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IZA DP No. 17944

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ABSTRACT

Racial Representation Among Academics and Students' Academic and Labor Market Outcomes*

We study the impact of racial representation among academic staff on university students' academic and labor market outcomes. We use administrative data on the universe of staff and students at all UK universities, linked to survey data on students' post-graduation outcomes, exploiting idiosyncratic variation (conditional on a set of fixed effects and observable student, staff, and university department level characteristics) in the proportion of racial minority academic staff to whom students are exposed. We find that minority representation benefits the academic outcomes of minority groups: When minority students are exposed to 1 SD higher proportion of minority academics, they are 1.03ppt more likely to graduate with a first or upper second class honors degree and they are also 0.88ppt more likely to graduate on time. There is no beneficial impact of minority or own-race representation on the labor market outcomes of minorities. However, we do find that minority representation among academic staff significantly increases progression of minority students to graduate study, suggesting that there may be benefits of same-race representation operating through provision of role models or domain-specific advice and guidance.

JEL Classification: I23, I26, J15, J24

Keywords: minorities, representation, returns to education, labor market outcomes

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1 Introduction

Racial or ethnic inequalities in educational and labor market outcomes extend to those who have accessed or graduated from university (Arcidiacono & Koedel, 2014; Meschede *et al.*, 2017; Zwysen & Longhi, 2018; Lessard-Phillips *et al.*, 2018). For example, among 2020/21 graduates from UK universities, White students were twice as likely to obtain a first class honors degree as Black students (39.4% versus 20.0%; HESA (2022)), and 6 percentage points more likely to be in full-time employment than Black and Asian graduates (63% versus 57%) 15 months after graduation (HESA, 2023). This suggests that there are inequalities in human capital accumulation at university by ethnicity, that restrict graduates' access to the careers in which they will be most productive. This may hinder economic growth (Hseih *et al.*, 2019) as well as innovation and knowledge creation (Parrotta *et al.*, 2014; Freeman & Huang, 2015).

Educational institutions have implemented a range of interventions to attempt to mitigate racial inequalities. Affirmative action policies have been much-studied in relation to inequalities in *access* to Higher Education (Arcidiacono, 2005; Hinrichs, 2012, 2014; Arcidiacono *et al.*, 2015, 2016; Sen, 2023), but for later outcomes, it is difficult to disentangle the effects of selection into different institutions from the changing co-ethnic composition of peers. Some curriculum reforms aim to improve ethnic minority students' sense of belonging and representation, but there is as-yet no quantitative evidence on the impacts of such schemes on minority students' outcomes.

Previous literature has shown that racial representation in the classroom has positive effects on students' academic outcomes in community college (Fairlie *et al.*, 2014) and university (Lusher *et al.*, 2018; Oliver *et al.*, 2021). Between 2012 and 2017, 13% of university academic staff in the UK were non-White ("minority" henceforth), and 2% per Black, compared with 21% and 5% of students respectively. This means there is scope to increase the representativeness of academic staff, and perhaps improve students' outcomes.

In this paper, we identify the impact of racial composition of academic staff in university departments on the academic and post-graduation outcomes of students from different racial groups. We use Higher Education Statistics Agency (HESA) administrative data on the universe of undergraduate students at UK universities, and the academic staff in their departments and institutions of study. HESA records include extensive information about the demographic characteristics of the universe of students and staff at UK universities between 2011 and 2017. Student records document their academic progression through university and previous educational qualifications. Staff records include their contract type, job grade, salary bracket, tenure in current role, and teaching qualifications. We derive the proportion of academic staff from each racial group within each university department and academic year[1] as our measure of students' exposure to racial minority academics. We link these datasets to the HESA Destination of Leavers from Higher Education (DLHE) survey which surveys graduates 6 months after graduation and includes information about their labor market and further study outcomes.

Our identification strategy is to exploit idiosyncratic variation in exposure to racial minority academics across cohorts, subjects, and universities. We may be concerned that racial representation and education and labor market

[1] We focus on White, Black, and non-Chinese Asian racial groups of both students and staff. We group the remainder, which includes those of Chinese, Arab and several mixed backgrounds into "Other".

outcomes may be moving in the same direction over time; or that racial representation is systematically correlated with aspects of university, staff, or student "quality" or selectivity. We therefore condition on university, subject, cohort, and student choice-set fixed effects, a rich set of student demographic characteristics, educational background variables, and other staff characteristics. Our identifying assumption is then that the residual variation in students' exposure to racial minority staff is quasi-random. It is reasonable to expect that this is true. The subject areas that students can apply for are determined by subjects and qualifications chosen at least two years earlier. Universities to which prospective students can be admitted are determined substantially by predicted grades at least one year previously. Students apply for universities in the preceding academic year before entry, before they can observe changes to the racial composition of staff to those that they will be exposed to throughout their degree. Finally, having applied, students cannot control which courses they receive offers from, nor know in advance that they will achieve the required grades to be *accepted* on the course.

We support this assumption by showing that students' demographic characteristics do not predict their exposure to minority academics. Additionally, we follow Fairlie *et al.* (2014) and show that White-minority gaps in demographic characteristics and entry test scores cannot be predicted by the proportion of minority academics in a given department. This provides evidence that there is no differential selection into such environments across students of different races.

