Applicant characteristics and their influence on success: results from an analysis of applicants to the University of Adelaide Medical School, 2004–2007

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Admission to medical school in Australia and elsewhere is highly competitive, and there are ongoing debates about the admission processes used by medical schools.[1-3] The demographic and social profile of medical school cohorts has implications for the future medical workforce, particularly the discipline of medicine a graduate selects and where they may practise.[4] Ethnic minority students are more likely to practise in areas of medical workforce shortage and to treat disadvantaged patients,[4] and medical students from rural backgrounds are more likely to practise in rural areas.[5] Any admission process should therefore ensure that a broad range of population subgroups are reflected in the successful applicants, while they should also meet all other criteria. The British Medical Association has stated that doctors should be as representative as possible of the society they service in order to provide the best possible care for a country's population.[6,7]

Over the past decade, Australia has seen great changes in medical school selection processes, with the aim of broadening the applicant pool and selecting the most suitable candidates for medicine.[6] Most medical schools now use a combination of cognitive aptitude testing, prior academic performance, and interviews. In light of these changes, monitoring admission procedures is important, particularly to ensure that factors such as social class, type of education (government or non-government school), ethnicity and sex do not become significant predictors of short-listing or interviewing success. The little research undertaken on medical school applicants, mainly from the United Kingdom and the United States, indicates that inequalities around socioeconomic status,[8] social class,[9] ethnicity[10-12] and sex[7] can occur in the selection process. However, there have been few published studies on the predictors of applicant success in Australian medical schools.[13]

We aimed to describe the characteristics of applicants to the University of Adelaide Medical School (hereafter referred to as the Medical School) and determine which characteristics influence a successful outcome

ABSTRACT

Objective: To determine the applicant characteristics that influence success at each application stage for entry to the University of Adelaide Medical School.

Design, setting and participants: Retrospective analysis of characteristics associated with a successful outcome to an undergraduate-entry medical school for 6699 applicants from four cohorts (2004–2007).

Main outcome measures: Offer of an interview, offer of a place, and acceptance of a place in the medical school.

Results: Female applicants were less likely to gain an interview (odds ratio [OR], 0.88; 95% CI, 0.78–0.99) but more likely to receive an offer of a place (OR, 1.33; 95% CI, 1.07–1.66). Older applicants were less likely than younger applicants (OR, 0.78; 95% CI, 0.71–0.86) and non-school leavers (applying after leaving school) were more likely than school leavers (applying while at school) (OR, 9.54; 95% CI, 6.16–14.78) to receive an offer of an interview. Applicants from areas of high socioeconomic status were more likely to gain an interview (quartile 1 v 4: OR, 0.55; 95% CI, 0.45–0.68). The more interviews an applicant had, the more likely he or she was to be offered a place (OR, 1.49; 95% CI, 1.34–1.66).

Conclusion: This study indicates that some applicant characteristics have a significant influence on the success of an application at particular stages, but overall there does not appear to be a large or inherent systematic bias in the selection process at the University of Adelaide Medical School.

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and whether any systematic biases occur in the process.

METHODS

Admission process

The Medical School offers a 6-year undergraduate-entry course. The selection process used during this study was introduced in 1997 with the aim of selecting students for an integrated curriculum with concurrent preclinical and clinical study, and a self-directed learning and problem-based focus. The selection process has three components: the Undergraduate Medicine and Health Sciences Admission Test (UMAT), which assesses logical reasoning, problem solving, interaction skills and non-verbal reasoning;[14] the oral assessment, which assesses a number of humanistic non-cognitive qualities; and a threshold matriculation score equivalent to a Tertiary Entrance Rank of 90.

Ethics approval for this study was provided by the University of Adelaide Human Research Ethics Committee.

Participants

Data for all students applying to the Medical School were provided by the Medical School Admissions Office. The data were analysed retrospectively for all applicants applying for places commencing in 2004, 2005, 2006 and 2007, who were Australian citizens or permanent residents, and who had completed the standard application process in that year. The study excluded international students applying for fee-paying places, deferrers from previous years, Aboriginal and Torres Strait Islander applicants, and applicants processed through the tertiary transfer scheme (a new addition to the admission process in 2005). This scheme allowed about 10 students to apply during their first or second year of another undergraduate degree program at the University of Adelaide; the process includes the UMAT and interview, but uses a grade point average instead of the Tertiary Entrance Rank.

