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THE SUTTON TRUST

Access to medical schools for students from disadvantaged backgrounds

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Key findings

Access to medical degrees by school type

- Between 2012 and 2022 the number of medical applicants domiciled in England, aged 19 and under, and applying to medical school for the first time, grew by 64%, from under 7,500 to over 12,000. Meanwhile the number of students entering medical school grew by only 44% between 2012 and 2021. Between 2019 and 2021 the demand for medical school places grew considerably faster than the number of students entering medical school.

- More of the growth in medical applicants came from non-selective state schools than from independent schools. Independent schools had fairly stable numbers of applicants each year over this period, while the number from non-selective state schools grew. In 2022, independent school applicants made up fewer than one in six of all applicants (16%), down from one in four (25%) in 2012. The proportion of all applicants from non-selective state schools rose from 53% in 2012 to 59% in 2022.

- While applications from non-selective state schools increased, applicants from independent schools had higher odds of getting an offer and entering medical school. This remained the case even after adjusting statistically for their exam grades, socio-economic status and other demographic factors.

- This suggests that other factors, perhaps advice and preparation materials, were important in enabling independent school applicants to get offers, which then increased their chances of entering medical school. Independent school applicants may have received this advice and support from their school, but they may also have been more likely to have receive help and support via paid courses and/or personal contacts, such as medical family members or friends.

- Most of the schools and colleges in the dataset sent very few applicants to medical school: the most common number of applicants sent by a school or college per year was one, with 80% of schools and colleges providing fewer than five applicants per year and only 2% providing 20 applicants per year. The majority (54%) of the schools/colleges that provided applicants from 2012 to 2021 averaged fewer than one entrant per year.

- Schools and colleges that sent more medical applicants tended to have more medical school entrants: on average, every two additional applicants sent by a school resulted in one additional entrant. However, this varied by school type: independent schools had the highest number of entrants per applicant in both 2012 and in 2021.

- This indicates that independent schools remained very effective at preparing and supporting their students through the medical application and admissions processes, or at selecting applicants who gained effective preparation and support from elsewhere (such as paid courses and/or personal contacts), or both.

- Non-selective state schools improved their entrant rates in 2021 compared to 2012, however sixth form and further education (FE) colleges had some of the lowest entrant rates, indicating they may need additional support helping their applicants successfully navigate the medical admissions process.

Access to medical degrees by socio-economic group

- The proportion of medical applicants from the lowest socio-economic group (based on applicant parental occupation) doubled from 2012 to 2021. Despite this, in 2021 only 6% of applicants, 5% of offer-holders and 5% of entrants were from the lowest socio-economic group.

- The growth in numbers of applicants from 2012 to 2021 was primarily among Asian and Black ethnic groups, although this varied by socio-economic group: averaged across all years, 15% of medical school entrants within the lowest socio-economic group were White, whereas 52% of entrants in the highest socio-economic group were White.

- Relatively few applicants from the low and medium socio-economic groups got an offer to study medicine compared to those in the highest socio-economic group. A major factor in this was those students' generally lower points from GCSEs, predicted A-levels and the UCAT medical admissions test used by most medical schools in selection.

- Medical applicants in our dataset had very high predicted and achieved A-levels; offer-holders and entrants had even higher grades, averaging the equivalent of one A and one or two A* grades. Applicants with very high predicted A-level points also tended to have very high scores on the UCAT.

- However, on average, applicants from the lowest socio-economic group had poorer UCAT scores given their predicted A-level grades. Even among applicants with the highest predicted A-levels, those from the lowest socio-economic group had lower UCAT scores on average compared to those from the highest socio-economic group. The difference was about half a standard deviation, or approximately 5% of the average test score, and suggests applicants from the lowest socio-economic groups - even those with very high predicted A-level grades - may need additional support for the UCAT test.

Access to medical degrees by neighbourhood deprivation

- The proportion of applicants living in the most deprived neighbourhoods [Index of Multiple Deprivation (IMD) quintile 1, which contains the 20% most deprived neighbourhoods in England] grew significantly from 2012. By 2022, 20% of applicants lived in IMD1 and 25% of applicants lived in IMD5, which is the least deprived (wealthiest) neighbourhood quintile.

- Applicants from IMD1 were less likely to get an offer to study medicine, which was largely accounted for by their relatively lower points in exams. However it is striking to note that applicants from IMD1 were *more* likely to get an offer compared to applicants from less deprived neighbourhoods who had similar grades and were otherwise demographically similar.

- Offer-holders from IMD1 were also *more* likely to enter medical school compared to applicants living in less deprived neighbourhoods with similar grades and demographic backgrounds. A potential cause is that applicants from the most deprived neighbourhoods benefited from medical school contextual admissions, which took IMD into consideration.

The impact of gateway courses on access to medical degrees and the recruitment of local medical students

- Gateway medical degree courses are designed specifically to attract and admit applicants from under-represented backgrounds. A third of all medical applicants from the lowest socio-economic group applied to at least one gateway course, but only 11% of all entrants to gateway courses were from the lowest socio-economic group.

- Just under half (46%) of all gateway course entrants were from the highest socio-economic group, although this was still considerably lower than the three quarters of entrants to standard entry medical degree courses who were from the highest socio-economic group.

- Gateway courses were successful at admitting applicants from the most deprived backgrounds who had relatively high grades. When taking into account their grades, applicants from the most deprived backgrounds who applied to at least one gateway course had higher odds of getting an offer than applicants from similar backgrounds who did not apply to a gateway course (i.e. who applied only to standard entry medical degree courses).

- Without taking into account grades however, applicants to a gateway course who were from the most deprived backgrounds still had much lower odds of getting an offer compared to those from the same backgrounds who applied only to standard entry courses. This suggests that, despite having relatively lower grade requirements for eligible applicants, gateway courses did not entirely remove the academic barriers that applicants from the most deprived backgrounds are more likely to experience.

- Gateway courses attracted and admitted students who lived closer than applicants and entrants to standard entry courses. The average gateway course entrant lived on average 135km (85 miles) from their medical school at the time they applied to study medicine. This was 36km (22 miles) closer than the average distance of 175km (109 miles) that the average entrant to a standard entry course lived from their medical school at application to medicine.

The impact of new medical schools on access to medical degrees and the recruitment of local medical students

- Between 2018 and 2021, six new medical schools admitted students for the first time. New medical schools have been established in areas with the greatest shortages of doctors and with a remit to recruit local students and students from under-represented groups.

- New medical schools did attract applicants from more deprived backgrounds. Nearly a quarter (23%) of all applicants in the lowest socio-economic group applied to at least one new medical school, compared to 16% of all applicants from the highest socio-economic group.

- However, only 7% of entrants to new medical schools were from the lowest socio-economic group, with two thirds (66%) being from the highest socio-economic group. At established (pre-2018) medical schools, 4% of entrants were from the lowest socio-economic group and 76% were from the highest socio-economic group.

- Among applicants from the most deprived backgrounds, those who applied to new medical schools tended to have lower grades compared to those who applied only to established medical schools; however, despite this, they had similar odds of becoming a medical student.

- Moreover, after taking into account their grades, applicants from the most deprived backgrounds actually had *higher* odds of success if they applied to one or more new medical schools, compared to if they only applied to established medical schools. This could indicate that new medical schools helped more applicants from the most deprived backgrounds become medical students, although more research is needed to confirm this.

- The introduction of new medical schools in 2018 does not appear to have reduced the distance that applicants were generally willing to travel to study medicine. Applicants lived on average 320km (199 miles) from the furthest medical school they had applied to, and this distance actually increased slightly from 2012 to 2022. The average distance between an applicant's home and the medical schools they had applied to was 194km (121 miles), and this also changed relatively little over the period.

- New medical schools admitted students who lived 54km (34 miles) closer on average compared to established medical schools. However, the average entrant to a new medical school still lived at a considerable commuting distance at 120km (75 miles) away.

- There were regional differences in the average distance travelled from home to medical school. In 2022, 41% of medical applicants domiciled in England lived in London or the South East. Within England therefore, London medical schools tended to have students who lived the closest on average, whereas medical schools in North East and South West had entrants from the furthest away.

- Most new medical schools tended to admit more local students compared to established medical schools in the same region. However, on average the majority of entrants to new medical schools (with the exception of Aston University) lived further than 30km away and (with the exception of Edge Hill University and Aston University) the majority lived over 100km away.

Background on medical school admissions

Medical school admissions processes are a key determinant of the shape of the medical workforce. The 2023 National Health Service (NHS) Long Term Workforce Plan put the expansion of medical school recruitment and reforms to medical education and training at the heart of efforts to ensure the sustainability of the medical workforce over the next 10-15 years.[1]

Medical school education and training in the UK

In the UK, universities provide undergraduate medical education and training. Standard entry medical degree programmes[2] are five years long (or six for courses that include an additional year of a bachelor's degree in a relevant subject), after which graduates are eligible to enter two years of Foundation Training and become registered as doctors with the General Medical Council. Dropout from medical training is still relatively rare, so nearly all entrants to medical school become doctors working in the NHS, who can then go on to undertake several years of further specialist postgraduate training before qualifying as a consultant or general practitioner (GP).

Applying to medical school in the UK

Medicine is among the most competitive university courses to apply to. In 2023, only 21.5% of applications to UK universities to study medicine resulted in an offer, compared to an offer rate of 77% for all courses.[3] Applying to study medicine is also more complex than applying to many other subjects.[4] The UCAS deadline for applications is three months earlier

[1] NHS England. (2023). *NHS Long Term Workforce Plan*. NHS England. https://www.england.nhs.uk/publication/nhs-long-term-workforce-plan/

[2] Standard Entry medical degree programmes do not require applicants to have any specific demographic or social eligibility criteria.

[3] Universities and Colleges Admissions Service (UCAS). (2023). *UCAS Undergraduate end of cycle data resources 2023* [Dataset]. https://www.ucas.com/data-and-analysis/undergraduate-statistics-and-reports/ucas-undergraduate-end-cycle-data-resources-2023. Comparison of applications to subject group (CAH01-01-02) medicine (non-specific) with applications to subject group "All". Data restricted to English-domiciled applicants aged 18 years old in 2023.

[4] For information about the medical application process in the UK, and the entry requirements and selection processes of different UK medical schools, see the Studying Healthcare website managed by Medical Schools Council. *Studying Healthcare*. (n.d.). Retrieved 17 February 2025, from https://studyinghealthcare.ac.uk/

than for most other courses, and applicants can only use four of their five UCAS choices for medicine. Most medical degree courses require applicants to sit an admissions test, usually the University Clinical Aptitude Test (UCAT[5]) as well as gaining relevant work experience. Before making offers, most medical schools assess applicants in an interview process, which increasingly takes the form of a multiple mini-interview.[6]

The under-representation of medical students from disadvantaged backgrounds

Historically, UK medical schools have had an under-representation of applicants from disadvantaged backgrounds. For example, an analysis of data on UK-domiciled applicants to medicine from 2009-2011 by Steven et al[7] found:

- Only 3% of applicants had parents in the lowest socio-economic group (semi-routine and routine occupations), compared to three quarters (74%) who had parents in the highest socio-economic group (higher managerial/admin and professional occupations);[8]

- 13% of applicants who were domiciled in England lived in the most deprived 20% of neighbourhoods, whereas 33.5% lived in the least deprived (wealthiest) 20% of neighbourhoods;

- Over a quarter (26%) of applicants came from independent schools, 20% came from grammars, and 52% came from state comprehensive schools.

A 2014 report[9] by the University of Nottingham commissioned by Medical Schools Council (MSC, the representative body for UK medical schools)

[5] UCAT Consortium. (n.d.). *About the University Clinical Aptitude Test (UCAT).* Retrieved 15 November 2024, from https://www.ucat.ac.uk/

[6] Eva, K. W., Rosenfeld, J., Reiter, H. I., & Norman, G. R. (2004). An admissions OSCE: The multiple mini-interview. *Medical Education*, *38*(3), 314–326. https://doi.org/10.1046/j.1365-2923.2004.01776.x

[7] Steven, K., Dowell, J., Jackson, C., & Guthrie, B. (2016). Fair access to medicine? Retrospective analysis of UK medical schools application data 2009-2012 using three measures of socioeconomic status. *BMC Medical Education*, *16*(1), 11. https://doi.org/10.1186/s12909-016-0536-1

[8] This analysis used the 3 category version of the National Statistics Socio-economic Classification (NS-SEC).

[9] Garrud, P. (2014). *Help and hindrance in widening participation: Commissioned research report* (Selecting for Excellence). Medical Schools Council. https://www.medschools.ac.uk/media/2446/selecting-for-excellence-research-dr-paul-garrud.pdf

also using data from 2009-2011, found that 80% of UK applications to medical school were from 20% of UK secondary schools, and half of schools had not sent any applicants to medical school.

When students from disadvantaged backgrounds have applied to medical school, they have historically been less likely to receive an offer. Steven et al's[10] analysis of 2009-2011 UCAS data found that applicants from independent schools, those from less deprived (wealthier) neighbourhoods, and those with a parent in the highest socio-economic group were more likely to get an offer that they accepted. Similarly, Kumwenda et al[11] analysed data from 2006-2014 on applicants to those medical schools that used the UK Clinical Aptitude Test (UKCAT, now UCAT) in admissions. They found that, among non-graduate applicants to medical school (i.e. who didn't already have a university degree), more medical school entrants were from fee-paying schools, from the least deprived (wealthiest) neighbourhoods, and from the highest socio-economic groups.

Changes to medical schools to widen access

Contextual admissions

It is well recognised that high grade requirements represent a significant barrier to applicants from under-represented groups being admitted to university.[12] In efforts to tackle these inequalities, the majority of medical schools now implement contextual admissions, by which they take into account the educational and socio-economic background of applicants in the admissions process. Contextual admissions have been recommended in the UK since at least 2009 to increase access to professional careers, including medicine.[13]

[10] Steven, K., Dowell, J., Jackson, C., Guthrie, B. (2016) Fair access to medicine? Retrospective analysis of UK medical schools application data 2009-2012 using three measures of socio-economic status. *BMC Medical Education* 13;16:11. doi: 10.1186/s12909-016-0536-1

[11] Kumwenda, B., Cleland, J., Greatrix, R., MacKenzie, R. K., & Prescott, G. (2018). Are efforts to attract graduate applicants to UK medical schools effective in increasing the participation of under-represented socioeconomic groups? A national cohort study. *BMJ Open*, *8*(2), e018946. https://doi.org/10.1136/bmjopen-2017-018946

[12] Chowdry, H., Crawford, C., Dearden, L., Goodman, A., & Vignoles, A. (2013). Widening Participation in Higher Education: Analysis Using Linked Administrative Data. *Journal of the Royal Statistical Society Series A: Statistics in Society*, *176*(2), 431–457. https://doi.org/10.1111/j.1467-985X.2012.01043.x

[13] Cabinet Office. (2011). *Unleashing Aspiration: The Final Report on the Panel of Fair Access to the Professions*. Cabinet Office. https://webarchive.nationalarchives.gov.uk/ukgwa/+/http:/www.cabinetoffice.gov.uk/media/227102/fair-access.pdf

Each medical school sets its own admissions process, and medical schools vary in how they implement contextual admissions. In 2012 a review of best practice in medical school admissions conducted for the General Medical Council[14] reported that "*the use of contextual data in the admissions process is variable and medical schools wish for guidance on this matter*". This variability remains in the types of contextual data used and the ways in which that data is used. MSC information for applicants to medicine in 2025 states that:

"Medical schools often use different contextual factors together. The contextual information is then used in different ways, it can be used to:

- Consider if an applicant should be invited to interview
- Consider the test or interview scores within the applicant's educational or social context
- Provide an offer for an access route or alternative pathway to medicine
- Give further consideration to the application if the student just misses the grades they were predicted." [15]

Gateway courses

An increasing number of medical schools have introduced alternative entry routes into medicine for applicants with contextual factors. Seventeen medical schools[16] now have gateway courses. These courses have lower grade requirements for eligible applicants and an additional Foundation year[17] after which students join Year 1 of the standard entry medical degree course. We are unaware of any national studies that have examined the impact of gateway courses by comparing entry rates for applicants

[14] Cleland, J., Dowell, J., McLachlan, J., Nicholson, S., & Patterson, F. (2012). *Identifying best practice in the selection of medical students (literature review and interview survey)*. General Medical Council. https://www.gmc-uk.org/-/media/gmc-site/about/identifyingbestpracticeintheselectionofmedicalstudentspdf51119804.pdf

[15] Studying Healthcare. (n.d.). *Entry Requirements*. Retrieved 15 November 2024, from https://studyinghealthcare.ac.uk/why-medicine/entry-requirements-medicine/

[16] Medical Schools Council. (2024). *Entry requirements | Medical Schools Council*. https://www.medschools.ac.uk/studying-medicine/how-to-apply-to-medical-school-in-the-uk/entry-requirements

[17] Medical Schools Council. (n.d.). *Course types | Medical Schools Council*. Retrieved 13 November 2024, from https://www.medschools.ac.uk/studying-medicine/how-to-apply-to-medical-school-in-the-uk/course-types

from under-represented groups who apply to at least one gateway course rather than to standard entry courses only.

In one of the largest studies of gateway courses to date, Curtis and Smith[18] analysed outcomes for students admitted between 2007 and 2021 to the University of Southampton, King's College London and the University of East Anglia (Norwich Medical School), which have the UK's three longest-running gateway courses. They compared students on the gateway course with students on the standard entry course, finding that gateway students were more likely to be from a state school, from a deprived neighbourhood, and from the lowest socio-economic group. They also had considerably lower UCAT scores and A-level points compared to those on standard entry courses.

Curtis and Smith[19] then followed up the gateway and standard entry students throughout their time at medical school, finding that gateway students had significantly lower performance than those on the standard entry course. Only 83% of gateway students had progressed to graduation without delay or dropout, compared to 96% of standard entry students. A National Audit Office evaluation of NHS England (NHSE) modelling for its Long Term Workforce Plan[20] noted that the modelling for the expansion of medical school training did not consider differential attrition for medical students admitted with lower grades.

A further follow-up study by Elmansouri et al[21] looked at the postgraduate performance of the same gateway and standard entry students. They found that only 39% of gateway graduates passed a postgraduate examination at their first attempt, compared to 63% of standard entry graduates who passed first time. Over half of gateway graduates (56%) applied to be a general practitioner (GP) compared to 39% of standard entry graduates.

[18] Curtis, S., Smith, D. (2020) A comparison of undergraduate outcomes for students from gateway courses and standard entry medicine courses. *BMC Medical Education*, 20(4) https://doi.org/10.1186/s12909-019-1918-y

[19] Curtis, S., Smith, D. (2020) A comparison of undergraduate outcomes for students from gateway courses and standard entry medicine courses. *BMC Medical Education* 20(4). https://doi.org/10.1186/s12909-019-1918-y

[20] National Audit Office. (2024). *NHS England's modelling for the Long Term Workforce Plan*. National Audit Office. https://www.nao.org.uk/wp-content/uploads/2024/03/NHS-Englands-modelling-for-the-Long-Term-Workforce-Plan.pdf

[21] Elmansouri, A., Curtis, S., Nursaw, C., & Smith, D. (2023). How do the post-graduation outcomes of students from gateway courses compare to those from standard entry medicine courses at the same medical schools? *BMC Medical Education*, *23*(1), 298. https://doi.org/10.1186/s12909-023-04179-3

New medical schools

Another aspect of inequity in access to medicine is the relative lack of medical schools in parts of the country with fewer doctors. There is evidence[22] that doctors often return to practice medicine in areas reasonably close to where they lived at application to medical school, and this is more common among doctors who attended state schools, from lower socio-economic groups, and with other measures of disadvantage.

To increase the number of UK-trained doctors, in 2016 the Government agreed to increase the number of medical school places by 25%, focusing on shortage areas and increasing access to under-represented groups. As part of this increase in places, new medical schools were announced in areas with relatively few doctors (either in general, or in particular shortage specialities) at universities with a track record in widening participation.[23] These new medical schools were at Anglia Ruskin University, Edge Hill University, Kent and Medway Medical School, University of Lincoln and the University of Sunderland. In addition Aston University started training its first medical students in 2018.[24]

In 2023 the NHS Long Term Workforce Plan[25] pledged to increase the number of medical school places further, to up to 15,000 per year by 2031/32. In 2024 the Government[26] reported that it was providing another 205 medical school places that year, with 350 more places due to be delivered in 2025. These places were allocated to existing medical schools, (including those in 2018) as well as to additional new medical schools around the country.[27]

[22] Kumwenda, B., Cleland, J. A., Prescott, G. J., Walker, K. A., & Johnston, P. W. (2018). Geographical mobility of UK trainee doctors, from family home to first job: A national cohort study. *BMC Medical Education*, *18*(1), 314. https://doi.org/10.1186/s12909-018-1414-9

[23] Rimmer, A. (2018). Five medical schools are created in England in bid to increase home grown doctors. *BMJ*, k1328. https://doi.org/10.1136/bmj.k1328

[24] General Medical Council. (2018). *Visit Report on Aston Medical School*. https://www.gmc-uk.org/-/media/documents/gmc-visit-report-aston-medical-school-may-2018_pdf-76227254.pdf

[25] NHS England. (2023). *NHS Long Term Workforce Plan*. NHS England. https://www.england.nhs.uk/publication/nhs-long-term-workforce-plan/

[26] Department of Health and Social Care. (2024, May 13). *350 extra medical school places allocated in NHS training boost*. https://www.gov.uk/government/news/350-extra-medical-school-places-allocated-in-nhs-training-boost

[27] Department of Health and Social Care. (2024, May 13). *350 extra medical school places allocated in NHS training boost*. https://www.gov.uk/government/news/350-extra-medical-school-places-allocated-in-nhs-training-boost

Although new medical schools have been established with a widening participation remit, a recent qualitative study[28] conducted with leaders of new medical schools found that the enactment of widening participation practices at those medical schools was highly context-specific, posed practical challenges (such as those relating to the different regulatory and funding frameworks surrounding medical degree courses compared to other university courses), and also presented difficulties due to competing incentives around meeting widening participation targets while maintaining student retention and performance levels. The authors suggested that a potential unintended consequence of establishing new medical schools in England could be "*a differentiated medical education system where degrees from the new medical schools are seen as less prestigious than those from traditional, well-established medical schools*", and this could lead to new medical schools reducing their widening participation activities to try to increase prestige.[29] To date we are unaware of any large-scale quantitative research analysing the educational and social backgrounds of applicants to new medical schools compared to established medical schools.

