Medical school applicants from ethnic minority groups: identifying if and when they are disadvantaged

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Abstract
Objective—To assess whether people from ethnic minority groups are less likely to be accepted at British medical schools, and to explore the mechanisms of disadvantage.
Design—Prospective study of a national cohort of medical school applicants.
Setting—All 28 medical schools in the United Kingdom.
Subjects—6901 subjects who had applied through the Universities' Central Council on Admissions in 1990 to study medicine.
Main outcome measures—Offers and acceptance at medical school by ethnic group.
Results—Applicants from ethnic minority groups constituted 26.3% of those applying to medical school. They were less likely to be accepted, partly because they were less well qualified and applied later. Nevertheless, taking educational and some other predictors into account, applicants from ethnic minority groups were 1.46 times (95% confidence interval 1.19 to 1.74) less likely to be accepted. Having a European surname predicted acceptance better than ethnic origin itself, implying direct discrimination rather than disadvantage secondary to other possible differences between white and non-white applicants. Applicants from ethnic minority groups fared significantly less well in 12 of the 28 British medical schools. Analysis of the selection process suggests that medical schools may make fewer offers to such applicants than to others with equivalent estimated A level grades.
Conclusions—People from ethnic minority groups applying to medical school are disadvantaged, principally because ethnic origin is assessed from a candidate’s surname; the disadvantage has diminished since 1986. For subjects applying before A level the mechanism is that less credit is given to referees' estimates of A level grades. Selection would be fairer if (a) application forms were anonymous; (b) forms did not include estimates of A level grades; and (c) selection took place after A level results are known.

Introduction
The selection of medical students is necessarily controversial since the number of able applicants exceeds the number of places. Those selecting have a duty to ensure that selection is fair and a legal obligation under the Race Relations Act 1976 and the Sex Discrimination Act 1975 to ensure that selection does not discriminate according to ethnic origin or sex. Agreement is also lacking on the balance of academic and non-academic characteristics needed for a course that leads to a registrable qualification for medical practice. Those selecting also need to ensure that the medical students chosen are well qualified to cope with a demanding course and have the best potential to practise effectively as doctors.

In 1986 the proportion of medical students with non-European surnames differed significantly between London medical schools. Such data, however, could not indicate "racial discrimination" because entrants with equivalent qualifications were not shown to differ in their success at selection. Reanalysis of our 1981 cohort of medical school applicants showed that applicants with non-European surnames were less likely to be accepted, even after taking differences in academic qualifications into account. In 1987 the Commission for Racial Equality investigated the specific admissions procedure at St George's Hospital Medical School in London and found evidence for discrimination by race and by sex. Cohort studies in 1981 and 1986, however, found no evidence of discrimination against women. In the 1986 cohort ethnic origin was based on self reporting, and clear evidence emerged that applicants from ethnic minority groups were less likely to be accepted than white applicants with equivalent qualifications.

As a result of the commission's inquiry and earlier research the (then) Universities' Central Council on Admissions began collecting routine statistics in the autumn of 1989 from applicants on ethnic origin. For university applicants in general, applicants from ethnic minority groups tend to be of lower social class, to have lower educational qualifications, and to have less access to more examinations, although such factors only partly explain a lower success rate. Applicants from ethnic minority groups also apply more to higher status institutions, for high demand and competitive courses such as medicine and law, and to local institutions; all such factors make success less likely.

To show that applicants from ethnic minority groups are disadvantaged is not straightforward; it requires prospective information and comparison of those who are successful and those who are not after accounting for relevant background factors. We describe a large study of applicants for admission in October 1991 to five English medical schools. The study examined 68% of all home applicants to British medical schools and is large enough to assess selection individually at most British medical schools as each candidate can apply to five.

