# UKMED P091: Access to HE qualifications and widening participation in medicine

## Report June 2021[1]

## Background

Access to Higher Education (HE) in the 21st century is widely regarded as an inclusive good, a means to develop greater equity in society, and for the professions, an instrument to gradually achieve a profile that reflects fair representation of all different communities (e.g. Goastellec & Valimaa, 2019). In medicine, the case is often made that a representative workforce can best provide healthcare for the diverse population commonly found in developed countries (e.g. Patterson et al, 2018).

In the UK a number of different routes into HE have been introduced to increase and broaden access. These include contextualised admission (Schwartz, 2004), foundation courses, and Access to HE qualifications, a variety of initiatives particularly important in highly selective universities and subjects. The first two have been primarily focussed on disadvantaged and under-represented young people at school or college, typically aged 16-19, and the Access to HE qualification explicitly oriented towards older, mature students, especially those who may have left school without formal level 3 qualifications.

Access to HE (Higher Education) diplomas developed to provide pre-university qualifications for mature learners without the usual UK secondary educational qualifications, such as A-levels. First introduced in a variety of subject areas in the 1970s, a national framework was established in 1989, and the Quality Assurance Agency (QAA, 2016) has been responsible for this framework since 1997. The qualifications are awarded by Access-validating agencies (AVAs), of which there are currently 11, equivalent to the GCSE/A-Level exam boards, with the QAA fulfilling an Ofqual-equivalent regulatory role. Further education (FE) colleges deliver courses leading to the award of Access diplomas in the same way as schools and colleges deliver courses leading to the award of A-Levels. The early courses, many providing Certificate qualifications, evolved into diploma qualifications and around 40,000 mature students now take Access to HE diplomas each year (QAA, 2015) and circa 600 on diplomas allied to medicine (J Mizon [QAA], personal communication). In 2020, a subject descriptor for medicine was piloted in Access diplomas offered by four AVAs in a small number of colleges nationally. From 2021-22, all diplomas bearing the name Access to HE Diploma (Medicine) are required to conform to this specification. The Access to HE diploma is formally a level 3 qualification, equivalent to Advanced Level and Scottish Higher qualifications. It was hailed in the 1987 UK government white paper *Higher Education: Meeting the Challenge* as 'the third recognised route to higher education'.

Overall, success in entering HE runs at 65-70% for those gaining Access qualifications (Farmer, 2017), but an initial trawl of the UKMED database suggested that the conversion rate to medicine degree programmes may be substantially lower for several reasons. Currently, the majority of UK medical schools do not recognise Access to HE qualifications as a sufficient entry requirement, and, among

[1] NB In accordance with UKMED statistical disclosure requirements, numbers are rounded to the nearest 5, <5 to 0, and percentages based on <25 cases suppressed.

those that do, recognition may be restricted to diplomas from only one or a few of the colleges offering them. One reason is probably a perception that these students may be at greater risk of not completing a medicine programme, though there is evidence that they have considerable persistence in their educational courses (Hinsliff-Smith et al, 2012). A more recent study (Wilkinson et al, 2015) reports positive experiences of Access to HE students entering the Bradford-Leeds medicine course, but no evidence about their likelihood of progressing and completing the programme.

As there has been increasing focus on widening access to medicine (and other professions) extending over the last decade (see Milburn, 2009; Medical Schools Council, 2014), it is timely to examine how successful the introduction of Access to HE qualifications has been in broadening access to medical school. The specific research questions were:-

1. What is the demographic profile of applicants to medicine programmes with Access to HE diploma qualifications?[2]
2. What are the numbers and demographic profile of students entering medical school each year with Access diplomas?
3. How successful are entrants with Access qualifications at medical school (progression & completion, FPAS educational performance measure, FPAS Situational Judgment Test)?

# Methods

## Dataset

This was the UKMED (UK Medical Education Database; Dowell et al, 2018) provided dataset (GMC3605_UKCAT91_ALL_DATA_ENTRANT_COHORT_MATCHEDCASES_22012021.sav) at 22nd January 2021. The data comprised: a) all applicants and entrants to medicine programmes between 2007 and 2018 recorded with Access to HE qualifications (hereafter termed '*Access students*'); plus b) all other entrants (hereafter termed '*Non-Access students*' to the same medicine programmes (course, university, year) as the Access students. The data is summarised below in Table 1.

TABLE 1: DATA SOURCE FOR EACH CASE

| **AVAILABLE_DATA** | ***Access to HE students*** | | ***Non-Access students*** | |
|---|---|---|---|---|
| | **No.** | **%** | **No.** | **%** |
| Applicant only | 1,715 | 68.6% | - | - |
| Entrant and applicant | 785 | 31.4% | 42,810 | 100% |
| Total | 2,500 | | 42,810 | |

There were, of course, repeat applications through UCAS; the one included is the final one – which for medicine entrants will have been the successful one.

[2] This research question was not part of the original P091 proposal, but became pertinent when UCAS data about applications for medicine became available.

### Exclusion criteria

All non-UK domiciled applicants were excluded (n=5,125), leaving 2,500 Access cases[3] and 37,685 Non-access cases. Applicants for direct entry to later years, and other partial or non-standard medicine courses were also excluded: there were no instances of these amongst Access students.

### Inclusion criteria

All Access student applicants and entrants to: standard entry medicine (5 yr programmes in most cases), graduate entry medicine, gateway and foundation courses in medicine, medicine with a preliminary year and clinical sciences/medicine foundation (University of Bradford[4]).

### Analysis

Analysis was conducted within the University of Dundee Health Information Centre Safe Haven using SPSS v25 (IBM, 2018). For inferential tests alpha=0.05.

Applicant data was analysed only for the Access students (data for all other applicants not being included in this dataset). Entrant data was analysed in two ways:-

a) All entrant data for Access and non-Access students;
b) Case-control comparisons for Access students and controls matched on their UKCAT aptitude cognitive total test z-score[5]

Analyses were conducted separately by type of medicine course applied for/entered; these were grouped into standard entry medicine (5 years duration in most cases), graduate entry programmes (4 years in most cases), and foundation courses, comprising foundation, gateway, and courses with a preliminary year (mostly 6 years in duration).

In general, the approach taken was first descriptive, then to use univariate analyses to identify factors of interest, followed by multivariate analysis to distinguish independence (or otherwise) of significant univariate factors.

## Results

### Access student demographic characteristics

The average age of Access qualified students was older than the typical medicine applicant at 27 years, and ranged from 20 to 50. The distribution of age for applicants and entrants is shown in Figures 1 and 2 below. Average age did not vary significantly between applicants and entrants (p=0.94).