The data used are collected routinely as part of the medical school application process. Additional information was obtained

1 Number of applicants and proportion of previous application stage, 2004–2007*

Stage of process	2004	2005	2006	2007
Applicants	1494	1556	1697	1952
Interviews	394 (26.4%)	386 (24.8%)	396 (23.3%)	586 (30.0%)
Offers	255 (64.7%)	213 (55.2%)	159 (40.2%)	350 (59.7%)
Acceptances	93 (36.5%)	75 (35.2%)	65 (40.9%)	105 (30.0%)

* Excludes Aboriginal and Torres Strait Islander applicants, tertiary transfer scheme applicants, deferrers from previous cohorts, and international students applying for fee-paying places. ◆

2 Selected characteristics of applicants, by application stage, 2004–2007*

Applicant characteristics	Applicants	Interviews	Offers
Total	6699	1762	977
Age 17–18 years	5961 (89.0%)	1497 (85.1%)	821 (84.3%)
Female	3919 (58.5%)	990 (56.3%)	585 (60.1%)
Home state			
New South Wales	1138 (17.0%)	380 (21.7%)	213 (21.9%)
Victoria	1925 (28.7%)	567 (32.3%)	330 (34.0%)
South Australia	2347 (35.0%)	450 (25.7%)	247 (25.4%)
Queensland	392 (5.9%)	117 (6.7%)	56 (5.7%)
Western Australia	358 (5.3%)	93 (5.3%)	49 (5.1%)
NT/Tasmania/ACT	313 (4.7%)	98 (5.6%)	56 (5.8%)
Overseas	226 (3.4%)	48 (2.7%)	20 (2.1%)
IRSD — home			
Quartile 1 (greatest disadvantage)	944 (14.1%)	161 (9.2%)	100 (10.3%)
Quartile 4 (least disadvantage)	4672 (69.7%)	1366 (77.6%)	766 (78.6%)
Unknown or overseas	249 (3.7%)	62 (3.5%)	27 (2.8%)
IRSD — school			
Quartile 1 (greatest disadvantage)	482 (7.2%)	102 (5.8%)	57 (5.9%)
Quartile 4 (least disadvantage)	4661 (69.6%)	1301 (73.9%)	727 (74.6%)
Unknown or overseas	971 (14.5%)	244 (13.9%)	138 (14.2%)
Home location			
Urban	5645 (84.3%)	1508 (85.7%)	837 (85.9%)
Rural	824 (12.3%)	192 (10.9%)	112 (11.5%)
Unknown or overseas	230 (3.4%)	60 (3.4%)	26 (2.7%)
School location			
Urban	5194 (77.5%)	1394 (79.1%)	769 (78.9%)
Rural	540 (8.1%)	117 (6.6%)	68 (7.0%)
Unknown or overseas	965 (14.4%)	251 (14.2%)	138 (14.2%)
Preference for studying medicine			
First	6310 (94.2%)	1754 (99.7%)	974 (99.9%)
Second	270 (4.0%)	3 (0.2%)	0
Applicant type: school leaver	6050 (90.3%)	1533 (87.2%)	850 (87.4%)
No. of interviews at other medical schools			
0	—	379 (21.6%)	195 (20.0%)
1	—	635 (36.1%)	332 (34.1%)
2	—	376 (21.4%)	211 (21.7%)
3 or more	—	369 (21.0%)	236 (24.2%)

NT = Northern Territory. ACT = Australian Capital Territory. IRSD = Index of Relative Socio-economic Disadvantage. * Denominators for percentages vary (not all categories are shown). ◆

for students who successfully gained an interview. This was voluntary and included information on the number of medical schools to which they had applied, number of interviews undertaken, and rural background.