Aim and research questions

Our overall aim was to investigate access to medical schools from 2012 to 2022 for applicants from disadvantaged backgrounds.

To do this, we explored the socio-economic, demographic, and educational characteristics of applicants, offer-holders, and entrants to medicine nationally, as well as to different medical schools and course types.

We also examined how applicants' likelihood of gaining an offer and entering different types of medical schools and courses varied by applicant characteristics.

[28] Cleland, J., Buxton, J., Hughes, E., & Patterson, F. (2024). Translating government policy into practice: How new UK medical schools enact widening participation. *Medical Education*, *58*(10), 1247–1256. https://doi.org/10.1111/medu.15403

[29] Cleland, J., Buxton, J., Hughes, E., & Patterson, F. (2024). Translating government policy into practice: How new UK medical schools enact widening participation. *Medical Education*, *58*(10), 1247–1256. https://doi.org/10.1111/medu.15403

We present findings in the following five sections:

- Section 1: Characteristics of applicants, offer-holders and entrants from 2012 to 2022;
- Section 2: The predictors of achieving an offer and entering medical school;
- Section 3: Success rates among deprived applicants to new medical schools and gateway courses;
- Section 4: UCAT and A-level performance among those from lower socio-economic groups;
- Section 5: The number and characteristics of schools and colleges producing medical school applicants and entrants.

Further information regarding the aims and research questions is provided in the Supplementary aims and research questions in the Appendix.

Methods

Data source: the UK Medical Education Database (UKMED)

The UK Medical Education Database (UKMED) is a research database administered by the UK medical regulator, the General Medical Council (GMC). UKMED is a collaboration between the GMC, MSC and several other medical education and training administrative bodies. It collects and links administrative data relating to the medical education, training and career progression of all applicants to UK medical schools. UKMED prepares data extracts and makes them available via a secure Trusted Research Environment, to approved researchers for approved research

projects, in accordance with strict data access rules. The current report was approved by UKMED as project UKMED P197.[30]

For more information about UKMED and its creation, see Dowell et al.[31] For more information about UKMED, including the data dictionary and the application and approvals process, see the UKMED website.[32]

Acknowledgement

Source - UK Medical Education Database ("UKMED") P197 extract generated on 14/08/2024. Approved for publication on 18/12/2024. We are grateful to UKMED for the use of these data. However, UKMED bears no responsibility for their analysis or interpretation. The data includes information derived from that collected by the Higher Education Statistics Agency Limited ("HESA") and provided to the GMC ("HESA Data"). Source: HESA Student Record 2012/2013 and 2021/2022 Copyright Higher Education Statistics Agency Limited. The Higher Education Statistics Agency Limited makes no warranty as to the accuracy of the HESA Data, cannot accept responsibility for any inferences or conclusions derived by third parties from data or other information supplied by it.

Sample

We analysed data from a sample comprising individuals within the UKMED database who applied to study medicine in the UK via UCAS from 2012 to 2022. The sample we received from UKMED was restricted to medical applicants who met all of the following inclusion criteria:

- Domiciled in England;
- Applied to medical school for the first time (only one application year recorded in the data);

[30] Details of the approved project (UKMED P197) and all other research applications approved by UKMED can be found on the UKMED website UKMED. (n.d.). *Applications*. Retrieved 13 November 2024, from https://www.ukmed.ac.uk/accepted_applications/

[31] Dowell, J., Cleland, J., Fitzpatrick, S., McManus, C., Nicholson, S., Oppé, T., Petty-Saphon, K., King, O. S., Smith, D., Thornton, S., & White, K. (2018). The UK medical education database (UKMED) what is it? Why and how might you use it? *BMC Medical Education*, *18*(1), 6. https://doi.org/10.1186/s12909-017-1115-9

[32] *UK Medical Education Database (UKMED)*. (n.d.). [Dataset]. Retrieved 13 November 2024, from http://www.ukmed.ac.uk/

- Aged 19 or younger at the time of application.

We further restricted the sample to only those with evidence of having predicted A-level grades.[33]

The sample was restricted in this way to reduce confounding due to the different admissions criteria used for international students, postgraduate applicants, and reapplicants; and to allow for homogeneous measures of academic attainment (a key predictor of success) to be included. For example, Scotland has different school examinations from the rest of the UK and also has a different student funding scheme that strongly incentivises students resident in Scotland to apply only to Scottish medical schools.[34]

Further information about the sample can be found in the Supplementary Methods in the Appendix.

Variables

Information about each variable used in the analysis can be found within the Supplementary Methods in the Appendix.

Statistical analyses

Information about the statistical analyses we conducted can be found in the Supplementary Methods in the Appendix.

We report all findings according to HESA disclosure controls, which are in place to protect the anonymity of participants within the data. This includes rounding counts of people to the nearest 5, and suppressing averages calculated from group numbers of 7 or fewer, and percentages calculated from groups of 22.5 people or fewer.[35]

[33] See Supplementary Methods for further information about how the sample was created.

[34] Student Information Scotland. (n.d.). *Funding Your Studies*. Retrieved 15 November 2024, from https://www.studentinformation.gov.scot/students/higher-education/funding-your-studies

[35] Higher Education Statistics Agency (HESA). (n.d.). *Rounding and suppression to anonymise statistics*. Retrieved 13 November 2024, from https://www.hesa.ac.uk/about/regulation/data-protection/rounding-and-suppression-anonymise-statistics

Results

Section 1: Characteristics of applicants, offer-holders and entrants from 2012 to 2022

This section explores the national landscape of medical school applications, offering insights into the characteristics of applicants, offer-holders, and entrants. It provides an overview of the most significant trends and patterns observed over the decade from 2012 to 2022.

64%

The growth in medical applicants from 2012 to 2022.

Growth in numbers of medical applicants, offer-holders and entrants

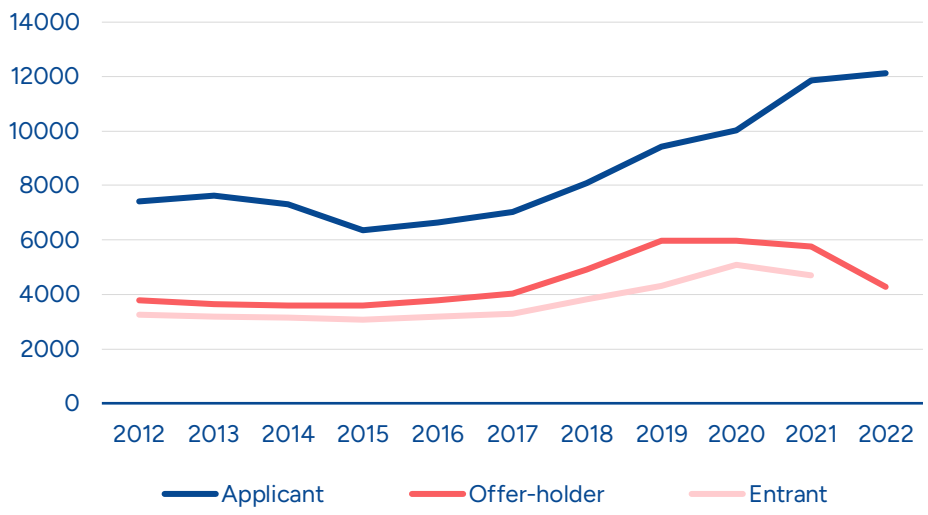
The number of medical applicants in our sample grew by 64%, from 7,400 in 2012 to 12,125 in 2022.[36] From 2019 to 2021, the demand for medical school places grew faster than the number of places at medical school (Figure 1). Up to the pandemic the number of offer-holders grew by 58% (3,770 in 2012 to 5,970 in 2020), which was similar to the growth in applicants; however, in 2021 and 2022 the number of offer holders dropped to the lowest since 2017.[37] The number of medical school entrants therefore grew only by 44%, from 3,260 in 2012 to 4,690 in 2021.[38]

[36] Numbers rounded to the nearest five.

[37] This was largely due to the cancellation of A-level examinations in 2020, which resulted in more applicants than expected meeting their offers and therefore being encouraged to defer entry until subsequent years. See Reed, M., Atherton, J., & Petty-Saphon, K. (2020, August 28). Additional funds for medical school places must continue beyond 2020. *The BMJ*. https://blogs.bmj.com/bmj/2020/08/28/additional-funds-for-medical-school-places-must-continue-beyond-2020/. For further information about medical school numbers and the impact of the pandemic on medical school applications, please see Kaminskaite, V., and Harvey, A. (2022) Impact of the covid-19 pandemic on medical school applicants,: BMJ;378:o1398 and Lewis, J. (2023) The cap on medical and dental student numbers in the UK, House of Commons Library Briefing number CBP-9735, UK Parliament, London.

[38] The latest data available from UKMED on applicants and offer-holders was from 2022. However, the latest data on entrants was from 2021. This is also reflected in graphs and tables below.

Figure 1 : Total number of applicants, offer-holders and entrants to medical school from 2012 to 2022



The sample comprises applicants domiciled in England, aged 19 or younger, applying to medical school for the first time via UCAS, who had predicted A-level grades.

Source: UKMED P197

44%

The growth in medical school entrants from 2012 to 2021.

Because of this growth in medical school applicants and entrants over time, the relative proportions of different groups over time did not necessarily reflect absolute differences in the numbers within those groups. For example, in Figure 6 it is clear that, while the absolute number of applicants from independent schools remained broadly stable over the period, the *proportion* dropped as more applicants came from other school/college types.

Applications and entry to gateway courses and new medical schools

Approximately 1 in 7 (15%) of all medical school applicants between 2012 and 2022 had applied to at least one gateway course; the remaining 86% had applied only to standard entry courses.[39] Of all those who entered medical school from 2012 to 2021, 4% entered a gateway course.

18%

of all medical applicants applied to at least one new medical school.

[39] The odds of applicants from the most deprived backgrounds (NS-SEC 4 or 5 and IMD 1 or 2) receiving an offer from a Gateway course compared to a Standard Entry course, and of receiving an offer from a new medical school compared to an established medical school are shown in Section 3 below.

Approximately 1 in 6 (18%) of all applicants between 2018 and 2022 had applied to at least one new medical school. Of all those entering medical school during that period 4% entered a new medical school.[40]

Socio-economic background

Changes over time

From 2012 to 2021[41] the proportion of applicants, offer-holders and entrants from the highest socio-economic group dropped while the proportion from the medium and lowest groups increased (see Table 1).

Table 1: Number and percentage of applicants by socio-economic group in 2012 and 2021

Year	Socio-economic group	Count	Total	Percentage (95% CI)
2012	High	5480	7400	74 (73-75)
	Medium	900	7400	12 (911-13)
	Low	240	7400	3 (3-4)
	Unknown	780	7400	11 (10-11)
2021	High	8120	11850	69 (68-69)
	Medium	1345	11850	11 (11-12)
	Low	680	11850	6 (5-6)
	Unknown	1700	11850	14 (14-15)

Counts are rounded to the nearest 5.

6%

of medical applicants, 5% of medical offer-holders and 5% of entrants in 2021 were from the lowest socio-economic group.

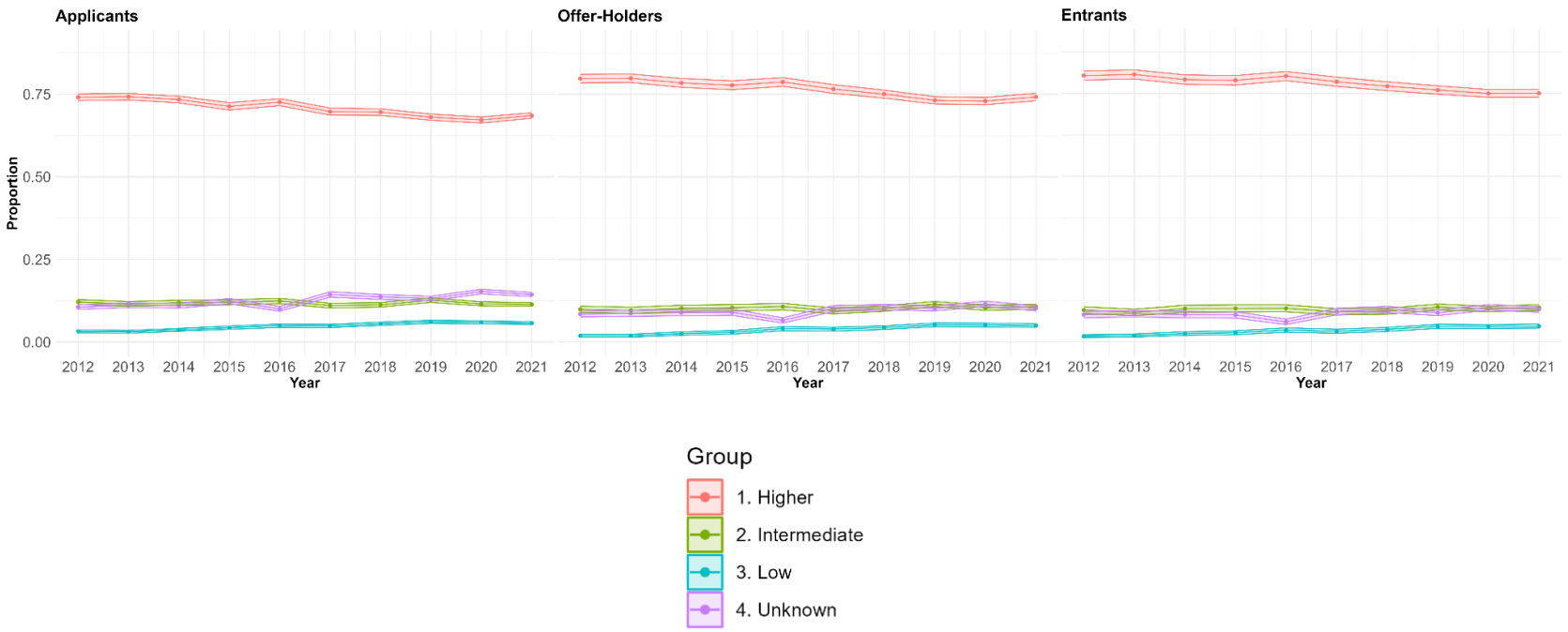
In 2021 individuals from the highest socio-economic group made up 69% of applicants, 74% of offer-holders and 75% entrants, while those from the lowest socio-economic group made up 6% of all applicants, 5% of offer-holders and 5% of entrants.

[40] The proportions applying to and entering Gateway courses and new medical schools are not mutually exclusive because it is possible to enter a Gateway course at a new medical school, for example at the University of Lincoln.

[41] In 2022 the proportion of applicants whose NS-SEC category was "unknown" grew to 36%, making it difficult to interpret trends in this year.

Figure 2 shows this relative stability over time in the proportion of applicants, offer-holders and entrants from different socio-economic groups.

Figure 2: The proportions of applicants, offer-holders and entrants from the highest, medium and lowest socio-economic groups from 2012-2021



Source: UKMED P197

Differences by medical school and course type

The heatmaps in Figure 3 show the proportion of applicants and entrants to each medical school[42] from the lowest socio-economic group over time. It can be seen from these heatmaps that there were more applicants than entrants from the lowest socio-economic group across the sector. It is also clear that some medical schools attracted and/or admitted more applicants from the lowest socio-economic group than others. New medical schools had relatively more applicants and entrants from the lowest socio-economic group compared to established medical schools:

- Nearly a quarter (23%) of all applicants (2018-2022) from the lowest socio-economic group had applied to at least one new medical school, compared to 16% of those in the highest socio-economic group.

- Only 7% of entrants to new medical schools were from the lowest socio-economic group, with 13% from the medium group and two thirds (66%) from the highest socio-economic group.[43] By contrast, 76% of those in established medical schools were from the highest socio-economic group, with 10% from the medium group and 4% from the lowest socio-economic group.[44]

The social differences between gateway courses and standard entry courses were even more pronounced than between new and established medical schools:

- A third (33%) of all applicants from the lowest socio-economic group had applied to at least one gateway course, compared to 23% of those in the medium group and 8% of those in the highest socio-economic group.

- Despite this, only 11% of all entrants to gateway courses were from the lowest socio-economic group, with 46% from the highest socio-economic group. Among entrants to standard entry courses however, 4% were from the lowest socio-economic group and

33%

of all medical applicants from the lowest socio-economic group applied to at least one Gateway course.

[42] Non-English medical schools were excluded from heatmaps because relatively few English domiciled applicants apply to Scottish universities. Entrants to the University of Buckingham were excluded because they did not necessarily come through the central clearing house UCAS.

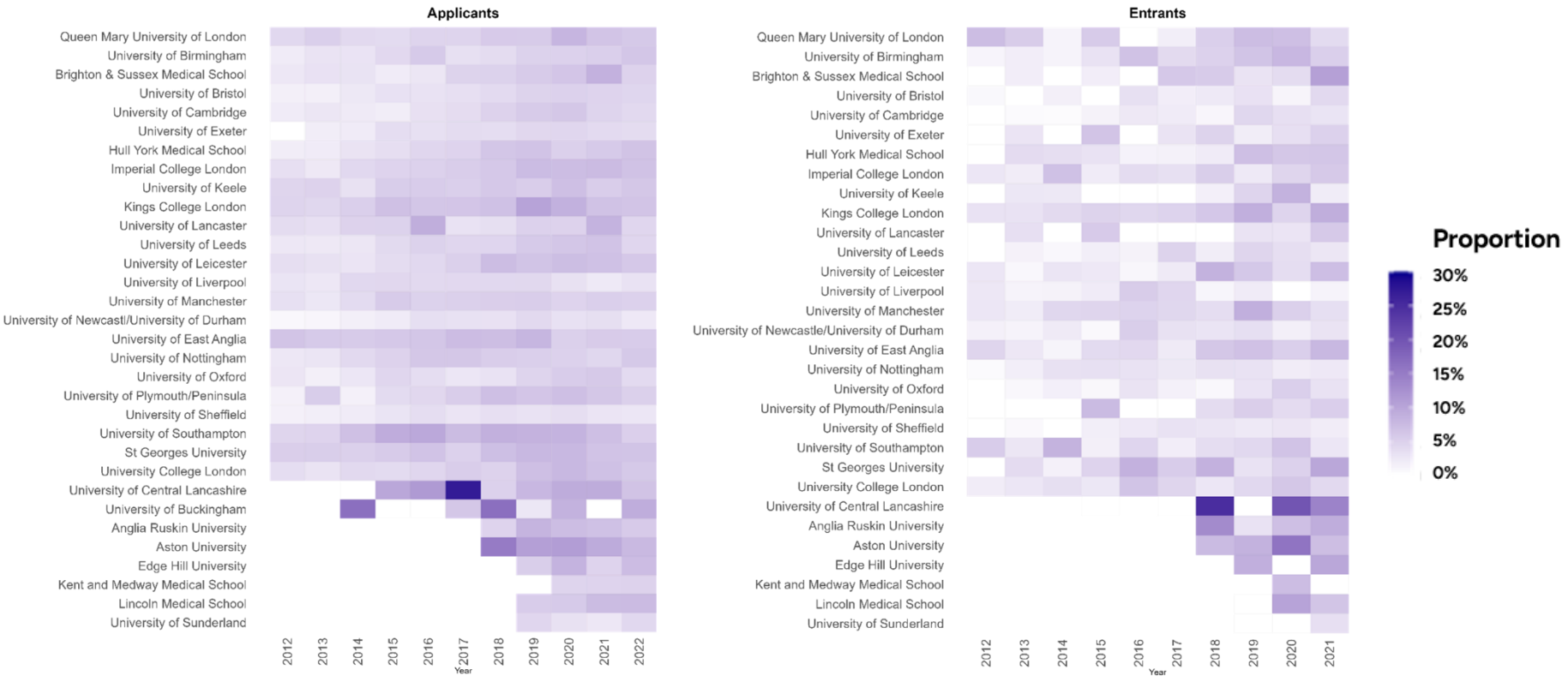
[43] 14% of entrants to new medical schools were missing socioeconomic data, however even if all were from the lowest socio-economic group, the total from that group would still be less than half that from the highest socio-economic group.

[44] 10% of entrants to established medical schools were missing socio-economic data.

nearly three quarters (73%) were from the highest socio-economic group.[45]

[45] 19% of entrants were missing data on their socio-economic group, however even if all of those missing data were from the lowest socio-economic group, the proportion would still be smaller than that from the highest socio-economic group.

