

## Research & Evaluation Division: University of Cambridge Local Examinations Syndicate

### MVAT scores and outcomes of applications for medical and veterinary courses in 2002

This report contains summary statistics and initial analyses of performance on the University of Cambridge Medical and Veterinary Admissions Test (MVAT) set in November 2002 and subsequent admissions decisions.

The test was developed and administered by the Research & Evaluation Division of the University of Cambridge Local Examinations Syndicate on behalf of the University of Cambridge. It contains three sections. Sections 1 and 2 consisted of objectively marked short-answer or multiple-choice questions and were marked by UCLES. Section 3 contained a choice of open ended tasks, which were passed to applicants' colleges for marking and use as interview tools. This report is concerned only with Sections 1 and 2.

#### Summary Statistics

Mean scores and standard deviations for 1697<sup>1</sup> applicants for Medicine (including CGCM) and Veterinary courses are provided in table 1, by Section and for the total of Sections 1 and 2. The spread of marks was slightly narrower than in 2001, reflecting the fact that both sections contained fewer questions than in previous years. Mean marks in Sections 1 and 2 were 56% and 59% respectively. These are higher than in 2001, when mean marks were close to 50%, which may be the result of a reduction in the number of questions and, hence, time pressure at the University's request. However, the test's level of difficulty remains appropriate for it to discriminate within this highly able target group.

Table 1: Summary statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Section 1 (out of 17)	1697	0	17	9.48	3.062
Section 2 (out of 30)	1697	2	30	17.79	5.408
Sections 1 + 2 (out of 47)	1697	5	45	27.27	7.541

Table 2 provides details of means and standard deviations of scores, and the numbers involved, for sub-groups of applicants by course and gender.

Table 2: Summary statistics by course and sex

		Section 1		Section 2		Sections 1 + 2		
		Valid N	Mean	S.D.	Mean	S.D.	Mean	S.D.
CGCM	female	94	7.83	3.26	13.32	5.24	21.15	7.71
	male	70	10.00	3.24	15.63	5.36	25.63	7.54
Medicine	female	630	9.30	2.97	17.86	5.29	27.17	7.26
	male	478	10.32	2.94	19.77	5.15	30.10	7.10
Veterinary	female	341	8.84	2.94	16.61	5.00	25.45	7.09
	male	84	9.96	3.13	17.55	4.63	27.51	6.94
Total		1697	9.48	3.06	17.79	5.41	27.27	7.54

As in previous years, males tended to perform a little better, on average, than females. The gender difference was most marked amongst CGCM applicants. CGCM applicants also displayed lower mean scores than the others, especially on Section 2. Medical applicants had the highest mean scores, as in the previous two years.

<sup>1</sup> This excludes applicants who did not take the MVAT test; those who withdrew their applications; and those (n 5) for whom no decision regarding selection is available to RED at the time of writing.

Table 3 gives the means and standard deviations of scores for the sub-groups applying from different types of school within the UK, from schools in EU countries and elsewhere, and for mature candidates - in this case all those over 21 by October in the year they intend to start the course.

Table 3: Summary statistics by school type

	Valid N	Section 1		Section 2		Sections 1 + 2	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
UK Comprehensive	307	9.19	2.97	17.40	4.41	26.59	6.39
UK FE/6th Form College	130	9.39	2.99	17.08	4.40	26.48	6.55
UK Grammar	158	9.77	2.89	18.59	4.47	28.37	6.25
UK Independent	499	10.10	2.85	19.55	4.87	29.65	6.78
UK other maintained	130	9.57	2.78	18.82	4.64	28.38	6.30
School in EU country	71	7.90	3.11	11.99	5.19	19.89	7.49
Non-EU overseas school	142	10.37	2.95	20.65	5.94	31.03	7.95
Mature - MED/VET	94	7.74	3.29	14.10	5.79	21.84	8.17
Mature - CGCM	164	8.76	3.42	14.30	5.40	23.06	7.94
not specified	2	8.50	.71	17.00	.00	25.50	.71
Total	1697	9.48	3.06	17.79	5.41	27.27	7.54

The mean total (Section 1+2) score for applicants from UK FE/6th Form Colleges was slightly lower than that of applicants from Comprehensives. Applicants from Independent schools had the highest mean, with the mean for those from UK other maintained schools next highest, followed very closely by Grammar schools. Independent school applicants performed well on both Section 1 and Section 2 of the test.