Statistical analysis

The factors assessed in the study were: age; sex; state of residence; socioeconomic status, using the Index of Relative Socio-economic Disadvantage (IRSD)[15] based on postcodes of high school and home address on application; urban or rural location of home and school using the Rural, Remote and Metropolitan Areas (RRMA) classification[16] based on postcodes; preference for studying medicine; type of applicant (school leaver [applying while at school] or non-school leaver [applying after leaving school]); and number of interviews undertaken for other medical schools.

Multiple logistic regression analysis was used to determine which characteristics were associated with being offered an interview, adjusted for cohort. This was repeated for interviewees to determine characteristics associated with being offered a place, and again to determine characteristics associated with accepting a place. Outcome measures were offer of an interview, offer of a place, and acceptance of a place in the Medical School. For the latter measures, the sample included only those who were successful in the previous round. The analysis did not investigate the quality of the application process.

Applicants with no postcodes in Australia and those with an overseas address were excluded from the regression model but not from descriptive analysis. Missing data were minimal (< 1%), with the exception of the RRMA and IRSD classifications of school (eg, 61.3% of the 2007 cohort did not have school information). To avoid exclusion of these observations, an "unknown" category was included in the regression analysis.

Statistical significance was set at 5%. All analyses were performed using SAS 9.1 (SAS Institute, Cary, NC, USA).

RESULTS

Applicant characteristics

Over the 4-year period, there was a 30.7% increase in applications for places at the Medical School (Box 1). About a quarter of applicants obtained an interview although, with additional positions available in 2007, this rose to 30%. Overall, more than half of

3 Multiple regression analysis for each stage of application process, 2004–2007*

Characteristic	Odds of being offered an interview	Odds of being offered a place	Odds of accepting offer of a place
Age + 1 v age[†]	0.78 (0.71–0.86)	1.14 (0.95–1.37)	0.99 (0.74–1.31)
Female v male	0.88 (0.78–0.99)	1.33 (1.07–1.66)	0.97 (0.67–1.40)
IRSD of home			
Q1 v Q4	0.55 (0.45–0.68)	1.32 (0.86–2.02)	1.24 (0.62–2.47)
Q2 v Q4	0.52 (0.41–0.67)	0.53 (0.32–0.88)	2.29 (0.82–6.29)
Q3 v Q4	0.90 (0.67–1.23)	0.76 (0.43–1.35)	1.97 (0.80–4.85)
Q1 v Q3	0.61 (0.43–0.87)	1.73 (0.89–3.37)	0.63 (0.22–1.84)
Q2 v Q3	0.58 (0.40–0.84)	0.69 (0.33–1.44)	1.16 (0.31–4.32)
Q1 v Q2	1.06 (0.79–1.42)	2.50 (1.35–4.63)	0.54 (0.17–1.72)
IRSD of school			
Q1 v Q4	0.87 (0.67–1.12)	0.84 (0.51–1.38)	2.17 (0.93–5.06)
Q2 v Q4	0.75 (0.55–1.02)	0.52 (0.27–1.01)	1.21 (0.33–4.47)
Q3 v Q4	0.69 (0.50–0.96)	1.08 (0.58–2.00)	2.26 (0.91–5.62)
Rurality of home			
RRMA 3–7 v 1–2	1.23 (0.93–1.64)	1.09 (0.58–2.04)	0.37 (0.13–1.05)
Unknown v RRMA 1–2	0.85 (0.07–10.9)	nd	nd
Unknown v RRMA 3–7	0.69 (0.05–8.85)	nd	nd
Rurality of school			
RRMA 3–7 v 1–2	0.87 (0.61–1.23)	1.11 (0.53–2.33)	0.65 (0.18–2.29)
Unknown v RRMA 1–2	0.16 (0.03–0.95)	nd	nd
Unknown v RRMA 3–7	0.18 (0.03–1.11)	1.07 (0.56–2.05)	nd
Home state			
Australian Capital Territory v SA	1.96 (1.39–2.76)	0.81 (0.44–1.51)	0.16 (0.07–0.37)
New South Wales v SA	1.94 (1.64–2.30)	0.70 (0.50–0.98)	0.08 (0.04–0.14)
Northern Territory v SA	0.51 (0.25–1.03)	0.32 (0.06–1.58)	nd
Queensland v SA	1.39 (1.08–1.80)	0.57 (0.35–0.93)	0.06 (0.02–0.14)
Tasmania v SA	1.96 (1.17–3.29)	0.56 (0.20–1.56)	nd
Victoria v SA	1.47 (1.27–1.71)	0.79 (0.59–1.07)	0.06 (0.04–0.11)
Western Australia v SA	1.06 (0.81–1.38)	0.72 (0.42–1.24)	0.06 (0.02–0.15)
NT/Tasmania v SA	na	na	0.04 (0.01–0.38)
Medical preference + 1 v medical preference[†]	0.24 (0.16–0.37)	0.66 (0.24–1.86)	nd
Non-school leaver v school leaver	9.54 (6.16–14.78)	6.30 (0.80–49.85)	nd
No. of interviews + 1 v no. of interviews[†]	—	1.49 (1.34–1.66)	0.60 (0.50–0.72)