Subjects and methods
The study considered all subjects who applied through the Universities' Central Council on Admissions in 1990 to study medicine in October 1991 at one of three medical schools of the University of London (St Mary's Hospital Medical School, University College and Middlesex School of Medicine (now University College London Medical School), and the United Medical and Dental Schools of Guy's and St Thomas's Hospitals) or to the medical school of the University of Sheffield or University of Newcastle upon Tyne. These English medical schools were chosen because jointly they were geographically disparate and received a high proportion of all applications to British medical schools. Since each applicant makes five university applications, of which typically only one is to the five schools in our study, the other applications on the form allow the indirect study of selection at the remaining 23 medical schools in the United Kingdom. Final destinations of candidates,
basic background information, and results at A and AS level were provided by the Universities' Central Council on Admissions at the end of selection. Detailed information on all qualifications, including O levels, GCSEs, and estimated A level grades, were coded from the forms for all applicants applying by the official closing date of 15 December 1990. Mean examination grades were calculated from results using a score of five for a pass at grade A, of four at grade B, of three at grade C, of two at grade D, and of one at grade E; other grades were scored as zero. AS levels were included in calculating the mean grade at A level, scores being weighted as half those for A levels. All applicants applying by the closing date who were resident in the European Community were sent a detailed questionnaire, which asked about demographic variables and attitudes and opinions on a range of topics and included various specific psychological inventories. Whenever possible measures reported here are comparable with those in previous studies, although inevitable differences mean that strict comparison with previous studies is not always possible. We note in particular that the 1991 cohort was the first to take GCSE examinations, and that older applicants had taken O levels; that previous studies had not included applicants for the 1st MB examination; that instead of ranking their five choices applicants for 1991 were allowed to mark a "strong preference" for one choice with an asterisk; ethnic origin is as reported by the candidate on the application form, with supplementary information on ethnic origin derived from our questionnaire. In addition, a non-European surname, previously shown to be assessed reliably by independent rates, was coded if either of the two raters (BCW and KAS) reported a surname as non-European. Overall, the rates showed 93.7% agreement, and Cohen's k statistic was 0.853, showing 85.3% agreement after correction for chance. 

Logistic regression used the program GLIM, with missing values replaced by means. Structural equation modelling was used LISREL; because some variables were not normally distributed owing to ceiling and floor effects restricting the possible range and others were categorical, covariance matrices were computed with PRELIS, with all variables treated as censored above and below; listwise deletion was used for missing data. All other statistical analysis was with SPPS-X.

Results
Our study considered the application forms of 6901 subjects who applied to at least one of the five participating medical schools (55% applied only to one participating school, 8% to more than two, and none to all five). Since most applicants had applied to five medical schools in total, most of which were not participating schools, it was possible in principle to assess application and acceptance at all medical schools. Of the 6901 applicants, 2962 were accepted at one of the 28 medical schools in the United Kingdom (2905 for 2nd MB and 57 for 1st MB (premedical courses), representing 69.7% of the 4248 subjects accepted for medicine in the United Kingdom. A total of 5918 of these applicants had applied to the Universities' Central Council on Admissions by the closing date and had a postal address in the European Community and were sent questionnaires; of the remainder, 352 applied late and the rest had addresses outside the community. Of the 5918 applicants sent questionnaires, 5388 (91%) responded and 2814 (47.5%) were admitted to a medical school. Of the total 6901 applicants in the study, 5553 were British nationals; since non-British nationals are typically more heterogeneous and often subject to specific quotas for admission, the remainder of this report considers only British nationals, of whom 2619 (47.2%) were accepted at medical school. Of the 5553 British nationals, 5152 received a questionnaire (the remainder had addresses outside the European Community, applied late, or had their questionnaires returned as undeliverable by the post office); and it was returned by 4791 (93.0%).

NUMBERS OF APPLICANTS AND ENTRANTS FROM ETHNIC MINORITY GROUPS

Table I compares the proportions of the various ethnic groups in university applicants and entrants in general (based on data from the Universities' Central Council on Admissions6), and medical school applicants and entrants (present study), with population estimates from the 1991 census. The ethnic mix of the applicants and of the general population was clearly different, Asian groups being overrepresented and Afro-Caribbean groups being underrepresented relative to population proportions. In addition, the proportion of applicants to British medical schools who were from ethnic minority groups, as indexed by a non-European surname, increased from 11.2% in 1981 to 22.9% in 1986 and 26.3% in 1991.

COMPARISON OF ETHNIC MINORITY AND WHITE APPLICANTS

Applicants from ethnic minority groups differed from white applicants in several ways. Table II summarises statistics on selected educational, demographic, application, and outcome measures and compares those who were accepted with those who were not, white with non-white applicants, black with Asian applicants, subgroups of Asian applicants (Indian, Pakistani, Bangladeshi, Chinese, and other Asian), and applicants who chose not to tell the Universities' Central Council on Admissions their ethnic origin with other applicants.

PREDICTORS OF OVERALL SUCCESS

Successful and unsuccessful applicants were compared by multiple logistic regression with acceptance as the dependent variable. Thirty variables were entered into the analysis and successfully removed in order of significance by backwards elimination with a criterion of P<0.01. Table III shows, in order of significance, the significant predictors (all P<0.001) of success. The remaining 22 variables in the analysis were not significant (five choices on form; two or fewer choices on form; two or fewer medical schools on form; number of London medical schools on form; application to Oxford or Cambridge University; application for 1st MB course; being a mature student; being female; being from the north of Britain; having