We find significant positive effects of racial minority academic staff on minority students' academic outcomes. We find no significant effect on White students. Breaking these racial groups, of both staff and students, down into Black, non-Chinese Asian and Other racial minority groups, we find that own-race representation benefits the academic outcomes of minority students, but there is no beneficial (and some detrimental) impact of own-race representation on the employment outcomes of both groups. We do find that minority representation among academic staff significantly increases progression of minority students to graduate study. Point estimates for the corresponding own-race effects for Black and non-Chinese Asian staff and students to graduate study are larger in magnitude but not statistically significant. Hence, we find tentative evidence that increasing minority representation among academic staff now meets a necessary condition for further increases in racial minority representation among academic staff and in the R&D sector in the future.[2] This may improve innovation and the quality of academic work, as Parrotta *et al.* (2014) show that racial diversity increases firms' innovation while Freeman & Huang (2015) show that racially diverse co-authorship leads to better publication and knowledge creating in academia. We also show evidence that White students benefit from exposure to racial minority staff in terms of progression to graduate-level or high-status occupation employment, though exposure to Black academic staff may discourage their progression to graduate study.

There are several potential mechanisms through which exposure to minority staff may impact students' outcomes. The role model hypothesis (Bettinger & Long, 2005; Fairlie *et al.*, 2014; Kofoed *et al.*, 2019; Gershenson *et al.*, 2022) suggests that when minority students see individuals from their own ethnic background in academic roles, it can

[2]We recognize there may also be differential barriers to completion and career progression in postgraduate research and academia, that the UK's national body of research councils is investing in several initiatives to mitigate https://www.ukri.org/what-we-offer/browse-our-areas-of-investment-and-support/widening-participation-in-postgraduate-research/

positively influence their future outcomes by motivating them to work harder, either to impress these role models or because they see concrete evidence that hard work can lead to success. This may be particularly important for minority students, for whom stereotype threat – being at risk of conforming a negative stereotype about one's group – has been shown to affect academic performance (Aronson *et al.*, 2002). However, these impacts may not always be positive in the long run: Gershenson *et al.* (2022) show that exposure to Black teachers may divert Black students to costly or risky educational paths that may not pay off in the labor market.

A second hypothesis is that minority academic staff are more effective in communicating with and mentoring minority students. They can offer career and academic guidance that is better tailored to challenges faced by minority students. Culturally sensitive advice, or that from personal experience of navigating the labor market as a minority, may be particularly helpful when advising on post-university careers (Hindera, 1993; Lim, 2006).

Minority academic staff may also be better equipped to understand any systemic or structural barriers that can cause minority students to perform worse than their White peers (Grissom *et al.*, 2015; Liera & Dowd, 2019). For example, a minority staff member who worked for pay while studying may recognize that minority students are more likely to work during their degrees to cover financial costs, and may be more proactive in supporting students on how to balance work and academic commitments. Additionally, minority staff may be more involved and effective in advocating for changes in the curriculum or other aspects of the department's environment that improve minority students' sense of belonging or engagement, ultimately enhancing their overall university experience and academic outcomes (Hall *et al.*, 2021; Sakata *et al.*, 2023). These staff need not be directly involved in teaching. In a school setting, Bartanen & Grissom (2023) shows that same-race principals improve Black students' maths achievement. They suggest that policies to level disparities in discipline between Black and White students may help explain this.

Another potential mechanism relates to the diversity of the teaching staff. Research in labor economics has shown that diversity enhances innovation within firms (Parrotta *et al.*, 2014). These findings can be applied to academic settings as well. For instance, departments with racially diverse academic staff may be better equipped to address communication barriers, particularly with minority students who are underrepresented in higher education (Bunderson & Sutcliffe, 2002). Such diverse teams are also likely to generate higher-quality solutions to student challenges compared to less diverse departments (Watson *et al.*, 1993). This could improve teaching by both White and minority staff, and lead to better academic outcomes for all students. The presence of minority academic staff could have a positive impact on White students by better preparing them for diverse work environments, ultimately enhancing their employment prospects (Bartanen & Grissom, 2023; Wells *et al.*, 2016).

As with much of the previous economics literature on the impacts of minority or same-race representation in education, we are unable to formally test the underlying mechanisms at play. However, by examining a broad range of outcomes and exploring heterogeneity based on teaching staff roles and the type of university, we are able to offer valuable insights into these potential mechanisms.

Our study closely relates and contributes to a growing literature on the effect of representation in the classroom and student outcomes. There is now a portfolio of evidence from the HE setting, from Bettinger & Long (2005), Carrell *et al.* (2010), Canaan & Mouganie (2021) and others that female representation among STEM (Science,

Technology, Engineering and Maths) instructors increases female students' retention and progression in STEM subjects. With respect to race and ethnicity, earlier studies mainly focus on representation in primary school classrooms. Dee (2004, 2005) and Winters *et al.* (2013) find that students taught by teachers from their own gender and racial group achieve higher grades. Similarly, Holt & Gershenson (2019) find positive results for suspension and absenteeism, Lindsay & Hart (2017) for exclusion, Ehrenberg *et al.* (1995) and Gershenson *et al.* (2016) for teacher expectations and Egalite & Kisida (2018) for perception and attitudes of students. Fairlie *et al.* (2014) and Lusher *et al.* (2018) study community college and university students respectively, and both find significant gains in performance and progression to ethnic minority students from same-ethnicity instructors and teaching assistants.