Figure 3: Heatmap showing the proportions of applicants and entrants from the lowest socio-economic group by medical school annually



English medical schools only. Darker purple represents higher proportions and lighter mauve represents lower proportions. Different colours do not represent statistically significant differences and some cells may have small numbers. White indicates missing data.

Source: UKMED P197

Neighbourhood-level deprivation

Changes over time

While changes over time by socio-economic group were relatively small, the proportion of applicants, offer-holders and entrants living in the most deprived neighbourhood quintile (IMD1) grew significantly during the period and the proportion living in the least deprived neighbourhood quintile (IMD5) dropped (see Figure 4). For example:

- In 2012, 11% of applicants lived in the most deprived neighbourhood quintile compared to 35% who lived in the least deprived quintile.
- By 2022, 20% of applicants lived in the most deprived neighbourhood quintile and 25% lived in the least deprived quintile.

Among entrants, changes over time were also marked. For example:

- In 2012, 7% of all entrants lived in the most deprived neighbourhood quintile compared to 39% in the least deprived quintile.
- By 2021, 16% of entrants lived in the most deprived neighbourhood quintile compared to 31% who lived in the least deprived quintile.

20%

of medical applicants in 2022 lived in the most deprived neighbourhood quintile in England.

Figure 4: The proportions of applicants, offer-holders and entrants from the five neighbourhood deprivation quintiles annually from 2012-2021

Source: UKMED P197

Differences by medical school and course type

The variability between medical schools in the proportion of applicants they admitted from the most deprived neighbourhood quintile (IMD1) from 2012 to 2021 is shown in the heatmap in Figure 5.

New medical schools attracted relatively more applicants from the most deprived neighbourhoods:

- Between 2018 and 2022, a quarter (25%) of all applicants from the most deprived neighbourhood quintile (IMD1) had applied to at least one new medical school.

- 13% of applicants from the least deprived neighbourhood quintile (IMD5) had applied to at least one new medical school.

Entrants to new medical schools were fairly evenly distributed across the IMD quintiles, albeit with a slight over-representation (26%) in IMD1 (most deprived), and slight under-representation (16%) in IMD3 and IMD4. Entrants to established medical schools, however, were skewed towards the wealthiest neighbourhoods, with a third (33%) in IMD5 (wealthiest) and 13% in IMD 1 (most deprived).

Gateway courses tended to attract more applicants from the most deprived neighbourhoods. For example, between 2012 and 2022:

- Nearly a third (31%) of all applicants from the 20% most deprived neighbourhoods in England applied to at least one gateway course, whereas only 3% of all applicants from the least deprived (wealthiest) neighbourhood quintiles had applied to at least one gateway course.

As a result, gateway courses had markedly higher proportions of students from the most deprived neighbourhoods than did standard entry courses:

- 60% of entrants to gateway courses were from the 40% most deprived neighbourhoods in England.

- Only 20% of entrants to standard entry courses were from the 40% most deprived neighbourhoods.

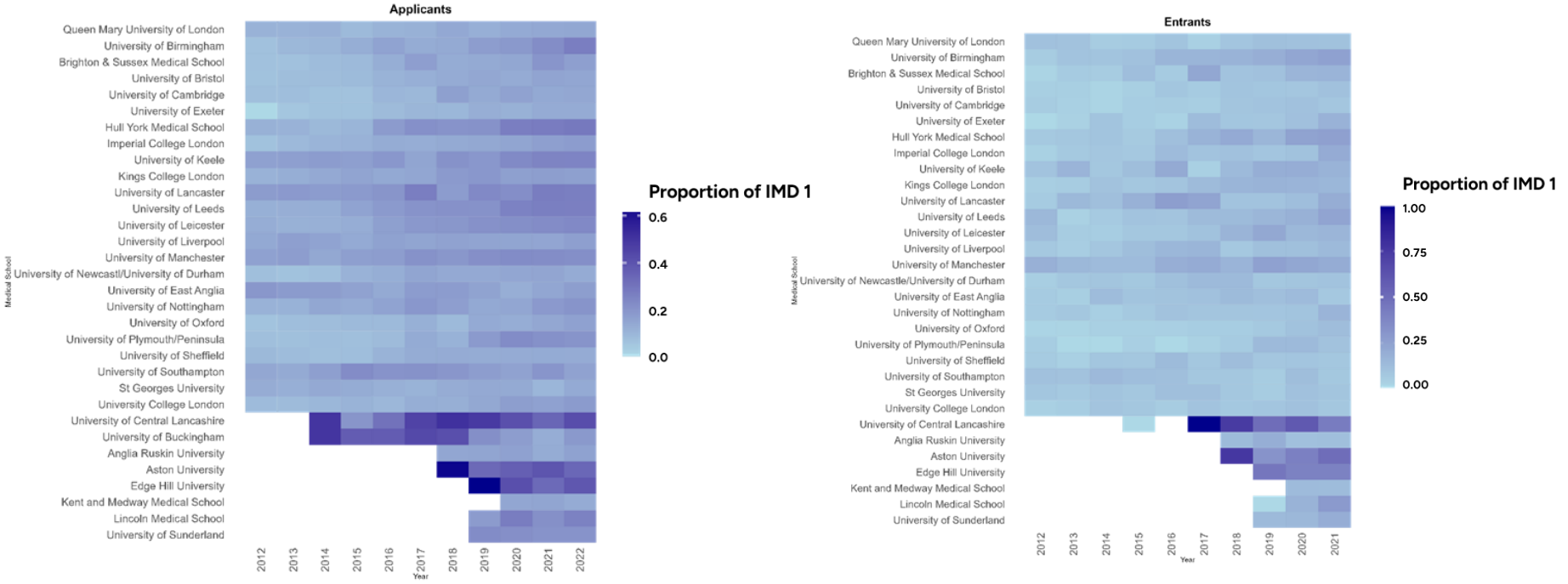
60%

of those entering Gateway medical degree courses were from the two most deprived neighbourhood quintiles in England.

20%

of those entering Standard Entry medical degree courses were from the two most deprived neighbourhood quintiles in England.

Figure 5: Heat map showing the proportion of medical school applicants and entrants from the most deprived neighbourhood quintile 2012 to 2022



English medical schools only. Darker purple represents higher proportions and lighter blue represents lower proportions. Different colours do not represent statistically significant differences and some cells may have small numbers. White indicates missing data.

Source: UKMED P197.

School/college type

Changes over time

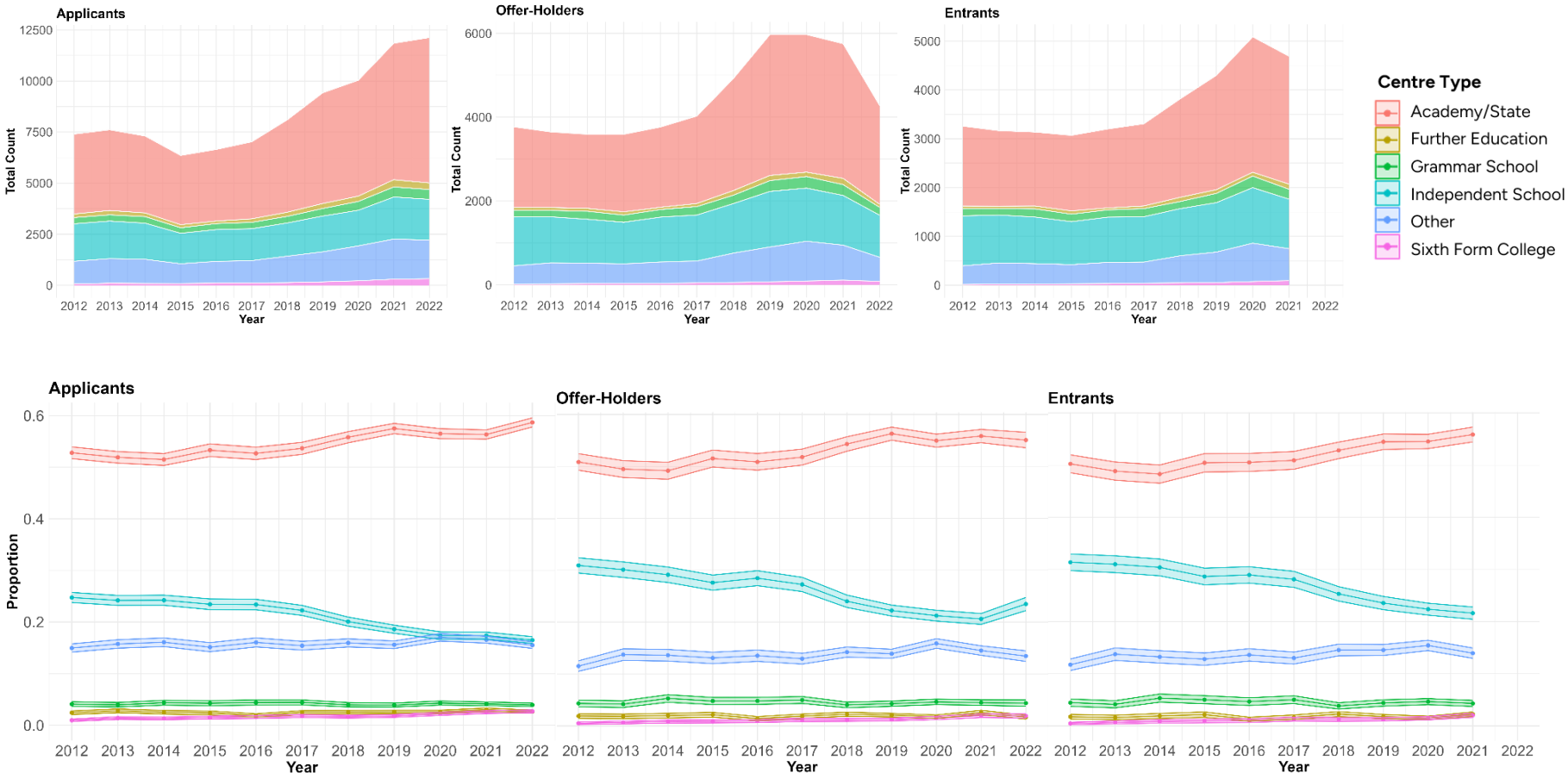
From 2012 to 2022, the proportion of applicants, offer-holders and entrants from academy/state schools (non-selective state schools)[46] grew, and the proportion from independent schools dropped. This is a result of the absolute number of applicants from independent schools staying relatively stable, while numbers grew from the rest of the sector, particularly academy/state schools, FE colleges and sixth form colleges:

- By 2022 independent school applicants made up fewer than one in six applicants (16%), down from one in four (25%) in 2012;
- By 2022 non-selective state school (academy/state) applicants made up 59% of applicants, up six percentage points from 53% in 2012;
- The proportion from grammar schools remained stable over the period, at around 4%.

Figure 6 shows the changes in proportions and numbers of applicants, offer-holders and entrants by school/college type over time.

[46] Grammar schools are counted separately in this analysis therefore the category academy/state schools refers to non-selective state schools that do not base admissions on an entrance exam like the 11+. It should be remembered that many sixth forms are selective in having minimum GCSE grade requirements in their admissions policies.

Figure 6: Top panel: numbers of applicants, offer-holders and entrants by school/college (centre) type over time. Bottom panel: proportions of applicants, offer-holders and entrants by school/college type over time



Source: UKMED P197

Differences by medical school and course type

Increases in the proportions of applicants from academy/state schools since 2012 were not always uniform across medical schools, as shown in the heatmap in Figure 7.

4%

of gateway course entrants were from independent schools.

New medical schools were less popular among applicants from independent and grammar schools compared to applicants from other school/college types:

- One in ten applicants from independent schools had applied to a new medical school, compared to around one in five (20%) of applicants from grammar schools (19%), non-selective state (academy/state) schools (19%) or sixth form colleges (19%), and one in six (17%) FE college applicants.

- Only around one in ten (11%) of all entrants to new medical schools were from independent schools, compared to around one in four (24%) of all entrants to established medical schools.

New medical schools had more entrants from sixth form colleges compared to established medical schools (21% vs 14%). New medical schools also had a slightly higher proportion of entrants from academy/state schools (59% vs 54%). Gateway courses were also less popular with applicants from independent and grammar schools, and relatively more popular with applicants from FE and sixth form colleges, which reflects the eligibility criteria for gateway courses.

28%

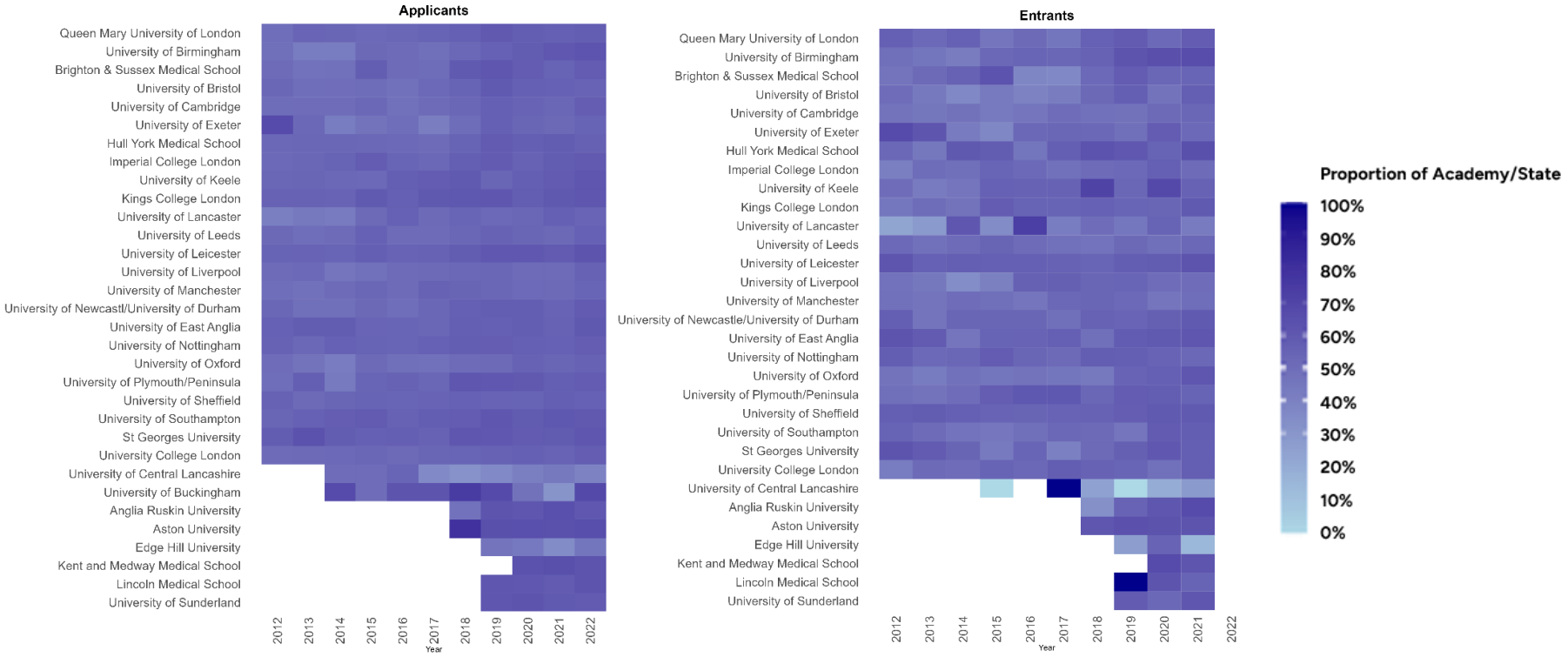
of standard entry course entrants were from independent schools.

- Only 2% (1 in 50) of applicants from independent schools and 6% of grammar school applicants had applied to at least one gateway course.

- By comparison, 16% of all applicants from academy/state schools, 20% (1 in 5) of all applicants from sixth form colleges and 20% of all applicants from FE colleges had applied to a gateway course.

- Only 4% of all those entering a gateway course were from independent schools, whereas over a quarter (28%) of those entering a standard entry course were from independent schools.

Figure 7: Heatmap showing the proportions of applicants and entrants from academy/state (non-selective state) schools by medical school over time



English medical schools only. Darker purple represents higher proportions and lighter purple or blue represents lower proportions. Different colours do not represent statistically significant differences and some cells may have small numbers. White indicates missing data.

Source: UKMED P197.

Gender and ethnic profile of applicants, offer-holders and entrants

Changes over time

The proportion of female applicants, offer-holders and entrants to medical school rose from over half to around two thirds over the period, which also saw large increases among the proportion of Asian and Black ethnic groups and a relative decrease among the White ethnic group.[47]

As shown in the mosaic plots in Figure 8, changes in the demographics of medical school entrants were not always consistent across socio-economic group or gender:

- Within the highest socio-economic group, the number of male entrants was fairly similar in 2012 and 2021, however the number of White men dropped and the number of Black and Asian men increased.

- The lowest socio-economic group saw a small increase in the proportion of male entrants, the majority of whom were of Asian ethnicity.

Combining data across all years from 2012 to 2021 showed stark differences by ethnicity and socio-economic group. Over half (52%) of entrants from the highest socio-economic group were White, 8% were Black and 31% were Asian; whereas among entrants from the lowest socio-economic group, 15% were White, 16% were Black and 61% were Asian.

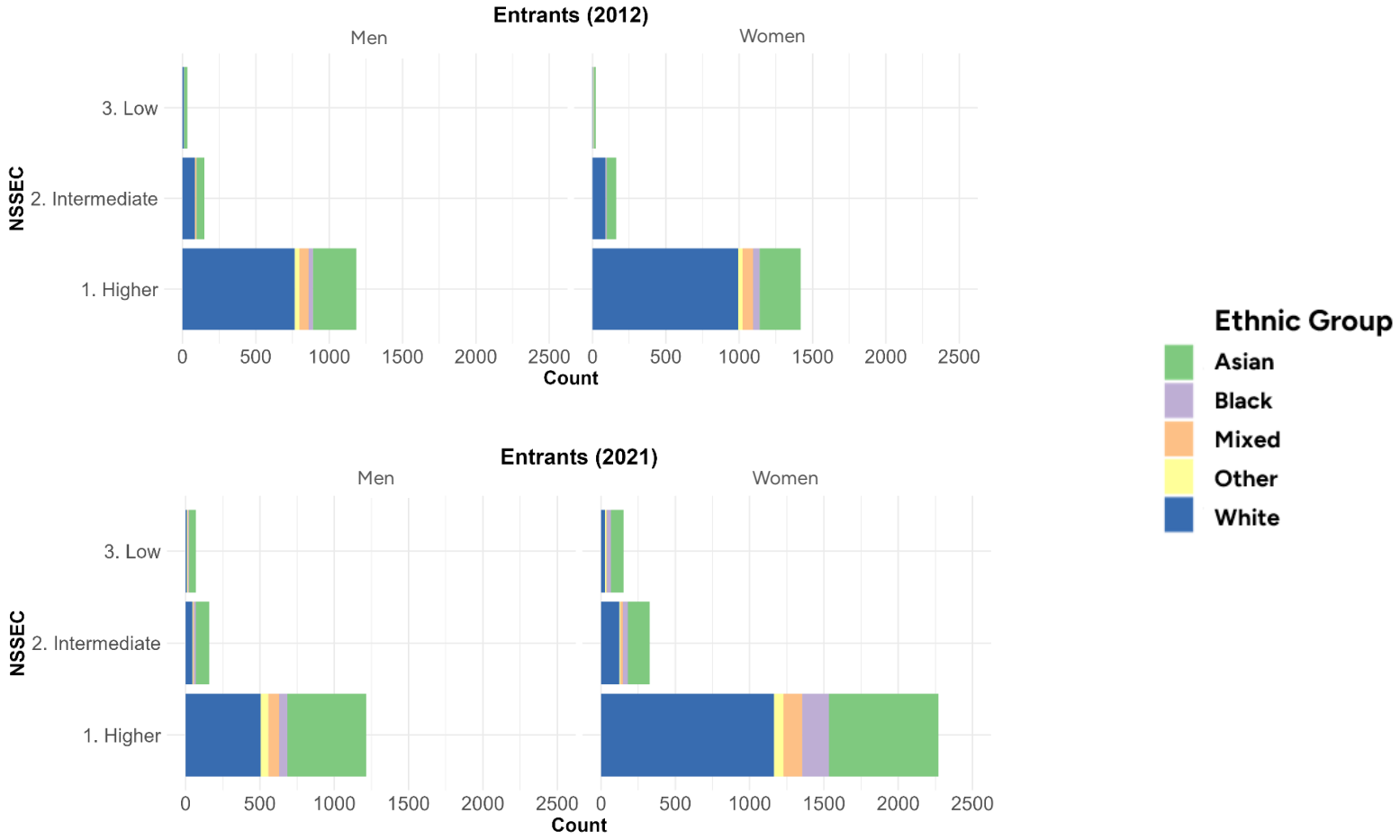
The differences were similar among male and female entrants to medical school:

- In the highest socio-economic group over a third (35%) of male and 29% of female entrants were Asian, 6% of male and 9% of female entrants were Black, and 50% of male and 53% of female entrants were White.

- In the lowest socio-economic group two thirds (66%) of male and 57% of female entrants were Asian, 13% of male and 18% of female entrants were Black, and 13% of male and 16% of female entrants were White.

