

EDUCATION AND TRAINING

Impact of the increase in tuition fees and demographic factors on medical student intercalation rates between 2006 and 2020

Authors: Hassan Maimouni,^A Khaylen Mistry,^B Omkaar Sivanesan,^A Haysum Asif,^A Allan Clark^C and Vassilios S Vassilou^D

ABSTRACT

Introduction

No quantitative research has assessed the trends in English medical student intercalation. In addition, the impacts of the increase in tuition fees, introduced in 2012, and demographic factors on intercalation rates are unknown.

Methods

Freedom of information requests were sent to all UK universities. Regression analysis compared intercalation rates before (2006–2012) and after (2012–2020) the tuition fee increase. Student's *t*-tests compared demographics of medical students who intercalated. Questionnaires were sent to all UK universities to explore reasons for intercalating.

Results

In total, 101,085 students from seven universities responded. The intercalation rate increased from 4.70% to 10.53% (mean percentage difference (MPD) 5.84; 95% confidence interval (CI) 2.94–8.73). Intercalating students were more likely to be <25 years of age (MPD 33.36%; 95%CI 28.34–38.39), without a previous degree (MPD 8.56%; 95% CI 7.00–10.11) and without a disability (MPD 3.15%; 95% CI 0.88–5.42). In total, 389 completed questionnaires were received from 10 universities. Medical students believed an intercalated degree made them a better doctor.

Discussion

The proportion of students who intercalated was greater following the increase in tuition fees. This might be explained by the value medical that students placed on the skills and opportunities that accompany an intercalated degree.

KEYWORDS: intercalation, medical students, medical education, tuition fees

DOI: 10.7861/fhj.2023-0019

Introduction

An intercalated degree provides an opportunity for medical students enrolled in an English medical school to undertake an extra year of study and gain an additional Bachelor's or Master's-level qualification before completing their primary medical qualification. Approximately one-third of UK medical students undertake a 1-year intercalated degree.^{1,2} There are a variety of academic subjects across several fields, including scientific disciplines and the humanities, at both the Bachelor's and Master's level.² Only a few English medical schools (including Oxford, Cambridge, Imperial College, University College London and Nottingham) have compulsory intercalated degree years as part of the course. At medical schools where intercalating is not compulsory, students have the option of undertaking a 1-year intercalated degree in addition to their medical course, usually by taking a break from the medical course on completion of year 2, 3 or 4. Previous studies have shown that students value intercalated degrees, feeling that they gained a substantial advantage over their peers as well as transferrable skills helpful for their future careers.^{3,4} In 2012, tuition fees in England increased from approximately £2,895 to £9,000 per year. Prior research suggested that this increase could result in fewer students intercalating.^{5,6}

A qualitative study, conducted a year after the fees increased, concluded that this increase might reduce the number of students opting to intercalate.⁵ Conversely, it would be unlikely that this increase would lead to a reduction in the number of medical students intercalating in England because of the availability of an NHS student bursary. The bursary contributes to student tuition fees in addition to a non-means tested grant of £1,000 per year and a means-tested bursary based on household income.⁷ The bursary is available after 4 years of study for all home undergraduate medical students. Medical graduates with an intercalated degree are more likely to enter academic medicine or become consultants, publish more articles in scientific journals and raise more research grants; therefore, a reduction in intercalation could have other unwanted effects.^{2,8–10} There has been no published quantitative research assessing intercalation trends over time

Authors: ^Asenior house officer, Norwich Medical School, University of East Anglia, Norwich, UK; ^Bacademic clinical fellow in dermatology, Norfolk and Norwich University Hospital, Norwich, UK, and honorary tutor, Norwich Medical School, University of East Anglia, Norwich, UK; ^Cassociate professor in public health and epidemiology, Norwich Medical School, University of East Anglia, Norwich, UK; ^Dclinical professor in cardiac medicine, Norwich Medical School, University of East Anglia, Norwich, UK

and the impact of the 2012 increase in tuition fees in England. This research is important to ascertain whether the increase in tuition fees has inadvertently impacted medical research in England, given the link between intercalation and future medical research.