Yet, these papers focus on within-classroom interactions, study short or medium-term educational outcomes. One contribution of this paper is to capture the impact of same-race representation on outcomes both within and beyond the classroom, identifying the persistence (if any) both *over time*, beyond the immediate period of exposure, and *across environments* to include labor market outcomes.[3] This paper shows whether higher representation in the education setting changes behaviors or improves human capital in ways that benefit racial minority individuals in the job market and access to postgraduate study and research, beyond, for example, direct effects driven by mechanisms such as biases in teacher grading (Dee, 2005).

Previous papers, whether at the university or pre-university level, also tend to focus on either one institution or small group of institutions. Our second contribution to the literature is therefore of external validity, by studying these impacts using data on the universe of students in the UK HE institutions, enabling us, for example, to assess impacts in more and less selective universities. It is possible that students studying at more or less selective universities are differently impacted or subjects or those studying in different years may have different effects when they are exposed to minority academics. This is especially true for labor market outcomes where graduates from more selective universities might have better labor market outcomes no matter the degree of exposure to minority academics. By using data from the universe of students and staff at the universities in the UK, we can capture the average impact across institutions of varying selectivity and subjects of study with varying labor market prospects, and we can show heterogeneity of impacts across subjects areas grouped along these lines.

2 Institutional framework

2.1 Application process

UK-domiciled students aspiring to attend university in the UK study a broad curriculum to age 16. At this point, they must obtain sufficiently high performance in 'Level 2' qualifications to progress into 'Sixth Form' education for an additional 2 years. This can entail an 'academic track' usually comprising 'A Levels', or 'Highers' in Scotland, taught in schools or Sixth Form Colleges; or a vocational track, usually comprising 'BTECs'[4], predominantly taught in Further Education Colleges. Both options are already very specialized, with A Levels typically taken

[3] Gershenson *et al.* (2022) do study long-term effects, showing how exposure to same race teachers from kindergarten till grade 3 impacts students' university enrollment, but this remains within the education domain

[4] BTEC or Business and Technology exams involve hands-on training on a vocational subject. These include but not limited to Accountancy, Business Management, Childcare, etc.

in 3 subjects, and BTECs often in a single subject. These are all 'Level 3' qualifications, and the University and College Admissions Service (UCAS) publishes 'tariffs' associated with the size of different qualifications and grades achieved, in order to judge 'equivalent' qualifications.[5]

Unlike the US where students apply to universities and declare their majors later on, in the UK students apply to study a specific "degree programme", that is an institution-and-subject combination. Many degree programs have specific pre-requisites. For example, studying Physics at university invariably requires an A Level or Advanced Higher in Mathematics; while until 2019 the "Russell Group" of selective universities published a list of "Facilitating Subjects", of which these institutions would expect at least one A Level or Advanced Higher.[6] Universities also differ in their selectivity in terms of grades (or UCAS tariff scores) required for admission. Students apply for university during the preceding academic year to entry, submitting achieved grades in age-16/level 2 qualifications and predicted grades for age-18/level 3 qualifications. In the period we study, the latter were substantially determined by achieved grades in "AS Levels" (at the time the first half of an A-Level), and in that BTEC coursework already completed. This means that students' choice set of programs to which they can realistically be admitted, is already somewhat narrowed at time of application.

Students apply for up to five programs, must choose their first and second choice from any offers they receive, and are admitted to the higher-ranked of these for which they achieve the required grades. Students may make *application* and *rank-ordering* decisions with reference to observed presence of racial minority academic staff in the relevant university department. However in this framework there is no opportunity to base these decisions on *changes* in prevalence of racial minority staff that they will face compared with earlier cohorts, which would be the threat to identification in our case.[7]

2.2 Degree programmes

Degree programs consist of modules (courses or classes) at Levels 4 -6 (year 1-3) of the national qualifications framework, a minimum number of each of which students must pass to be awarded a degree. Typically the average mark from second and third year determines the degree class that students graduate with. This modular structure means that some degree programs cover multiple subject areas and are taught by multiple departments.[8]. Because second and year third year modules will themselves have first and second-year modules as prerequisites, there is very limited scope to switch 'major' or degree program, except by dropping 'minor' subjects, or withdrawing and starting again. This ensures that students cannot choose to switch programmes to study in departments with a

[5]For example, a 'BTEC National Extended Diploma' is worth the same as 3 A Levels.

[6]See e.g. https://www.theguardian.com/education/2019/may/23/russell-group-scraps-preferred-a-levels-list-after-arts-subjects-hit. Facilitating subjects have been replaced by an online tool explaining what subjects are required in post-16 study in order to "keep options open" (see https://www.informedchoices.ac.uk/).

[7]We restrict our focus and estimation sample to UK-domiciled students. International students predominantly apply through the same system and on the same timescale. They may also apply directly to a chosen university, but the requirement to obtain a visa means they cannot do this later, or based on more information, than UK-domiciled students. Together with evidence from Costas-Fernandez *et al.* (2023), who show that foreign students have little impact on the educational and labor market outcomes of UK students, using the same data, this means we should not be concerned about the impact of potential differential selection of international students for the validity of our identification strategy.