[47] See Supplementary Section 1 in the Appendix for further details

Figure 8: Mosaic plot showing the number of medical entrants by gender, socio-economic group and ethnicity in 2012 and 2021



Source: UKMED P197

Parental education of entrants

Changes over time

The proportion of medical school entrants[48] with a degree-level educated parent showed fairly little change: in 2012, 77% of entrants had a degree-educated parent compared to 74% in 2021.[49]

Differences by medical schools and courses

There was considerable variability in entrants' parental education by course type:

- Around one in ten (11%) medical school entrants without a degree-educated parent entered a gateway course (2012-2021). Among all medical school entrants with a degree-educated parent, only one in 50 (2%) entered a gateway course.

- 59% of those entering a gateway course did not have a degree-educated parent compared to 21% of those entering a standard entry course.

New medical schools had more students without a degree-educated parent compared to established medical schools:

- A third (33%) of entrants to new medical schools did not have a degree-educated parent, compared to just under a quarter (24%) of those entering established medical schools.

Academic factors

Applicants tended to have very high predicted A-levels, averaging between 31 to 32 points for their 3 best predicted A-levels, which is equivalent to two A grades and one A* grade. The predicted A-level grades of offer-holders and entrants were even higher, averaging at 33 points, which is equivalent to one A grade and one or two A* grades.

Applicants' achieved A-level points averaged 28 points for their best 3 A-level grades, equivalent to two As and a B, which was considerably lower than their predicted A-levels, on average. Offer-holders averaged 31 A-level points for their three best A-levels, and entrants averaged 32 A-level

[48] Parental education data was only available for entrants.

[49] These percentages exclude the 16% of entrants in 2012 and 8% of entrants in 2021 with missing data for parental education.

points for their best 3 A-level grades, which is equivalent to two As and one A*.[50]

Those who applied to and entered a new medical school and/or a gateway course had, on average, significantly lower predicted and achieved A-level grades than those applying to or entering an established medical school or a standard entry course. They also had significantly lower GCSE and UCAT scores.[51]

Region of England and distance from home to medical school

Changes over time

The proportions of applicants from the different regions in England remained fairly stable between 2012 and 2022 (see Figure 9):

- A quarter (25%) of applicants lived in London;
- Another 15% lived in the South East;
- The North East had the lowest percentage of applicants (4%).

40%

of medical school applicants lived in London or the South East.

Aspiring doctors were willing to travel relatively far to go to medical school, and this varied little over the period:

- Applicants originally lived on average 194km from the medical schools they had applied to.
- Entrants lived on average 174km from the medical school they entered.

From 2012 to 2022, the maximum distance between applicants' homes and the furthest of all medical schools they applied to was 320km on average. This distance increased slightly from 307km in 2012 to 325km in 2022. Consequently, the introduction of new medical schools does not appear to have reduced the furthest distance the average applicant was willing to travel.

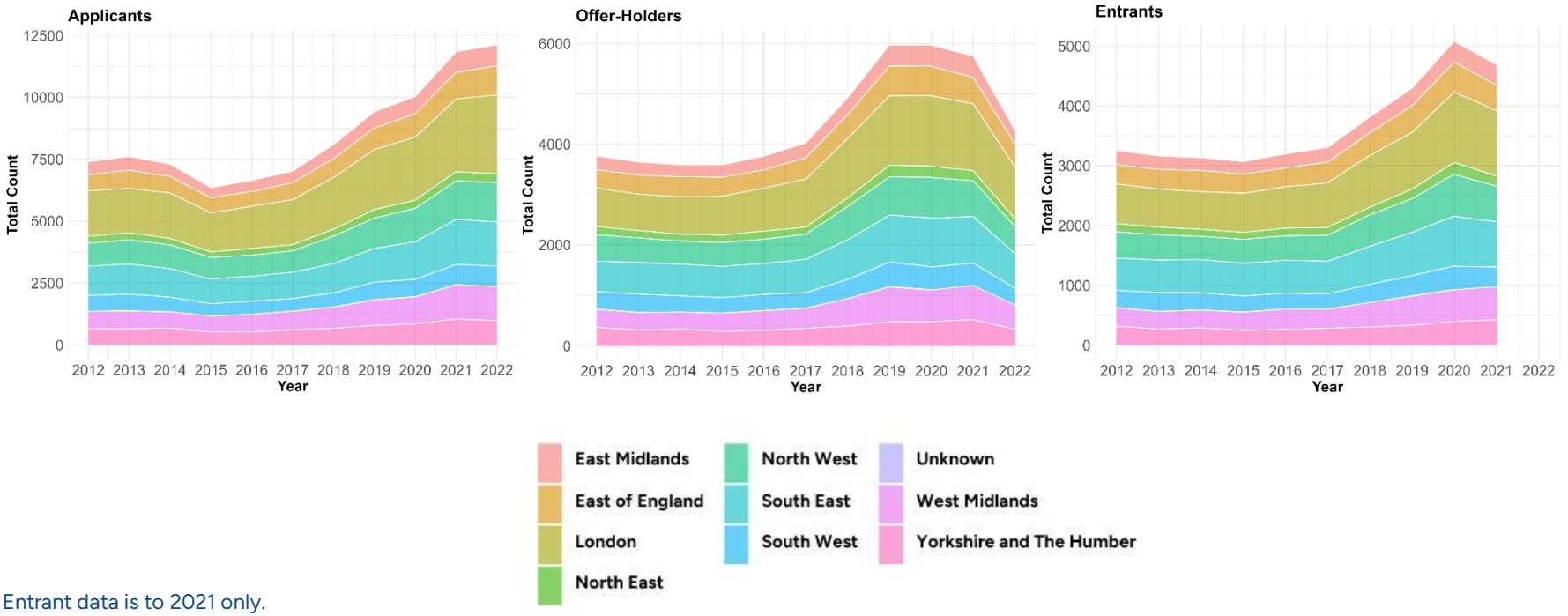
[50] Further information about predicted and achieved A-level points over time can be found in Supplementary Section 1 in the Appendix.

[51] See Supplementary Section 1 in the Appendix for detailed results.

Differences by medical schools and courses

Our sample consisted of data from applicants domiciled in England. During the period of this research (2012-2022), 40% of applicants lived in London and the South East (41% in 2022). As such, the longest average distances among both applicants and entrants were to medical schools in Scotland, Northern Ireland, North East England and South West England.

Figure 9: Changes over time in the numbers of applicants, offer-holders and entrants from each English region



Entrant data is to 2021 only.

Source: UKMED P197

Applicants and entrants to new medical schools tended to live closer than applicants and entrants to established medical schools:

- Applicants to one or more new medical schools (2018-2022) lived on average 177km from the medical schools they had applied to, which was 22km closer than those who only applied to established medical schools.

- Among entrants to new medical schools, their home at the time of application was on average 119km from their medical school. This was 55km closer than the average distance entrants to established medical schools lived from their medical school at the time they applied to study medicine.

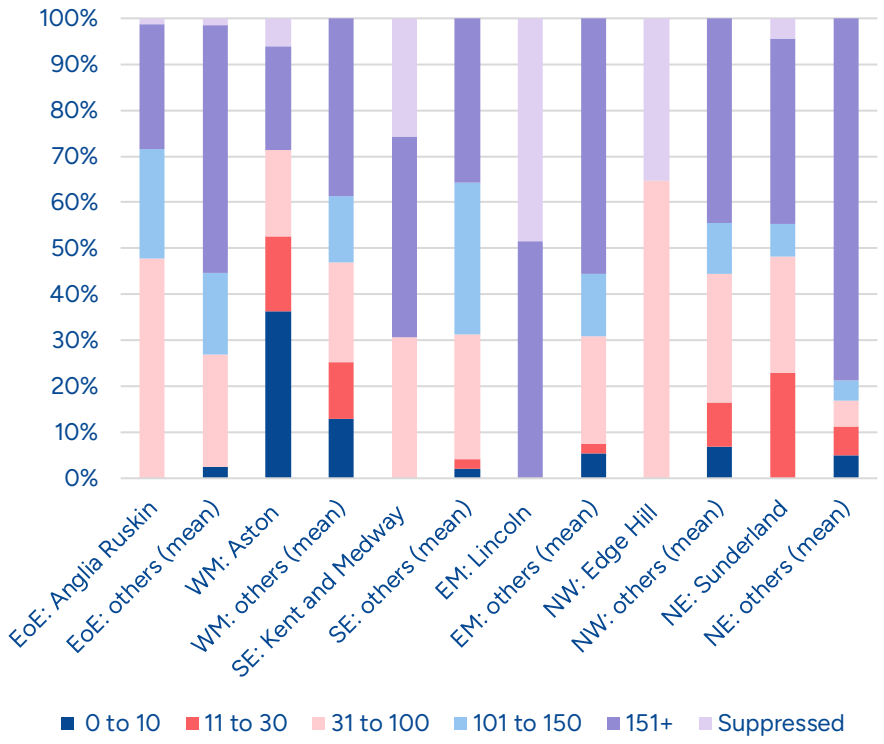
119 km

The average distance between home and medical school for those entering new medical schools between 2018 and 2021.

Figure 10 shows the distances from home of entrants to new medical schools (2018 to 2021) compared to entrants to more established medical schools in the same region. This visualisation suggests that most new medical schools admitted students who lived nearer, on average, than other medical schools within the same region.

The proportion (and number) of entrants to new medical schools whose home at the time of application was within 30km of their medical school was still fairly low, with the exception of Aston University in the West Midlands. This perhaps in part reflects population densities. With the exception of Edge Hill University and Aston University, more than half of entrants to new medical schools lived further than 100km away from their medical school at the time they applied.

Figure 10: Average distance in km from home of entrants to new medical schools, in comparison to the average of distance from home of entrants to all other medical schools within the same region



Data combined for 2018-2021. Distances categorised into bins of 0-10km (dark blue), 11-30km (red), 31-100km (pink), 101-150km (light blue), 151+km (dark purple), with proportions in each bin shown. Proportions suppressed in categories with fewer than 22.5 people (shown as light purple). EoE=East of England, NE=North East, NW=North West, SE=South East, WM=West Midlands. In this context "home" refers to the postcode of their home address at the time they applied to study medicine via UCAS.

Source: UKMED P197

Applicants and entrants to gateway courses tended to live closer to the medical schools they had applied to compared to applicants and entrants to standard entry courses only:

- Those who applied to one or more gateway courses (2012-2022) lived, on average, 175km from the medical schools they had applied to, which was 23km closer that applicants who only applied to standard entry courses.

- The average distance from home among gateway course entrants was 135km. This was 36km closer than the average distance from home among entrants to standard entry courses.

Section 2: The predictors of achieving an offer and entering medical school

In this section we examine in more detail the differences by social background in receiving at least one offer to study medicine. Among those receiving at least one offer, we also calculated the odds of entering medical school.[52]

Receiving at least one offer to study medicine

In 2012 and in 2021, applicants from more deprived backgrounds tended to have lower odds of receiving an offer:

- Applicants from the lowest and medium socio-economic groups had lower odds of receiving an offer compared to those in the highest socio-economic group.

- Applicants from more deprived neighbourhood quintiles had lower odds of receiving an offer compared to those in the least deprived (wealthiest) quintile (IMD5). However, over the period the relative disadvantage of applicants in IMD1 decreased, from a third of the odds to more than half (0.55) of the odds compared to those in IMD5.

These findings were confirmed in step 1 of a hierarchical logistical regression (Model 1), which calculated applicants' odds of receiving an offer, mutually adjusting for socio-economic group and IMD (neighbourhood deprivation), and combining data from across the period and controlling for year of application.

The addition of gender, ethnicity and region in Model 2 did little to alter the effects of socio-economic group or deprivation on applicants' odds of receiving an offer. The further addition of school/college type in Model 3 also did little to alter the effects of socio-economic group or deprivation on the odds of receiving at least one offer. Model 3 did show that, compared to applicants from non-selective state (academy/state) schools, those from independent schools and grammar schools had higher odds of getting an offer, while those from sixth form and FE colleges had lower odds.

[52] See Supplementary Section 1 in the Appendix for detailed results.

The inclusion of achieved and predicted academic attainment in Model 4 significantly changed the relationship between socio-economic background and the odds of getting one or more offers (Figure 11). After adjusting for GCSE, UCAT and predicted A-level points:

- There were no longer significant differences by socio-economic group in the odds of getting an offer.

- Those in the most deprived neighbourhoods (IMD1) had *higher* odds of receiving an offer than those in the least deprived (wealthiest) neighbourhood (IMD5). Those from IMD3 and IMD4 had slightly lower odds than those in IMD5 of receiving an offer.

Other significant predictors of receiving one or more offers in the fully-adjusted Model 4, were as follows:

- UCAT score was a very strong predictor of receiving an offer: every standard deviation increase in UCAT score was associated with over three times the odds of receiving an offer. Higher predicted A-level points and, to a lesser extent, GCSE points, increased applicants' odds of receiving an offer.

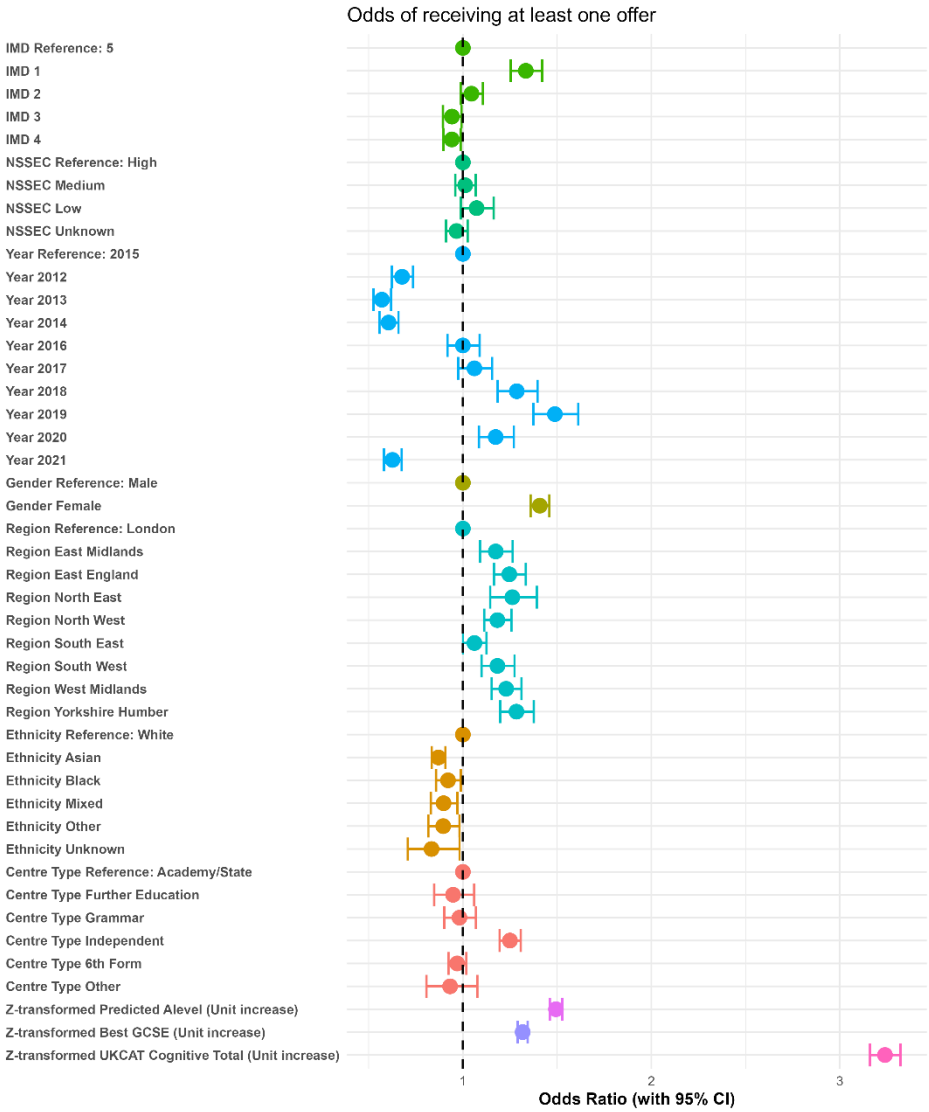
- Independent school applicants had one and a half times the odds of receiving an offer compared to non-selective state (academy/state) school applicants.

- Female applicants had higher odds than male applicants of receiving an offer.

- Applicants from Asian, Black, or Mixed ethnic groups had slightly lower odds of receiving an offer than those from White groups.

- Applicants from all regions of England had higher odds of receiving an offer compared to applicants from London.

Figure 11: Results of the fully-adjusted logistic regression of demographic and educational factors on the odds of receiving at least one offer (vs none)



The dashed vertical line is the line of no effect and represents a lack of an association between the variables and the outcome of receiving an offer. Each dot represents the statistical relationship between a variable and receiving an offer, expressed as an odds ratio, with the whiskers showing the 95% confidence interval. Dots to the right of the line are associated with higher odds of an offer; dots to the left of the line are associated with lower odds of an offer. Dots with whiskers that cross the line indicate the variable is not statistically associated with receiving an offer. Each variable is shown in a different colour and for categorical variables, the reference group is shown on the line of no effect.

Source: UKMED P197

Entering medical school

Comparing 2012 with 2021 showed some small differences by offer-holder background in the odds of their entering medical school:[53]

- In 2012 (but not in 2021), offer-holders from the medium socio-economic group had slightly lower odds of entering medical school compared to those from the highest socio-economic group.

- In 2021 (but not in 2012), offer-holders in the second *most* deprived (IMD2) and the second *least* deprived (IMD4) neighbourhood quintiles had slightly lower odds of entering medical school compared to those in the least deprived quintile (IMD5).

In both 2012 and 2021, offer-holders from the most deprived neighbourhood quintile (IMD1) had lower odds than those in the least deprived neighbourhood quintile (IMD5) of entering medical school.

Combining data across years in a logistic regression, controlling for year of application and mutually adjusting for socio-economic group and deprivation, confirmed that offer-holders from the medium and lower socio-economic groups had lower odds of entering medical school than those in the highest socio-economic group; and offer-holders in all quintiles of neighbourhood deprivation had lower odds than those in the least deprived (wealthiest) neighbourhood quintile (IMD5) of entering medical school.[54]

The addition of gender, ethnicity and region in Model 2[55] and of school type in Model 3[56] did little to change the effects of socio-economic group or IMD on the odds of entering medical school.

The addition of academic attainment in Model 4[57] however reduced the effects of low socio-economic status on entering medical school: offer-holders in the medium socio-economic group, and in IMD1 and IMD2, had slightly increased odds of entering medical school given their demographics, school/college type and grades. This may reflect that those

[53] See Supplementary Section 2 in the Appendix for details.

[54] See Supplementary Section 2 in the Appendix for details.

[55] See Supplementary Section 2 in the Appendix for details.

[56] See Supplementary Section 2 in the Appendix for details.

[57] See Supplementary Section 2 in the Appendix for details.

groups had predicted A-level grades that were closer to their actual A-level grades and/or it may be that they tended to receive lower offers from medical schools (which they were then more likely to meet).

These effects persisted in the fully-adjusted Model 5[58] (Figure 12), which additionally adjusted for the number of offers received. Other significant predictors of entering medical school in the fully-adjusted Model 5 were as follows:

- A-level grades were by far the strongest predictor of whether or not an offer-holder entered medical school.

- The number of offers was also a strong predictor of entering medical school: applicants with two or more offers had twice the odds of entering compared to those with just one. This is unsurprising because applicants with more than two offers have to select one as their firm choice and another as their insurance choice, and applicants will often choose an insurance choice that requires lower A-level grades.