[3] All Access applicants were UK domiciled; non-UK domiciled students are not permitted to register for Access to HE diplomas.
[4] Bradford has a long-standing scheme whereby a small number of successful students on the Medicine Foundation course may transfer to a standard entry medicine programme (previously Leeds University, currently Sheffield) or apply to some other standard entry medicine programme.
[5] Matching was carried out using the SPSS FUZZY procedure: one match for each Access case was obtained by specifying entry to the same university, same medicine course, in the same year, and with a UKCAT cognitive total z-score tolerance of 0.5

FIG. 1: APPLICANT AGE DISTRIBUTION

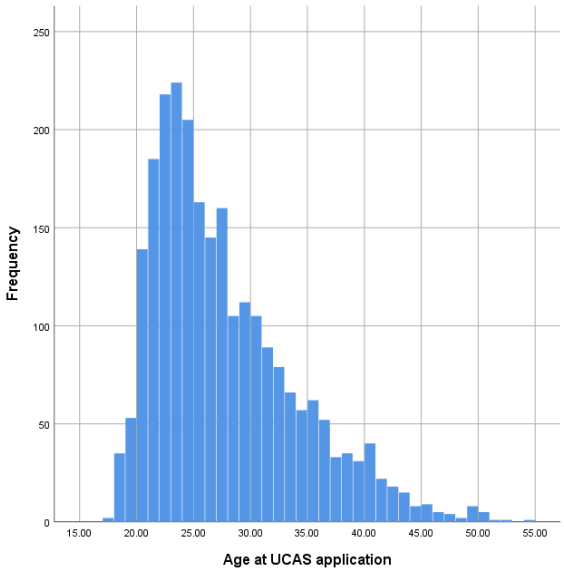
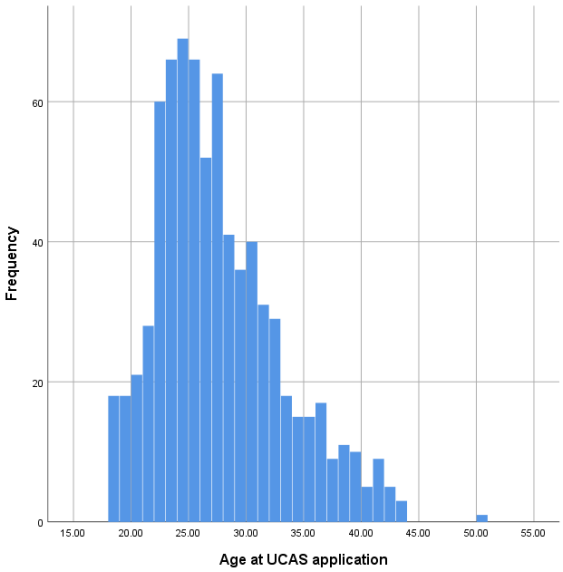



FIG. 2: ENTRANT AGE DISTRIBUTION




More females (56.4%) than males applied to medicine, and more females were accepted (52.4%) onto a medicine course, but women applicants were less likely to gain a place ($\chi^2$=5.25, df=1, p=0.022, $\varphi$=0.05). Table 2 displays this data.

TABLE 2: APPLICANT & ENTRANT GENDER

| | | Enrolled in medicine year 1 | | |
|---|---|---|---|---|
| | | No | Yes | Total |
| UCAS_GENDER | Female | 995 | 415 | 1410 |
| | Male | 720 | 370 | 1090 |
| Total | | 1715 | 785 | 2500 |

Substantial numbers of people of Asian (17.6%) and black (17.8%) ethnicities applied to medicine courses, but were substantially less likely to gain a place ($\chi^2$=168.83, df=5, p<0.001, $\varphi$=0.26). Of the black applicants, around 90% identified as black African, only a small minority as black Caribbean. Table 3 displays this data below.

TABLE 3: APPLICANT & ENTRANT ETHNICITY

| | | Enrolled in medicine year 1 | | |
|---|---|---|---|---|
| | | No | Yes | Total |
| UCAS_ETHNIC_GROUP | Asian | 340 | 100 | 440 |
| | Black | 390 | 55 | 445 |
| | Mixed | 85 | 45 | 130 |
| | Other | 80 | 15 | 90 |
| | Unknown or Prefer not to say | 45 | 15 | 60 |
| | White | 780 | 555 | 1335 |
| Total | | 1715 | 785 | 2500 |

The majority of both applicants and entrants were living in England. There was no significant difference in domicile between applicants and entrants ($\chi^2$=5.289, df=3, p=0.15, $\varphi$=0.046). This can be seen in Table 4 below.

TABLE 4: APPLICANT & ENTRANT DOMICILE

| | | Enrolled in medicine year 1 | | |
|---|---|---|---|---|
| | | No | Yes | Total |
| UCAS_DOMICILE | England | 1610 | 740 | 2350 |
| | Northern Ireland | 15 | 5 | 20 |
| | Scotland | 45 | 25 | 70 |
| | Wales | 45 | 15 | 60 |
| Total | | 1715 | 785 | 2500 |

Much higher numbers of Access applicants came from more deprived areas, but they were significantly less likely to gain a medicine place ($\chi^2$=114.958, df=4, p<0.001, $\varphi$=0.215) – with similar numbers of Access entrants coming from each IMD quintile[6]. This is shown in Table 5 below.

TABLE 5: APPLICANT & ENTRANT INDEX OF MULTIPLE DEPRIVATION

| | | Enrolled in medicine year 1 | | |
|---|---|---|---|---|
| | | No | Yes | Total |
| UCAS_IMD_QUINTILE | 1 | 620 | 145 | 765 |
| | 2 | 395 | 160 | 555 |
| | 3 | 285 | 165 | 450 |
| | 4 | 230 | 150 | 380 |
| | 5 | 175 | 160 | 335 |
| Total | | 1705 | 780 | 2485 |

### *Demography summary*

#### Research Question 1: What is the demographic profile of applicants to medicine programmes with Access to HE diploma qualifications?

#### Research Question 2: What are the numbers and demographic profile of students entering medical school each year with Access diplomas?

In brief, Access applicants were older (mean 27 years) than most university applicants to medicine. Most were from England (94%) and from white ethnic backgrounds (53%), although substantial numbers identified as Asian or black (18% each). Just over half were female (56%). There was a strong gradient from less to more deprived geographic background (IMD) with three times as many from the most deprived quintile as from the least deprived.

[6] The Index of Multiple Deprivation (IMD) is constructed from a variety of information covering income, employment, education, housing, crime & environment; it is calculated separately for the four devolved UK nations. IMD Quintiles are based on postcode; IMD 1 is the most deprived quintile. NB 15 Access students had this data missing.

The profile of Access entrants was similar in terms of domicile and age, but differed significantly in terms of gender (fewer women successful), ethnicity (fewer minority ethnicity community members successful), and deprivation (fewer entrants from more deprived quintiles).

