post-baccalaureate with arts and sciences (business dominant); Postbac-A&S/Ed=post-baccalaureate with arts and sciences (education dominant); S-Doc/Other=single doctoral (other field).

Table 2 shows the mean MAT scores, GRE scores, and prior GPAs for the 1,000 students that entered the participating schools in the fall of 2005.

Table 2 Entering Graduate Student Frequencies (*n*) and Variable Means

Entering Variable	*n*	Mean
MAT Scaled Score	513	413.0
GRE Verbal Scaled Score	437	492.9
GRE Quantitative Scaled Score	432	537.1
GRE Analytical Writing Score	326	4.49
Undergraduate GPA	639	3.24
Previous Graduate GPA	118	3.67

Table 3 shows the entering variable means and first-year graduate GPAs by academic and demographic category for the students that entered the nine participating schools in the fall of 2005.

Table 3 Characteristics of Students Entering Fall 2005 and Completing the 2005-06 Academic Year

Characteristics	Entering Variables												Outcome Variable	
Undergraduate Major Field	**MAT SS**		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Business	6	419.3	2	435.0	2	545.0	0	—	8	3.10	1	3.80	8	3.76
Education	32	411.1	10	469.0	10	492.0	0	—	40	3.39	12	3.85	41	3.85
Humanities	29	428.6	34	568.8	34	511.2	0	—	62	3.39	11	3.55	63	3.79
Natural Sciences	8	437.4	8	498.8	8	558.8	1	3.50	13	3.18	0	—	14	3.84
Social Sciences	49	410.7	7	534.3	7	570.0	1	5.50	55	3.22	6	3.84	56	3.82
Other	17	408.9	14	505.0	14	488.6	1	2.00	30	3.19	2	3.46	30	3.83
Age at Admission (on 9/1/05)	**MAT SS**		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
≤25	112	404.4	127	471.4	125	547.0	101	4.39	74	3.33	1	3.26	235	3.78
26–35	111	411.5	69	479.7	69	490.7	25	4.28	91	3.23	17	3.65	175	3.80
36–45	68	416.0	26	495.4	26	453.5	15	4.10	50	3.26	19	3.78	93	3.84
46–55	36	426.9	19	555.8	19	498.4	10	4.05	31	3.38	7	3.83	55	3.84
56–65	2	402.5	2	575.0	2	580.0	1	4.00	2	3.32	0	—	4	3.71
	MAT SS		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
Sex	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Female	351	411.5	344	492.2	341	534.6	255	4.51	468	3.28	84	3.67	733	3.83
Male	160	416.6	93	495.5	91	546.4	71	4.42	169	3.11	34	3.67	262	3.74
	MAT SS		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
Ethnic identification	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Asian	7	424.0	16	509.4	16	627.5	14	4.71	20	3.17	4	3.64	28	3.84
Black/African American	41	399.6	50	445.0	50	484.2	36	4.18	62	2.99	16	3.44	96	3.68
Hispanic/Latino	14	398.4	9	434.4	9	478.9	6	3.58	21	3.04	1	3.95	25	3.64
White	386	414.1	322	501.2	320	543.2	238	4.55	449	3.30	80	3.75	734	3.83
Other	10	413.5	5	384.0	5	480.0	4	4.13	8	2.80	1	3.73	14	3.80

Table 3 (continued)