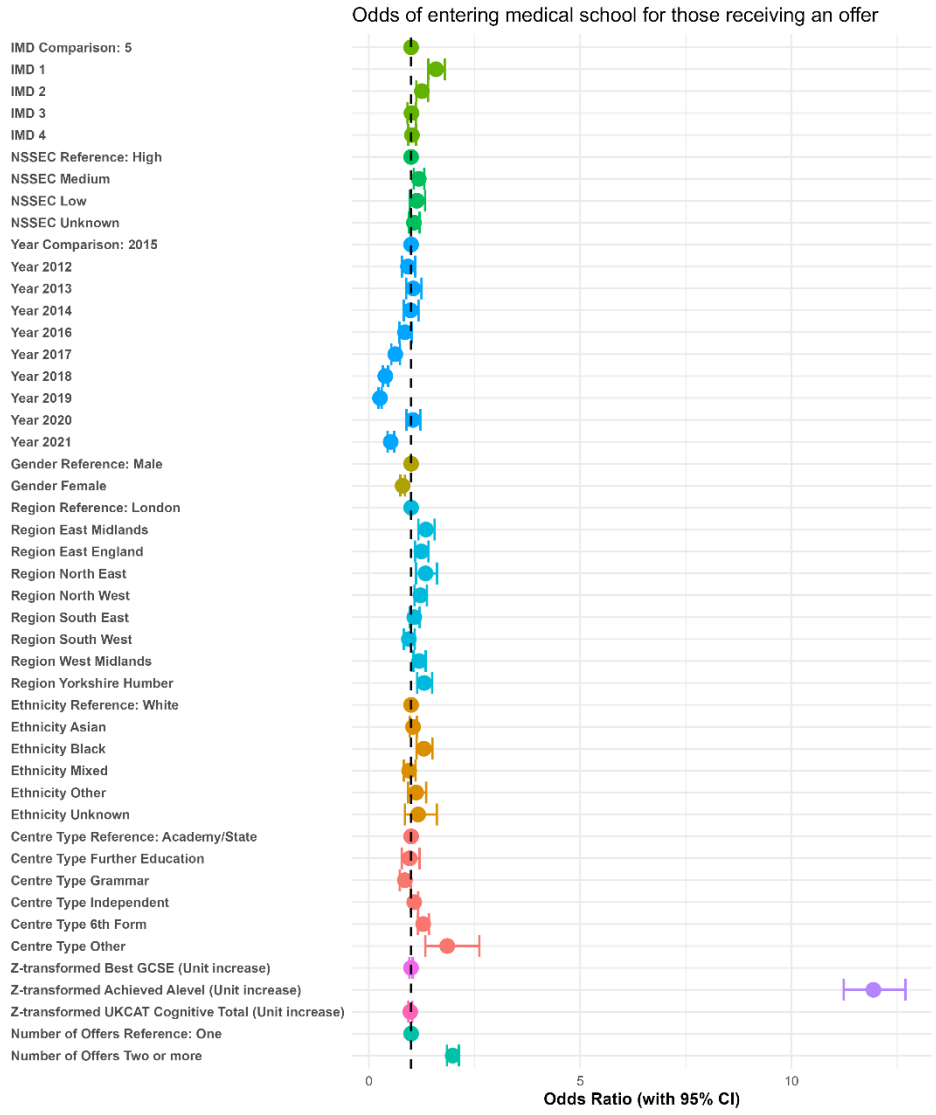
- Offer-holders who applied from a school/college classified by UCAS as "Other" had slightly higher odds of entering compared to those applying from non-selective state (academy/state) schools.

- Offer-holders of Black ethnicity and male offer-holders had slightly higher odds than White and female offer-holders, respectively, of entering medical school.

There were also differences by year and by region, with offer-holders in the East Midlands, East of England, North East, North West, West Midlands and Yorkshire and Humber all having higher odds of entering medical school compared to offer-holders from London.

[58] See Supplementary Section 2 in the Appendix for details

Figure 12: Results of the fully-adjusted logistic regression of demographic and educational factors on the odds of entering medical school (vs not) among offer-holders only



The dashed vertical line is the line of no effect and represents a lack of an association between the variables and the outcome of entering medical school. Each dot represents the statistical relationship between a variable and entering medical school, expressed as an odds ratio, with the whiskers showing the 95% confidence interval. Dots to the right of the line are associated with higher odds of entering; dots to the left of the line are associated with lower odds of entering. Dots with whiskers that cross the line indicate the variable is not statistically associated with entering medical school. Each variable is shown in a different colour and for categorical variables, the reference (comparison) group is shown on the line of no effect.

Source: UKMED P197

Section 3: Success rates among deprived applicants to new medical schools and gateway courses

In this section we explore the impact that applying to new medical schools and gateway courses had on the likelihood that applicants from the most deprived backgrounds would get an offer. We defined applicants as being in the "most deprived" group if they were from one of the two lowest socio-economic groups (NS-SEC 4 or 5) or if they lived in the two most deprived neighbourhood quintiles (IMD 1 or 2).

New medical schools

In every year from 2018 to 2021, applicants from the most deprived backgrounds who applied to at least one new medical school, had similar offer rates on average compared to those from the same backgrounds who applied only to established medical schools. The exception was in 2019 when applicants to at least one new medical school had higher offer rates compared to applicants to established schools only (see Table 2).

After taking grades into account, applicants from the most deprived backgrounds in every year who applied to at least one new medical school were more likely to get an offer than applicants from similar backgrounds *with equivalent grades* who applied only to established medical schools. In other words, applicants from the most deprived backgrounds had higher odds of success if they applied to one or more new medical schools, given their grades (see Table 3).

Table 2: Offer rates and mean grades for applicants from the most deprived backgrounds who applied to at least one new medical school compared to established medical schools only

Year	Medical School types applied to	N applicants	N offer-holders	Offer rate (95% CIs)	Mean GCSE points	Mean Predicted A-Level points	Mean UCAT points
2018	1+ new	80	50	59 (48-69)	44.6	31.0	2464.0
	All established	2635	1400	53 (51-55)	45.8	30.9	2541.0
2019	1+ new	685	435	63 (60-67)	43.6	29.6	2428.8
	All established	2665	1440	54 (52-56)	45.9	31.0	2483.0
2020	1+ new	1060	545	52 (49-55)	44.4	29.6	2431.9
	All established	2660	1420	53 (51-55)	46.4	31.0	2486.3
2021	1+ new	1090	505	46 (43-49)	44.1	29.6	2458.5
	All established	3330	1445	43 (42-45)	44.9	30.7	2507.1

Offer rates and mean grades (GCSE, predicted A-level and UCAT) for applicants from the most deprived backgrounds (NS-SEC 4 or 5 or living in IMD 1 or 2 neighbourhoods). Applicant numbers rounded.

Table 3: Odds of receiving at least one offer, among applicants from the most deprived backgrounds who applied to one or more new medical schools, compared to those who applied to established medical schools only

	2018		2019		2020		2021	
	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)
1+ new (vs all established)	1.25 (0.80-1.97)	1.89 (1.15-3.15)	1.48 (1.25-1.76	2.59 (2.12-3.17)	0.93 (0.81-1.07)	1.40 (1.19-1.65)	1.13 (0.98-1.29)	1.53 (1.31-1.78)
GCSE points z-score		1.26 (1.14-1.39)		1.33 (1.22-1.46)		1.30 (1.20-1.42)		1.21 (1.11-1.32)
Predicted A-levels z-score		1.42 (1.28-1.57)		1.48 (1.34-1.63)		1.45 (1.32-1.59)		1.26 (1.16-1.37)
UCAT cognitive z-score		2.89 (2.56-3.27)		2.61 (2.34-2.93)		2.58 (2.33-2.87)		2.68 (2.44-2.95)

Deprived backgrounds by NS-SEC groups 4/5 or living in IMD 1/2 neighbourhood areas. Odds ratios are unadjusted (uOR) or adjusted (aOR) for GCSE points, predicted A-level points, and UCAT cognitive score. All grades z-standardised within the whole cohort of applicants per year. Separate models for each year from 2018 to 2021.

Gateway courses

Applicants from the most deprived backgrounds who applied to at least one gateway course had significantly *lower* offer rates than those from the same backgrounds who applied only to standard entry courses (see Table 4).

After taking their lower grades into account, applicants from the most deprived backgrounds who applied to at least one gateway course had *higher* odds of getting an offer than applicants from similar backgrounds *with equivalent grades* who applied only to standard entry courses (see Table 5).

In other words, applicants from the most deprived backgrounds had higher odds of success if they applied to a gateway course, given their grades. This was the case in every year from 2018 to 2021. For example, in 2018 those applying to gateway courses had over three times the odds of receiving an offer than those applying only to standard entry courses. In 2021 the odds were 1.55.

Table 4: Offer rates and mean grades for applicants from the most deprived backgrounds who applied to at least one gateway course or standard entry courses only.

Year	Course types applied to	N applicants	N offer-holders	Offer rate (95% CIs)	Mean GCSE points	Mean Predicted A-Level points	Mean UCAT points
2018	1+ Gateway courses	720	160	22 (19-25)	41.9	27.6	2394.1
	Standard Entry only	2000	840	42 (40-44)	47.1	32.0	2590.9
2019	1+ Gateway courses	920	235	25 (23-28)	41.5	27.7	2340.5
	Standard Entry only	2430	985	41 (39-42)	46.9	31.9	2521.6
2020	1+ Gateway courses	1015	310	30 (28-33)	41.5	27.3	2341.5
	Standard Entry only	2710	1280	47 (45-49)	47.5	31.8	2519.2
2021	1+ Gateway courses	1290	300	23 (21-26)	40.8	26.9	2351.3
	Standard Entry only	3130	1250	40 (38-42)	46.3	31.9	2554.3

Mean grades for GCSE, predicted A-level and UCAT; deprived backgrounds by NS-SEC 4 or 5 or living in IMD 1 or 2 neighbourhoods. Applicant numbers rounded.

Table 5: Odds of receiving at least one offer among applicants from the most deprived backgrounds. Those who applied to one or more gateway courses are compared to those who applied to standard entry courses only

	2018		2019		2020		2021	
	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)w
1+ Gateway course (vs all Standard entry)	0.64 (0.54-0.76)	3.78 (2.95-4.87)	0.59 (0.50-0.68)	2.18 (1.77-2.68)	0.59 (0.51-0.68)	2.39 (1.97-2.93)	0.51 (0.44-0.58)	1.53 (1.28-1.83)
GCSE	-	1.35 (1.22-1.50)	-	1.34 (1.22-1.46)	-	1.33 (1.22-1.46)		1.23 (1.13-1.34)
Predicted A-levels	-	1.81 (1.61-2.05)	-	1.60 (1.44-1.77)	-	1.68 (1.51-1.86)		1.34 (1.22-1.47)
UCAT	-	3.39 (2.97-3.88)	-	2.76 (2.47-3.10)	-	2.79 (2.51-3.12)		2.75 (2.50-3.03)

Deprived backgrounds by NS-SEC groups 4 and 5 or living in IMD 1 and 2 neighbourhood areas. Odds ratios are unadjusted (uOR) or adjusted (aOR) for GCSE points, predicted A-level points, and UCAT cognitive score (all z-standardised within the whole cohort of applicants per year). Separate models were created for each year from 2018 to 2021.

Section 4: UCAT and A-level performance among those from lower socio-economic groups

The correlation between applicants' UCAT scores and predicted A-levels was similar in each of the three socio-economic groups at 0.3.[59]

To explore whether the relationship between UCAT and predicted A-level grades varied by socio-economic group after controlling for other factors related to UCAT scores (gender, ethnicity and school type), we conducted a multiple regression that included an interaction between predicted A-level points and socio-economic group.

The results of the regression[60] showed a strong positive association between predicted A-levels and UCAT scores. However, among applicants from low and medium socio-economic groups, the association between predicted A-levels and UCAT scores was slightly weaker than in the higher socio-economic group, even after accounting for the significant effects of gender, ethnicity and school/college type on UCAT score.

To explore this finding further, we compared mean UCAT scores by socio-economic group among only those applicants with the highest predicted A-level points (equivalent to 3 A* grades). We found small but significant differences in UCAT scores by socio-economic group: the highest socio-economic group achieved a higher average UCAT score than the average score of applicants in the lowest socio-economic group (see Table 6). The difference between the scores was equivalent to approximately half a standard deviation. In 2022, the mean cognitive total UCAT score in our sample was 2585, with a standard deviation 249, meaning that half a standard deviation was equivalent to 125 points or 5% of the total score.

These findings suggest that applicants from lower socio-economic groups who had the highest predicted A-level points, may have faced challenges in achieving the highest UCAT scores, even after considering their gender, ethnicity, and school type.

[59] Kendall rank correlations between UCAT cognitive score and sum best three predicted A-level grades = 0.30 (high socio-economic group), 0.31 (medium socio-economic group), 0.31 (low socio-economic group).

[60] See Supplementary Table 10 in Supplementary Section 4 in the Appendix.

Table 6: Mean UCAT scores by socio-economic group among applicants with the highest points from their predicted A-level grades, equivalent to 3 A* grades

Socio-economic group	N	Mean UCAT z-score (95% CIs)
High	15425	0.795 (0.781-0.809)
Medium	1600	0.474 (0.431-0.517)
Low	660	0.305 (0.238-0.372)

Counts rounded to the nearest 5. UCAT scores z-transformed to allow averaging over years from 2012-2021.

Section 5: The number and characteristics of schools and colleges producing medical school applicants and entrants

Number of schools/colleges producing medical school applicants and entrants

Over the 10-year period from 2012 to 2022, there were 2,719 unique schools/colleges in the dataset, meaning that during this period 2,719 schools/colleges provided at least one medical applicant who met our criteria for inclusion in the sample.[61]

Not all of those schools/colleges provided an applicant every year: per year, an average of 1,683 schools/colleges provided at least one

[61] An approximation of the proportion of all schools/colleges in England that this represents is provided in the Supplementary Section 5 in the Appendix, along with a comparison by school/college type.

applicant.[62] An average of 1,102 schools/colleges provided at least one medical school entrant per year.[63]

In 2022, 1,899 schools/colleges provided at least one applicant. This was an increase of just over 300 schools compared to 2012, when 1,590 schools/colleges provided at least one applicant. The number of schools/colleges providing at least one entrant also grew by a similar number from 1,032 in 2012 to 1,297 in 2021.

The most common number of applicants per year from a school/college was one and over the 10-year period, 80% schools/colleges (1,962/2,443[64]) sent five applicants or fewer per year.

A very small proportion of schools/colleges sent large numbers of applicants: 58 centres (2%) sent 20 or more applicants per year on average and 11 schools/colleges (<1%) achieved 20 or more entrants per year to medical school. A single school/college provided 855[65] applicants over the 10-year period: an average of 85 applicants per year (see Table 7).

More than half (54%) of all schools/colleges had fewer than 10 of their applicants enter medical school during the 10-year period, averaging fewer than one entrant per year on average. Another 39% of schools/centres had between 1 and 5 entrants per year on average (see Table 7).

54%

of the schools/colleges that provided any medical applicants achieved fewer than one medical school entrant per year between 2012 and 2021.

[62] Excluded from this number are 276 schools/colleges that appeared only once in the data during the period, i.e. they only once provided one or more applicants.

[63] As above, excluded are the 276 schools/colleges that appeared only once. Not all schools/colleges appeared 10 times (once per year) between 2012 and 2022. This may be because they sent no applicants in some years; however it may also be because during the period some schools/colleges closed, opened or merged.

[64] This excludes the 276 schools/colleges that provided applicant(s) only once during the period.

[65] Figure rounded to the nearest 5

Table 7: Proportion of schools/colleges by average numbers of applicants (2012-2022) and entrants (2012-2021) per year

Average number of applicants per school/college	Number of schools/colleges	Proportion of schools/colleges
1 to <5	1,962	80%
5 to <10	298	12%
10 to <20	125	5%
20+	58	2%
Average number of entrants per school/college	**Number of schools/colleges**	**Proportion of schools/colleges**
0 to <1	1,308	54%
1 to <5	952	39%
5 to <10	124	5%
10 to <20	48	2%
20+	11	<1%

Number of entrants per applicant by school/college

Unsurprisingly, schools/colleges that provided more applicants tended to produce more entrants: on average, every two applicants a school/college provided resulted in one extra entrant.[66]

2:1

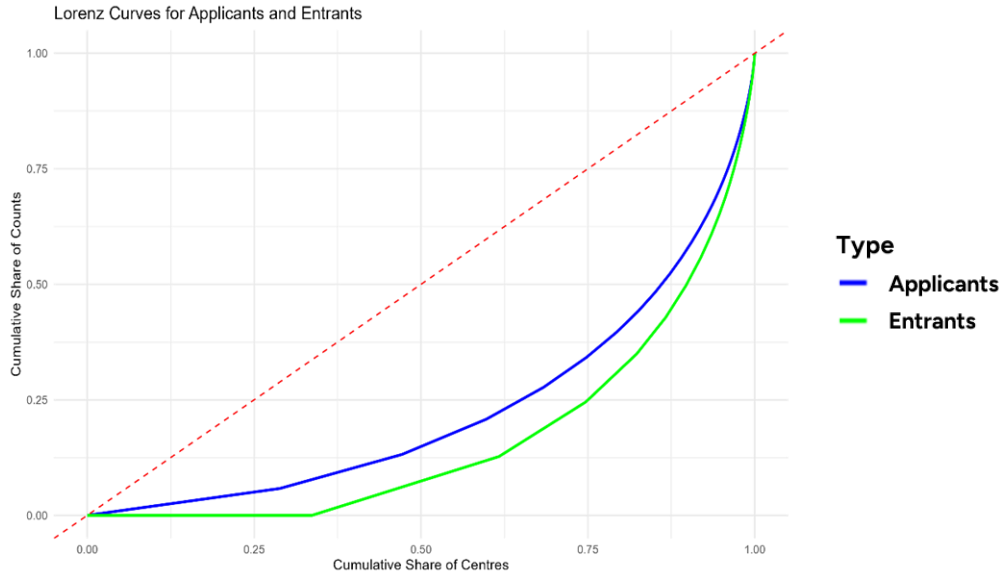
For every two applicants provided by a school or college, they achieved one more medical entrant, on average.

As mentioned above, some schools/colleges produced a very high number of applicants and entrants, while most produced very few. The Lorenz curves in Figure 13 show visually the large inequality between schools/colleges in the numbers of applicants and entrants they produced. The Gini co-efficient for entrants (0.67) was greater than that for

[66] A linear regression of the number of entrants on the number of applicants per school/college was highly statistically significant ($F(1, 16612) = 7.40$, $p < .0001$). The r^2 was .82, meaning that over 80% of the variance in entrant numbers explained by applicant numbers. The regression slope for applicant count was 0.50, indicating that every two additional applicants a school/college produced resulted in one additional entrant.

applicants (0.54), suggesting that certain schools/colleges produced greater numbers of applicants and also had higher success rates in supporting their applicants to secure medical school places.

Figure 13: Lorenz curves demonstrating the inequality between schools/colleges in the number of applicants and entrants they produced



The cumulative percentage of applicants (dark blue) and entrants (bright green) per centre is plotted against the cumulative percentage of centres in the dataset. If all centres produced the same number of applicants/entrants, the graph would show a perfect correlation ("the line of equality": red dashed line). The further the curve from the line of equality, the greater the inequality between schools/colleges in the number of applicants (blue) or entrants (green) they produced.

Source: UKMED P197

Type of schools/colleges sending medical applicants and entrants

Among schools/colleges with at least one applicant in the dataset, the proportion of non-selective state (academy/state) schools increased from 64% in 2012 to 68% in 2021, and the proportion of independent schools decreased from 23% to 19%. The proportion of academy/state schools producing entrants also grew from 60% in 2012 to 66% in 2021, while the proportion of independent schools producing entrants dropped from 27% to 22% (see Table 8).

This is in line with the increase in non-selective state (academy/state) school applicants and entrants relative to the proportion of independent school applicants and entrants described in Section 1 above.

Table 8: Number (proportions) of school/college types providing at least one applicant or entrant to medicine per year

	Number (%) of schools/colleges with at least one applicant per year			
	Average 2012-2021	2012	2019	2021
Academy/State	1,127 (67)	1,020 (64)	1,235 (69)	1,296 (68)
Independent	348 (21)	367 (23)	350 (20)	370 (19)
Sixth Form College	119 (7)	119 (8)	116 (7)	126 (7)
FE College	47 (3)	42 (3)	50 (3)	61 (3)
Grammar School	36 (2)	35 (2)	35 (2)	38 (2)
Other	6 (<1)	7 (<1)	5 (<1)	8 (<1)
Total	1,683 (100)	1,590 (100)	1,791 (100)	1,899 (100)
	Number (%) of schools/colleges with at least one entrant per year			
	Average 2012-2021	2012	2019	2021
Academy/State	692 (63)	621 (60)	774 (65)	850 (66)
Independent	271 (25)	279 (27)	270 (23)	280 (22)
Sixth Form College	87 (8)	85 (8)	90 (8)	98 (8)
FE College	20 (2)	19 (2)	23 (2)	31 (2)
Grammar School	30 (3)	26 (3)	29 (2)	34 (3)
Other	2 (<1)	2 (<1)	1 (<1)	4 (<1)
Total	1,102 (100)	1,032 (100)	1,187 (100)	1,297 (100)

The average over the period from 2012-2021 is shown, as are the numbers (proportions) for the years 2012, 2019 and 2021.

Using the Department for Education (DfE) number for each UCAS centre (school/college), we were able to calculate the number of applicants and entrants per school/college in each region of England and Wales (see Table 9).[67] London and the North West had the highest number of applicants per school/college. However, London had a lower number of entrants per school/college. The South West was the English region with the lowest number of applicants per school/college.

[67] Although all applicants in the sample were domiciled in England, they could have applied to medicine from a UCAS centre (school/college) outside of England.

