

Research & Evaluation Division: University of Cambridge Local Examinations Syndicate

MVAT scores and outcomes of applications for medical and veterinary courses in 2001

This report contains summary statistics and initial analyses of performance on the University of Cambridge Medical and Veterinary Admissions Test (MVAT) set in November 2001 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 1716¹ 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 similar to that in 2000, when the MVAT test was first introduced, and mean marks in both sections were close to 50% (marginally lower than in 2000, especially in section 2), indicating that the test's level of difficulty was 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 20)	1716	0	19	9.54	3.481
Section 2 (out of 39)	1716	2	38	19.51	6.451
Sections 1 + 2 (out of 59)	1716	5	57	29.05	8.834

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	104	8.23	3.45	14.63	5.99	22.86	8.33
	male	77	8.64	3.85	15.58	6.22	24.22	8.83
Medicine	female	592	9.56	3.39	19.43	6.20	28.99	8.45
	male	497	10.43	3.36	21.79	6.20	32.22	8.41
Veterinary	female	352	8.58	3.33	18.45	6.02	27.03	8.28
	male	94	10.45	3.47	20.65	6.11	31.10	8.55
Total		1716	9.54	3.48	19.51	6.45	29.05	8.83

As in 2000, males tended to perform a little better, on average, than females, although the gender difference was less 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 2000.

¹ This excludes applicants who did not take the MVAT test; those who withdrew their applications (often after being pooled); and those (n 7) 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. Some caution should be exercised in interpreting these, as the 'other maintained' sub-group appears larger than in 2000 and investigation of those classified by colleges under this heading revealed some misclassifications. Time did not allow further investigation and we have retained colleges' classifications for the purpose of these analyses. When data from UCAS forms become available for this cohort (prior to analyses relating scores and other data to achievement at University) it should provide a robust classification of school types.

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	219	9.43	3.36	19.05	5.39	28.47	7.57
UK FE/6th Form College	148	9.27	3.17	18.28	5.66	27.55	7.98
UK Grammar	122	10.04	2.99	21.63	5.54	31.67	7.12
UK Independent	568	9.89	3.30	21.29	5.60	31.18	7.63
UK other maintained	212	9.98	3.54	21.02	5.85	31.00	8.32
School in EU country	50	8.18	3.43	13.60	7.57	21.78	10.07
Non-EU overseas school	131	10.77	3.74	21.27	7.93	32.05	10.93
Mature - MED/VET	81	7.36	3.60	14.42	5.86	21.78	8.48
Mature - CGCM	181	8.40	3.62	15.03	6.09	23.44	8.55
not specified	4	10.25	4.65	16.00	6.78	26.25	10.81
Total	1716	9.54	3.48	19.51	6.45	29.05	8.83

The mean total (Section 1+2) score for applicants from UK FE/6th Form Colleges was lower than that of applicants from Comprehensives. Applicants from Grammar schools had the highest mean, with the mean for those from Independent schools next highest. Grammar and Independent school applicants performed especially well on Section 2 of the test, although on Section 1 Independents were in fact (very slightly) outperformed by applicants from schools classed as 'other maintained'.

Applicants from non-EU overseas schools had the highest mean score of all these sub-groups but, 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.

Mature applicants appeared to find the MVAT test relatively difficult. They performed relatively poorly on both Sections, but Section 2 clearly posed particular problems. Mature medical applicants had the lowest mean of all these sub-groups but CGCM applicants also had a lower mean score than applicants from all UK school types - even on Section 1.

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 2000, the mean scores of those offered a place with or without being pooled were closer together than those rejected.

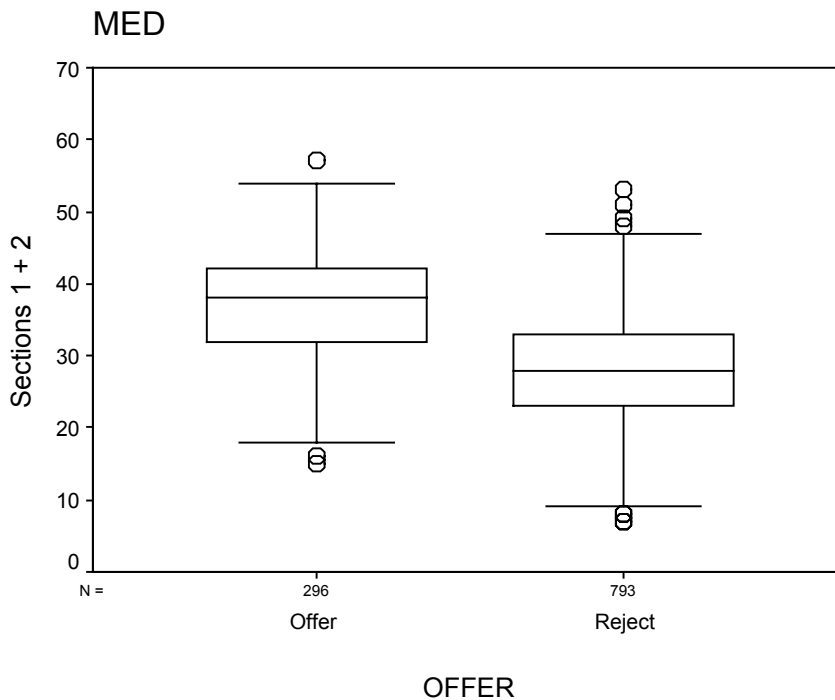
Table 4: Summary statistics by selection decision