## Application and selection

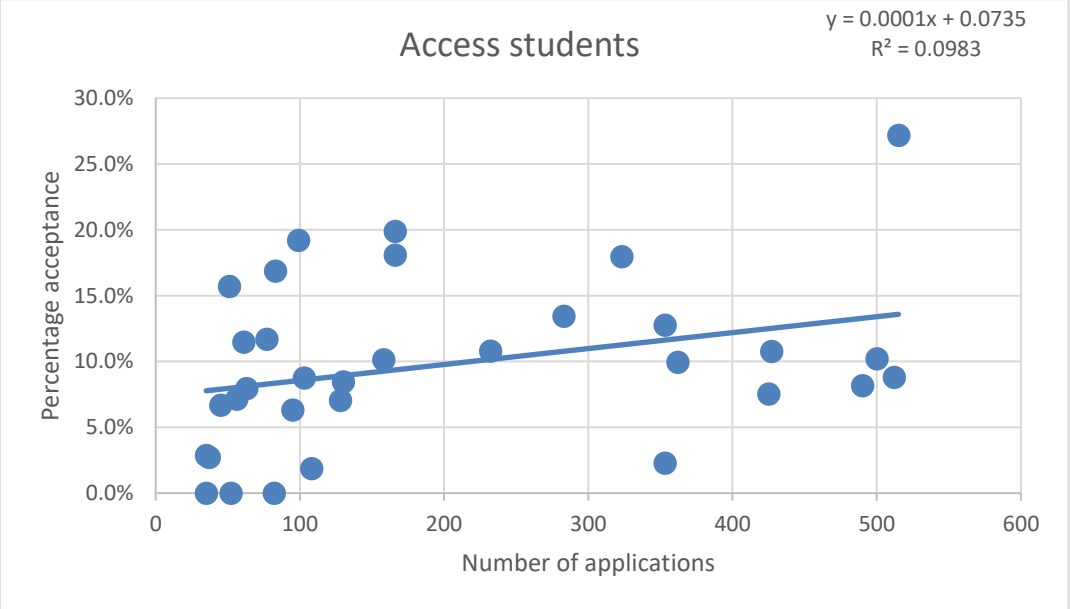
There were significant numbers of applicants for and entrants to medicine at 34 UK medical schools[7]. Applicant and entrant numbers declined across the time period of this sample and are shown below in Table 6. It is notable that the overall chance of gaining a place was roughly the same as for other applicants at 30.7% overall for Access students (see MSC, 2019 - 32% in 2011).

TABLE 6: APPLICANTS & ENTRANTS BY YEAR OF APPLICATION

| | *UCAS Year of application* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *2007* | *2008* | *2009* | *2010* | *2011* | *2012* | *2013* | *2014* | *2015* | *2016* | *2017* | *2018* |
| *Applicants* | 185 | 290 | 210 | 270 | 225 | 230 | 195 | 185 | 205 | 200 | 140 | 160 |
| *Entrants* | 80 | 130 | 70 | 80 | 70 | 70 | 50 | 55 | 60 | 50 | 35 | 35 |

The largest numbers of applications were to a restricted number of medical schools; Table 7 below shows both the number of medicine applicants and the number of acceptances by each medical school (ordered by number of applicants), and Figure 3 shows the relationship between number of applicants and the probability of being accepted. Clearly, medical schools varied considerably in the likelihood of accepting an Access student, in part because only a minority recognise the Access to HE diploma as a valid entry qualification.

FIGURE 3: APPLICANT NUMBERS AND PROBABILITY OF ACCEPTANCE BY MEDICAL SCHOOL[8]




[7] Aston, Buckingham, Edge Hill, Kent and Medway, Queens University Belfast, Sunderland, and UCLan omitted as zero or very few applications were made and none admitted.

[8] NB The proportion of Access applicants accepted to each medical school is substantially lower than the overall proportion of Access applicants who are accepted to any medical school since most make 3 or 4 separate medicine applications to different schools and/or programmes.

TABLE 7: APPLICANTS AND ENTRANTS BY MEDICAL SCHOOL

| *Medical School* | *Applicants* | *Entrants* | *Applicants accepted (%)* |
|---|---|---|---|
| Brighton & Sussex | 515 | 140 | 27.2% |
| Kings (KCL) | 510 | 45 | 8.8% |
| Southampton | 500 | 50 | 10.2% |
| Leicester | 490 | 40 | 8.2% |
| Keele | 425 | 45 | 10.8% |
| St. Georges (SGUL) | 425 | 30 | 7.5% |
| Liverpool | 360 | 35 | 9.9% |
| Bristol | 355 | 10 | - |
| Newcastle | 355 | 45 | 12.7% |
| Manchester | 325 | 60 | 18.0% |
| East Anglia (UEA-Norwich) | 285 | 40 | 13.4% |
| Cardiff | 230 | 25 | 10.8% |
| Bradford[9] | 165 | 30 | 18.1% |
| Leeds | 165 | 35 | 19.9% |
| Aberdeen | 160 | 15 | - |
| Hull-York | 130 | 10 | - |
| Lancaster | 130 | 10 | - |
| Sheffield | 110 | 0 | - |
| Nottingham | 105 | 10 | - |
| Warwick | 100 | 20 | 19.2% |
| Queen Mary (Barts) | 95 | 5 | - |
| Glasgow | 85 | 15 | - |
| Birmingham | 80 | 0 | - |
| St. Andrews | 75 | 10 | - |
| Cambridge | 65 | 5 | - |
| UCL (University College) | 60 | 5 | - |
| Imperial | 55 | 5 | - |
| Dundee | 50 | 0 | - |
| Swansea | 50 | 10 | - |
| Edinburgh | 45 | 5 | - |
| Oxford | 35 | 0 | - |
| Exeter | 35 | 0 | - |
| Plymouth | 35 | 0 | - |

### *Applications and acceptances by type of medicine course*

The 2,500 Access applicants made, in total, some 5,350 medicine applications[10]; within this total there were instances of students applying for both graduate and standard entry medicine, as well as

[9] University of Bradford has a long-standing scheme whereby successful students on the Foundation course may transfer to a standard entry medicine programme (formerly Leeds, now Sheffield).

[10] Most Access students also made applications to other subjects than medicine.

examples of students applying for both standard entry and foundation programmes. Table 8 below shows the numbers of applicants who made at least one application for each type of medicine programme and whether that application (or applications) were successful (i.e were accepted as entrants) or unsuccessful. There's a clear and significant difference ($\chi^2$=142.281, df=2, p<0.001, $\varphi$=0.21) in the likelihood of being successful in gaining a place depending on the type of course applied for i.e. standard entry, graduate entry, or foundation medicine programmes.

TABLE 8: APPLICANTS[11] AND ENTRANTS BY TYPE OF MEDICINE COURSE

| | *Unsuccessful* | *Successful* | *% success* |
|---|---|---|---|
| *Type of Course* | | | |
| Foundation Course/Gateway/Preliminary year | 810 | 100 | 11% |
| Graduate Entry Programme | 335 | 70 | 17% |
| Standard Entry Medicine | 1,325 | 585 | 31% |

## Predictors of Access student acceptance

As described above, there was a number of differences in the demographic profiles of Access students who applied and those accepted for medicine. The influence of these different factors was examined separately by type of medicine programme, first using univariate analysis (Chi square for the categorical data reported above, logistic regression for continuous measures). In addition, the predictive value of the commonest selection criterion – the UKCAT[12] cognitive total score – was also analysed.