Table 9: Applicant and entrant numbers per centre (school/college) in each region (2012 to 2022)

Region	Number applicants	Number entrants	Number centres	Applicants/ centre	Entrants/ centre
North West	12,030	4,815	263	45	20
London	22,130	7,585	517	45	15
Yorkshire and The Humber	8,840	3,535	259	35	15
South East	14,370	6,215	463	30	15
East of England	9,140	3,970	312	30	15
North East	3,240	1,430	106	30	15
West Midlands	9,745	3,805	309	30	10
East Midlands	5,260	2,100	188	30	10
South West	7,125	3,085	276	25	10
Wales	65	30	17	5	0
Islands	5	0	3	0	0
Unknown/not applicable	15	5	6	5	0

Counts of individuals rounded to the nearest 5. Figures are for applicants domiciled in England according to their UCAS application

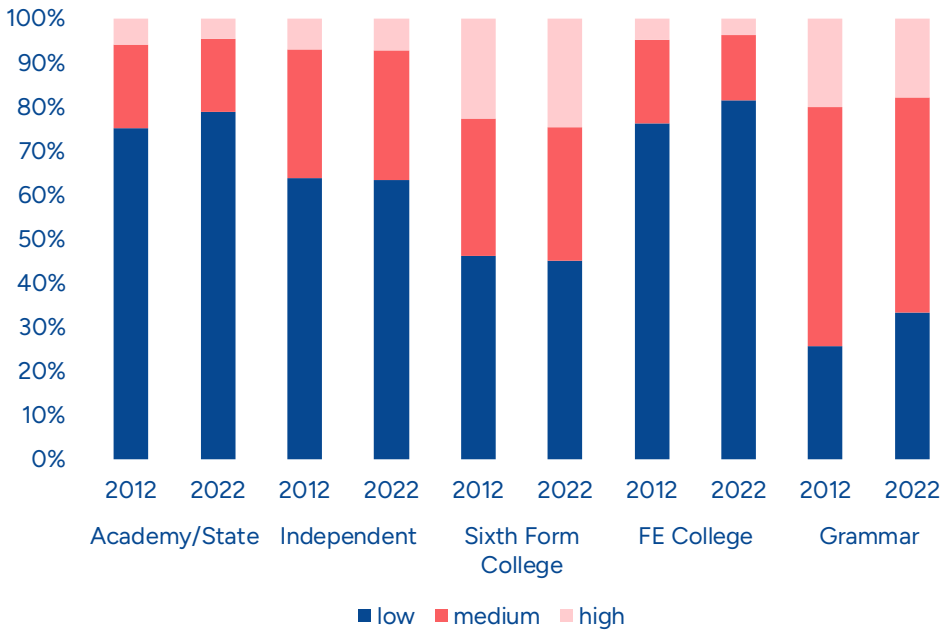
Types of school or college providing small, medium and large numbers of applicants and entrants

To explore the characteristics of schools/colleges providing different numbers of applicants, we split schools/colleges into tertiles based on the total number of applicants they provided during the period: 70% of schools/colleges provided a low number (47 or fewer applicants), 23%

provided a medium number (between 48 to 139 applicants) and 7% produced a high number (140 or more applicants).[68]

Sixth form colleges and grammar schools tended to provide high and medium numbers of applicants; independent schools tended to provide medium numbers of applicants; whereas academy/state schools and FE colleges tended to provide low numbers (see Figure 14), which also shows that the proportions of school/college types providing low, medium and high numbers of applicants changed relatively little over the period from 2012 to 2022.

Figure 14: The proportion of each type of school/college providing low, medium and high numbers of applicants to medical school in 2012 and in 2022



The school/college type "Other" was excluded due to small numbers.

Source: UKMED P197

[68] It is important to note that annual data on the total number of students on the roll at each school/college was unavailable within UKMED, so we could not assess the proportion of its students each school/college provided.

Types of school/college providing entrants

As seen above, some types of school/college were relatively successful at providing entrants while others were less so. In Table 8 it can be seen that:

- Of the 36 grammar schools that provided one or more applicants over the period, 30 (83%) provided at least one entrant, as did 78% of independent schools and 73% of sixth form colleges;

- 61% of academy/state schools that provided one or more applicants produced at least one entrant during the period and only 43% of FE colleges provided at least one entrant during the period.

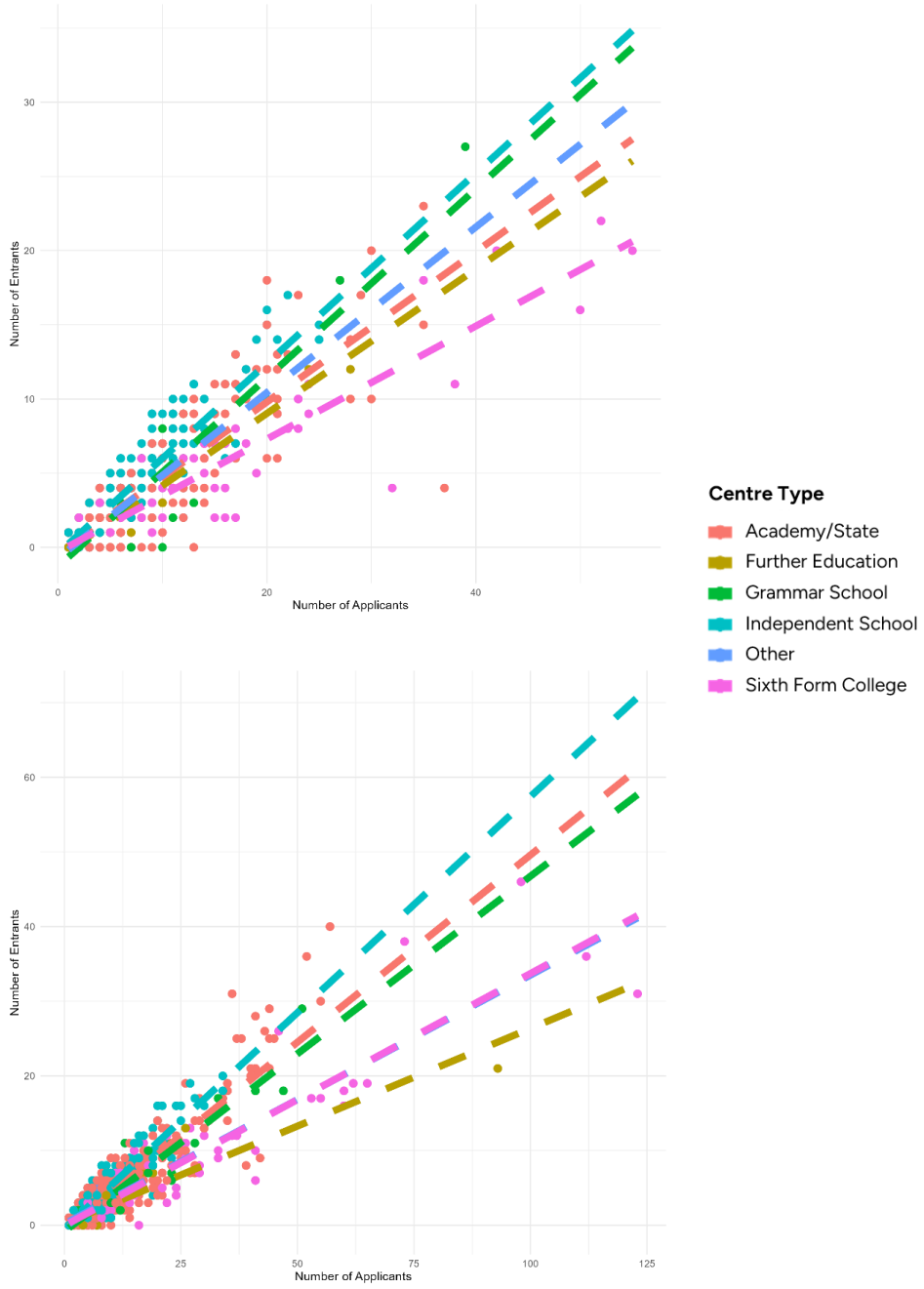
73%

grammar schools with one or more applicants provided at least one entrant.

Figure 15 plots the number of entrants against the number of applicants per school/centre type in 2012 and in 2021. The independent schools that provided at least one applicant maintained a higher success rate than most other school/centre types, achieving more entrants per applicant. However, the gap between independent schools and academy/state schools narrowed in 2021 compared to 2012.

This reflects the results in Section 1 and 2 above, which found that applicants from independent schools tended to get more offers than those from academy/state schools, and among offer-holders those from independent schools were more likely to enter medical school than those from academy/state schools.

Figure 15: Scatterplots showing the number of entrants per applicant by school/college type in 2012 (top) and 2021 (bottom).



The dots represent UCAS centres (schools/colleges). The dashed lines represent the rate of entrants per applicant for each school/college type in that year: schools/college types with steeper lines achieved more entrants per applicant.

Source: UKMED P197

Appendix

Supplementary information on aims and research questions

Our overall aim was to investigate access to medical schools from 2012 to 2022 for applicants from disadvantaged backgrounds.

To do this, we explored the socio-economic, demographic, and educational characteristics of applicants, offer-holders, and entrants to medicine nationally, as well as to different medical schools and course types. We also examined how applicants' likelihood of gaining an offer and entering different types of medical schools and courses varied by applicant characteristics.

- Patterns among applicants to medicine enabled us to examine the groups attracted to study medicine over time, and groups attracted to specific medical schools and course types.

- Patterns among offer-holders enabled us to explore which groups of applicants medical schools and course types selected.

- Patterns among entrants enabled us to explore which groups successfully met their medical school offers, and to compare the profiles of entrants to different medical schools and course types.

We present findings in five sections, each with its own research question(s).

In **Section 1: Characteristics of applicants, offer-holders and entrants from 2012 to 2022** we describe the proportions of applicants, offer-holders and entrants from different socio-economic backgrounds, who attended different types of school/college. We describe trends over time since 2012 across all medical schools, and the variability between medical schools. We also consider differences in the make-up of applicants, offer-holders and entrants to gateway courses compared to standard entry courses, and to new (post-2018) medical schools and pre-2018 (established) medical schools. We seek to answer the following research questions:

- Research question 1: Nationally, what were the characteristics of medical school applicants, unsuccessful applicants, offer-holders, and entrants from 2012 to 2022 (2021 for entrants)?
- Research question 2: What were the characteristics of applicants, offer-holders, and entrants by medical school from 2012 to 2022?
    - How did the characteristics of applicants, offer-holders and entrants to gateway courses compare to standard entry courses from 2012 to 2022?
    - How did the characteristics of applicants, offer-holders, and entrants to new (post-2018) medical schools compare to those from pre-2018 medical schools, between 2018 and 2022?

In **Section 2: The predictors of achieving an offer and entering medical school** we calculate the odds applicants had of receiving an offer or entering medical school, from 2012 to 2022. We compare applicants from different socio-economic backgrounds, taking into account the type of school/college they attended, their achieved and predicted grades, and their gender and ethnicity. We seek to answer the following research question:

- Research question 3: Annually from 2012 to 2022 (2021 for entrants) did the odds of i) receiving at least one offer ii) entering medical school vary by applicant characteristics, including academic attainment/predicted attainment?

In **Section 3: Success rates among deprived applicants to new medical schools and gateway courses** we explore the impact of applying to gateway courses and new medical schools on the success of applicants from the most deprived backgrounds at getting an offer or entering medical school, after taking into account their attainment. We seek to answer the following research question:

- Research question 4: In 2018 and 2022, were applicants with at least one commonly-used indicator of disadvantage (NS-SEC 4 or 5 OR IMD 1 or 2) more likely to receive an offer if they applied to i) at least one gateway course vs none, or ii) at least one new medical school vs none, controlling for academic attainment/predicted attainment?

In **Section 4: UCAT and A-level performance among those from lower socio-economic groups** we explore whether the use of UCAT in selection to medical school might pose a barrier to applicants from the lowest socio-economic groups. We calculate the statistical relationship between UCAT and predicted A-level grades in applicants and in offer-holders from different socio-economic groups. We also consider whether the UCAT scores for applicants from the lowest socio-economic group were relatively lower than the UCAT scores of applicants from the medium and

highest socio-economic groups with equivalent predicted A-level grades. We seek to answer the following research question:

- Research question 5: How does the relationship between predicted A-levels and UCAT scores vary by socio-economic status among i) applicants; and ii) offer-holders?

In **Section 5: The number and characteristics of schools and colleges producing medical school applicants and entrants** we further explore the representation of applicants from different school/college (UCAS centre) types. We count the number of applicants provided by different schools/colleges, and examined the characteristics of schools/colleges providing low, medium and high numbers of applicants. We seek to answer the following research question:

- Research question 6: Annually from 2012-2022, how many UCAS centres did applicants apply from?

Supplementary Methods

Cohort creation

Applicant cohort

The dataset we received from UKMED restricted the applicant cohort to those:

- Domiciled in England.
- Applied to medical school for the first time from 2012 to 2022.
- Aged 19 or younger at the time of application.

We refined the sample according to the following inclusion and exclusion criteria:

- Excluded those missing predicted A-levels.
- Included only those applying to any of the following course types: standard entry, private, preliminary, or gateway.
- Excluded those applying to any graduate course.
- Excluded application choices to non-medical courses. Non-medical courses were identified based on: course code, course group (A1-pre-clinical medicine), medical school and course type).

We made further adjustments to the Higher Education Institution of two courses:

(i) For application to the University of Liverpool for the medical degree course run at Lancaster University, we re-coded medical school to be Lancaster University
(ii) For applications to the University of Nottingham for the medical degree course run at University of Lincoln, we re-coded medical school to be the University of Lincoln.

Offer-holder cohort

The cohort of offer-holders was restricted to those applicants with one or more of the following:

- conditional offer, or
- unconditional course change, or
- unconditional offer.

Entrant cohort

The entrant cohort comprised offer-holders who:

- entered university in the same year as their application, or
- who entered university in the year following their application if they had no evidence of having another U(K)CAT application.

For each entrant we checked that the higher education institution they entered matched with one of the higher education institutions they had applied to study medicine.

Entrants to Buckingham University can apply outside of UCAS and so we excluded the 43 entrant cases who entered university via this route.

We have described each variable briefly below. Further details on all variables can be found in the UKMED data dictionary.[69] When we derived new variables from the data provided within UKMED, we have given further details below.

[69] UK Medical Education Database (UKMED). (n.d.). *All Data Dictionary Categories*. Retrieved 13 November 2024, from https://www.ukmed.ac.uk/data_dictionary_categories?identifier=PERSON_EVENT

Variables

UKMED provided us with a data extract containing data that was provided to UKMED by the Universities and Colleges Admission Service (UCAS) and the University Clinical Aptitude Test (UCAT) for applicants to medicine between 2012 and 2022. This included data on demographics, education and schooling, and medical school application data. The data extract also included data on medical school entrants from 2012 to 2021, provided to UKMED by the Higher Education Statistics Agency (HESA). HESA additionally provided parental education which was therefore not available for applicants or offer-holders.

We used the two main outcome measures:

Receiving at least one offer to study medicine

For each applicant, we created a binary variable to indicate whether they received one or more offers to study medicine (coded 1) or not (coded 0) within an application cycle.[70]

Entering medical school[71]

For all offer-holders (defined as applicants holding at least one offer for medicine within an application cycle), we created a binary variable to indicate whether they had entered medical school (coded as 1) or not (coded as 0). We considered entrants to be offer-holders who had started a medical degree course within the same application cycle in which they received their offer, or in the following cycle when there was no evidence of a second application (i.e. they had deferred entry).

We used two secondary outcome measures:

Applied to at least one gateway course; entered a gateway course

We created a binary variable to indicate whether an applicant had applied to at least one gateway or preliminary course (called 'gateway course' hereafter) (coded 1) compared to only standard entry courses (coded 0). For entrants, we created a binary variable indicating whether they entered a gateway course (coded 1) or a standard entry course (coded 0).

[70] For the analyses in Section 2, we also created a binary variable indicating whether an offer-holder had received 1 or 2+ offers.

[71] As described above under Sample we had data on entrants between 2012 and 2021 only (no data for 2022 was provided).

Applied to at least one new medical school; entered a new medical school

We created a binary variable to indicate whether an applicant had applied to at least one new medical school (coded 1) compared to only established medical schools (coded 0). For entrants, we created a binary variable indicating whether they entered a new medical school (coded 1) or an established medical school (coded 0). We counted the following as new medical schools: Anglia Ruskin, Aston, Edge Hill, Kent and Medway, Lincoln and Sunderland.

The main demographic and educational characteristics were:

Socio-economic status

Socio-economic status was derived from the five-level National Statistics Socio-economic Classification (NS-SEC) groupings of parental occupation (NS-SEC 1 managerial and professional occupations; NS-SEC 2 intermediate occupations; NS-SEC 3 small employers and own account workers; NS-SEC 4 lower supervisory and technical occupations; NS-SEC 5 semi-routine and routine occupations). We re-categorised the five-level variable into a three-level variable (high=NS-SEC 1; medium=NS-SEC 2, 3 or 4; low=NS-SEC 5).

Index of multiple deprivation (IMD) quintile

The IMD is the official measure of relative deprivation in England. It is calculated at a neighbourhood level (Lower-layer Super Output, LSO) using over 30 measures of income, employment, health, education, crime, housing and living environment. All neighbourhoods in England are ranked by IMD and then divided into five equal-sized groups or quintiles, from quintile 1 (the most deprived) to 5 (the least deprived).[72]

School/college (UCAS centre)

School or college type was based on the Centre Type variable provided to UKMED by UCAS. Our variable had six levels: academy/state school, independent school, grammar school, further education (FE) college, sixth form college, other.[73] In our analysis of the schools/colleges that sent

[72] For further information on IMD calculations, please see Ministry of Housing, Communities & Local Government. (2019). *The English Indices of Deprivation 2019*. UK Government. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835115/IoD2019_Statistical_Release.pdf

[73] The category academy/state school refers to non-selective state schools.

applicants to medical school (Section 5), we also used each UCAS centre's DfE number.[74]

The secondary demographic characteristics were:

Gender

Gender coded as 'male' or 'female'.

Ethnicity

Ethnicity categorised into five high-level groupings of 'Asian', 'Black', 'Mixed', 'Other', 'White' or 15 low-level groupings of: 'White', 'Black – Caribbean', 'Black – African', 'Black - Other Black background', 'Asian – Indian', 'Asian – Pakistani', 'Asian – Bangladeshi', 'Asian – Chinese', 'Asian - Other Asian background', 'Mixed – White and Black Caribbean', 'Mixed – White and Black African', 'Mixed – White and Asian', 'Mixed – Other Mixed background', 'Other', 'Unknown'.

Parental education

Parental education showing whether any of a student's parents had a higher education qualification ('yes', 'no', 'unknown', 'do not know'). Information available only for entrants.

The geographic characteristics were:

Region of England

UK geographic region of applicant home postcode, using the UCAS categories of East Midlands, East of England, London, North East, North West, South East, South West, West Midlands, and Yorkshire and Humber.

Distance from home postcode to medical schools applied to or entered

Distance in kilometres (km) from applicants' home postcodes to the postcode of each medical school applied to. Distances were obtained by UKMED from Google. From this distance measure, we calculated for each applicant the mean and maximum distance from their home postcode to each of the medical schools they applied to. For entrants, the distance was from their home postcode to the medical school they entered. We grouped distances into bins for visualisation.[75]

[74] The DfE number is also known as LEADFES (local authority number and establishment number)

[75] Distance from home to medical school bins (in km): 0-10, 11-30, 31-100, 101-150, 151+

The attainment variables were:

Predicted and Achieved Advanced Level (A-level) grades

Sum of the best three predicted A-level grades and sum of the best three achieved A-level grades, both calculated by UKMED. UKMED assigned point scores to A-Level grades in 2-point increments (A*=12, A=10, B=8. C=6, D=4, E=2, else=0), and calculated the sum of the three highest-scoring A-level grades [see McManus et al[76] for more details of the methodology]. We additionally z-transformed the scores within year (giving z-scores with a mean of 0 and a standard deviation of 1) to enable us to compare scores across years.

General Certificate of Secondary Education (GCSE) grades

Sum of the best 9 GCSE grades. Point scores were assigned to each GCSE grade (A*=6, A=5, B=4, C=3, D=2, E=1, else =0). Double Science and other double GCSEs were scored as A*A*=12, A* A=11 and so on (see McManus et al 2013).[77] We z-transformed scores within year to enable us to combine point scores across years.

University Clinical Aptitude Test (UCAT) Cognitive Total

The format of the UCAT test changed several times between 2012 and 2022. From 2012 to 2014 the UCAT comprised four cognitive sub-tests: Verbal Reasoning (VR), Quantitative Reasoning (QR), Abstract Reasoning (AR), and Decision Analysis (DA). In 2015 a separate Situational Judgement Test (SJT) was added to the cognitive sub-tests. In 2016 the DA was dropped, so the exam contained one SJT subtest and three cognitive subtests: VR, QR and AR. Since 2017 when the Decision Making (DM) cognitive subtest was added, UCAT Cognitive Total has comprised one SJT subtest and four scored cognitive subtests: VR, QR AR, and DM. Raw subtest scores are scaled. Universities receive scaled subtest scores plus a combined cognitive subtest score, and a scaled SJT quartile score.[78]

[76] McManus, I. C., Dewberry, C., Nicholson, S., & Dowell, J. S. (2013). The UKCAT-12 study: Educational attainment, aptitude test performance, demographic and socio-economic contextual factors as predictors of first year outcome in a cross-sectional collaborative study of 12 UK medical schools. *BMC Medicine*, *11*(1), 244. https://doi.org/10.1186/1741-7015-11-244

[77] McManus, I. C., Dewberry, C., Nicholson, S., & Dowell, J. S. (2013). The UKCAT-12 study: Educational attainment, aptitude test performance, demographic and socio-economic contextual factors as predictors of first year outcome in a cross-sectional collaborative study of 12 UK medical schools. *BMC Medicine*, *11*(1), 244. https://doi.org/10.1186/1741-7015-11-244

[78] UCAT Consortium. (n.d.). *Technical Reports*. Retrieved 14 November 2024, from https://www.ucat.ac.uk/about-us/technical-reports/

We used the total score on the cognitive sub-tests of the UCAT test for the year preceding an application. Because of changes to UCAT over the period, we z-transformed scores within year.

Statistical analysis

In this section we describe the statistical analyses used to answer the research questions in Sections 1-5 of the report.