Type of Graduate Program Entered	MAT SS		GRE-V SS		GRE-Q SS		GRE-AW		UGPA		PGGPA		2005–06 GPA	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Master's	473	412.9	396	492.6	391	537.3	292	4.47	567	3.26	63	3.65	899	3.81
Doctorate	20	416.5	31	515.8	31	574.8	26	4.77	30	3.19	28	3.76	52	3.77
Other	20	412.5	10	435.0	10	413.0	8	4.31	42	2.92	27	3.63	46	3.91
Graduate Major Field	**MAT SS**		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Business	141	411.4	16	448.1	12	522.5	11	4.64	121	3.12	6	3.61	162	3.81
Education	211	412.5	207	494.9	207	554.4	181	4.57	300	3.20	85	3.68	461	3.83
Humanities	2	401.0	7	501.4	7	471.4	6	4.92	1	3.04	1	3.26	9	3.60
Natural Sciences	15	403.7	52	474.4	52	485.6	48	4.13	4	3.23	0	—	67	3.77
Social Sciences	71	410.4	81	468.9	80	546.3	78	4.46	76	3.30	2	3.41	153	3.79
Other	73	422.6	74	535.5	74	523.5	2	4.75	137	3.38	24	3.68	145	3.81
Academic Scholarship or Assistantship	**MAT SS**		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Scholarship or Asst.	44	411.7	52	513.3	52	599.6	40	4.59	93	3.27	20	3.70	105	3.86
None	469	413.1	385	490.2	380	528.5	286	4.47	546	3.23	98	3.66	892	3.80
Admission Classification	**MAT SS**		**GRE-V SS**		**GRE-Q-SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Without Conditions/Clear	247	418.2	167	531.6	167	560.2	78	4.87	405	3.30	94	3.71	445	3.83
Conditional/Provisional	36	401.8	94	476.5	92	525.8	90	4.43	117	3.14	15	3.48	138	3.81
Enrollment Status	**MAT SS**		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Full-time	140	413.6	250	499.0	248	559.2	186	4.55	244	3.33	33	3.66	398	3.79
Part-time	234	411.6	183	486.0	180	509.0	136	4.42	295	3.21	85	3.67	462	3.83
2005–06 Credits Earned	**MAT SS**		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
≤12	230	415.8	111	495.1	108	525.9	67	4.39	303	3.20	57	3.63	376	3.79
13–18	152	411.7	133	496.2	132	521.4	98	4.56	189	3.24	36	3.77	296	3.84
19–28	97	411.6	112	496.4	112	563.2	93	4.60	117	3.34	11	3.72	208	3.85
≥29	34	404.0	81	479.9	80	541.5	68	4.32	30	3.15	14	3.54	117	3.75
2005–06 GPA	**MAT SS**		**GRE-V SS**		**GRE-Q SS**		**GRE-AW**		**UGPA**		**PGGPA**		**2005–06 GPA**	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
≤2.99	9	411.4	5	436.0	5	400.0	3	3.67	8	3.05	3	3.61	13	2.61
3.00–3.49	40	405.7	40	455.5	38	506.6	29	4.38	49	3.06	4	3.57	83	3.30
3.50–3.99	276	409.9	258	492.2	257	538.3	205	4.49	367	3.20	61	3.64	553	3.79
4.00	188	419.2	134	507.7	132	548.6	89	4.54	215	3.35	50	3.72	348	4.00

Note. SS=scaled score; GRE-V=GRE Verbal; GRE-Q=GRE Quantitative; GRE-AW=GRE Analytical Writing score; UGPA=undergraduate GPA; PGGPA=previous graduate GPA.

The data in Table 3 show the relative performances of students with different academic and demographic characteristics who entered a graduate program in the fall of 2005 and completed the 2005–06 academic year.

With regard to students' undergraduate majors, it is difficult to draw conclusions with such a small number of reported cases (*n*-counts) for each major field. For the age categories, uneven *n*-counts also make it difficult to draw conclusions, but it does appear that those aged 36 and older averaged higher on most variables, including MAT scores.

Males averaged higher on each entering test score variable except for GRE Analytical Writing, and females averaged higher for undergraduate GPA and first-year graduate GPA. Students identified as either Black/African American or White were the only ethnic categories with large enough *n*-counts to reasonably compare, with White students averaging higher for each variable.

Though students in doctoral programs averaged higher for many variables than those in master's programs, the low *n*-count for doctoral students makes this comparison unreliable. While no consistent patterns are apparent with regard to entering variables for students' graduate major field, education majors averaged slightly higher than other major fields for first-year graduate GPA. Though students receiving an academic scholarship or assistantship were relatively few in number, these students averaged higher for each variable except for MAT scores. Students with no admission condition averaged higher (if even slightly higher) for each variable.

Full-time students averaged higher than part-time students for each variable except for previous graduate GPA and first-year graduate GPA. No pattern emerges with regard to the entering variables and the number of credits earned during the first-year of graduate study, but students earning 13–18 and 19–28 credits averaged the highest first-year GPAs (3.84 and 3.85, respectively). Students earning the highest first-year GPAs also performed best on all entering variables.