### *Standard entry medicine*

Univariate analyses showed significant associations between entry to medicine and: UCAS Year (higher acceptance in 2008 & 2009, ($\chi^2$=48.053, df=11, p<0.001, $\varphi$=0.139; see Figure 4), Ethnicity (lower acceptance for minority groups; ($\chi^2$=168.83, df=5, p<0.001, $\varphi$=0.26).), IMD (higher acceptance with less disadvantage ($\chi^2$=114.958, df=4, p<0.001, $\varphi$=0.21), and UKCAT cognitive total z-score (higher acceptance with increasing UKCAT; $\chi^2$=489.124, df=22, p<0.001, $\varphi$=0.532). No significant effect of age, gender, or domicile was found (p>0.05).

The simple relationship between probability of acceptance and UKCAT cognitive total z-score is shown in Figure 5 below, that illustrates the strong positive association between UKCAT cognitive score and probability of acceptance.

[11] Numbers in the Unsuccessful column are the number of Access applicants who made one or more applications to each type of medicine course, thus an individual applicant could be numbered in several rows.
[12] UKCAT (Now UCAT) was the aptitude test taken by most Access applicants (ca. 70%) and nearly all entrants. Since its introduction in 2006, it comprised four separate cognitive tests and, in 2013, a situational judgment test (SJT) was added. In these analyses, the cognitive total score was used, transformed to a z-score with reference to all test takers in the same year.

FIGURE 4: ACCEPTANCE PROBABILITY BY YEAR OF APPLICATION[13]

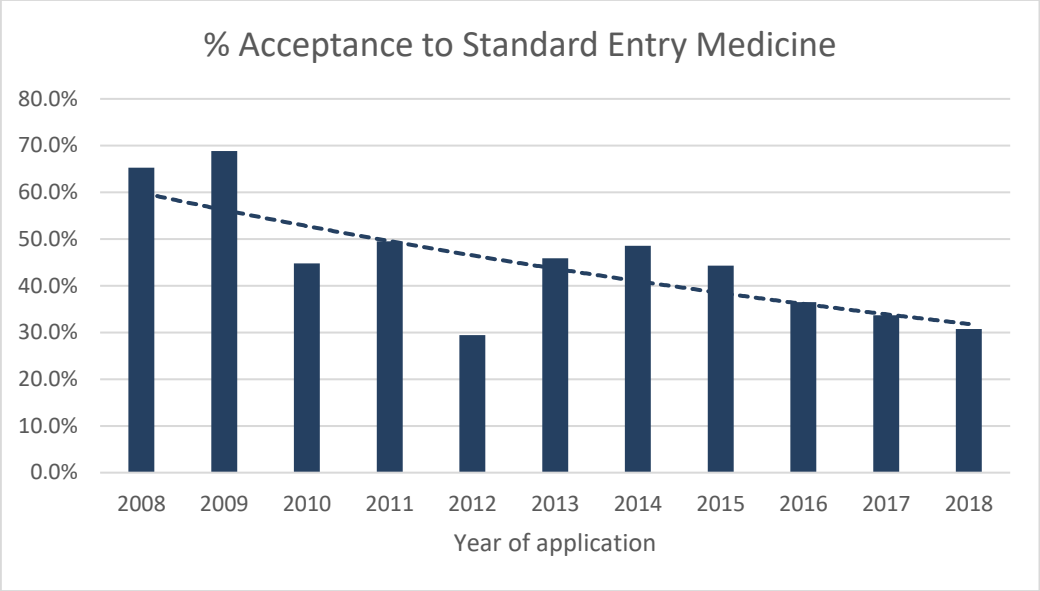
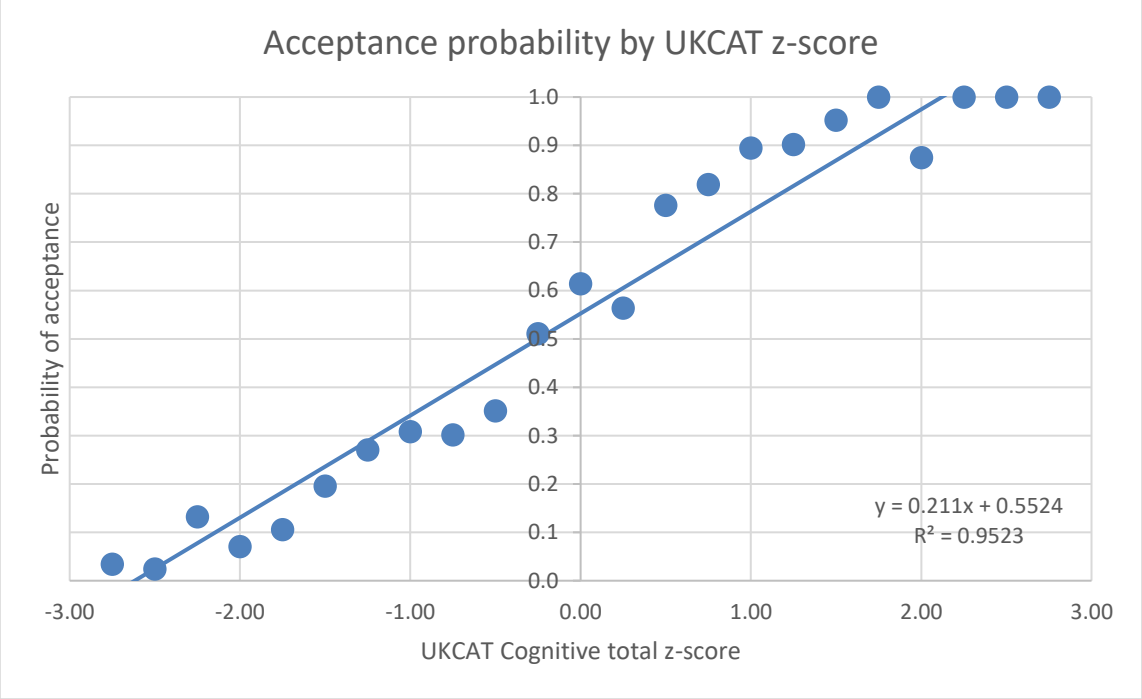



FIGURE 5: UKCAT COGNITIVE TOTAL Z-SCORE AND PROBABILITY OF ACCEPTANCE[14]




Multiple binary logistic regression[15] was then used to identify the major, significant predictors. This showed that there were significant independent effects of UKCAT cognitive total, UCAS Year and IMD, but no influence of ethnicity. The results are summarized in Table 9 below and demonstrate that acceptance probability increases with UKCAT score, that compared to 2007, acceptance was

[13] 2007 is omitted as there were very few applicants and entrants.
[14] UKCAT scores divided into bins 0.25z wide
[15] Backwards stepwise

significantly higher in 2008 and 2009 (ORs 3.5, 2.8 respectively; see also Figure 5 above), and acceptance was significantly lower in the most deprived group (lowest IMD quintile; OR=0.54).