As in 2001, applicants from non-EU overseas schools had the highest mean score of all these sub-groups and, in contrast, the mean for applicants from EU schools was lower than those of all UK school types, with their performance on Section 2 proving particularly disappointing.

Again, mature applicants appeared to find the MVAT test relatively difficult, performing relatively poorly on both Sections. Mature medical/veterinary and CGCM applicants had lower mean scores in both sections of the test than applicants from all UK school types.

### *Variations in MVAT scores and selection outcomes*

Table 4 shows the means and standard deviations of scores for those offered a place, pooled and offered a place or rejected, and those rejected without being pooled. As in previous years, the mean scores of those offered a place with or without being pooled were closer together than those rejected.

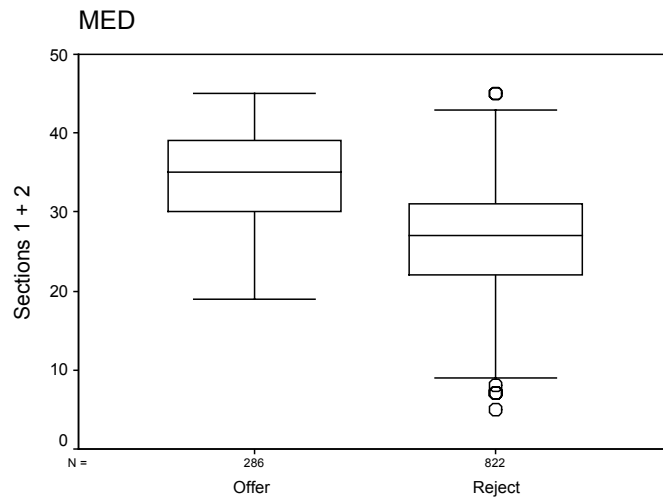
Table 4: Summary statistics by selection decision

Decision	Valid N	Section 1		Section 2		Sections 1 + 2	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Offer	340	11.65	2.63	22.02	4.57	33.67	6.18
Pool - offer	56	11.29	2.65	21.30	3.52	32.59	5.25
Pool - reject	250	10.51	2.52	19.85	4.15	30.36	5.50
Reject	1051	8.43	2.83	15.74	4.91	24.18	6.65
Total	1697	9.48	3.06	17.79	5.41	27.27	7.54

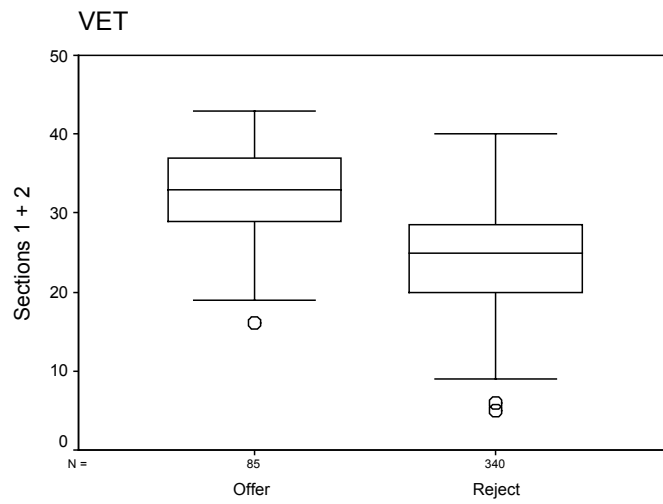
There is of course considerable overlap in MVAT scores between those accepted and rejected, as would be expected given the range of factors contributing to selection decisions.