[8]12% of the students in our data study for a course with an additional subject. For example a BSc in Economics *and* Politics is similar to double majoring in Economics and Politics. BSc in Economics *with* Mathematics would be similar to majoring in Economics and minoring in Mathematics

higher or lower proportion of racial minority academics.

In this paper, we define our treatment variable, exposure to racial minority staff, based on the department administering the student's degree and at the time the student first enters university. This is because alternative definitions, such as a weighted average of the departments administering the modules the student finally takes, may be endogenous, given that the characteristics of teaching staff for specific modules are more readily observable to students once present at university.

2.3 Student-staff interactions

Interactions between staff and students include teaching events, support classes, office hours, and *ad-hoc* meetings. Teaching events are taught by the academic staff affiliated with the specific department.[9] In 2012, universities averaged approximately 18 staff per student (Guardian, 2012). In general, higher-status universities have and had a lower student-to-staff ratio (Guardian, 2012, 2024).

With the exception of Oxford and Cambridge, which form the "Very High Status" cluster of universities (Boliver, 2015), these interactions follow a similar format across university types within subject areas.

Teaching events are either "Lectures" taught by the main instructor (module director), and not typically requiring engagement and participation from students; or "Classes", taught by either instructors or by teaching assistants. Classes are typically in smaller groups and somewhat more interactive, and students on the same programme and module may be taught by different staff.[10] Classes can take many forms such as problem sessions, discussion sessions, labs or seminars. It is possible that lab sessions, which are more common in STEM courses, are more likely to require co-operation between staff and students and the participation of all students. Similarly, in the 'Very High Status' universities classes are more likely to consist of small tutorials of 4-5 students. In both these cases, the more intense or constructive interactions may lead academic staff ethnicity to play a more important role. Students may also have additional support classes which are generally voluntary and targeted at students who are falling behind or who have less prior knowledge in the subject studied.[11]

Notionally, all students are expected to undertake 3600 'learning hours' in order to gain the 360 credits required to obtain a UK undergraduate degree. This is equivalent to 40 hours per week for 30 weeks of the year (Quality Assuance Ageny for Higher Education, 2011). Neves & Brown (2022) calculate that average attendance is 11.3 hours per week out of 13.4 scheduled hours per week, which shows that while students attend a high percentage of their scheduled teaching, the majority of learning hours should be accumulated through private study. Scheduled contact hours tend to be higher in subjects allied to health and in STEM, and lower in Social Sciences and Humanities (Sastry & Bekhradnia, 2007).

[9] For example, in the UK a Mathematics course in an Economics curriculum will be taught by academic staff affiliated with Economics department, in contrast with other countries where this might be taught by staff from Mathematics departments.

[10] Typically, students are assigned to these classes by the universities' timetabling algorithms, without any possibility to actively sort into events with particular staff. However, we are unable to observe this teaching group assignment, and we measure exposure to academic staff at the department-level. This means that while we are unable to leverage any information about class assignment to learn about the mechanisms for impacts of minority staff, there is no threat to identification of causal effects from this source.

[11] We exclude the Open University because it was the only one to operate under a different model, with courses offered online, allowing students to register for any number of credits and complete their degree at their own pace. Being a single institution, we do not have the power to assess the impact of online versus in-person teaching in relation to our research question.

Additionally, academics hold office hours where students can interact with their instructors, and students can request individual meetings. During these optional sessions and meetings, students can seek advice on various topics and academic staff are available to provide guidance on study- or career-related and personal matters. For example, students might ask to discuss the written feedback on their assignments, talk about applying for graduate study, learn about additional support the university offers for job or work experience applications, or seek advice on balancing university studies with other responsibilities. These may be especially important for students with caring responsibilities, as staff can direct them to additional resources if needed. These interactions allow academic staff to get to know students better, which is crucial if a student requests a letter of recommendation. Such interactions provide opportunities for staff to understand the students' non-academic skills and qualities. Race of the academic staff and the student might play an important role in students' willingness to attend or request these meetings. It may also affect the usefulness of the information provided by the academic staff. For example, they may rely on their own experiences in the job market or in their studies, and help students overcome fears about race being an important factor in hiring decisions. Although there is no data on the exact number of hours students spend in office hours or one-to-one interactions with academic staff, Neves *et al.* (2024) indicate that students make extensive use of these additional support hours.

3 Data and descriptive statistics

3.1 Data

For this paper, we link three datasets. The first is the Higher Education Statistics Agency (HESA)'s Student Records. HESA is the regulatory body in the UK that collects student data from all the degree-awarding Higher Education Institutions ("universities" henceforth). HESA Student Records is an administrative dataset that includes information about all students regardless of their domicile, nationality or the program of study. The records include detailed information about the students' progress over time and their graduation outcomes as well as students' personal characteristics including previous qualifications and grades, and their ethnicity.[12]

The second source is the HESA's Destinations of Leavers from Higher Education (DLHE) survey. DLHE is a survey sent to all graduates from UK universities, approximately 6 months after completion. It collects data about graduates' education or labor market activity on a "snapshot day". This includes, for those in employment, the type of job and contract they have, whether a degree was required to obtain the job, and the Standard Occupational Classification of the job.