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The image contains a table labeled "TABLE I—Numbers (percentages) of people from ethnic minority groups in medical school and university applicants and in general population (census data)." The table has columns for Medicine, Applicants, and Entrainers, and rows for White, Asian, Indian, Pakistanis, Bangladeshis, Chinese, and Other Asian. The table also includes columns for Applicants (1991) and Entrainers (1991), and a Total population (aged 16+) column. The table provides data for various ethnic groups, comparing applicants and entrants with the general population.
TABLE II—Significance of comparisons between applicants who were successful and unsuccessful in being accepted into medical school and between applicants from different ethnic groups. Values are percentages of applicants unless stated otherwise.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Accepted (n=443)</th>
<th>Rejected (n=995)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>4</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>Asian</td>
<td>4</td>
<td>5</td>
<td>1.00</td>
</tr>
<tr>
<td>Indian</td>
<td>4</td>
<td>5</td>
<td>1.00</td>
</tr>
<tr>
<td>Pakistani</td>
<td>4</td>
<td>5</td>
<td>1.00</td>
</tr>
<tr>
<td>White</td>
<td>4</td>
<td>5</td>
<td>1.00</td>
</tr>
<tr>
<td>BA</td>
<td>4</td>
<td>5</td>
<td>1.00</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>5</td>
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<tr>
<td>BHS</td>
<td>4</td>
<td>5</td>
<td>1.00</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>5</td>
<td>1.00</td>
</tr>
</tbody>
</table>

TABLE III—Significant predictors of entry to medical school in 1991 by multiple logistic regression analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Significance</th>
<th>Odds ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean A level grade</td>
<td>Z=37.1</td>
<td>10.10 per unit increase in mean grade (8.94 to 11.42)</td>
</tr>
<tr>
<td>No of levels</td>
<td>Z=10.23</td>
<td>1.50 per A level (1.38 to 1.62)</td>
</tr>
<tr>
<td>Mean GCSE grade</td>
<td>Z=32.24</td>
<td>3.06 per unit increase in mean grade (2.52 to 3.73)</td>
</tr>
<tr>
<td>No of choices for medicine</td>
<td>Z=8.41</td>
<td>3.19 if all five choices for medicine (2.44 to 4.19)</td>
</tr>
<tr>
<td>Date of application</td>
<td>Z=5.91</td>
<td>1.75 per 28 days before closing date (1.22 to 1.49)</td>
</tr>
<tr>
<td>Previous applications</td>
<td>Z=5.16</td>
<td>1.92 if previous application (1.67 to 2.24)</td>
</tr>
<tr>
<td>Mean O level grade</td>
<td>Z=4.84</td>
<td>1.79 per unit increase in mean grade (1.41 to 2.26)</td>
</tr>
<tr>
<td>Ethnic origin</td>
<td>Z=7.72</td>
<td>1.46 if not from ethnic minority group (1.19 to 1.74)</td>
</tr>
</tbody>
</table>

DIFERENCES BETWEEN ETHNIC GROUPS

Comparison of the success of the various ethnic groups after taking into account showed no significant difference in success between black, Asian, and other groups (χ²=1.2, df=2, NS) or between the five Asian subgroups (χ²=3.6, df=4, NS).

ETHNIC ORIGIN, SURNAME, LANGUAGE, PLACE OF BIRTH, AND PARENTS' AND GRANDPARENTS' PLACE OF BIRTH

Members of ethnic minority groups differ from the majority of the population in several ways (table II); they are members of a particular ethnic group, with its own characteristic geographical, genetic, and cultural origins; they typically have surnames distinguishable from non-minority surnames; they are sometimes less acculturated in British society, as indexed by not having been born in the United Kingdom or having parents or grandparents who were not born in the United Kingdom; and English is not always their mother tongue, assessed as having learnt English after the age of 3. The locus of disadvantage can therefore be partitioned for the separate effects of each variable. That the five measures do have additional predictive value was shown by entering them in the logistic regression after ethnic origin (non-white v white) had been entered (χ²=20.06, df=5, P<0.001); this effect was entirely due to non-European surname, which predicted acceptance after the other variables were taken into account (χ²=11.53, df=1, P<0.001; odds ratio 1.68 (95% confidence interval 1.25 to 2.27) lower for those with non-European surnames). With surname taken into account the disadvantage of non-white applicants was not significant (χ²=0.002, df=1, NS; odds ratio 0.99 (0.74 to 1.33) less likely to be accepted). Parents' and grandparents' place of birth and the applicant's age at learning English were not significant when surname was taken into account.