Moreover, there has been no research evaluating any differences in the demographic breakdown of medical students who choose to intercalate. Identification of differences in demographics could lead to further research to examine why such differences exist and solutions to address them.

Thus, the objectives of this study were to: (1) evaluate intercalation rates before and after the increase in tuition fees; (2) evaluate the demographic variables of students who intercalated; and (3) evaluate student decisions about why they chose to intercalate or not by exploring perceptions of the benefits of intercalation, tuition fee increase and demographic variables, which might influence intercalation.

Methods

Study design

This paper comprised two sets of studies: (1) retrospective freedom of information (FOI) historical data (2006–2020) from universities in England; and (2) a questionnaire-based study of students at 10 universities, including two from the previous study. The study was conducted in accordance with Strengthening The Reporting of Observational Studies in Epidemiology (STROBE). Intercalation data were requested from 41 UK medical schools using FOI requests. Intercalation data were requested from 1 January 2006 to 1 January 2020. Student demographics, including age, gender, ethnicity, degree before medicine, international versus home fee status and disability aggregate-level data, were requested. Demographic variables were self-defined by students. Data underwent independent peer-review to ensure accuracy.

Universities from Scotland, Wales and Northern Ireland were excluded because of differences in tuition fees. Universities where intercalation was mandatory were also excluded. In addition, universities were excluded if they did not provide at least 10 years of data to ensure sufficient data before and after the 2012 increase in tuition fees.

Student questionnaires (supplementary material S1) were distributed in July 2020 by email to all medical schools in the UK through the INSPIRE leads of the Academy of Medical Sciences. Questionnaires had two main domains: (1) demographics; and (2) perceptions of the benefits of intercalation, tuition fee increase and demographic variables that might influence intercalation. Questionnaires were anonymised and completed online. A participant information sheet and informed written consent were obtained from survey participants.

Statistical analysis

Microsoft® Excel version 2010 (Microsoft; Los Angeles, CA, USA), Graphpad prism and Stata® version 16 (Stata Corporation; College Station, TX, USA) were used for statistical analysis. Adjusted and unadjusted regression analysis was used to compare intercalation rates in the cohorts before (2006–2012) and after (2012–2020) the rise in tuition fees. Student's *t*-tests were used to identify differences in demographic

variables between the cohorts before and after the increase in tuition fees. Demographic variables with a significant difference between cohorts were included in the adjusted regression analysis. Student's *t*-tests were also used to identify differences between intercalating and non-intercalating students based on age, ethnicity, sex, previous degree, disability and fee status. Descriptive analysis of questionnaire responses were reported.

Ethics

Ethical approval for the study was obtained from the University of East Anglia Faculty of Medicine and Health Sciences Research Ethics Committee (ID 2019/20-062).

Results

Intercalation rates before and after the rise in tuition fees

A total of 101,085 medical students from seven universities (Brighton and Sussex, Keele, King's College London, Lancashire, Leeds, Liverpool and Norwich) across England were included in the quantitative analysis. In total, 34 universities were excluded from analysis, mainly because of insufficient provision of data (Fig 1). Of those students, 8.7% (8,746/101,085) intercalated between 2006 and 2020. Intercalation rates fell from 5.8% (223/3,838) in 2006 to a low of 3.6% (301/8,274) in 2011 before increasing steadily to a high of 13.8% (1,232/8,947) in 2016 and then falling to 7.9% (358/4,525) in 2019 (Fig 2).