IRSD = Index of Relative Socio-economic Disadvantage.[15] Q = quartile (Q1 = greatest disadvantage; Q4 = least disadvantage). nd = not determined due to insufficient data. RRMA = Rural, Remote and Metropolitan Areas (1–2 = capital cities and other metropolitan centres; 3–7 = rural and remote centres and areas).[16] SA = South Australia. na = not applicable (data for the NT and Tasmania were combined for analysis of acceptance of place). * Figures are odds ratios (95% CI). Model excludes applicants with an overseas address. Shading indicates significant associations ($P < 0.05$). † Change in odds per unit difference in age (year), preference (second, third preference) and interviews (two, three or more interviews). ◆

(69.7% of applicants to 78.6% at the offers stage). Most applicants resided in urban locations and indicated medicine was their first preference for university study. The proportion of students from rural regions was similar at each application stage.

Most applicants were from South Australia (35.0%), Victoria (28.7%) or New South Wales (17.0%). More than half of those offered a place were from NSW and Victoria (Box 2). About 80% of applicants who were offered or accepted a place had undertaken more than one medical school interview. Of the 977 offers made to students during the study period, 65.4% were declined.

Outcomes of each application stage

Results of the logistic regression analysis are shown in Box 3. An offer of an interview was more likely if the applicant was a non-school leaver (odds ratio [OR], 9.54) or was from Victoria, NSW, Queensland, Tasmania or the Australian Capital Territory, rather than from SA. The odds of being offered an interview decreased if the applicant was older (OR, 0.78) or female (OR, 0.88), if medicine was not the applicant's first preference (OR, 0.24), or the applicant's home or school was located in an area of relatively high socioeconomic disadvantage.

The odds of receiving an offer of a place increased if the applicant was female (OR, 1.33), was from a low socioeconomic area (quartile 1 v 2: OR, 2.50) or had more than one interview with medical schools (OR, 1.49). An offer was less likely if the applicant was from NSW (OR, 0.70) or Queensland (OR, 0.57) compared with SA.

The odds of accepting an offer of a place decreased if the applicant was from any state or territory compared with SA, or had more than one interview with medical schools (OR, 0.60).

DISCUSSION

Over the 4 years of analysis, applicants to the Medical School tended to be aged 17–18 years, be female, reside and have attended a school in an area of high socioeconomic status, be from an urban area, and have undertaken more than one medical school interview. Our findings indicate that some of these characteristics were linked to a successful outcome. The influencing characteristics varied for each stage of the application process, although the effect of socioeconomic status, home state and number of interviews undertaken was found across more than one stage. Thus, there does not

those interviewed received an offer, but only a third accepted the offer.

Consistent proportions of some applicant characteristics were found across the three application stages (Box 2). At all stages, the majority of applicants were female, school leavers, aged 17–18 years, and residing in high socioeconomic index areas. For this last characteristic, the proportion increased with each stage of the application process

seem to be a large inherent bias in the selection process at the Medical School.