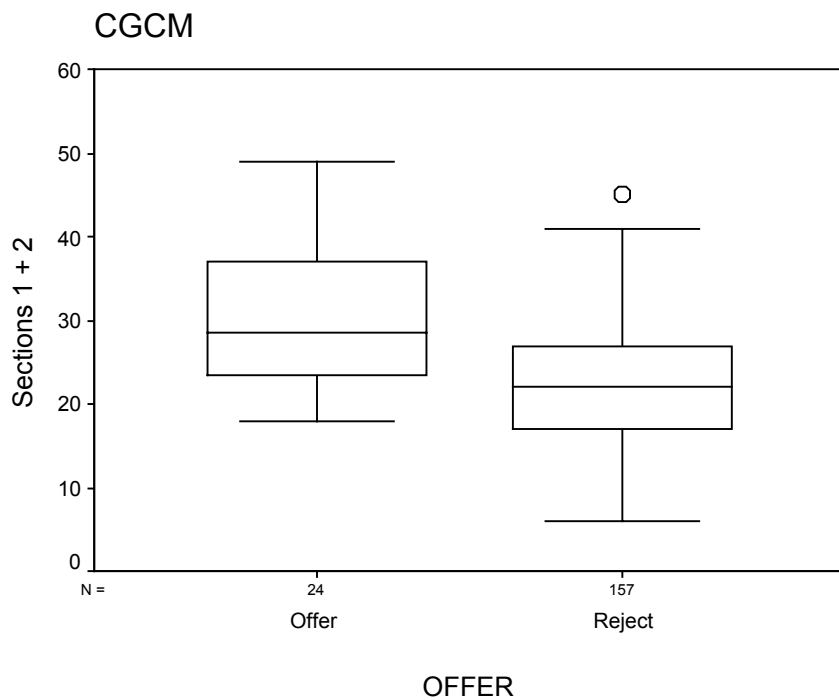
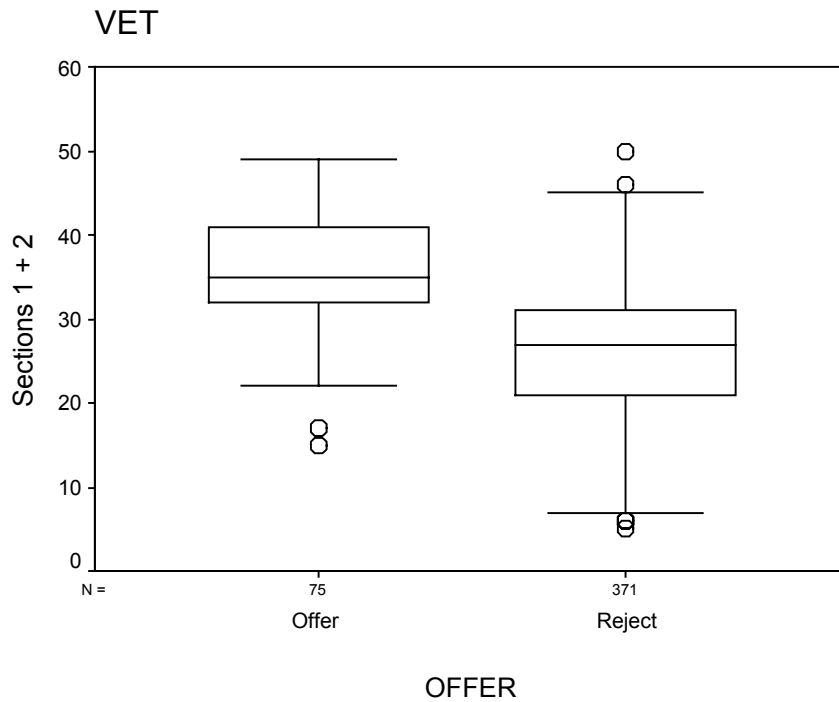
Decision	Valid N	Section 1		Section 2		Sections 1 + 2	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Offer	321	12.13	3.25	24.64	5.86	36.77	7.99
Pool - offer	74	11.45	2.89	24.18	4.46	35.62	6.09
Pool - reject	279	10.24	3.29	21.71	5.16	31.95	6.97
Reject	1042	8.42	3.09	17.02	5.68	25.44	7.52
Total	1716	9.54	3.48	19.51	6.45	29.05	8.83

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 especially well separated in the case of Medicine, whilst there is most overlap in CGCM applicants.