Our last data source is the HESA Staff Records. Similar to Student Records, HESA collects data from all UK universities about their staff including ethnicity, qualifications, employment, salary and years of service in their current role. Using this dataset, we calculate department × university × academic year level averages for racial composition of staff, plus other department level characteristics such as proportion of female academics, proportion

[12]The non-response rate for ethnicity for our population of interest of UK-domiciled students ethnicity is 1.58%. Ethnicity is not recorded for international students. For staff ethnicity the non-response rate is 12%. We code all staff and students with missing ethnicity in the "Other" group. Although all our data refers to ethnicity rather than race, we use the terms interchangeably where this will improve readability or alignment with language used in the existing literature.

of academics at the level of Reader and above, proportion of academics earning a high salary, etc.[13]

We link students' administrative records to their responses to the DLHE, and to staff characteristics of the department administering their degree program. Our linked data includes 114 universities and 45 subjects (see Appendix Table D1). We drop two highly-selective subject fields for which we expect the effects to be atypical, namely Medicine and Dentistry, where student numbers are capped by the government to maintain quality and ensure there are enough placements for practical training available (Lewis, 2023). Students studying these subjects also have different career paths once they graduate from these programs which might affect the interpretation and external validity of our results on the post-university outcomes. We also restrict the sample to students without a disability as selection into HE for students with a disability is markedly different across ethnic groups.

Our linked datasets allows us to follow the entire undergraduate university careers and labor market outcomes for the majority of students in three entry cohorts, in 2012, 2013 and 2014. UK undergraduate degree programs are typically intended to take 3 or 4 years to complete, and some students may repeat a year yet still graduate. Our last year of Student Records data pertains to the academic year-beginning 2017, so we cannot expect consistently to capture the complete academic careers of students in entry cohorts from 2015 onwards.

3.2 Descriptive statistics

In this section we document (i) the variation in the proportion of racial minority staff that students are exposed to; and key differences in (ii) the predetermined characteristics and (iii) the outcomes of students and graduates from different racial groups.

Figure 1 and Figure 2 show the proportion of academic staff from all racial minorities, then Black, non-Chinese Asian and Other racial minorities, across groups defined by department-university-year, first unweighted and then weighted by the student numbers. As some students leave university without completing their studies, in our analysis we use *first year* exposure to racial minority academics since this is observed for every student in every entry cohort. (Using each student's own last year of exposure would be endogenous to the treatment, while using exposure for the student's *anticipated* last year will introduce measurement error as dropouts would never be exposed to that group of academics). In order to capture every entering students' entire undergraduate university careers, in our analysis we will exploit variation in this first year exposure only for those in entry cohorts 2012-2014. Over the extended period shown in Figure 1 and Figure 2, the median proportion of minority academics is around 10%, but there is variation between zero and 80%. Similarly, while median prevalence of staff from each distinct racial group is low, there still exists substantial variation in each case. Figure 3 shows very small increases over time in the share of racial minority academics in the university sector as a whole. However, what matters for this paper is the residual variation, across the department-university-year groups plotted in Figure 1 and Figure 2, after controlling for fixed effects and observable characteristics. We document this in section 4.1.

In Table 1, we present the control variables and outcomes of interest, first for all students and then by students'

[13]The level of Reader is similar to Associate Professor in US and other countries. We consider academics to have high salaries if they are earning over £60k a year. Departments are referred to as "cost centres" in HESA records.

race.[14] This table shows that White students are less disadvantaged than racial minority students, as indicated by the disadvantage index, compiled from markers for coming from a low SES family, being a first generation university student and coming from an area where HE participation is low, using the approach proposed by Anderson (2008). Non-Chinese Asian students are the most disadvantaged racial group followed by Black students and then Mixed-Other race students. These differences are similar when we look at the type of school these students attended prior to university. While 10% of White students come from private schools, 3% of Black and 7% of non-Chinese Asian students do so.

White students are also advantaged in terms of prior educational performance (White students' average Tariff score is equivalent to over one grade in an A-Level higher than Black students', and half a grade higher than non-Chinese Asians) and educational track (12% of White students arrive with the vocation BTEC qualifications versus 26% of Black students and 19% of non-Chinese Asians).[15] These differences reflect a combination of the overall composition of the school population (higher attainment and SES among White), and conditional on this, gaps in access to HE by race for the cohorts we study (higher for racial minorities, of whom those with the highest participation are the least positively selected on attainment and SES (Crawford & Greaves, 2019; Richardson *et al.*, 2020). We control for these predetermined characteristics in our analyses, since we expect all to have an important impact on academic and labor market outcomes (Del Bono & Holford, 2018).

The lower panels of Table 1 show that White students achieve better outcomes at university and in the labor market after graduation. For example, 19% of White students who start a degree programme eventually achieve a first class honors degree[16], versus 7% and 13% of Black and non-Chinese Asian students. This may partly be driven by differences in personal characteristics and/or entry test scores, which we will control for. The situation is similar in post-graduation, although the differences are lower. While we do not see much difference in terms of being employed between White and Black students, the difference between White and non-Chinese Asian students is 5ppt, or 7.8% of the mean. On the other hand, when we look at the differences between White and minority graduates' job characteristics, the difference in holding a graduate level or high SOC job[17] between White and Black graduates is 2.65ppt and 3.41ppt, or 7% of the mean. Interestingly, we do not find much difference between White and non-Chinese Asian students in job characteristics but this may reflect the difference in selection. When it comes to likelihood of studying for any degree or a graduate degree, we see that proportions are similar for White and minority students.