TABLE 9: PREDICTORS OF ACCEPTANCE to STANDARD ENTRY MEDICINE (multivariate analysis)

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| UKCAT_COG_TOTAL_Z_FINAL | 1.211 | .073 | 271.871 | 1 | .000 | 3.356 |
| UCAS_YEAR | | | 37.180 | 11 | .000 | |
| UCAS_YEAR (2008) | 1.258 | .341 | 13.625 | 1 | .000 | 3.517 |
| UCAS_YEAR (2009) | 1.031 | .308 | 11.224 | 1 | .001 | 2.804 |
| UCAS_YEAR (2010) | .367 | .330 | 1.240 | 1 | .265 | 1.444 |
| UCAS_YEAR (2011) | .318 | .324 | .962 | 1 | .327 | 1.374 |
| UCAS_YEAR (2012) | .467 | .326 | 2.050 | 1 | .152 | 1.595 |
| UCAS_YEAR (2013) | .256 | .326 | .620 | 1 | .431 | 1.292 |
| UCAS_YEAR (2014) | .298 | .339 | .771 | 1 | .380 | 1.347 |
| UCAS_YEAR (2015) | .500 | .348 | 2.065 | 1 | .151 | 1.649 |
| UCAS_YEAR (2016) | .047 | .342 | .019 | 1 | .890 | 1.048 |
| UCAS_YEAR (2017) | .110 | .367 | .090 | 1 | .764 | 1.116 |
| UCAS_YEAR (2018) | .877 | .524 | 2.805 | 1 | .094 | 2.404 |
| UCAS_APP_IMD_QUINTILE | | | 9.879 | 4 | .043 | |
| UCAS_APP_IMD_QUINTILE(1)[16] | -.601 | .200 | 9.060 | 1 | .003 | .548 |
| UCAS_APP_IMD_QUINTILE(2) | -.224 | .200 | 1.246 | 1 | .264 | .800 |
| UCAS_APP_IMD_QUINTILE(3) | -.207 | .203 | 1.045 | 1 | .307 | .813 |
| UCAS_APP_IMD_QUINTILE(4) | -.248 | .205 | 1.466 | 1 | .226 | .780 |
| Constant | .053 | .300 | .031 | 1 | .861 | 1.054 |

a. Variable(s) entered on step 1: UKCAT_COG_TOTAL_Z_FINAL, UCAS_YEAR, UCAS_APP_IMD_QUINTILE, UCAS_ETHNIC_GROUP_SUM.

### *Graduate entry medicine*

A similar approach to graduate entry medicine found, after univariate analyses, significant relationships of acceptance probability with IMD quintile (higher acceptance with less disadvantage, $\chi^2$=17.32, df=1, p<0.001), ethnicity (lower acceptance for all minority ethnic groups, $\chi^2$=70.74, df=5, p<0.001), age (lower acceptance with increasing age, $\chi^2$=20.62, df=1, p<0.001), and UKCAT cognitive total score (higher acceptance with higher UKCAT score, $\chi^2$=157.55, df=1, p<0.001); there was a marginally significant effect of gender (women less likely to be accepted, $\chi^2$=3.84, df=1, p=0.05). No reliable association was found with UCAS year of application, or domicile. Multiple logistic regression[17] showed that only UKCAT cognitive total and ethnicity were significant independent predictors. The results can be seen in Table 10 below, that illustrates the strong positive relationship of acceptance with UKCAT, and the lower acceptance rate of black applicants.

[16] IMD quintile 1 – most deprived

[17] Backwards stepwise

TABLE 10: PREDICTORS OF ACCEPTANCE to GRADUATE ENTRY MEDICINE (multivariate analysis)

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| UKCAT_COG_TOTAL_Z_FINAL | 1.443 | .194 | 55.507 | 1 | .000 | 4.234 |
| UCAS_ETHNIC_GROUP | | | 8.184 | 5 | .146 | |
| UCAS_ETHNIC_GROUP (Asian) | -.596 | .525 | 1.289 | 1 | .256 | .551 |
| UCAS_ETHNIC_GROUP_(Black) | -1.878 | .785 | 5.721 | 1 | .017 | .153 |
| UCAS_ETHNIC_GROUP_(Mixed) | -.170 | .633 | .072 | 1 | .788 | .844 |
| UCAS_ETHNIC_GROUP_(Other) | .218 | .751 | .085 | 1 | .771 | 1.244 |
| UCAS_ETHNIC_GROUP_(Unknown) | -1.107 | .847 | 1.708 | 1 | .191 | .330 |
| Constant | .336 | .176 | 3.650 | 1 | .056 | 1.400 |

### *Foundation medicine programmes*

With the remaining course types (foundation, gateway, and preliminary year) grouped together, univariate analyses found significant positive relationships between acceptance and two factors - UKCAT cognitive total ($\chi^2$=65.751, df=1, p<0.001, $\varphi$=0.35) and UCAS year of application ($\chi^2$=4.308, df=1, p<0.038, $\varphi$=0.069). Multiple logistic regression using these two factors confirmed their independent effect – a strong positive relationship between UKCAT cognitive total and acceptance (OR=2.485), and a higher rate of acceptance for the second year of application in this dataset (2008, compared to 2007; OR=4.59). The details are shown in Table 11 below.

TABLE 11: PREDICTORS OF ACCEPTANCE to FOUNDATION MEDICINE COURSES (multivariate analysis)

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| UKCAT_COG_TOTAL_Z_FINAL | .910 | .120 | 57.582 | 1 | .000 | 2.485 |
| UCAS_YEAR | | | 21.858 | 11 | .025 | |
| UCAS_YEAR(2008) | 1.525 | .670 | 5.186 | 1 | .023 | 4.593 |
| UCAS_YEAR(2009) | 1.224 | .646 | 3.590 | 1 | .058 | 3.402 |
| UCAS_YEAR(2010) | .730 | .671 | 1.184 | 1 | .277 | 2.076 |
| UCAS_YEAR(2011) | -.011 | .661 | .000 | 1 | .986 | .989 |
| UCAS_YEAR(2012) | .697 | .667 | 1.092 | 1 | .296 | 2.008 |
| UCAS_YEAR(2013) | .400 | .663 | .363 | 1 | .547 | 1.491 |
| UCAS_YEAR(2014) | .419 | .682 | .378 | 1 | .539 | 1.521 |
| UCAS_YEAR(2015) | .110 | .726 | .023 | 1 | .879 | 1.117 |
| UCAS_YEAR(2016) | .115 | .732 | .025 | 1 | .875 | 1.122 |
| UCAS_YEAR(2017) | -.014 | .775 | .000 | 1 | .986 | .986 |
| UCAS_YEAR(2018) | .622 | 1.285 | .234 | 1 | .629 | 1.862 |
| Constant | -.800 | .584 | 1.874 | 1 | .171 | .449 |

a. Variable(s) entered on step 1: UKCAT_COG_TOTAL_Z_FINAL, UCAS_YEAR.