The mean (SD) percentage intercalation in the cohort before the tuition fee increase was 4.70% (0.93) compared with 10.53% (3.13) after the increase (Fig 3). This represented a mean percentage difference (MPD) of 5.84% (95% confidence interval (CI) 2.94–8.73, $p=0.001$). Student's *t*-tests showed a significant difference in disability (MPD 4.91%, $p<0.001$), students from ethnic minority backgrounds (MPD 10.96%, $p<0.001$), degree before medical school (MPD 3.48%, $p=0.03$) and age (MPD $-7.94%$, $p=0.003$) between cohorts before and after the tuition fee increase (Table 1). Adjusted regression analysis showed disability (2.06%; 95% CI -3.10 to 7.23, $p=0.40$) and students from ethnic minority backgrounds

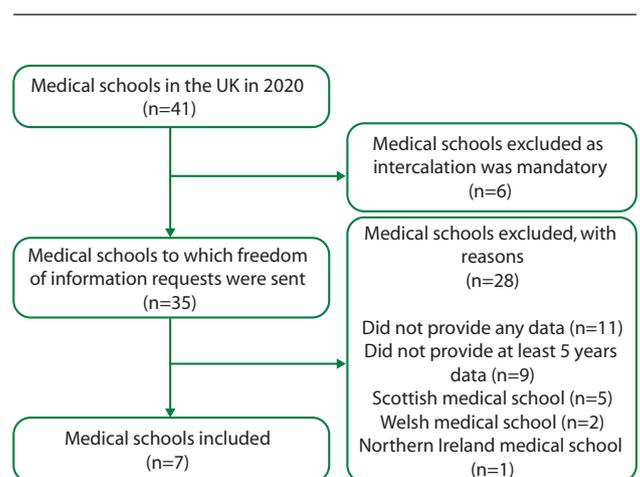
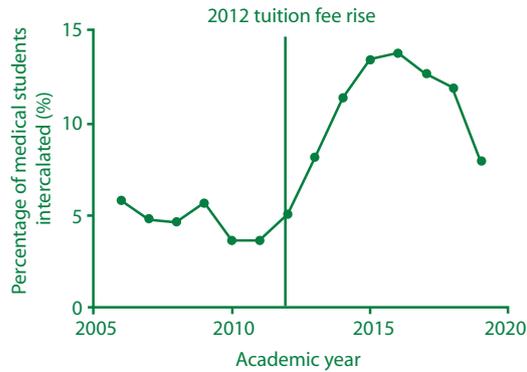


Fig 1. Flow diagram showing the number of universities included in the quantitative analysis and rationale for the exclusion of others.



Year	Number intercalated	Total students	% intercalating
2006/7	223	3,838	5.8
2007/8	270	5,590	4.8
2008/9	265	5,731	4.6
2009/10	327	5,811	5.6
2010/11	177	4,829	3.7
2011/12	301	8,274	3.6
2012/13	451	8,896	5.1
2013/14	715	8,796	8.1
2014/15	992	8,736	11.4
2015/16	1,199	8,926	13.4
2016/17	1,232	8,947	13.8
2017/18	1,142	9,029	12.6
2018/19	1,094	9,157	11.9
2019/20	358	4,525	7.9

Fig 2. Percentage of intercalated medical students per year in seven medical schools in England between 2006 and 2020.

(4.31%; 95% CI -0.97 to 9.59, $p=0.10$) might have confounded the observed difference in mean percentage intercalation. Sex (MPD 0.45%, $p=0.69$) and international fee status (MPD 0.01%, $p=0.98$) did not differ significantly between cohorts (Table 1).

Demographic variables that might have influenced intercalation rates

Student's *t*-tests identified that intercalating students were more likely to be less than 25-years old (MPD -33.36%, 95% CI -38.39 to -28.34, $p<0.0001$), without a prior degree (MPD 8.56%, 95% CI 7.00-10.11, $p<0.0001$) and without a disability (MPD 3.15%, 95% CI 0.88-5.42, $p=0.008$) (Fig 3). Ethnicity (MPD 1.31%, 95% CI -7.15 to 9.77, $p=0.75$), sex (MPD -2.49%, 95% CI -6.22 to 1.24, $p=0.18$) and international status (MPD 1.26%, 95% CI -0.28 to 2.79, $p=0.10$) did not differ significantly between groups (Fig 3).