This is illustrated by the boxplots in Figure 1 (where the box contains the middle 50% of the distribution). MVAT scores of successful and unsuccessful candidates appear to be relatively well separated in the case of both Medicine and Veterinary Medicine, whilst there is most overlap in CGCM applicants.

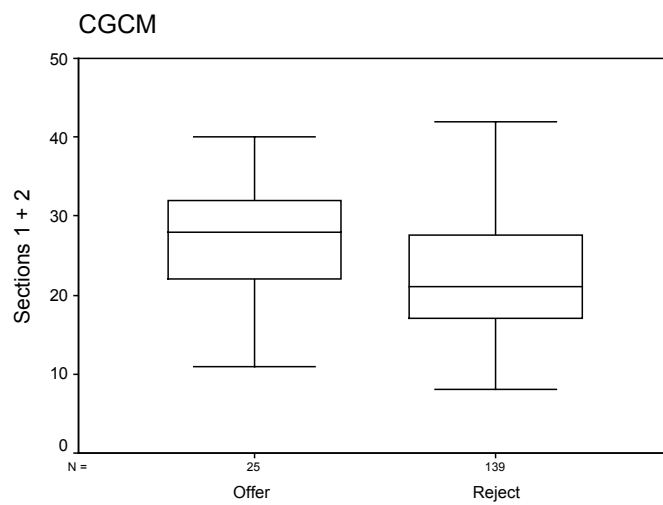
Figure 1 Boxplots showing MVAT scores for successful and unsuccessful applicants, by course



OFFER



OFFER



OFFER

The correlation between offers and MVAT scores (shown in table 5) was 0.46 (for the total of Sections 1+2). The correlation between section 1 and offers was lower (0.38) than that for Section 2 (0.42) but it should be remembered that Section 1 had a lower 'mark allocation' and hence less variance. The correlation between Sections 1 and 2 was 0.55. These correlations closely matched those observed in 2001.

Table 5: Pearson correlations between marks for sections 1 & 2 and outcome

	Section 2	Sections 1 + 2	Outcome
Section 1	.55	.80	.38
Section 2		.94	.42
Sections 1 + 2			.46

N = 1697: All correlations are significant at the 0.01 level.

Table 6 details the means and standard deviations of MVAT scores for those accepted and rejected from different types of school etc. In each case this also shows the percentage of such applicants accepted.

Table 6: Summary statistics by school type and outcome

		% of school type	Valid N	Section 1		Section 2		Sections 1 + 2	
				Mean	S.D.	Mean	S.D.	Mean	S.D.
UK Comprehensive	Offer	23.45	72	11.43	2.63	20.75	3.85	32.18	5.28
	Reject	76.55	235	8.50	2.72	16.37	4.06	24.87	5.68
UK FE/6th Form College	Offer	24.62	32	11.06	2.60	19.66	4.22	30.72	5.67
	Reject	75.38	98	8.85	2.92	16.24	4.15	25.09	6.23
UK Grammar	Offer	24.05	38	12.37	2.44	22.87	3.56	35.24	5.30
	Reject	75.95	120	8.95	2.51	17.24	3.83	26.19	4.78
UK Independent	Offer	31.26	156	11.99	2.41	23.28	3.54	35.27	4.86
	Reject	68.74	343	9.24	2.61	17.85	4.42	27.09	5.95
UK other maintained	Offer	23.85	31	11.45	2.46	23.16	3.90	34.61	5.07
	Reject	76.15	99	8.98	2.62	17.45	3.98	26.43	5.32
School in EU country	Offer	5.63	4	11.50	1.29	22.50	3.42	34.00	4.55
	Reject	94.37	67	7.69	3.06	11.36	4.57	19.04	6.77
Non-EU overseas school	Offer	11.27	16	13.06	1.29	26.56	3.71	39.63	4.27
	Reject	88.73	126	10.03	2.93	19.90	5.75	29.94	7.64
Mature - MED/VET	Offer	23.40	22	9.68	3.64	18.23	4.87	27.91	7.25
	Reject	76.60	72	7.15	2.96	12.83	5.48	19.99	7.56
Mature - CGCM	Offer	15.24	25	10.16	2.85	16.88	5.20	27.04	7.37
	Reject	84.76	139	8.50	3.46	13.84	5.32	22.35	7.85
not specified	Reject	100	2	8.50	.71	17.00	.00	25.50	.71
Total			1697	9.48	3.06	17.79	5.41	27.27	7.54