[14] In accordance with the data license from HESA, all sample sizes are rounded to the nearest 5. For descriptive statistics by the cluster and racial minority shares of the universities, see Appendix Table A1 and Appendix Table A2.

[15] While the UK HE entry system uses letter grades, we quantify these and present them in the table. We use the conversion table from the Universities and Colleges Admissions Service which is UK's university admissions service provider and cap the grades at A. We use the top three grades from A Level (or equivalent) exams as the universities normally consider the top three grades from these exams. As we cap the grades at A and use top three grades, our tariff measure is between 0 and 144. The difference in points between two letters (A vs B or B vs C) is 8 tariff points.

[16] First class honors degree is given to those who achieve an average mark of 70 or higher.

[17] We define graduate jobs as a job where subject or level of study is important or qualification is needed. We classify High SOC jobs as those in managerial, professional or intermediate occupations.

4 Empirical strategy

In order to study how exposure to minority academics affects students' academic and labor market outcomes we estimate the following model. We run an independent Ordinary Least Squares regression for each outcome, separately. We use this method despite the dependent variables being binary, since no proportions are close to zero or one:

$$Y_{isjt} = \beta_1 \mathbf{X}_i + \beta_2 \Gamma_i + \beta_3 PMin_{sjt} + \beta_4 \Gamma_i \times PMin_{sjt} + \beta_5 \mathbf{D}_{sjt} + \beta_6 \delta_s + \beta_7 \theta_j + \beta_8 \tau_t + \beta_9 \lambda_g \times \psi_c + \beta_{10} \mathbf{Q}_i + \epsilon_{isjt} \quad (1)$$

where Y_{isjt} is the outcome of individual i, studying subject s, in university j, and in entry cohort t. [18]

Although the raw HESA data has a panel structure, following each student through their university career through to 6 months after graduation, we convert this to a student-level cross-sectional dataset, with each outcome, treatment and explanatory variable measured exactly once. Students' academic outcomes are measured at the end of their observed undergraduate university career, typically 3 or 4 years after entry; and for those who do graduate their labor market outcomes are measured a further 6 months later. We observe a sufficient period for a complete undergraduate university career for every student only for those belonging to entry cohorts 2012 to 2014, so we restrict our estimation sample to these entry cohorts.

The treatment variable *PMin* is either (i) the proportion of minority academics or (ii) a vector containing the proportion of Black academics, proportion of non-Chinese Asian academics and proportion of Other minority racial academics, that the student is exposed to in their subject, university and entry cohort of study. We always use the *PMin* recorded for the student's first year of study, as this is measured for all entrants, including those who drop out.

$\mathbf{X}$ is a vector of student characteristics that includes sex, a dummy for coming from state school, disadvantage index and, mature student status. We create the disadvantage index using the method proposed by Anderson (2008). This method takes the correlation between the variables that it includes into account when creating the index. To create this index, we use dummies for coming from a low SES family, being a first generation student, and coming from a low HE participation area. All of these factors are considered as disadvantage factors by UK universities (Sen, 2023). Γ is a student race dummy. This is either i) White and minority or ii) White, Black, non-Chinese Asian and Other (which includes Chinese ethnicity and mixed-race students as well as as those with missing ethnicity.). $\mathbf{D}$ is a vector of department level characteristics: Proportion of female academics, proportion of academics that are Reader of above, proportion of academics tenured, proportion of student facing academics, academics' average years of service in a given university, and proportion of academics earning a high salary[19]. $\mathbf{Q}$ is

[18] Henceforth, where we refer to cohort this always means entry cohort, rather than graduating cohort.

[19] Reader is similar to Associate Professor in American system. High earning academics are defined as those earning over £60k per year

a vector of pre-university qualification subjects.[20]

We control for subject fixed effects (δ_s), university fixed effects (θ_j) and cohort fixed effects (τ_t). These remove the impact of any correlations between share of minority academics and additive impacts of students' subject, university or cohort on their potential outcomes. These could act, for example, through subject or institution-specific grading standards or reputations with graduate employers, the changing overall health of the economy, or other unobservable student and staff characteristics. These fixed-effects would not however capture any *interactive* effects, such as if there is a bigger difference in the returns to taking a Humanities degree in more versus less competitive universities, than the return to a STEM degree between these institutions. Including university $\times$ subject fixed effects could address this, but this leaves little residual variation to identify the effect of minority academic staff representation on student outcomes. Instead, we address this form of unobserved heterogeneity by including subject *group* fixed effects, λ_g, interacted with university group ("cluster") fixed effects, ψ_c. Specifically, we create 5 subject groups: Allied to Health, STEM, Social Sciences (including Business), Humanities and Others; and use 4 university "cluster" groups, as defined in Boliver (2015) using several factors such as their selectivity, research output, teaching performance etc., and listed in Table D2.