Correlations

Correlation analysis is a commonly used measure of the strength and direction of the relationship between two sets of variables and is often used as an indication of predictive validity. A correlation coefficient (*r*) is a statistic ranging between 0 and 1 that indicates the degree and direction of relationship between two variables. The strength of the relationship is indicated by the values of the coefficients, with greater values indicating stronger relationships. The direction of the relationship is indicated as either positive, in which variables tend to increase or decrease together, or negative, representing an inverse relationship between variables.

Table 4 shows correlations between entering MAT scores, GRE scores, and prior GPAs and first-year graduate GPAs for the students who entered the nine participating schools in the fall of 2005. Table 4 includes correlations for all cases and separately for students with graduate majors in three academic categories: business, education, and the social sciences.

Table 4 Correlations (*r*) between Predictor Variables and 2005–06 GPA for All Cases, Business Majors, Education Majors, and Social Science Majors

Predictor Variables for All Cases	*n*	2005–06 GPA *r*
MAT Scaled Score	513	0.27**
GRE Verbal Scaled Score	437	0.21**
GRE Quantitative Scaled Score	432	0.27**
GRE Analytical Writing Score	326	0.11
Undergraduate GPA	639	0.24**
Previous Graduate GPA	118	0.30**

Predictor Variables for Education Majors	*n*	2005–06 GPA *r*
MAT Scaled Score	211	0.15*
GRE Verbal Scaled Score	207	0.08
GRE Quantitative Scaled Score	207	0.15*
GRE Analytical Writing Score	181	0.02
Undergraduate GPA	300	0.21**
Previous Graduate GPA	85	0.06

Predictor Variables for Business Majors	*n*	2005–06 GPA *r*
MAT Scaled Score	141	0.29**
GRE Verbal Scaled Score	16	—
GRE Quantitative Scaled Score	12	—
GRE Analytical Writing Score	11	—
Undergraduate GPA	121	0.07
Previous Graduate GPA	6	—

Predictor Variables for Social Sciences Majors	*n*	2005–06 GPA *r*
MAT Scaled Score	71	0.20
GRE Verbal Scaled Score	81	0.33**
GRE Quantitative Scaled Score	80	0.28*
GRE Analytical Writing Score	78	0.31**
Undergraduate GPA	76	0.02
Previous Graduate GPA	2	—

Note. **=Significant at 0.01 level; *=significant at 0.05 level; correlations are only reported for predictor variables with at least 60 cases; correlations for MAT and GRE score variables have been corrected based on normative sample standard deviations; correlations for undergraduate and previous graduate GPAs are uncorrected.

As shown in Table 4, all of the correlations are positive to varying degrees. For all cases, all correlations with 2005–06 GPAs are significant except for GRE Analytical Writing scores. The highest correlation is between previous graduate GPA and first-year graduate GPA, followed closely by correlations between MAT and GRE Quantitative scores and 2005–06 GPAs.

When considering correlations for the three major fields listed in Table 4, note that coefficients tend to be lower for any subset of the total sample due to restriction of range and a relatively smaller sample. Also, within each subset (e.g. social science majors), coefficients that are calculated based on different sample sizes (e.g., MAT scaled scores and GRE Verbal scaled scores) cannot be compared to each other when samples are relatively small. For graduate majors in a business field, the MAT score correlation of 0.29 is the only significant one and is similar to the highest correlations for all cases. For education majors, the only significant correlations are for MAT scaled scores, GRE Quantitative scaled scores, and undergraduate GPA, with a slightly higher correlation for undergraduate GPA. For students majoring in a social science field, only GRE scores are significant, with GRE Verbal scores correlating highest with 2005–06 GPAs, followed closely by GRE Analytical Writing scores.

Many of the correlations shown in Table 4 are significant and are comparable to correlations typically found in similar types of analyses, where predictor variables are standardized test scaled scores with a large range of score points (e.g., MAT scaled score range of 200–600) and the outcome variable is a grade point average (typically on a more restricted scale of 1–4). These low correlations are due to restriction of range, the limited variability in a sample that only includes students who scored high enough on a test to gain admission but does not include the full range of scores represented by all of the candidates who took the test, or even all those who applied for admission.