The distribution of applicants from different school types varied significantly from that in 2001, with increasing numbers coming from UK Comprehensives and Grammars and other maintained schools, and fewer from FE colleges and Independent schools. The number of non-EU overseas applicants increased slightly, but EU applicants were notably more numerous. Applications from mature candidates were down on those in 2001.

The percentages of applicants receiving offers were more similar across non-independent UK school types than in 2001, ranging from 23% for Comprehensives to 25% for FE/6<sup>th</sup> Form Colleges. (In 2001 these percentages ranged from 19% for Comprehensives to 33% for Grammar schools.) Of applicants from Independent schools, 31% received offers, slightly higher than in 2001.

Only 6% of applicants from EU schools received offers, together with 11% of those from non-EU overseas schools.

Mature medical and veterinary applicants were marginally less successful than those from non-independent UK schools (23% receiving offers) but only 15% of CGCM applications were successful. As in 2001, those mature applicants who were successful had markedly higher MVAT scores (in both

Sections) than those who were not, although these by no means matched those of applicants from schools.

Of candidates receiving offers, those from Independent and other maintained schools performed relatively well on Section 2, in comparison with mean Section 1 scores.

Candidates from Independent, Grammar and 'other maintained' schools had higher mean Section 1+2 totals than those from the other two UK school types; with the mean for those accepted from FE/6th Form Colleges lowest of all, as in the previous two years.

### ***Demographic variables and selection outcomes***

Tables 7, 8 and 9 relate gender, UK v Overseas<sup>2</sup> status and Independent v Other school backgrounds and the outcome of selection, in each case by course applied for.

Table 7: Cross-tabulation of sex and outcome

CGCM	Outcome		Total	% Success
	Reject	Offer		
female	77	17	94	18.09
male	62	8	70	11.43
Total	139	25	164	13.26

$\chi^2 = 1.376$  (1 d.f.) not significant

MED	Outcome		Total	% Success
	Reject	Offer		
female	475	155	630	24.60
male	347	131	478	27.41
Total	822	286	1108	25.81

$\chi^2 = 1.115$  (1 d.f.) not significant

VET	Outcome		Total	% Success
	Reject	Offer		
female	273	68	341	19.94
male	67	17	84	20.24
Total	340	85	425	20.00

$\chi^2 = 0.004$  (1 d.f.) not significant

A higher proportion of female than male CGCM applicants were offered places, although this difference was less marked than in 2001 and was not statistically significant. In the case of Medical and Veterinary applicants, although greater numbers of females were offered places, a slightly higher proportion of male applicants received offers. These differences were not statistically significant. It is notable that the success rate of male and female applicants for Veterinary Medicine was very similar in 2002, contrasting with the relative lack of selection of females in 2001.

Table 8: Cross-tabulation of UK/Overseas status and outcome

MED	Outcome		Total	% Success
	Reject	Offer		
UK	635	259	894	28.97
Overseas	167	23	190	12.11
Total	802	282	1084	26.01

$\chi^2 = 23.158$  (1 d.f.) Sig. 0.000

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<sup>2</sup> Overseas status refers to the location of the candidate's centre, not the candidate's fee status.

VET	Outcome		Total	% Success
	Reject	Offer		
UK	282	74	356	20.79
Overseas	36	2	38	5.26
Total	318	76	394	19.29

$\chi^2 = 5.314$  (1 d.f.) Sig. 0.021

As in 2001, a (statistically) significantly higher proportion of UK applicants for medical places received offers than did Overseas applicants. This trend was even more true for Veterinary applications.