We reported all findings according to HESA disclosure controls, which are in place to protect the anonymity of participants within the data. This includes rounding counts of people to the nearest 5, and suppressing averages calculated from group numbers of 7 or fewer, and percentages calculated from groups of 22.5 people or fewer.[79]

Prior to receiving the data we set a missingness threshold of 5% for imputation of missing values (excluding the outcome measures and socio-economic status, which was our primary predictor variable). This threshold was not reached by any of the analysis variables and therefore we did not impute any data.

In **Section 1: Characteristics of applicants, offer-holders and entrants from 2012 to 2022** we summarised the demographic, educational and geographic characteristics of applicants, offer-holders and entrants, annually from 2012 to 2022 using descriptive statistics. To explore any changes over time, we plotted these descriptive statistics with 95% confidence intervals (95% CIs) by year.

To explore variability between medical schools, we summarised the key characteristics of applicants/offer-holders/entrants separately for each medical school per year. For example, we tabulated the proportion of applicants/entrants coming from the most deprived postcodes and lowest socio-economic group. These statistics were used to generate heatmaps which demonstrated the concentration of proportions of a characteristic within a medical school over the time period. We included only English medical schools in these graphs since our sample was restricted to English-domiciled applicants.

We also used descriptive statistics to summarise and compare the characteristics of applicants and entrants to gateway and standard entry

[79] Higher Education Statistics Agency (HESA). (n.d.). *Rounding and suppression to anonymise statistics*. Retrieved 13 November 2024, from https://www.hesa.ac.uk/about/regulation/data-protection/rounding-and-suppression-anonymise-statistics

courses and established and new medical schools. When comparing new and established medical schools, we limited the time period to 2018 onwards to ensure like-for-like comparisons. 95% CIs were included where appropriate.

In **Section 2: The predictors of achieving an offer and entering medical school**, we used hierarchical logistic regression to examine the relationship between social background and odds of receiving an offer to study medicine, and of entering medical school, adjusting for other demographic factors, school/college types and academic performance. Given that offer and entry rates varied by year, we included year of application in statistical models.

To calculate the odds of applicants from different socio-economic backgrounds receiving at least one offer (vs not) we first constructed a base model (Model 1), including only socio-economic status and IMD quintile, controlling for year of application. Model 2 additionally included gender, ethnicity and geographic region. Model 3 additionally included school type. The final fully-adjusted model (Model 4) additionally included GCSE grades, UCAT scores and predicted A-level points.

To calculate the odds of offer-holders from different socio-economic backgrounds entering medical school (vs not), our base model (Model 1) included only socio-economic status and IMD quintile, controlling for year of application. Model 2 additionally included gender, ethnicity and geographic region. Model 3 additionally included school type. Model 4 additionally included GCSE grades, UCAT scores and achieved A-level points. The final fully-adjusted model (Model 5) additionally included a binary variable indicating whether the individual held one offer to medical school, or two or more offers.

In **Section 3: Success rates among deprived applicants to new medical schools and gateway courses**, we restricted our cohort to applicants from the lowest socio-economic groups (NS-SEC 4 or 5) or who lived in the most deprived neighbourhood quintiles (IMD 1 or 2). We used descriptive statistics to calculate the offer rates among those who applied to at least one gateway course compared to the offer rate among those who applied to standard entry courses only. We did the same comparing those who applied to at least one new medical school with who applied to established medical schools only.

We performed logistic regressions of receiving an offer (vs not) on course type (applying to at least one gateway course vs Standard entry courses

only), controlling for GCSE, UCAT cognitive score, and predicted A-level points. Similarly, we regressed receiving an offer (vs not) on medical school type (at least one new medical school vs established medical schools only) controlling for exam points. We performed separate regressions for each year from 2018 to 2021.

In **Section 4: UCAT and A-level performance among those from lower socio-economic groups**, we explored how different socio-economic groups might perform in UCAT relative to their predicted A-level grades. We first examined the relationship between UCAT cognitive total scores and predicted A-level grades for each socio-economic group using a Kendall rank correlation. We then regressed UCAT cognitive total scores onto the interaction between predicted A-level grades and socio-economic group, controlling for predicted A-level grades, socio-economic group, gender, ethnicity and school/college type.

In **Section 5: The number and characteristics of schools and colleges producing medical school applicants and entrants**, we explored applicant and entrant numbers by school/college types. We aggregated the number of applicants and entrants per school/college (identified by DfE number) and year. Lorenz curves and Gini coefficients were computed to assess the distribution of both applicants and entrants among centres for each year. The Lorenz curves plotted the cumulative share of school/colleges against the cumulative share of school/colleges counts, with a 45-degree line serving as a baseline of equality. The Gini co-efficient was calculated as the area between the Lorenz curves and the baseline of equality line. [80]

We created scatter plots to explore the relationship between applicant and entrant counts, with linear regression lines overlaid to capture trends by different school/college types.

To calculate the number of schools/colleges providing different numbers of applicants (or entrants), we computed summary statistics for the number of schools/colleges that fell within different applicant and entrant ranges (i.e. providing 1 to <5, 5 to <10, 10 to <20 and 20+ applicants or entrants). For each range, the mean values of minimum and maximum applicants/entrants were calculated, along with the total number of schools/colleges and the proportion of all schools/colleges that were accounted for within each range.

[80] Hasell, J. (2023). Measuring inequality: What is the Gini coefficient? *Our World in Data*. https://ourworldindata.org/what-is-the-gini-coefficient

We also split school/colleges into tertiles based on the number of medical applicants they provided over the entire period and examined which school/college types provided low, medium and high numbers of applicants. We regressed school entrant numbers against school applicant numbers, and plotted this relationship by school/college type to identify the types of school/colleges that provided relatively more or fewer entrants per applicant.

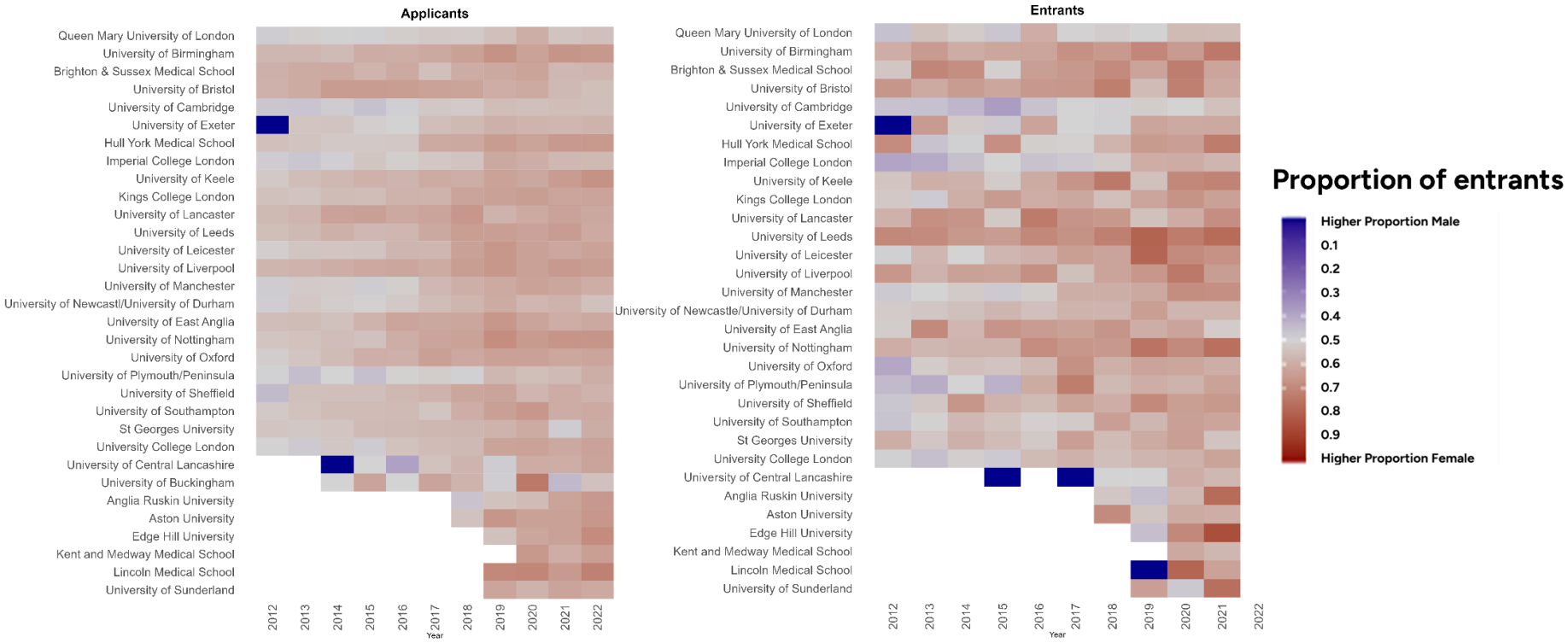
Supplementary Section 1

Gender and ethnic profile of applicants, offer-holders and entrants

Between 2012 and 2022 the proportion of female applicants, offer-holders and entrants to medical school rose from over half to around two thirds: in 2012 54% of applicants, 54% of offer-holders and 53% of entrants were female; by 2022 63% of applicants, 64% of offer-holders and 65% of entrants were female.

Variability in the proportion of women at different medical schools can be seen in the heatmap in Supplementary Figure 1.

Supplementary Figure 1: Heatmap showing the proportions of female applicants (left) and entrants (right) per medical school 2012 – 2022



English medical schools only. Blue cells represent higher proportions and redder cells represents lower proportions of male entrants. Different colours do not represent statistically significant differences and some cells may have small numbers. White indicates missing data.

Source: UKMED P197.

Averaging across the period from 2012 to 2022, it is clear from Supplementary Table 1 that applicants, offer-holders and entrants to medicine were very ethnically diverse, with strong representation in particular from the Asian Indian and Black African groups.

Supplementary Table 1: Numbers and proportions of medical school applicants, offer-holders and entrants by ethnic group, averaged 2012 to 2022

Ethnic group (18 categories)	Applicants N (%)	Offer Holders N (%)	Entrants N (%)
Asian - Bangladeshi	3,275 (3%)	1,370 (3%)	925 (3%)
Asian - Chinese	1,830 (2%)	1,070 (2%)	845 (2%)
Asian - Indian	12,205 (13%)	6,770 (14%)	5,065 (14%)
Asian - Other Asian background	6,975 (7%)	3,135 (6%)	2,230 (6%)
Asian - Pakistani	9,960 (11%)	4,095 (8%)	2,775 (7%)
Black - African	7,580 (8%)	2,655 (5%)	1,750 (5%)
Black - Caribbean	505 (1%)	185 (<1%)	125 (<1%)
Black - Other Black background	275 (<1%)	90 (<1%)	60 (<1%)
Mixed - Other Mixed background	1,395 (1%)	715 (1%)	520 (1%)
Mixed - White and Asian	2,520 (3%)	1,475 (3%)	1,140 (3%)
Mixed - White and Black African	555 (1%)	275 (1%)	190 (1%)
Mixed - White and Black Caribbean	480 (1%)	260 (1%)	175 (<1%)
Other ethnic background	3,865 (4%)	1,635 (3%)	1,160 (3%)
White	41,380 (44%)	25,010 (51%)	19,645 (53%)
Unknown or Prefer Not to Say	1,070 (1%)	535 (1%)	410 (1%)
Total	93,870	49,280	37,025

Cell counts rounded.

Application data that we downloaded from the UCAS website[81] showed that among 18-year-old applicants to UK universities by the June deadline from 2012 to 2022:

- 76% were from all White groups combined (vs 44% in our sample)
- 13% from all Asian groups combined (vs 36% in our sample)
- 5% from all Black groups combined (vs 9% in our sample)
- 4% from all Mixed groups combined (vs 6% in our sample)
- 2% from all other ethnic groups combined (vs 4% in our sample)

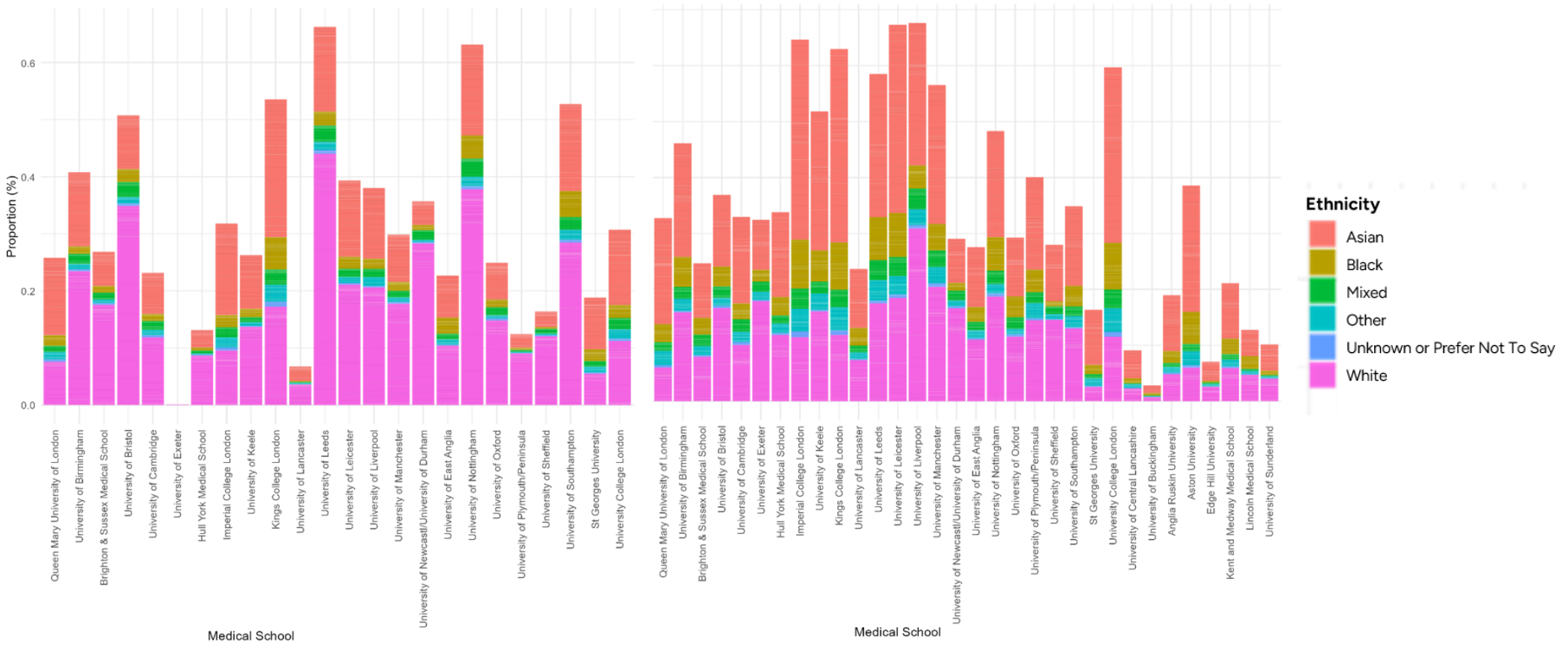
Between 2012 and 2022 there were large increases within medicine in the proportion of Asian and Black ethnic groups and a relative decrease among the White ethnic group. This change was particularly noticeable among applicants:

- In 2012, 55% of applicants were White, 30% were Asian, 6% were Black, 5% were Mixed and 3% were in the Other ethnic group.
- By 2022, the largest ethnic group among applicants was the Asian group at 43%, followed by the White group (35%), and the Black group (11%).
- Among entrants in 2021, students of White ethnicity (42%) slightly outnumbered those of Asian ethnicity (40%), while 8% of entrants were of Black ethnicity, 5% Mixed ethnicity and 4% in the other ethnic group.

Medical schools varied in the proportion of applicants from different ethnic groups they attracted and admitted, and this variability remained large even as overall numbers grew (Supplementary Figure 2).

[81] Universities and Colleges Admissions Service (UCAS). (2022). *2022 entry UCAS Undergraduate reports by sex, area background, and ethnic group*. https://www.ucas.com/data-and-analysis/undergraduate-statistics-and-reports/ucas-undergraduate-sector-level-end-cycle-data-resources-2022/2022-entry-ucas-undergraduate-reports-sex-area-background-and-ethnic-group

Supplementary Figure 2: Proportions of applicants from different ethnic groups by medical school in 2012 (left) and 2022 (right)



English medical schools only.

Source UKMED P19

New medical schools were more popular among applicants from ethnic minority groups compared to those from White or Mixed ethnicity groups:

- Nearly a quarter of all applicants of Black ethnicity (23%) applied to a new medical school, as did 22% of all Asian applicants, compared to 12% of White applicants and 14% of Mixed ethnicity;

- Forty five percent of entrants to new medical schools were Asian, 35% were White and 10% were Black, while at established medical schools, 35% of entrants were Asian, 48% were White and 6% were Black.

Gateway courses medical schools were also more popular among applicants from ethnic minority groups than among White groups:

- A third (34%) of all Black applicants, and more than one in six (17%) of all Asian applicants had applied to at least one gateway course, compared to only 6% of all White applicants;

- Nearly 1 in 5 (19%) of entrants to gateway courses were from Black ethnic groups compared to 5% of entrants to standard entry courses. By contrast, only 29% of gateway course entrants were from White ethnic groups, compared to 54% of standard entry entrants.

Predicted and achieved A-levels over time

Predicted grades were fairly stable from 2012 to 2022, varying by one point (equivalent to half a grade) between years on average.

Achieved A-level grades varied more between years, dropping in 2018 before rising again in 2020 at least in part because of the cancellation of A-level examinations during the pandemic. Grades were generally high, particularly among offer-holders and entrants. Averaging points across years from 2012 to 2022 showed:

- Applicants had 28.4 A-level points on average, equivalent to just over two A grades and one B grade.

- Offer-holders had 31.9 A-level points on average, equivalent to almost two A grades and one A*.

- Entrants had 31.9 A-level points on average, equivalent to almost two A grades and one A*.

Those who applied to and entered new medical schools had, on average, significantly lower predicted and achieved A-level grades than those applying to or entering established medical schools (Supplementary Table 2 and Supplementary Table 4).

Those who applied to or entered gateway courses also had, on average, significantly lower predicted and achieved A-level grades than those who applied to or entered standard entry courses. However the difference was around twice the size compared to the difference between new and established medical schools (Supplementary Table 3 and Supplementary Table 5).

Supplementary Table 2: Average performance in exams for applicants who applied to at least one new medical school compared to all established medical schools

		Mean	95% CI Lower	95% CI Upper	N
Predicted A-Level	All established schools	0.07	0.06	0.07	42,435
	1+ new school	-0.30	-0.32	-0.29	9,090
Achieved A-Level	All established schools	0.06	0.05	0.07	42,240
	1+ new school	-0.30	-0.32	-0.28	9,060
GCSE	All established schools	0.03	0.02	0.04	42,010
	1+ new school	-0.14	-0.16	-0.12	8,990
UCAT	All established schools	0.08	0.07	0.09	40,655
	1+ new school	-0.37	-0.39	-0.35	9,030

Data from 2018-2021 combined and z-transformed within applicants per year. Participant counts rounded.

Supplementary Table 3: Average performance in exams for applicants who applied to at least one gateway course compared to all standard entry courses

	Course type	Mean	95% CI Lower	95% CI Upper	N
Predicted A-Level	All standard courses	0.18	0.17	0.19	81,100
	1+ Gateway course	-1.14	-1.16	-1.12	12,770
Achieved A-Level	All standard courses	0.17	0.17	0.18	80,810
	1+ Gateway course	-1.10	-1.11	-1.08	12,660
GCSE	All standard courses	0.12	0.11	0.12	80,500
	1+ Gateway course	-0.75	-0.77	-0.73	12,640
UCAT	All standard courses	0.15	0.14	0.16	78,220
	1+ Gateway course	-0.96	-0.98	-0.95	12,080

Data from 2012-2021 combined and z-transformed within applicants per year. Participant counts rounded.

Supplementary Table 4: Average performance in exams for entrants to established and new medical schools

	Medical school type	Mean	95% CI Lower	95% CI Upper	N
Predicted A-Level	Established	0.42	0.41	0.43	17,105
	New	-0.02	-0.06	0.02	785
Achieved A-Level	Established	0.62	0.61	0.63	17,090
	New	0.20	0.17	0.24	785
GCSE	Established	0.31	0.30	0.32	17,045
	New	0.09	0.03	0.15	785
UCAT	Established	0.56	0.55	0.58	16,915
	New	-0.13	-0.18	-0.08	785

Data from 2018-2021 combined and z-transformed within applicants per year. Participant counts rounded.

Supplementary Table 5: Average performance in exams for entrants to standard entry and gateway courses

	Course type	Mean	95% CI Lower	95% CI Upper	N
Predicted A-Level	Standard entry	0.46	0.46	0.47	35,435
	Gateway	-0.63	-0.67	-0.58	1,590
Achieved A-Level	Standard entry	0.63	0.62	0.63	35,400
	Gateway	-0.34	-0.37	-0.31	1,590
GCSE	Standard entry	0.37	0.36	0.37	35,350
	Gateway	-0.32	-0.37	-0.28	1,580
UCAT	Standard entry	0.57	0.57	0.58	34,925
	Gateway	-0.47	-0.50	-0.43	1,565

Data from 2012-2021 combined and z-transformed within applicants per year. Participant counts rounded.