Interacting these creates 20 dummy terms, which we label "choice set" fixed effects. We assign these to students using their realized outcomes: the subject of the degree program and the university attended. For identification, our assumption is that these capture any differential returns to subject or differences by subject in unobservable heterogeneity in staff and student characteristics across institutions. The features of the UK university admission system ensure that using ex-post outcomes still gives an intuitive interpretation of these fixed-effects as representing students' ex-ante choice set. As previously discussed, students typically study a maximum of only 3 subjects in the year prior to coming to university. This circumscribes the subject areas for which they can realistically be admitted to a degree program. Meanwhile, applications are based on predicted grades and admissions on realized grades in these qualifications, the criteria for which vary chiefly across university clusters. This circumscribes the institutions to which students can realistically be admitted on a degree program, or (where predicted grades far exceed standard entry requirements) those to which a student would apply. Conditional on other covariates, students with the same choice set are likely to have more similar potential outcomes than students with different choice sets, and less scope for these potential outcomes to be correlated with the share of racial minority staff they are exposed to.

We, then, assume that students' exposure to minority academics is random conditional on their university cluster $\times$ subject group choice set and the additional fixed-effects and controls. With this assumption the coefficient β_3 in equation 1 identifies the impact of exposure to minority academics on White students' academic and labor market outcomes; and β_4 the differential effect of minority academics on minority students, relative to White students.

To give a concrete example, consider two identical students from different cohorts. They faced the same choice set, and attended the same university to study the same subject. Over time the racial composition of academic staff teaching that subject at that university changed; Student 1 faced 10% minority staff, and student 2 faced

[20] Vector of qualification subjects includes dummies for having taken (Further) Mathematics, English Literature, Biology, Chemistry, Physics, Geography, History and Modern Languages.

12% minority staff; while nationally the proportion of racial minority staff remained static. That 2 percentage point increase in minority exposure is the variation we use to identify the effect of minority staff on these students' outcomes.

To give a second example, consider Universities A and B, that have a similar selectivity and research output so are in the same cluster and choice set. University A is located in an area with a high proportion of minority residents, and therefore has a high share of both minority students and minority academics. University B in contrast is in a low-minority area, and its composition reflects this. In our model, any selection-on-unobservables of either staff or students that is driven by these differences across geographical areas will be controlled for by the university fixed effects, and so this variation does not contribute to identifying the effect of minority staff on student outcomes.

We next assess the extent of identifying variation, and threats to the credibility of this identifying assumption.

4.1 Residual variation

One typical worry in studies exploiting naturally occuring variation in treatment intensity, is whether there is enough variation in the treatment across groups. As we also control for several department level characteristics as well as university cluster-subject group fixed effects, there may be little residual variation in proportion of minority academics between cohorts, subjects and the universities, for us to exploit. Following Blanden *et al.* (2016) we first document the raw variation and how much variation is left when we control for cohort, department, and university fixed effects as well as department controls and university cluster - subject group fixed effects.

Column (1) of Table 2 shows the mean share of racial minority academics that UK-domiciled students in UK universities are exposed to is 12.47%, with a standard deviation of 10.01%. Subsequent columns show that when we progressively control for cohort, university, subject, university cluster-subject group fixed effects as well as department level characteristics, the residual standard deviation falls to 6.13% in column (6). In the last column, we also control for university $\times$ department fixed effects. This reduces the residual variation to only 2.54% meaning 75% of the raw variation is then controlled for.

We build our empirical specification with the controls and fixed effects shown in column (6). This leaves more meaningful variation to exploit. We argue, and support in our balancing checks below, that conditional on the many factors we do control for, and given the timing of application decisions, the within choice-set residual variation exploited here is as good as randomly assigned. Subsequent rows show that these additional controls reduce the residual variation of non-Chinese Asian and Mixed-Other staff by a slightly larger proportion than Black staff, perhaps because the share of Black staff is more often bounded at zero, but in all cases this leaves a meaningful level of residual variation to exploit. For example, a one standard deviation change in residual exposure to Black Academic Staff in column 6 (0.0254) corresponds to 1.35 extra Black Academic in a department of 53 academic staff, the department mean size in our estimation population. We contend that such a change would be visible to students and have the potential to impact their academic and labor market outcomes.

The solid gray bars in the histograms in Figure 4 document the distribution of this residual variation, net of year fixed-effects and net of all our controls, in more detail. These show, for our final specifications (net of all

controls) a range of support between +/- 15% for minority academic staff, +/- approximately 5% for Black, and +/- approximately 8% for Non-Chinese Asian. Following Lavy & Schlosser (2011) we also conducted a Monte-Carlo analysis to check whether the variation in minority or specific-ethnicity academics follows is consistent with what we would expect from a random process. The hollow red bars plot the average of the distribution obtained from 5000 iterations of randomly shuffling all staff within their subject area (which we treat as predetermined) but across all universities and academic years. While the shape of the distribution is similar, these figures all show that the real-world data contains more instances of university-by-subject-area groups with especially high or low minority representation than the simulated data (with the exception of major outliers to expected from some iterations of a random process). This suggests that there is some unobserved process of differential selection of minority academics into (and away from) certain universities and subjects. We now proceed to show that that these deviations from pure randomness do not present a threat to identification.