Of those applying for medicine, a (statistically) significantly higher proportion (33%) of those from Independent schools received an offer of a place than did those from other types of UK schools (26%). It was also the case that a higher proportion of Independent school Veterinary applicants (25%) received offers than their counterparts from maintained schools (19%), although this difference was not statistically significant.

Table 9: Cross-tabulation of school sector and outcome (UK candidates only)

MED	Outcome		Total	% Success
	Reject	Offer		
Not independent	376	131	507	25.84
Independent	259	128	387	33.07
Total	635	259	894	28.97

$\chi^2 = 5.585$  (1 d.f.) Sig. 0.018

VET	Outcome		Total	% Success
	Reject	Offer		
Not independent	194	45	239	18.83
Independent	88	29	117	24.78
Total	282	74	356	20.79

$\chi^2 = 1.693$  (1 d.f.) not significant

### **Modelling selection outcomes**

The above comparisons of the proportions of applicants from different backgrounds offered places fail to take into account the ability of the applicants (amongst many other relevant factors). The following analyses take MVAT performance into account, answering the question 'are applicants from different backgrounds with equivalent MVAT scores equally likely to be accepted?' by fitting logistic regression models.

The dependent variable is the (binary - accept or reject) selection outcome. The independent continuous variables are scores on Sections 1 and 2 of the MVAT test and gender, nationality and school sector form independent categorical variables.

#### *Model 1: Gender (CGCM candidates only)*

The model fitted was:

$$\log \text{ odds (accept)} = \alpha + \beta_1 (\text{sec 1}) + \beta_2 (\text{sec 2}) + \beta_3 (\text{male}) + \text{error}$$

	B	S.E.	Wald	df	Sig.	Exp(B)
Section 1 mark	.119	.092	1.682	1	.195	1.126
Section 2 mark	.080	.053	2.270	1	.132	1.084
MALE (1)	-1.005	.507	3.936	1	.047	.366
Constant	-3.672	.804	20.855	1	.000	.025

n 164

Model 1 explored the effects of MVAT and gender on selection outcomes for CGCM applicants. The B parameters show the size and direction of the effect of each variable. The effect of gender was particularly interesting and can be seen in the final column, which gives the exponent of the B parameter - in effect the odds of success. Males still have markedly worse odds once MVAT scores are taken into account - only 0.37 of those of females with similar MVAT scores, although this represents a modest improvement on their chances in 2001.

*Model 2: Nationality and gender*

The model fitted was:

$$\log \text{ odds (accept)} = \alpha + \beta_1 (\text{sec 1}) + \beta_2 (\text{sec 2}) + \beta_3 (\text{male}) + \beta_4 (\text{UK}) + \text{error}$$

Model 2 considered the effects of MVAT scores, nationality and gender on the outcome of medical and veterinary applications (separately). As would be hoped, both Section 1 and Section 2 of the MVAT test have significant effects in respect of both medical and veterinary applications.

*MEDICAL*

	B	S.E.	Wald	df	Sig.	Exp(B)
Section 1 mark	.298	.037	64.811	1	.000	1.347
Section 2 mark	.225	.023	95.782	1	.000	1.252
MALE	-.551	.179	9.533	1	.002	.576
UK	2.271	.320	50.467	1	.000	9.691
Constant	-10.501	.712	217.310	1	.000	.000

n 1058

*VETERINARY*

	B	S.E.	Wald	df	Sig.	Exp(B)
Section 1 mark	.287	.078	13.722	1	.000	1.333
Section 2 mark	.359	.056	41.768	1	.000	1.432
MALE (1)	-.541	.416	1.697	1	.193	.582
UK (1)	1.137	.931	1.492	1	.222	3.118
Constant	-12.331	1.597	59.606	1	.000	.000

n 379

For medical applicants the effects of both gender and nationality were statistically significant, after allowing for performance on the MVAT test. The odds of a UK medical applicant being offered a place in 2002 improved to almost ten times greater than those of a non-UK<sup>3</sup> applicant, in part at least reflecting the modest increase in applications from high quality non-EU overseas students for a limited number of places. When gender was considered, the odds on male medical applicants being offered a place appeared only about half (0.58) those for females with similar MVAT scores. This suggests a very different conclusion to the simple comparison of the success rates for male and female applicants, which appeared even, and may merit further consideration.