Supplementary Section 2

Unadjusted odds of receiving at least one offer to medicine 2012 and 2021

Results of four logistic regression analyses, calculating the raw (unadjusted) odds of applicants receiving at least one offer to study medicine by socio-economic group and by neighbourhood deprivation quintile, in 2012 and in 2021 are shown in Supplementary Table 6.

In both years, applicants from lower socio-economic groups and more deprived areas had higher odds of receiving an offer. In 2021 compared to 2012, applicants from lower socio-economic groups had increased odds of receiving an offer, however they still only had two thirds the odds of those in the highest socio-economic group. In 2021 compared to 2012, applicants from IMD1 had increased odds of receiving an offer, however their odds were still only just over half those of applicants from IMD5.

Supplementary Table 6: Unadjusted (raw) odds of receiving an offer for medicine by socio-economic group and index of multiple deprivation quintile, separately, in 2012 and in 2021

Socio-economic group	2012	2021
High (reference)	1.00	1.00
Medium	0.59 (0.51-0.68)	0.75 (0.67-0.85)
Low	0.36 (0.27-0.47)	0.65 (0.55-0.76)
Unknown	0.57 (0.49-0.67)	0.48 (0.43-0.53)
IMD quintile	**2012**	**2021**
IMD 5 (reference)	1.00	1.00
IMD 1	0.33 (0.28-0.39)	0.55 (0.50-0.62)
IMD 2	0.47 (0.41-0.55)	0.59 (0.53-0.66)
IMD 3	0.68 (0.59-0.78)	0.69 (0.62-0.77)
IMD 4	0.84 (0.74-0.95)	0.84 (0.76-0.94)

Adjusted odds of receiving at least one offer (all years)

Results of a hierarchical logistic regression of applicants receiving at least one offer are shown in Supplementary Table 7.

The base model (Model 1) included socio-economic status and IMD quintile controlling for year of application. The addition of academic attainment variables in Model 4 attenuated the effect of socio-economic status on the outcome and changed the direction of the effect of IMD1, so applicants from the most deprived quintile were more likely to receive an offer given their grades.

Supplementary Table 7: Adjusted odds of applicants receiving one or more offers to medical school

		Model 1	Model 2	Model 3	Model 4
		aOR (95%CI)	aOR (95%CI)	aOR (95%CI)	aOR (95%CI)
IMD quintile	1	**0.49 (0.47-0.52)**	**0.61 (0.58-0.64)**	**0.67 (0.64-0.71)**	**1.33 (1.25-1.42)**
	2	**0.53 (0.51-0.56)**	**0.63 (0.60-0.66)**	**0.68 (0.65-0.71)**	1.05 (0.99-1.11)
	3	**0.70 (0.67-0.73)**	**0.74 (0.71-0.78)**	**0.77 (0.74-0.81)**	**0.94 (0.89-0.99)**
	4	**0.82 (0.79-0.85)**	**0.84 (0.81-0.88)**	**0.86 (0.82-0.89)**	**0.94 (0.90-0.99)**
	5 (ref)	1.00	1.00	1.00	1.00
Socio-economic group	High (ref)	1.00	1.00	1.00	1.00
	Medium	**0.73 (0.70-0.77)**	**0.74 (0.70-0.77**	**0.77 (0.74-0.81)**	1.01 (0.96-1.07)
	Low	**0.67 (0.62-0.71)**	**0.72 (0.67-0.77)**	**0.77 (0.72-0.82)**	1.07 (0.99-1.16)
	Unknown	**0.61 (0.59-0.65)**	**0.66 (0.63-0.70)**	**0.68 (0.65-0.72)**	**0.97 (0.91-1.03)**

Year of application	2012	**0.74 (0.69-0.80)**	**0.73 (0.68-0.78)**	**0.72 (0.67-0.78)**	**0.68 (0.62-0.74)**	
	2013	**0.66 (0.62-0.71)**	**0.65 (0.60-0.69)**	**0.64 (0.60-0.69)**	**0.57 (0.53-0.62)**	
	2014	**0.70 (0.65-0.75)**	**0.69 (0.64-0.74)**	**0.69 (0.64-0.74)**	**0.61 (0.56-0.66)**	
	2015 (ref)	1.00	1.00	1.00	1.00	
	2016	1.00 (0.93-1.08)	1.01 (0.94-1.09)	1.01 (0.93-1.08)	1.00 (0.92-1.09)	
	2017	1.07 (0.99-1.15)	**1.08 (1.01-1.16)**	**1.08 (1.01-1.17)**	1.06 (0.98-1.15)	
	2018	**1.25 (1.17-1.34)**	**1.26 (1.18-1.35)**	**1.28 (1.19-1.37)**	**1.29 (1.18-1.40)**	
	2019	**1.44 (1.34-1.54)**	**1.46 (1.37-1.57)**	**1.49 (1.39-1.59)**	**1.49 (1.37-1.61)**	
	2020	**1.21 (1.13-1.30)**		**1.24 (1.16-1.33)**	**1.27 (1.19-1.36)**	**1.17 (1.08-1.27)**
	2021	**0.76 (0.71-0.81)**		**0.78 (0.73-0.83)**	**0.80 (0.75-0.85)**	**0.63 (0.58-0.68)**
Gender	Male (ref)			1.00	1.00	1.00
	Female			**1.14 (1.11-1.18)**	**1.16 (1.12-1.19)**	**1.41 (1.36-1.46)**

Region	London (ref)	1.00	1.00	1.00
	East Midlands	0.98 (0.92-1.05)	1.01 (0.94-1.07)	**1.17 (1.09-1.26)**
	East England	**1.07 (1.01-1.14)**	**1.13 (1.07-1.20)**	**1.25 (1.16-1.33)**
	North East	1.07 (0.99-1.17)	**1.11 (1.02-1.21)**	**1.26 (1.14-1.39)**
	North West	1.02 (0.97-1.07)	**1.12 (1.06-1.18)**	**1.18 (1.11-1.26)**
	South East	1.00 (0.95-1.05)	1.04 (0.98-1.09)	**1.06 (1.00-1.13)**
	South West	1.02 (0.96-1.09)	**1.09 (1.02-1.16)**	**1.18 (1.10-1.27)**
	West Midlands	**1.12 (1.06-1.18)**	**1.16 (1.10-1.23)**	**1.23 (1.15-1.31)**
	Yorkshire Humber	0.99 (0.93-1.05)	1.03 (0.97-1.09)	**1.28 (1.20-1.38)**
Ethnicity	White (ref)	1.00	1.00	1.00

	Asian	**0.72 (0.70-0.75)**	**0.72 (0.69-0.74)**	**0.87 (0.83-0.91)**
	Black	**0.44 (0.42-0.47)**	**0.45 (0.42-0.48)**	**0.92 (0.86-0.99)**
	Mixed	**0.86 (0.80-0.92)**	**0.84 (0.79-0.90)**	**0.90 (0.83-0.97)**
	Other	**0.59 (0.55-0.64)**	**0.60 (0.56-0.65)**	**0.90 (0.82-0.98)**
	Unknown	**0.82 (0.72-0.94)**	**0.79 (0.69-0.91)**	**0.83 (0.71-0.98)**
School/College	Academy/State School (ref)		1.00	1.00
	FE College		1.00	0.95 (0.85-1.06)
	Grammar School		**1.36 (1.26-1.46)**	0.98 (0.90-1.07)

	Independent School	**1.48 (1.42-1.54)**	**1.25 (1.20-1.31)**
	6th Form College	**0.83 (0.79-0.86)**	0.97 (0.92-1.02)
	Other	**0.68 (0.60-0.76)**	0.93 (0.81-1.08)
Academic attainment/predicted attainment	Predicted A-level z-score		**1.49 (1.46-1.53)**
	GCSE z-score		**1.32 (1.29-1.34)**
	UCAT cognitive z-score		**3.24 (3.16-3.32)**

Model 1 is the base model containing socio-economic status and IMD controlled for year of application. Models 2-4 add other demographic and academic factors incrementally. Adjusted odd ratios (aOR) <1 in red; >1 in Black, those in bold have 95% confidence intervals that do not cross 1.

Unadjusted odds of entering medical school 2012 and 2021

Supplementary Table 8 shows the results of four logistic regression analyses, calculating the raw (unadjusted) odds of offer-holders entering medical school by socio-economic group and by neighbourhood deprivation quintile, in 2012 and in 2021.

Differences by socio-economic group were not statistically significant, with the exception of 2012 when offer-holders from the lowest socio-economic group had lower odds of entering medical school compared to those in the highest socio-economic group. However, the confidence interval is very wide due to small numbers. In both years, offer-holders from IMD1 were less likely to enter medical school compared to those in IMD5.

Supplementary Table 8: Unadjusted (raw) odds of offer-holders entering medical school by socio-economic group and index of multiple deprivation, separately, in 2012 and 2021

Socio-economic group	2012	2021
High (reference)	1.00	1.00
Medium	0.77 (0.57-1.03)	0.82 (0.66-1.01)
Low	0.51 (0.29-0.90)	0.75 (0.56-1.00)
Unknown	0.79 (0.57-1.09)	0.76 (0.62-0.94)
IMD quintile	**2012**	**2021**
IMD 5 (reference)	1.00	1.00
IMD 1	0.66 (0.47-0.93)	0.74 (0.60-0.90)
IMD 2	0.75 (0.56-1.01)	0.76 (0.62-0.93)
IMD 3	0.94 (0.71-1.23)	0.87 (0.71-1.07)
IMD 4	1.13 (0.88-1.45)	0.78 (0.64-0.94)

Adjusted odds of entering medical school (all years)

Supplementary Table 9 shows the results of a hierarchical logistic regression of offer-holders entering medical school. The base model (Model 1) includes socio-economic status and IMD controlling for year of application.

Supplementary Table 9: Odds of offer-holders entering medical school

		Model 1	Model 2	Model 3	Model 4	Model 5
		aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Socio-economic group	High (ref)	1.00	1.00	1.00	1.00	1.00
	Medium	**0.77 (0.71-0.84)**	**0.77 (0.72-0.84)**	**0.79 (0.73-0.85)**	**1.17 (1.05 -1.30)**	**1.18 (1.06 -1.31)**
	Low	**0.70 (0.62-0.78)**	**0.72 (0.64-0.80)**	**0.73(0.65-0.82)**	1.13 (0.97 -1.32)	1.14 (0.97 -1.33)
	Unknown	**0.71 (0.66-0.78)**	**0.72 (0.66-0.79)**	**0.72 (0.66-0.79)**	1.08 (0.96 -1.21)	1.07 (0.95 -1.20)
IMD quintile	IMD1	**0.59 (0.54-0.64)**	**0.63 (0.58-0.69)**	**0.65 (0.60-0.72)**	**1.62 (1.43 -1.83)**	**1.59 (1.41 -1.80)**
	IMD2	**0.70 (0.64-0.75)**	**0.74 (0.68-0.80)**	**0.76 (0.70-0.82)**	**1.25 (1.12 -1.40)**	**1.25 (1.12 -1.40)**

	IMD3	**0.80 (0.74-0.86)**	**0.83 (0.77-0.89)**	**0.84 (0.78-0.91)**	1.00 (0.91 -1.10)	1.01 (0.92 -1.11)
	IMD4	**0.90 (0.84-0.97)**	**0.91 (0.85-0.98)**	**0.91 (0.85-0.98)**	1.03 (0.94 -1.12)	1.02 (0.93 -1.12)
	IMD5 (ref)	1.00	1.00	1.00	1.00	1.00
Year of application	2012	1.02 (0.89-1.17)	1.01 (0.88-1.15)	1.00 (0.88-1.15)	0.90 (0.76 -1.07)	0.92 (0.78 -1.09)
	2013	1.06 (0.93-1.22)	1.06 (0.92-1.21)	1.05 (0.92-1.21)	1.00 (0.84 -1.19)	1.05 (0.88 -1.25)
	2014	1.14 (0.99-1.31)	1.14 (0.99-1.31)	1.14 (0.99-1.31)	0.96 (0.81 -1.14)	0.99 (0.83 -1.17)
	2015 (ref)	1.00	1.00	1.00	1.00	1.00
	2016	0.97 (0.84-1.10)	0.98 (0.85-1.12)	0.97 (0.85-1.11)	0.87 (0.74 -1.03)	0.85 (0.72 -1.01)
	2017	**0.79 (0.70-0.90)**	**0.81 (0.71-0.92)**	**0.81 (0.71-0.92)**	**0.67 (0.57 -0.79)**	**0.62 (0.53 -0.74)**

	2018	**0.59 (0.52-0.66)**	**0.60 (0.53-0.68)**	**0.60 (0.53-0.68)**	**0.43 (0.37 -0.50)**	**0.39 (0.33 -0.45)**
	2019	**0.45 (0.40-0.50)**	**0.46 (0.41-0.51)**	**0.46 (0.41-0.52)**	**0.29 (0.25 -0.34)**	**0.26 (0.23 -0.30)**
	2020	1.03 (0.91-1.17)	1.07 (0.94-1.21)	1.07 (0.95-1.21)	1.13 (0.97 -1.32)	1.04 (0.89 -1.22)
	2021	**0.77 (0.68-0.87)**	**0.80 (0.71-0.90)**	**0.81 (0.71-0.91)**	**0.52 (0.45 -0.60)**	**0.52 (0.44 -0.60)**
Gender	Male (ref)		1.00	1.00	1.00	1.00
	Female		**0.79 (0.75-0.83)**	**0.79 (0.75-0.83)**	**0.84 (0.78 -0.90)**	**0.80 (0.75 -0.86)**
Ethnicity	White		1.00	1.00	1.00	1.00
	Asian		**0.89 (0.83-0.94)**	**0.89 (0.83-0.94)**	1.04 (0.96 -1.13)	1.05 (0.97 -1.13)
	Black		**0.72 (0.64-0.80)**	**0.72 (0.65-0.81)**	**1.28 (1.11 -1.48)**	**1.30 (1.13 -1.50)**

	Mixed	**0.88 (0.78-0.98)**	**0.87 (0.77-0.97)**	0.95 (0.82 -1.10)	0.95 (0.82 -1.10)
	Other	0.89 (0.77-1.03)	0.89 (0.77-1.03)	1.11 (0.92 -1.34)	1.12 (0.93 -1.36)
	Unknown / Withheld	0.96 (0.76-1.23)	0.94 (0.74-1.21)	1.15 (0.85 -1.59)	1.17 (0.86 -1.61)
Region of applicant home postcode	London (ref)	1.00	1.00	1.00	1.00
	East Midlands	0.99 (0.89-1.11)	1.00 (0.90-1.12)	**1.38 (1.20 -1.59)**	**1.35 (1.17 -1.56)**
	East of England	1.02 (0.93-1.13)	1.03 (0.94-1.14)	**1.26 (1.11 -1.43)**	**1.24 (1.09 -1.41)**
	North East	0.96 (0.84-1.11)	0.98 (0.85-1.12)	**1.37 (1.14 -1.64)**	**1.34 (1.12 -1.61)**
	North West	**1.12 (1.02-1.23)**	**1.14 (1.04-1.25)**	**1.24 (1.10 -1.40)**	**1.22 (1.08 -1.37)**
	South East	1.05 (0.96-1.15)	1.06 (0.97-1.16)	1.09 (0.97 -1.21)	1.08 (0.96 -1.20)

	South West	**0.86 (0.78-0.96)**	0.90 (0.81-1.00)	0.96 (0.84 -1.09)	0.95 (0.83 -1.09)
	West Midlands	1.02 (0.93-1.12)	1.04 (0.95-1.14)	**1.22 (1.09 -1.38)**	**1.19 (1.05 -1.34)**
	Yorkshire and The Humber	1.01 (0.91-1.12)	1.01 (0.92-1.13)	**1.34 (1.18 -1.54)**	**1.31 (1.14 -1.50)**
School/college type	Academy/State School (ref)		1.00	1.00	1.00
	Further Education College		**0.74 (0.63-0.87)**	0.94 (0.76 -1.17)	0.96 (0.78 -1.20)
	Grammar School		1.05 (0.93-1.19)	0.86 (0.74 -1.00)	0.85 (0.73 -1.00)
	Independent School		**1.26 (1.18-1.35)**	**1.11 (1.02 -1.20)**	1.07 (0.99 -1.17)
	Sixth Form College		**1.13 (1.04-1.22)**	**1.27 (1.15 -1.40)**	**1.29 (1.16 -1.42)**
	Other		**1.43 (1.11-1.85)**	**1.74 (1.26 -2.45)**	**1.85 (1.34 -2.61)**
Academic attainment	A-level points (z score)			**12.20 (11.48 - 12.96)**	**11.94 (11.24 - 12.69)**

	GCSE points (z score)	1.02 (0.98 -1.06)	1.00 (0.96 -1.04)
	UCAT cognitive points (z score)	**1.10 (1.05 -1.15)**	0.98 (0.94 -1.03)
UCAS offers for medicine	One offer (ref)		1.00
	Two or more offers		**1.98 (1.85 -2.13**)

Model 1 is the base model containing socio-economic status and IMD controlled for year of application. Models 2-5 add other demographic, academic and application factors incrementally. Adjusted odd ratios (aOR) <1 in red; >1 in Black, those in bold have 95% confidence intervals that do not cross 1.

Supplementary Section 4

From Supplementary Table 10 it can be seen that higher socio-economic group and higher predicted A-levels were both predictors of higher UCAT score, as were male gender, White ethnicity, applying to medicine from a grammar or independent school. The interaction between predicted A-levels and socio-economic group is also significant, indicating that the relationship between predicted A-levels and UCAT was significantly different in the socio-economic groups.

Supplementary Table 10: Linear regression of UCAT cognitive score (z-transformed) onto predicted A-level points (z-transformed), adjusted for socio-economic group and the interaction between predicted A-levels and socio-economic group, controlling for gender, ethnicity and school/college type.

		Beta	SE	P value
Intercept		0.42	0.01	<0.0001
Predicted A-levels (z-score)		0.42	0.00	<0.0001
Socio-economic group	High (ref)	-	-	-
	Medium	-0.22	0.01	<0.0001
	Low	-0.29	0.01	<0.0001
Gender	Male (ref)	-	-	-
	Female	-0.15	0.01	<0.0001
Ethnicity	White (ref)	-	-	-
	Asian	-0.20	0.01	<0.0001
	Black	-0.56	0.01	<0.0001
	Mixed	-0.06	0.01	<0.0001
	Other	-0.40	0.02	<0.0001
	Unknown	-0.15	0.03	<0.0001

School/College type	Academy/State (ref)	-	-	-
	FE College	-0.23	0.02	<0.0001
	Grammar	0.23	0.02	<0.0001
	Independent	0.19	0.01	<0.0001
	Sixth Form College	-0.16	0.01	<0.0001
	Other	0.03	0.03	0.2463
Interaction between predicted A-levels and socio-economic group	Pred A-level * High SEG (ref)	-	-	-
	Pred A-level * Medium SEG	-0.03	0.01	0.0005
	Pred A-level * Low SEG	-0.04	0.01	0.0022

Data from 2012-2021 combined.

Supplementary Section 5

On 10 October 2024 we downloaded publicly available data on all English Schools or Colleges in academic year 2021/2022 from the Department for Education UK Government website.[82] We selected to download data on "All of England". We categorised the schools/colleges on the list into: Academy/State Schools, Independent Schools, Grammar (Selective State Schools), Further Education Colleges, Sixth Form Colleges, and Other, using the following method:

First, we selected those where the maximum age is 18 or older (AGEH>17 including 99 and BLANKS). This resulted in 4551 schools/colleges. Then we categorised schools/colleges as follows:

- Independent: MINORGROUP=Independent (n=750)

[82] Department for Education. (2022). *School and college performance measures* [Dataset]. https://www.gov.uk/government/collections/school-and-college-performance-measures

- Academy/State Non-Selective: (MINORGROUP= Academy OR Maintained School) AND (ADMPOL=Non-Selective OR Not Applicable OR BLANKS) (n=2144)

- Grammar (State Selective)=(MINORGROUP= Academy OR Maintained School) AND (ADMPOL= Selective) (n=165)

- Further Education College =(MINORGROUP=College AND SCHOOLTYPE=Further Education or Free school 16-19) (n=303)

- Sixth Form= (MINORGROUP=College AND (SCHOOLTYPE=Sixth Form Centres) (n=18)

This totalled 3380 schools/colleges, leaving 1171 uncategorised. Of these, 1164 were categorised as Special Schools (MINORGROUP=Special School) and 7 were categorised as Other.

We were unable to directly map the schools/colleges that appeared in our sample in 2022 onto the DfE list from 2021/22, however an approximation is given in Supplementary Table 11, which shows that around 60% of State Schools provided an applicant, 49% of Independent Schools, 23% of Grammar schools and 58% of FE Colleges or Sixth Form Colleges.

Supplementary Table 11: Comparison of schools/college (UCAS centre) types in our UKMED sample with the categories of schools provided by the Department for Education UK Government Statistics for all schools and colleges providing education up to the age of 18 in England in 2021/22

	At least one applicant 2022	DfE (gov.uk) 2021/22	Proportion with 1+ medical applicants per year
State/Academy	1296	2144	0.60
Independent	370	750	0.49
Grammar (selective state)	38	165	0.23
Sixth form College or FE College	187	321	0.58
Other (UCAS)	8	N/a	N/a
Other (DfE)	N/a	7	N/a
Special Schools	N/a	1164	N/a
Total	1899	4551	0.42

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