Student perceptions of the benefits of intercalation, tuition fee increase and demographic variables that might influence intercalation

Questionnaire feedback was obtained for 389 students from 10 (10/41, 24%) universities across the UK, notably Brighton and Sussex, Bristol, Dundee, Edinburgh, Keele, Leicester, Manchester,

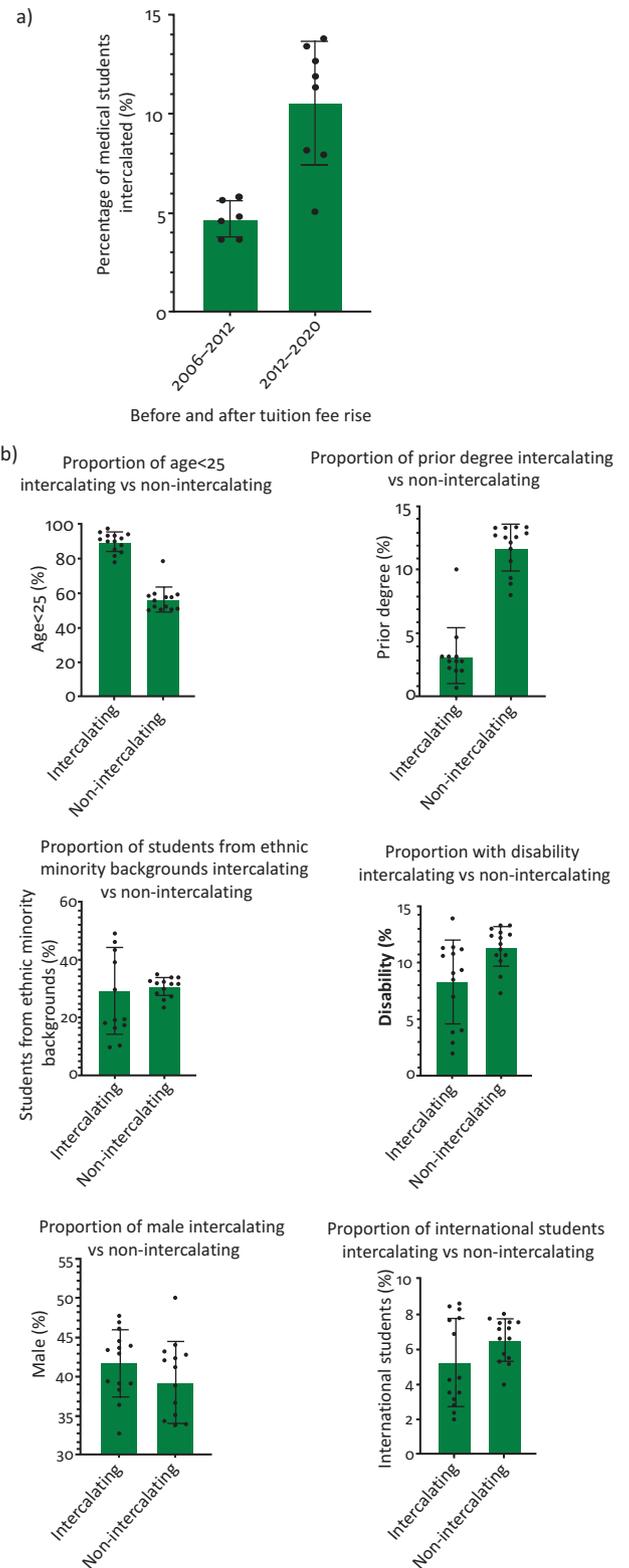


Fig 3. Intercalation rates before and after the tuition fee rise and comparison of demographic variables between intercalating and non-intercalating students. (a) Mean percentage intercalation +/- standard deviation in the cohort before (2006-2012) and after the tuition fee increased (2012-2020). (b) Student's *t*-tests comparing mean percentage and 95% confidence intervals for demographic variables (disability, ethnicity, age, sex, prior degree and international status) between intercalating and non-intercalating students. * $p\leq 0.05$.