The correlations found in this study are similar to findings in the research literature (Kuncel & Hezlett, 2007a, 2007b; The Psychological Corporation, 2004). The correlations for this study sample between MAT scores and first-year graduate GPAs are comparable to correlations found in a meta-analysis of MAT research and to correlations found in a similar meta-analysis of GRE research (Kuncel, Hezlett, & Ones, 2001, 2004). In their MAT meta-analysis, the researchers found sample-size weighted average correlations of 0.27 between MAT scores and overall graduate GPA and 0.29 between MAT scores and first-year graduate GPA (with corrected correlations of 0.39 and 0.41, respectively). In their meta-analysis of GRE research, the researchers found correlations between GRE scores and graduate school GPAs that were very similar to those found in the MAT study, which suggests that MAT scores are similar in predictive strength to GRE scores.

In a recent comparison of meta-analyses of standardized tests commonly used for graduate school admissions, Kuncel and Hezlett (2007a, 2007b) found nearly identical correlations between first-year graduate GPA and MAT scores (0.27 observed, 0.39 corrected), GRE Total scores (0.27 observed, 0.41 corrected), and GMAT scores (0.29 observed, 0.41 corrected). Kuncel and Hezlett (2007a, 2007b) also found slightly higher correlations between total graduate GPA and MAT scores (0.27 observed, 0.39 corrected) than either GRE Total scores (0.25 observed, 0.37 corrected) or GMAT scores (0.25 observed, 0.35 corrected).

The correlation data from the MAT predictive validity study are thus consistent with previous research findings and suggest effective predictive relationships between several entering variables and first-year graduate GPA. For the analysis of all cases combined, the correlation between entering MAT scaled scores and first-year GPAs suggests the usefulness of MAT scores as part of an admission requirement. However, because no single entering variable stands out as superior for each analysis, it seems that a combination of entering MAT scores and previously earned GPAs represents more complete predictive information than any single indicator alone.

Diagnostic Accuracy Analysis

A diagnostic accuracy analysis is a statistical method used to determine the ability of test scores to accurately identify individuals who are likely to have a specific characteristic (e.g., first-year students likely to earn a specific GPA). Table 5 presents a diagnostic accuracy analysis based on MAT scaled scores and 2005–06 graduate GPA data submitted for students enrolled in all of the programs that participated in this study. The analysis shown in Table 5 uses MAT scaled scores as predictor variables and represents outcome variables as percentages of students in the sample likely to earn among the lowest 5% (sensitivity) and highest 95% (specificity) of first-year GPAs in a graduate program. These outcome variables represent degrees of precision with which predictions of first-year graduate GPA can be made from specific MAT scaled scores used as admission cut scores.

Table 5 Diagnostic Accuracy for Predicting First-Year Graduate GPAs from Entering MAT Scaled Scores (SS) and Percentile Ranks (PR) (sample MAT SS mean=413)

Entering MAT Scores		Predicted 1st Year Graduate GPA Earners	
SS	PR	Sensitivity	Specificity
396	44	28	80
397	45	31	80
398	46	34	78
399	51	34	76
400	52	38	73
401	53	38	71
402	54	45	69
403	55	52	67
404	56	55	65
405	57	55	63
406	61	62	60
407	62	66	57
408	63	66	55
409	64	69	54
410	65	69	52

Entering MAT Scores		Predicted 1st Year Graduate GPA Earners	
SS	PR	Sensitivity	Specificity
411	66	69	49
412	67	69	48
413	71	69	46
414	72	69	45
415	73	69	44
416	74	72	42
417	75	76	40
418	76	76	39
419	77	79	37
420	78	79	35
421	81	83	34
422	82	83	32
423	83	83	30
424	84	83	29
425	85	86	28

Note. SS=scaled score; PR=total group percentile rank; Sensitivity=percent of students likely to earn within the lowest 5% of GPAs in first year of graduate study; Specificity=percent of students likely to earn within the highest 95% of GPAs in first year of graduate study.