### *Summary of acceptance predictors*

#### Research Question 1: What is the demographic profile of applicants to medicine programmes with Access to Higher Education diploma qualifications?

#### Research Question 2: What are the numbers and demographic profile of students entering medical school each year with Access diplomas?

One factor was a strong and consistent predictor of acceptance for Access applicants irrespective of the type of medicine course: the UKCAT cognitive total score[18]. For standard entry medicine, there was also significant variation by year, and a significant negative effect of deprivation. For graduate entry medicine, ethnicity was also significant, the largest difference being seen in lower acceptance for black vs. white Access applicants. For foundation programmes the year was also significant. The interpretation of these different effects is taken up under the Discussion section.

## Progress and attainment at medical school

### *Comparability of matched case controls*

The matching of cases (Access entrants) and controls found matches for 680 Access entrants out of a total of 755 Access entrants, i.e. controls starting the same medicine course at the same university and in the same year, with a UKCAT score within 0.5z. All analyses were carried out on this dataset.

Cases and controls did not differ significantly on the UKCAT cognitive total z-score with means of 0.17 and 0.21, minima and maxima of -2.8 +2.8, -2.3 +2.6 respectively ($F=0.82$, df 1&1382; $p=0.37$). Gender also did not differ reliably ($Chi^2=1.7$; $p=0.21$, but ethnicity was significantly different ($Chi^2=46.2$; $p<0.001$) with substantially more white students and fewer Asian students in the Access cases than in the controls.

### *Completion and attrition*

Progress and completion data were calculated for standard entry medicine students who started their course in 2013 or earlier, graduate entry medicine students 2014 and earlier, foundation and gateway students who started in 2012 or earlier[19].

Overall, completion rates were high and attrition during the medicine courses low. Table 12 summarises the numbers by type of course.

TABLE 12: COMPLETION AND ATTRITION BY COURSE TYPE & ACCESS

| ***Course Type*** | ***Access status*** | ***Completed*** | ***Academic failure*** | ***Drop out non-academic*** | ***Transfer*** | ***Continuing[20]*** |
|---|---|---|---|---|---|---|
| Standard entry | Non-access | 295 | 0 | 0 | 0 | 0 |
| | Access | 260 | 15 | 20 | 0 | 5 |
| Graduate entry | Non-access | 40 | 0 | 0 | 0 | 0 |
| | Access | 35 | 0 | 5 | 0 | 0 |
| Foundation & Gateway | Non-access | 30 | 0 | 0 | 0 | 0 |
| | Access | 25 | 0 | 0 | 0 | 5 |

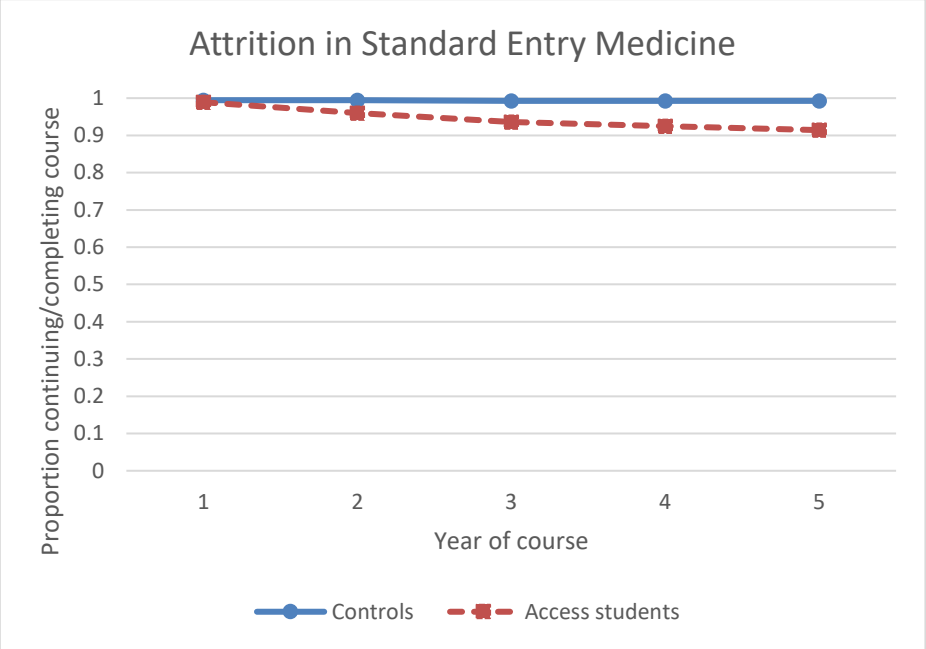
[18] The UKCAT cognitive score was used as a selection criterion for many, but not all, of these medicine programmes.

[19] Thus allowing 5 years to complete standard entry, 4 years for graduate entry, and 6 years for the foundation and gateway courses. University of Bradford students were excluded from this analysis.

[20] Continuing: students still on course – having repeated a year or suspended for other reasons.

For standard entry medicine, as can be seen above, attrition for Access students was relatively low (ca. 10%) and about similar rates for academic and non-academic reasons[21]. The time course can be seen in Figure 6 below, illustrating that drop out was occurring in each year of the course.

FIGURE 6: ATTRITION IN STANDARD ENTRY MEDICINE




Univariate logistic regression was employed to analyse which factors predict successful completion of standard entry medicine. Age at entry, ethnicity, graduate status on entry, and gender were not significantly related to completion (all $p>0.05$), but both Access status and UKCAT cognitive total z-score reliably predicted successful completion. They were then analysed in a multiple logistic regression that confirmed the significant impact of Access status (lower likelihood of completion) and UKCAT score (higher likelihood with increase in z-score). Table 13 below summarises the results. The completion data for the other types of medicine course, graduate entry and foundation, were not analysed further given the small numbers.

TABLE 13: MULTIPLE REGRESSION OF ACCESS STATUS, UKCAT COGNITIVE TOTAL Z-SCORE, AND SUCCESSFUL COMPLETION OF STANDARD ENTRY MEDICINE

| | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| Access_applicant | -2.729 | .605 | 20.349 | 1 | .000 | .065 |
| UKCAT_COG_TOTAL_Z_FINAL | .448 | .183 | 5.990 | 1 | .014 | 1.565 |
| Constant | 4.556 | .581 | 61.530 | 1 | .000 | 95.211 |

a. Variable(s) entered on step 1: Access_applicant.

b. Variable(s) entered on step 2: UKCAT_COG_TOTAL_Z_FINAL.

[21] These comprised a variety – financial, health, and personal.

Attrition was also examined within the different medical schools. However, numbers were so low (only one school had lost more than 10 Access students over the eleven years from all types of medicine course combined) it did not prove feasible to analyse this formally.