Table 1. Differences in demographics of cohort before and after tuition fee increase^a

Variable	2006–2012	2012–2020	p-value
N (years)	6	8	
Number of students intercalating	1,563	7,183	
% Intercalating, mean (SD)	4.70 (0.93)	10.53 (3.13)	<0.001
% Degree before medical school, mean (SD)	12.27 (3.12)	15.75 (2.02)	0.026
% Male, mean (SD)	47.00 (2.41)	46.55 (1.61)	0.690
% Disability, mean (SD)	10.89 (1.84)	15.80 (1.36)	<0.001
% Students from ethnic minority backgrounds, mean (SD)	31.19 (4.99)	42.15 (3.12)	<0.001
% International, mean (SD)	7.71 (0.58)	7.70 (0.84)	0.980
% <20 years old, mean (SD)	60.50 (5.28)	52.56 (2.44)	0.003
% 21–24 years old, mean (SD)	23.18 (5.95)	36.05 (2.73)	<0.001
% 25–29 years old, mean (SD)	9.62 (1.02)	8.37 (0.31)	0.006
% 30+ years old, mean (SD)	6.69 (2.64)	3.17 (0.57)	0.003

^aComparison of mean intercalation rates and demographic variables in the cohort before (2006–2012) and after (2012–2020) the increase in tuition fees analysed with Student's *t*-tests.

Norwich, Birmingham and Sheffield (supplementary material S2). Of these medical students, 28.5% (111/389) intercalated, of whom 61% (236/389) were aged between 21 and 24 years and 74% (286/389) were female. In addition, 69% (268/389) identified as White and 28% (108/389) as being from ethnic minority backgrounds. Of those who had not intercalated, 53% (146/278) planned to intercalate. In addition, 77% (301/389) of students believed an intercalated degree would give them an advantage over their peers, 46% (179/389) felt that intercalation would make them a better doctor and 85% (94/111) of those who intercalated felt that they had learnt skills that would be useful during their career. Of the respondees, 78% (303/389) chose/would choose an intercalated degree to improve their chances of getting the job they wanted, 49% (192/389) chose/would choose an intercalated degree to increase their chances of getting an academic job and 52% (202/389) chose an intercalated degree because they were interested in research. Of those from English medical schools, 69% (211/305) considered tuition fees when deciding to intercalate, with 73% (155/211) of these being discouraged by the increase in tuition fees. Of those from English medical schools who did not intercalate, 79% (129/164) were discouraged by the tuition fee increase. By contrast, only 47% (22/47) of students who intercalated from English medical schools were discouraged by the tuition fee increase, with 43% (169/389) of students feeling that the increase in tuition fees did not make an intercalation degree more valuable.

Discussion

In this first study to investigate the effect of increasing tuition fees on intercalation, the proportion of students who intercalated was greater following the increase in tuition fees. This could be explained primarily by the academic value that students placed on the opportunity to complete an intercalated degree. Students recognised that intercalation offered them an opportunity to focus on an area of interest, gaining invaluable research experience that would support them in applications for future desired jobs. Previously, a membership of a Royal College was often enough to be awarded a UK consultant post; however, a postgraduate