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





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 (0.39) than that for Section 2 (0.43) but it should be remembered that Section 1 had half the 'mark allocation' and hence less variance. The correlation between Sections 1 and 2 was 0.54.

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

	Section 2	Sections 1 + 2	Outcome
Section 1	.54	.79	.39
Section 2		.94	.43
Sections 1 + 2			.46

N = 1716: 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	19.18	42	12.24	3.33	24.10	5.07	36.33	7.16
	Reject	80.82	177	8.76	3.01	17.85	4.74	26.61	6.39
UK FE/6th Form College	Offer	19.59	29	11.41	3.50	24.34	5.20	35.76	7.87
	Reject	80.41	119	8.75	2.87	16.81	4.71	25.55	6.64
UK Grammar	Offer	32.79	40	11.70	2.58	24.85	5.33	36.55	6.46
	Reject	67.21	82	9.23	2.86	20.06	4.96	29.29	6.18
UK Independent	Offer	28.52	162	12.06	3.03	25.44	4.66	37.49	6.27
	Reject	71.48	406	9.02	3.00	19.64	5.07	28.66	6.61
UK other maintained	Offer	26.89	57	12.49	2.80	25.46	5.10	37.95	6.84
	Reject	73.11	155	9.05	3.34	19.39	5.24	28.44	7.30
School in EU country	Offer	10.00	5	12.80	3.96	25.40	4.04	38.20	7.26
	Reject	90.00	45	7.67	2.99	12.29	6.69	19.96	8.61
Non-EU overseas school	Offer	14.50	19	15.05	2.22	28.63	7.57	43.68	9.21
	Reject	85.50	112	10.04	3.46	20.03	7.31	30.07	9.95
Mature - MED/VET	Offer	20.99	17	8.71	3.31	17.00	5.45	25.71	8.25
	Reject	79.01	64	7.00	3.62	13.73	5.81	20.73	8.29
Mature - CGCM	Offer	13.26	24	11.00	3.55	18.96	5.84	29.96	8.57
	Reject	86.74	157	8.01	3.47	14.43	5.92	22.44	8.12
not specified	Reject	100	4	10.25	4.65	16.00	6.78	26.25	10.81
Total			1716	9.54	3.48	19.51	6.45	29.05	8.83

Fewer than 20% of applicants from Comprehensives and FE/6th Form Colleges received offers: although 27% of those classified as from other maintained schools and 33% of those from Grammar schools (the highest success rate of all) were successful. Of applicants from Independent schools, 29% received offers.

Only 10% of applicants from EU schools received offers (these clearly having done relatively well on Section 2), together with 15% of those from non-EU overseas schools.

Mature medical and veterinary applicants were marginally more successful than those from comprehensives (21% receiving offers) but only 13% of CGCM applications were successful. Those 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.

Variations in the mean scores of those accepted from different types of school were relatively small, although overall those from 'Other maintained' and Independent schools had slightly higher mean Section 1+2 totals than those from other school types; with the mean for those accepted from FE/6th Form Colleges lowest of all, as in 2000. When Sections 1 and 2 are considered independently it is apparent that those accepted from comprehensives did relatively well on Section 1, whilst those from Independents who were offered places performed relatively well on Section 2.

Demographic variables and selection outcomes

Tables 7, 8 and 9 relate gender, UK v Overseas 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	85	19	104	18.27
male	72	5	77	6.49
Total	157	24	181	13.26

$\chi^2 = 5.334$ (1 d.f.) Sig. 0.021

MED	Outcome		Total	% Success
	Reject	Offer		
female	430	162	592	27.36
male	363	134	497	26.96
Total	793	296	1089	27.18

$\chi^2 = 0.022$ (1 d.f.) not significant

VET	Outcome		Total	% Success
	Reject	Offer		
female	304	48	352	13.64
male	67	27	94	28.72
Total	371	75	446	16.82

$\chi^2 = 12.072$ (1 d.f.) Sig. 0.001

A (statistically) significantly higher proportion of female than male CGCM applicants were offered places, whilst the opposite was true for veterinary applicants. An approximately equal proportion of male and female medical applicants received offers.