For veterinary applicants, gender effects were similar, with males being about half as likely (also with odds of 0.58) to receive an offer as females with equivalent MVAT scores - although this effect was not statistically significant, given the smaller numbers involved. The effect of nationality on veterinary applications was similar to that in medicine, though less strong: UK veterinary applicants have odds of receiving an offer which are 3.1 of those for non-UK applicants.

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<sup>3</sup> Non-UK status refers to the location of the candidate's centre, not the candidate's fee status.

*Model 3: School type and gender (UK candidates only, excluding mature candidates)*

The model fitted was:

$\log \text{ odds (accept)} = \alpha + \beta_1 (\text{sec 1}) + \beta_2 (\text{sec 2}) + \beta_3 (\text{male}) + \beta_4 (\text{UK non-indep}) + \text{error}$

*MEDICAL*

	B	S.E.	Wald	df	Sig.	Exp(B)
Section 1 mark	.302	.038	61.715	1	.000	1.353
Section 2 mark	.232	.025	87.853	1	.000	1.261
MALE (1)	-.692	.190	13.197	1	.000	.501
non-independent (1)	.228	.184	1.533	1	.216	1.256
Constant	-8.474	.619	187.292	1	.000	.000

n 879

*VETERINARY*

	B	S.E.	Wald	df	Sig.	Exp(B)
Section 1 mark	.303	.080	14.368	1	.000	1.354
Section 2 mark	.370	.058	40.609	1	.000	1.447
MALE (1)	-.554	.425	1.700	1	.192	.575
non-independent (1)	-.109	.363	.091	1	.763	.897
Constant	-11.508	1.358	71.782	1	.000	.000

n 345

Model 3 was employed to consider the effects of MVAT scores, school type and gender on the outcome of both medical and veterinary applications - excluding mature candidates.

In this model too, effects relating to both sections of the MVAT test were highly significant for both medical and veterinary applications, and again effects of gender were similar to those estimated via model 2; with males odds of receiving an offer being 0.50 (medicine) and 0.58 (veterinary) of those of females with equivalent MVAT scores.

But this model also contrasts applicants from independent schools with those from other types of school. These school type effects also vary between the two courses.

As in 2001, and despite the fact that a slightly greater proportion of medical applicants from independent schools received offers in 2002, when MVAT performance is taken into account any suggestion that they were favoured is contradicted. Instead, for medicine, applicants from independent schools were in fact a little less likely to receive an offer than were applicants from other types of schools with similar MVAT scores, for whom odds of an offer were 1.26 of those of independent school applicants. This effect is too small to be statistically significant so we should conclude that it seems likely that school background had little effect on medical applications in 2002.

When we look at veterinary applications the opposite tendency emerges, with non-independent school applicants less likely to receive an offer of a place than those (with equivalent MVAT scores) from independent schools - their odds of a place being only 0.87 of those of independent school applicants. Again, however, this tendency was not statistically significant, so that we may again conclude that the effects of school background on veterinary applications were also somewhat inconsistent.

As was true of the reports on previous MVAT tests we should caution against over-interpretation of these results because so many other factors which must influence selection outcomes (e.g. interviews, GCSE results and predicted AL grades, school reports etc.) have not been included in these models. Subsequent analyses for this cohort may be able to include further data.

These initial analyses will however provide better evidence than a simple comparison of the proportions of applicants who are successful.