degree is now almost a mandatory requirement. Other possible explanations include the increased awareness and availability of intercalation and the NHS student bursary. Students are invited to apply for an NHS bursary by email and the application process requires registration and an application form that takes, on average, 45 minutes to complete.⁷ Students might have chosen to intercalate despite the financial implications of an additional year of study because they placed value on these long-term benefits of intercalation. Although students were discouraged by the increase in tuition fees, quantitative data suggested that this did not correlate with a fall in intercalation. In addition to research implications, students who intercalated have demonstrated deeper critical thinking and excellent time management and self-motivational skills, with higher marks in medical school examinations compared with those who did not.^{11,12} Given the importance of intercalation in clinical practice and research, it is necessary to identify factors hindering students from intercalating. It was reassuring that medical students in England continued to value the opportunity to pursue specific research interests, develop key transferrable skills and academic achievements in the form of an additional intercalation degree, as confirmed by the qualitative findings. Intercalation has had a significantly positive impact on postgraduate medical career progression and it is necessary that the potential career-long benefits of intercalation are communicated to students so that informed choices on whether to intercalate can be made.⁴ In 2020, the UK Foundation Programme Office announced that, from 2023, graduating medical students will no longer receive application points for additional degrees or academic publications.¹³ This decision aims to reduce disadvantages to students facing financial hardship. This step toward preference-based allocation might reduce undergraduate competitive behaviours, bias against UK minority ethnic students and healthcare inequalities.¹⁴ Future research should evaluate the impact of this decision upon intercalation rates, the proportion of students pursuing academic careers as clinical scientists, publication output and research grants.

Students who intercalated were more likely to be younger, without a prior degree and without disability. Older students

might have felt they did not have the time to dedicate to an additional year of study. Those who completed a degree before medical school might have already developed key transferrable skills and pursued research interests. The intercalation rate of students from ethnic minority backgrounds increased after the tuition fee rise. This might reflect increased research and awareness into ethnic disparities among medical students.^{15,16} A similar targeted approach could drive intervention and changes to policy and infrastructure resulting in increasing intercalation rates among students with disability. We were unable to access reliable data regarding the deprivation status of students; thus, future research could evaluate the correlation between deprivation and intercalation. Questionnaire data identified most students intercalated or planned to intercalate. These contemporary rates suggest high participation and awareness and satisfy equality. The small proportion of non-intercalating students is to be expected and could also be explained by personal choice.

Limitations

Quantitative data were reported from seven universities, which represented a small proportion of medical schools in England. Although this represented a sample of over 100,000 students, the results should be interpreted with caution. Overall, there were a small number of data points that might have limited potential adjustment for important factors. Continuous Joinpoint trend analysis of intercalation rates was not performed because of statistical power concerns and the absence of a comparison group. Differences in student demographics, such as disability and ethnicity, might have had an indirect effect on the observed difference in intercalation rates before and after 2012. Data were only available in an aggregated form and not at the individual level. Therefore, the study might have been underpowered to detect smaller associations with factors leading to higher intercalation. Intercalation rates were counted per year rather than per student. Most students intercalate once during their medical degree. Each student was counted as a data point for each year at medical school; however, this was done to evaluate the impact of the tuition fee increase. Only two universities provided both quantitative and questionnaire data. Qualitative data were obtained from 10 universities as a self-selected sample, which might have resulted in bias and unrepresentativeness of that sample.

Conclusion

This study showed an increase in intercalation rates following the tuition fee rise in 2012. We also identified that intercalating students were more likely to be less than 25-years old, without a prior degree and without disability. We hypothesise that the increase in intercalation rates can be explained by the high value that medical students placed on the skills and opportunities that accompany an intercalated degree. Further large-scale studies involving all universities in the UK are required to verify these results. ■

Supplementary material

Additional supplementary material may be found in the online version of this article at www.rcpjournals.org/clinmedicine:
S1—Survey instrument
S2—Summary of student responses from questionnaires

Summary

What is known?

Medical graduates with an intercalated degree are more likely to enter academic medicine, publish journal articles and raise research grants.

What is the question?

To determine whether the 2012 increase in tuition fees impacted intercalation rates in England and to evaluate the demographic variables that might influence intercalation rates.

What was found?