The diagnostic accuracy analysis conducted for this study is intended to illustrate the results of establishing specific MAT cut scores for admission decisions. This analysis suggests the percentages of qualified and unqualified candidates that are likely to be admitted if certain MAT cut scores are established for schools with the same entering mean MAT scaled score as the study sample (413). For purposes of this analysis, we defined "qualified" candidates as those likely to be among the highest 95% of first-year graduate GPA earners, and "unqualified" candidates as those likely to be among the lowest 5% of GPA earners. For the study sample on which this analysis is based, the lowest 5% consist of students earning GPAs less than 3.30 during the 2005–06 academic year.

Though the information in Table 5 may or may not be accurate for any given school or program, it effectively illustrates the consequences of establishing a rigid cut score. As shown in Table 5, the diagnostic accuracy analysis lists a range of MAT scaled scores (as well as total group percentile ranks) and the corresponding percentages of qualified and unqualified sample candidates likely to be admitted or not admitted for specific cut scores. This information has practical value in suggesting the consequences of setting MAT scaled score cut-offs in terms of the proportions of admitted candidates that are most likely to succeed (i.e., those likely to earn among the top 95% of first-year graduate GPAs).

For example, if a relatively low MAT scaled score of 396 (the 44th percentile) is selected as a cut score for admission, 28% of the unqualified entering students would be identified, and 80% of the qualified entering students would be identified. Therefore, a very high proportion of the candidates for admission who are likely to succeed (80%) would be admitted by a cut score of 396. However, by excluding only 28% of those likely to be among the lowest-performing 5%, 72% of those also likely to perform poorly would be admitted. The opposite extreme is observed if a MAT scaled score of 425 (the 85th percentile) were used as a cut score. In this case, 86% of the unqualified candidates would be identified (with 14% of the unqualified candidates inadvertently admitted), but only 28% of the qualified candidates would be identified (with 72% of the qualified candidates inadvertently excluded).

The ideal use of these diagnostic accuracy data is to determine the optimal balance between sensitivity and specificity predictions based on a specific MAT scaled score, where both outcome measures are similar in value and relatively high. For example, the data in Table 5 suggest that during the first year of a graduate program with a mean entering MAT scaled score of 413 (71st percentile), a MAT scaled score of 406 (61 PR) would correctly identify 62% of the candidates likely to be among the lowest 5% of performers and 60% of those likely to be among the highest 95%. However, even this ideal balance would inadvertently admit 38% of unqualified applicants and would inadvertently exclude 40% of the qualified applicants. It is for this reason that MAT scores, or any other standardized test scores, should never be used as the sole admission criterion, but must always be considered along with as many other pieces of information about candidates as possible when making admission decisions.

Conclusions

This report demonstrates adequate positive correlations between MAT scores and first-year graduate GPAs that are comparable to correlations found in the research literature, and suggests the continuing usefulness of MAT scores as an important part of the admission process. The diagnostic accuracy analysis shows the consequences of establishing rigid cut-scores for admission and illustrates the need to always consider MAT scores along with as many other pieces of candidate information as possible when making admission decisions.

Those responsible for this report hope that graduate school faculty, administrators, and staff find the results to be of practical value. Nevertheless, we must suggest that the results of this study be interpreted with consideration for several necessary limitations. One limitation relates to the nine schools that chose to participate in this study. The majority of these schools (six) are private institutions, which submitted nearly eighty percent of the cases (799 of 1,000) used for the analyses. Also, four of the schools are located in the Midwest and contributed over one 36% of the cases. These factors may limit the generalizability of the findings, especially for public schools and schools in other regions. Another limitation relates to a study design that could not control for the differences among institutional admission criteria, grading policies, and curricula. To ensure greater generalizability, future studies should attempt to enlist more schools to participate, especially public schools and schools from the Northeast, South, and West, and should attempt to control for the differences in program policies.

Regardless of the limitations of this study, the findings make a valuable contribution to the existing literature on the predictive validity of the MAT. This study not only supports the findings of previous studies that have examined the predictive validity of the MAT through correlation analyses, but also includes an analysis not previously done in such studies—diagnostic accuracy.

The results of this study suggest that the MAT continues to have value in predicting GPAs during the first year of graduate study. When used in combination with other pertinent information about candidates, the MAT can be a valuable tool in selecting students likely to perform successfully in graduate programs.

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