### *Time to complete*

The time taken to complete a medicine course and gain a primary medical qualification (PMQ) was calculated[22]. A further variable was then calculated: Time taken compared to the standard duration of each course {*Time cf normal*} (4 years graduate entry, 5 y standard entry, 6 y foundation & gateway[23]). One-way analysis of variance showed no significant effect of course type (F=0.65; df 3&389; p=0.58) on the *Time cf normal* variable and, hence, subsequent analyses included all course types.

Gender, ethnicity, disability[24], and Index of Multiple Deprivation were all non-significantly related to the *Time cf normal* variable (all p>0.05) in univariate analyses of variance. Simple linear regressions revealed a small effect of age on entry (F=4.4; df 1&961; p=0.036), a significant effect of UKCAT cognitive total z-score (F=5.8; df 1&957; p=0.016), and Access status (F=90.2; df 1&961; p<0.001). Multiple regression was then used to distinguish the effects of these three factors, demonstrating highly significant independent effects of all three: entering as an Access student increased the time to complete by roughly half a year; higher UKCAT cognitive scores reduced the time to complete, as did increasing age. Table 14 below summarises the results of this analysis.

TABLE 14: MULTIPLE REGRESSION OF ACCESS STATUS, UKCAT COGNITIVE TOTAL Z-SCORE, AND AGE OF ENTRY ON *TIME CF NORMAL*

| | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. |
| (Constant) | .495 | .109 | | 4.522 | .000 |
| Access_applicant | .576 | .057 | .399 | 10.172 | .000 |
| AGE_ON_ENTRY | -.024 | .005 | -.184 | -4.704 | .000 |
| UKCAT_COG_TOTAL_Z_FINAL | -.070 | .026 | -.082 | -2.669 | .008 |

a. Dependent Variable: Years compared to standard duration to complete PMQ

### *FPAS selection measures*

Selection for the UK Foundation Programme – the first two years of postgraduate medical training – comprises three elements: an educational performance measure (EPM) and a situational judgment test (SJT), the EPM being composed of a ranking of all graduates from the same medical school in each year, based on their medical school attainment, and a publication score. Here, only the EPM rankings (quartiles in 2012, deciles in subsequent years) and SJT scores are analysed. EPM rankings are constructed across all graduates from a medical school in a particular year irrespective of the course type; the FPAS SJT is taken by all graduates applying for the Foundation Programme each year, scores being equated across years.

[22] Year of PMQ award – Year of entry

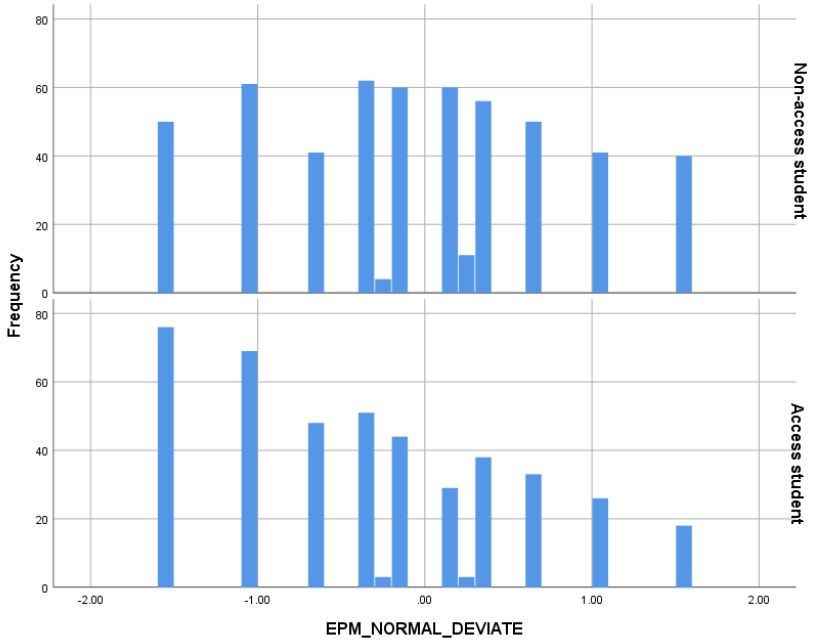
[23] The longer medicine courses at Cambridge, Oxford, Imperial and St. Andrews had an extra year allowed.

[24] Any recorded HESA disability

## EPM ranking

The EPM rankings were converted to a normal deviate score to include both quartile and decile rankings. Figure 7 below indicates that Access students were likelier to gain lower rankings and this was confirmed by 1-way analysis of variance (F=27.5; df 1&972; p<0.001).

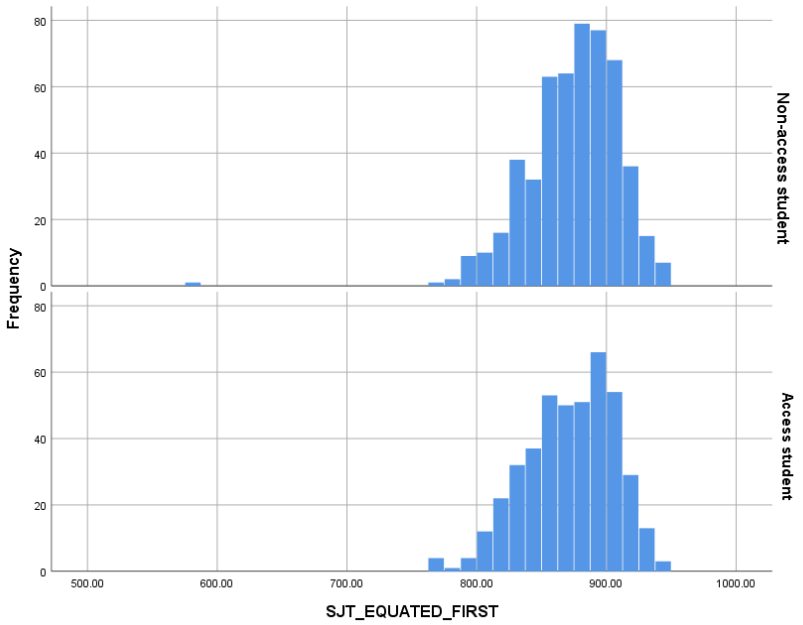
FIGURE 7: FPAS EPM RANKINGS BY ACCESS STATUS




## FPAS SJT

In contrast, the SJT equated scores were similar as between Access and non-Access students. This can be seen in Figure 8 below and was confirmed as non-significant by 1-way analysis of variance (F=1.2; df 1&947; p=0.28).

FIGURE 8: FPAS SJT SCORE BY ACCESS STATUS



Univariate analyses of other potential predictors for the FPAS measures showed that EPM rankings were significantly related to gender (women ranking higher; F=5.53, p=0.009)), ethnicity (BME students ranking lower, F=34.41, p<0.001), age (older students ranking lower, F=8.16, p=0.004), IMD (less deprived IMD quintiles ranking higher, F=2.71, p=0.03), and UKCAT cognitive total z-score (higher scorers ranked higher, F=32.81, p<0.001). Disability was not significantly related to EPM (F=0.04, p=0.84).