In this cohort study of 101,085 students from seven universities across England, intercalation rates increased from 4.70% (2006–2012) to 10.53% (2012–2020), with a MPD of 5.84% (95% CI 2.94–8.73). Intercalating students were more likely to be less than 25 years old, without a prior degree and without disability.

What is the implication for practice now?

Widening participation in intercalation through raised awareness surrounding the benefits of intercalation, bursaries and scholarships could improve equality among students.

Acknowledgements

We would like to acknowledge the help of the INSPIRE administration team from the Academy of Medical Sciences for forwarding the survey to all the INSPIRE leads in UK universities. We would also like to thank the INSPIRE leads of the universities of Birmingham, Brighton, Bristol, Dundee, East Anglia, Edinburgh, Keele, Leicester, Manchester and Sheffield for promoting the survey.

References

- Morrison J. Academic medicine and intercalated degrees. *Med Educ* 2004;38:1128–9.
- McManus I, Richards P, Winder B. Intercalated degrees, learning styles, and career preferences: prospective longitudinal study of UK medical students. *BMJ* 1999;319:542–6.
- Park S, Liang M, Sherwin TT *et al.* Completing an intercalated research degree during medical undergraduate training: barriers, benefits and postgraduate career profiles. *NZ Med J* 2010;123:24–33.
- Sorial AK, Harrison-Holland M, Young HS. The impact of research intercalation during medical school on post-graduate career progression. *BMC Med Educ* 2021;21:39.
- Stubbs TA, Lightman EG, Mathieson P. Is it intelligent to intercalate? A two centre cross-sectional study exploring the value of intercalated degrees, and the possible effects of the recent tuition fee rise in England. *BMJ Open* 2013;3:e002193.
- Nicholson JA, Cleland J, Lemon J *et al.* Why medical students choose not to carry out an intercalated BSc: a questionnaire study. *BMC Med Educ* 2010;10:1–6.
- NHS Business Services Authority. *NHS Bursary funding for medical and dental students 2022/23*. www.nhsbsa.nhs.uk/sites/default/files/2023-01/NHS%20Bursary%20Funding%20for%20Medical%20and%20Dental%20Students%202022-23%20%28V5%29%2012.2022.pdf [Accessed 12 June 2023].
- Jones M, Hutt P, Eastwood S *et al.* Impact of an intercalated BSc on medical student performance and careers: a BEME systematic review: BEME Guide No. 28. *Med Teacher* 2013;35:e1493–510.
- Eaton D, Thong Y. The Bachelor of Medical Science research degree as a start for clinician-scientists. *Med Educ* 1985;19:445–51.
- British Medical Association. *Pay and contracts*. www.bma.org.uk/pay-and-contracts/contracts [Accessed 12 June 2023].

- 11 Cleland JA, Milne A, Sinclair H *et al*. An intercalated BSc degree is associated with higher marks in subsequent medical school examinations. *BMC Med Educ* 2009;9:24.
- 12 Mahesan N, Crichton S, Sewell H *et al*. The effect of an intercalated BSc on subsequent academic performance. *BMC Med Educ* 2011;11:76.
- 13 Kumar AG, Kallikas G, Hassan M *et al*. Removing educational achievement points from the Foundation Programme Application System: is this the right decision? *JMIR Med Educ* 2021;7:e27856.
- 14 Sam AH, Fung CY, Reed M *et al*. Time for preference-informed foundation allocation? *Clin Med* 2022;22:590–3.
- 15 Richardson JT, Mittelmeier J, Rienties B. The role of gender, social class and ethnicity in participation and academic attainment in UK higher education: an update. *Oxford Rev Educ* 2020;46:346–62.
- 16 Woolf K, Potts HW, McManus IC. Ethnicity and academic performance in UK trained doctors and medical students: systematic review and meta-analysis. *BMJ* 2011;342:d901.

Address for correspondence: Dr Khaylen Mistry, Norwich Medical School, University of East Anglia, Norwich, NR4 7TJ, UK. Email: Khaylen.Mistry@nnuh.nhs.uk