DIFFERENCES BETWEEN MEDICAL SCHOOLS

We found that a non-European surname predicted overall lack of success at application after the seven variables mentioned earlier had been taken into account. Overall outcome, however, is the aggregate of the processes at the individual medical schools to which an applicant has applied. Selection at each of the 28 medical schools in the United Kingdom was analysed separately to assess how the eight predictors (substituting a non-European surname for ethnic origin) (table III) predicted an offer at a particular school. Figure 1 shows the disadvantage of having a non-European surname after the seven other predictors had been accounted for; a test for homogeneity of effect sizes showed significant differences between

![Disadvantage of having non-European surname among applicants applying to British medical schools. Values are odds ratios with 95% confidence intervals, and schools are arranged in order of effect within their group.](image-url)
school applicants (3%-0%). In contrast, subjects from an Asian background were overrepresented relative to population proportions (4%-7%), both among medical school applicants (23%-6%) and among entrants (18%-2%). Nevertheless, overall a smaller proportion of equivalently qualified applicants from ethnic minority groups was accepted relative to white applicants. One reason might be that white applicants were judged to be stronger on non-academic qualities, although our findings of the central role of surnames argue against that conclusion. Another might be a response to the perceived disproportionate number of applicants from ethnic minority groups, although such a reason would not be legitimate. The law is clear that selection or rejection of candidates must be entirely on a person's merits.

**WHERE DISCRIMINATION OCCURS**

White applicants were advantaged relative to non-white applicants (odds ratio 1.46 (1.19 to 1.74)), although the extent of the advantage was lower than that found in the 1986 cohort (odds ratio 2.7 (1.9 to 3)). Having a non-European surname was a more powerful predictor of disadvantage than ethnic origin itself, with ethnic origin providing no additional predictive power over surname. This suggests that the poorer performance of candidates from ethnic minority groups (which did not differ between ethnic groups) is unlikely to result from particular academic or non-academic behaviours characteristic of particular groups and that instead the disadvantage is predominantly associated with members of the groups who have certain surnames. Since surnames are but arbitrary labels that reveal nothing of a person's aptitudes or abilities, the implication is that surnames are principally being used in selection to identify the ethnic origin of applicants and thereby to discriminate against them. The size of the disadvantage differed between medical schools, probably reflecting further, but unmeasured, differences between medical schools. Because students with the largest reducer of numbers in application we suspect that it is the main place where discrimination occurs, as is also the case in postgraduate selection.

The path analysis of the process of selection is important in understanding why non-white applicants are less likely to be accepted. Although referees' estimates of A level grades are equally predictive of eventual achievement in white and non-white candidates, higher estimates are more likely to result in an offer in white than non-white candidates. This is probably the main point where disadvantage is experienced by applicants from ethnic minority groups; it occurs early in the selection process, a conditional offer being the principal hurdle in selection so that a large number of applicants will be affected. Non-white applicants are also less likely to be accepted through mechanisms that apply after A level grades are known. The overall result is that with equivalent academic achievement, non-white candidates are less likely to be accepted than are white candidates.

**THE WAY FORWARD AND SOME GOOD NEWS**

Our study shows that judged principally by examination performance, medical school selection is not fair to candidates from ethnic minority groups. We believe that this means that the process would be fairer if application forms forwarded to universities were anonymous and identified only by arbitrary code numbers, with universities being informed of a candidate's name only for the purposes of interview. If candidates could apply to medical school only after A level the bias against non-white applicants of using estimated A level grades would be eliminated and the present handicap experienced by those who apply
Key messages

• The proportions of medical school applicants from different ethnic groups are different from those in the general population, with some groups being overrepresented and others underrepresented relative to their age group.

• Applicants from ethnic minority groups continue to fare less well in being selected for medical school, although the extent of disadvantage is reduced in comparison with previous studies.

• Since surname is a better predictor of disadvantage than ethnic origin as such, discrimination could be reduced by making application forms anonymous.

• The locus of disadvantage in applicants is principally that estimated A level grades on application forms are given less weight in ethnic minority applicants—the problem could be circumvented by selecting medical students after they have their A Level results.

• No disadvantage was experienced by female applicants, mature applicants, or those from public sector schools, and no advantage was shown for those from medical families.

This study could not have taken place without the cooperation and help of the following people: Dr George Tait, Ms Fiona Bishop, Mr Dominic Farnsworth, Mr Simon Richardson, Ms Angela Richards (St Mary's Hospital Medical School); Dr Hywel Thomas, Dr Robert Linton, Dr Mary Dyson, Dr Phil Richardson, Ms Linda Kent (United Medical and Dental Schools of Guy’s and St Thomas's Hospitals); Dr John Foreman, Ms Gwen Austin (University College London); Dr Christine Sexton (Sheffield); Dr Mike Laker, Dr Reg Jordan, Mr David Minto (Newcastle upon Tyne). We also thank the Universities' Central Council on Admissions, particularly Mr Stuart Smith, for help in providing the final destinations of candidates. The Leverhulme Trust and the Department of Health provided financial support. Finally, we thank the applicants who completed our very long questionnaires.

5 McManus IC, Richards P, Maitlis SL. Prospective study of the disadvantage of people from ethnic minority groups applying to medical schools in the United Kingdom. BMJ 1989;298:723-6.

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