Multivariate regression, using the significant factors from the univariate analyses, confirmed the independent effect on EPM of Access status (Access students ranking lower), and that gender (women ranking higher), ethnicity (BME students ranking lower), and UKCAT cognitive total z-score (higher UKCAT scores associated with higher ranking) were also significant. A summary is shown in Table 15 below. The beta values indicate that Access status has a similar weight of influence as BME status and UKCAT cognitive total z-score, but gender is less influential.

TABLE 15: MULTIPLE REGRESSION OF FPAS EPM RANKING

| | Unstandardized Coefficients | | Standardized Coefficients | | | 95.0% Confidence Interval for B | |
|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. | Lower | Upper |
| (Constant) | -.004 | .055 | | -.082 | .935 | -.112 | .103 |
| UKCAT_COG_TOTAL_Z_FINAL | .176 | .032 | .176 | 5.529 | .000 | .113 | .238 |
| Access_applicant | -.341 | .055 | -.198 | -6.225 | .000 | -.448 | -.233 |
| BME_INT | -.357 | .058 | -.197 | -6.109 | .000 | -.472 | -.242 |
| GENDER_INT | .135 | .054 | .079 | 2.496 | .013 | .029 | .241 |

a. Dependent Variable: FP_NORMAL_DEVIATE

Further analysis of the FPAS SJT scores to examine their relationship to other variables than Access status, demonstrated significantly higher mean scores achieved by women (F=9.01, p=0.003), significantly lower scores from BME students (F=24.41, p<0.001), significantly lower scores with greater deprivation (IMD: F=2.98, p=0.019), and a significant positive relationship between UKCAT cognitive total z-score and SJT score (F=65.77, p<0.001). Multivariate regression demonstrated only significant independent effects of the UKCAT cognitive score and gender (women and higher UKCAT cognitive scores associated with higher SJT scores. The details of this analysis can be seen in TABLE 16 below.

TABLE 16: MULTIPLE REGRESSION OF FPAS SJT (equated)

| | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. |
| (Constant) | 865.658 | 1.681 | | 514.928 | .000 |
| UKCAT_COG_TOTAL_Z_FINAL | 11.236 | 1.298 | .272 | 8.657 | .000 |
| GENDER | 8.776 | 2.207 | .125 | 3.977 | .000 |

a. Dependent Variable: SJT_EQUATED_FIRST

### *Summary of progress and attainment*

#### Research Question 3: How successful are entrants with Access qualifications at medical school?

The vast majority (90%) of Access students completed their medicine courses, but they were significantly less likely to complete standard entry medicine than their matched controls. Access students who did complete and gain their primary medical qualification (from all types of course) took significantly longer on average to do so than their matched controls. Access students had significantly lower EPM rankings than their matched controls, but similar SJT scores when applying for Foundation training.

Other significant predictors of progress and attainment were UKCAT cognitive total scores, that were related to higher likelihood of completion, less time to complete, and higher FPAS EPM ranking and SJT scores; female gender, that was related to higher FPAS EPM ranking and SJT scores; ethnicity where Black and minority ethnicity had lower EPM ranking; and age, where older students were likely to complete their medicine qualification in a shorter time.

## Discussion

Access students apply to and enter medicine degree courses at UK universities in significant numbers; over the period 2007-2018 around 200 people applied each year and nearly one third were successful in gaining a place at medical school. This rate of success in entering medical school is markedly lower than the 65-70% entry to HE reported by Farmer (2017), but comparable with other applicants to medicine – a subject that is highly competitive and selective.

The profile of Access student applicants to medicine reflects the "3rd route to university", comprising an older cohort (average age 27), a slight majority of women, a majority from white communities but with substantial proportions from Asian and Black communities, and a positive association with geographically more deprived areas. However, analysis demonstrated that the chances of entering medical school were uneven across three demographic categories, with Access students from more deprived areas, from minority ethnic communities, and who identified as women being less successful.

Boliver (2013, 2016) has examined a number of disparities in selection to HE and those reported here may share some of the same factors responsible, including misconceptions on the part of selectors and disadvantage in negotiating the selection process as well as failure to meet stringent admissions criteria. It is notable that one common selection criterion, the UKCAT, was the most powerful predictor of acceptance for all three types of medicine course investigated in the present study, even though it is not used by all medical schools.

Once enrolled in medicine, Access students were pretty successful with around 90% gaining their primary medical qualification, though this was a lower proportion overall than control comparisons, and, on average, they took longer to do so. In terms of their performance at medical school, Access students were more likely to achieve a lower EPM ranking than controls, but achieved similar SJT scores as part of their application for postgraduate medical training.

The overall picture in consistent with the notion that people applying to medical school through the Access to HE route come from a background of educational and geographic disadvantage, are partly

disadvantaged in gaining entry to medical school, but then are largely successful in completing medical school and entering the postgraduate Foundation training programme. A small degree of underachievement is still present at medical school with slightly higher attrition and slightly lower attainment however.

The number of UK medical schools who recognize an Access to HE qualification as sufficient to meet their academic record criterion is limited currently, though there are many others who will accept it in combination with other level 3 qualifications. One question arising, therefore, is on what basis this difference in admissions policy is based? Historically, it seems likely that for a highly competitive subject like medicine, a simple notion of meritocracy, operationally interpreted as level 3 exam results, may have been responsible for an approach that has neglected alternative routes and assessments of suitability. In the last two decades, though, national workforce and HE agendas have established widening access as a priority, and the challenge for selection systems has been how best to enable this in an equitable means. The Schwartz report (2004) elaborated five principles for fair selection on merit, viz, transparency, potential to complete the course, use of valid & reliable assessment methods, minimizing barriers, and being professional and underpinned by appropriate institutional structures & processes. This study suggests that there is still work to be done in minimizing barriers, that Access students genuinely have the potential to complete their medical qualification successfully, and that using the UKCAT (now UCAT) aptitude test in conjunction with the Access to HE diploma is a valid approach to assessing that potential.

Over the last two years, the Quality Assurance Agency for Higher Education (QAA) has developed a new specification for the Access to Medicine HE diploma in consultation with Medical Schools Council (QAA, 2020). This detailed and appropriate specification should form a secure basis for the qualification that medical schools can be confident to use in future.

There are several limitations to the current study that should limit interpretation. Although the UKMED database encompasses the relevant population – Access applicants and entrants to medical school – there is a degree of missingness in that data. Numbers overall are modest and in terms of entrants to medical school in particular. The case-control methodology used to analyse progress and attainment at medical school was limited by the small number of matched controls (one each per Access case) found within a reasonable tolerance (0.5 Z UKCAT cognitive total) while keeping university, course type and year of entry consistent. At this point no analysis has been carried out that examines differences between medical schools either.

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