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

MED	Outcome		Total	% Success
	Reject	Offer		
UK	635	263	898	29.29
Overseas	143	24	167	14.37
Total	778	287	1065	26.95

$\chi^2 = 15.91$ (1 d.f.) Sig. 0.000

VET	Outcome		Total	% Success
	Reject	Offer		
UK	311	67	378	17.72
Overseas	27	1	28	3.57
Total	338	68	406	16.75

$\chi^2 =$ not appropriate (one cell with expected count < 5)

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 marginally higher proportion (30%) of those from Independent schools received an offer of a place in 2001 than did those from other types of UK schools (28%). It was also the case that a higher proportion of Independent school Veterinary applicants (23%) received

offers than their counterparts from maintained schools (15%). The differences in the proportions receiving offers were not statistically significant in either instance.

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

MED	Outcome		Total	% Success
	Reject	Offer		
Not independent	329	131	460	28.48
Independent	306	132	438	30.14
Total	635	263	898	29.29

$\chi^2 = 0.298$ (1 d.f.) not significant

VET	Outcome		Total	% Success
	Reject	Offer		
Not independent	208	37	245	15.10
Independent	103	30	133	22.56
Total	311	67	378	17.72

$\chi^2 = 3.285$ (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 (and many other relevant factors). The following analyses take MVAT performance into account, answering the question 'do 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	.179	.073	6.015	1	.014	1.197
Section 2 mark	.083	.044	3.544	1	.060	1.087
MALE (1)	-1.528	.576	7.043	1	.008	.217
Constant	-4.469	.833	28.764	1	.000	.011

n 181

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. For CGCM candidates Section 1 of the MVAT affected selection outcomes more than Section 2 (the effect of which just fails to reach statistical significance at the 5% level). This must reflect the varied academic backgrounds of the applicants for this course, which will particularly affect scores on Section 2.

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 have markedly worse odds once MVAT scores are taken into account - only 0.22 of those of females with similar MVAT scores.

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	.244	.030	64.202	1	.000	1.276
Section 2 mark	.195	.019	111.050	1	.000	1.215
MALE	-.641	.175	13.342	1	.000	.527
UK	1.764	.309	32.507	1	.000	5.833
Constant	-9.237	.644	205.741	1	.000	.000

n 1065

VETERINARY

	B	S.E.	Wald	df	Sig.	Exp(B)
Section 1 mark	.217	.058	13.870	1	.000	1.242
Section 2 mark	.161	.033	24.452	1	.000	1.175
MALE (1)	.480	.332	2.081	1	.149	1.615
UK (1)	.960	1.349	.506	1	.477	2.611
Constant	-8.388	1.597	27.595	1	.000	.000

n 406

However the effects observed for gender and nationality vary markedly between medicine and veterinary applicants.

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 2001 were almost six times greater than those of a non-UK applicant. When gender was considered, the odds on male medical applicants being offered a place appeared only about half (0.53) 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 may merit further consideration.

For veterinary applicants, gender effects were reversed, with males being more likely (with odds of 1.6) to receive an offer than females with equivalent MVAT scores - although this effect was not statistically significant and, hence, we may conclude that gender had relatively little effect on the outcome of veterinary applications. 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 2.6 of those for non-UK applicants. Taking MVAT scores into account here appears to moderate the effect of nationality, which looked stronger when only the proportion of applicants successful was considered.

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	.241	.032	55.821	1	.000	1.272
Section 2 mark	.215	.021	109.244	1	.000	1.240
MALE (1)	-.671	.188	12.807	1	.000	.511
non-independent (1)	.163	.180	.814	1	.367	1.177
Constant	-7.966	.563	200.265	1	.000	.000

n 894

VETERINARY

	B	S.E.	Wald	df	Sig.	Exp(B)
Section 1 mark	.225	.059	14.294	1	.000	1.252
Section 2 mark	.164	.034	23.992	1	.000	1.179
MALE (1)	.457	.336	1.847	1	.174	1.579
non-independent (1)	-.484	.316	2.336	1	.126	.617
Constant	-7.295	.887	67.607	1	.000	.001

n 375

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; contrasting between the two courses, with males odds of receiving an offer being 0.51 (medicine) and 1.58 (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.

Despite the fact that a slightly greater proportion of medical applicants from independent schools received offers, 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 1.18 of those of independent school applicants. This effect is insufficient to be statistically significant so we should conclude that it seems likely that school background had little effect on medical applications in 2001.

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 0.62 of those of independent school applicants. Again however this tendency was not statistically significant, so that we may conclude that the effects of school background on veterinary applications were also somewhat inconsistent.

As was true of the report on the 2000 MVAT test 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.

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