Although several characteristics were associated with success at various stages of the application process, their importance to the Medical School admission process must be assessed. Some of the successful characteristics reflect the Medical School course structure and the type of applicant this attracts. Being an undergraduate-entry course, the bulk of applicants are school leavers and therefore younger. However, the results seem to indicate that slightly more mature applicants (non-school leavers) are more successful at the first stage of the application process than school leavers. Maturity may also have a role in the success of female applicants receiving an offer compared with male applicants.

There is some debate regarding the high number of female students entering medical school and the implications this has for the medical workforce. Evidence indicates that female doctors are more likely to work fewer hours and choose specialties with flexible career arrangements. This has implications for location of practice, specialty choice and workforce requirements within specialties. Our study showed that 60% of those offered a place in 2004–2007 were female; although being female was not associated with success in gaining an interview, it was important in determining an offer. In comparison, in 2006, 48% of the 17–18-year age group in the SA population were female.[17]

The admission process seems to be less successful in increasing the number of applicants from lower socioeconomic backgrounds, a result also found in overseas studies.[7,8] It is likely that this reflects the quality of secondary education in these areas, support provided to gain entry to medical school, and broader social issues. A review of the South Australian Certificate of Education found a disproportionate number of early school leavers were from lower socioeconomic backgrounds and particular cultural groups.[18] This would have an impact on the number of students from such areas applying to university.

Our results found no significant association between rural background and the likelihood of not being successful with any stage of the application process. This result is similar to that found in a Canadian study, where students from rural backgrounds applying to medical school in Alberta were not disadvantaged by the admission process.[19]

This study indicates that experience seems to play a role in successful outcome — the more interviews undertaken, the greater the likelihood of receiving an offer. The group with the most interview experience were interstate applicants, who also received the greatest proportion of offers. Research indicates that coaching for situational employment interviews is related to interview performance.[20,21] This finding could also reflect the amount of preparation an applicant undertakes, although a study showed that coaching did not assist applicants to the School of Medicine at the University of Western Sydney.[22] South Australian applicants had the lowest number of interviews, and some only had an interview at this Medical School. It is unclear why this occurs, but it may relate to the competitiveness of interstate applicants, the low number of medical places per head in some states (Victoria and NSW), and the reluctance of South Australian applicants to travel interstate, and is worthy of further investigation.

This analysis has highlighted some issues with medical school admission processes, namely, the large and increasing number of applications dealt with each year and, for this Medical School, the high proportion of offers made that are not accepted. Our data indicate that it was primarily interstate applicants who did not accept offers. This places a high administrative burden on the admissions office and also lengthens the admission process, often beyond commencement of the first term. Although SA may be unique in having a high number of interstate applicants, it is likely that this is repeated across most medical schools, exponentially increasing the cost of the admission process. This aspect, combined with the finding that interview practice increases an applicant's likelihood of an offer, warrants discussion about alternative models of admission processes, such as a centralised process or mutual recognition of processes by medical schools.

Our study has some limitations. It relates to admissions to one university with an undergraduate-entry process. However, application processes are similar across most Australian medical schools and therefore the results may reflect those of other schools. Additionally, the data cover 4 years and any aberrations in the applicant pools are thus minimised.

The characteristics included in our analysis were limited by the data available as part of the admission process, so characteristics found to be significant in other studies, such as ethnicity, were not measured.

Additionally, factors such as academic performance, interview performance and preparation were not analysed directly. This was a historical analysis and, while it provides information on the characteristics associated with past admissions, it is not a predictor of future admissions.

Finally, although a number of characteristics were found to be significant, some of the effects were quite small and some of the larger effects may relate to the small size for that particular comparison.

While significant associations with application outcomes were found for sex and socioeconomic status, the largest effects were found for the characteristics relating to home state and number of interviews undertaken. Our study confirms that there does not seem to be a large or inherent bias in the selection process based on applicant characteristics. However, it does raise questions about the diversity of the applicant pool and the need for medical schools to work with the secondary school sector to encourage a broader range of applicants.

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COMPETING INTERESTS

None identified.

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