4.2 Threats to identification

Identification is threatened by endogenous selection, specifically if within choice sets and conditional on other observable characteristics, students' unobservable characteristics are correlated with both their counterfactual outcomes and the share of ethnic minority staff. To test for this possibility, we first investigate whether students' exposure to minority academics can be predicted by their observable characteristics. In Figure 5, we show coefficients α_1, with confidence intervals, from the following regression of exposure to minority academics (measured at university-subject-year level) against several student characteristics X_i, as shown in equation 2.

$$PMin_{sjt} = \alpha_1 X_i + \alpha_2 \mathbf{D}_{sjt} + \alpha_3 \delta_s + \alpha_4 \theta_j + \alpha_5 \tau_t + \alpha_6 \lambda_g \times \psi_c + \alpha_7 \mathbf{Q}_i + \mu_{isjt} \tag{2}$$

Figure 5 shows that for proportion of minority academic staff, proportion of Black academic staff and proportion of Mixed-Other minority academic staff, there is no significant selection on observables. However, the figure shows that those from high SES backgrounds are less likely to be exposed to non-Chinese Asian academic staff but this correlation is only weakly significant. However, our data on two other disadvantage indicators (first generation university student and coming from a low HE participation area) are not correlated with students' exposure to non-Chinese Asian academic staff. An analysis in the spirit of multiple hypothesis testing, or using the disadvantage index based on these three variables, gives us no indication of any systematically positive or negative selection. However, to account for any possible deviations from balance within choice sets and conditional on our fixed effects, we do control for a rich set of observable student characteristics in our main specifications. We also check for differential selection within racial groups. In Figure B1, we present marginal effects of the disadvantage index, and each component thereof, in corresponding regressions for each ethnic group. Although there are two individually significant coefficients across the 32 shown, coefficients on the disadvantage index are never statistically significant, and there is no evidence for differential selection of either White or minority students to minority staff along any of the dimensions.

In addition to presenting evidence on overall selection on observables, we follow Fairlie *et al.* (2014) and present

evidence on whether White-minority *gaps* in student characteristics within departments are correlated with the proportion of minority academics. We explain these tests and document our findings in detail in the Appendix with Appendix Table B1. In summary, these show balance on prior attainment and educational background, but evidence that minority students may be from more disadvantaged backgrounds, relative to White, in departments with more minority staff. However, this is driven by Mixed/Other ethnicity students, rather than Black or non-Chinese Asian students on whom we focus our same-race effect analysis.

These checks cannot rule out the possibility that some students have strong preferences for some university - degree programs which might result in them seeking out and being more exposed to minority academics, even within their choice set. If these students exert more effort once at the university, they might have better academic as well as labor market outcomes due to this effort, biasing upwards our estimates of the impact of minority academics. If these students preferences for interacting with minority staff means that they are negatively selected on their counterfactual outcomes in a low minority staff environment, we would expect our estimates to be negatively biased. However, given the few significant associations of (differences in) observable student characteristics with minority staff; and the institutional setting requiring any such students correctly to forecast *changes* in minority staffing a year ahead, this scenario seems unlikely.

5 Results

5.1 Effects of minority academics

In this section, we present how exposure to minority instructors impacts White and minority students' academic and labor market outcomes.

In Table 3, we present the results on academic outcomes.[21] First, there is no significant impact on the outcomes of White students, as indicated by the top row, which shows the coefficient on proportion of minority academics not interacted with students' minority status, i.e. β_3 in equation 1. The second row shows β_2, indicating at face-value that, in a department with no minority staff, minority students are predicted to have poorer academic outcomes than White students, both conditional on entering a degree programme (columns 1-4), and conditional on graduating (columns 5-6). The third row shows β_4, the interaction term between students' minority status and the proportion of minority academic staff. In the lower panel, the final row "TE on Minorities" reports $\beta_3 + \beta_4$, the impact of increasing the proportion of minority staff on minority students.

The sample in columns 1-4 comprises all students *starting* an undergraduate degree in entry cohorts 2012-2014. The outcomes are not conditional on anything else, so, for example, the dependent variable in column 1 is an indicator for the student ever graduating with a first class degree (GPA above 70) within the spell we observe for them. This outcome is set equal to zero for those who graduated with a lower class degree, or who were never observed to graduate. We observe no effect on minority students' likelihood of graduating with a first class degree, but a positive and significant effect on achieving a good degree, defined as earning either a first class or upper second class

[21] We cluster standard errors at the department level, since this is the level at which our treatment varies. In Appendix Table C1, we present robustness checks on the significance of all our treatment effects from Tables 3-6 . While we observe some differences, they mostly affect variables at the margin of weak significance. Our overall interpretations are not materially affected.

honors (GPA above 60). A 10% increase in exposure to minority academic staff (roughly 1 standard deviation, see Table 2) raises the likelihood of minority students achieving a good degree by 1.03 percentage points. Additionally, minority staff make minority students more likely to graduate on time and to graduate overall, with each outcome improving by 0.9 percentage points following a similar 10% increase in exposure to minority staff. These positive effects align with previous studies on the influence of racial minority instructors and teaching assistants (Fairlie *et al.*, 2014; Lusher *et al.*, 2018).

Columns (5-6) condition on students graduating. They show no significant positive effects of exposure to minority staff on degree class for minority students who do graduate. This suggests that the boost to good degree attainment is mainly driven by increasing probability of ever graduating, or equivalently, preventing dropout[22], rather than raising academic performance among those who do graduating. Taken together with the null effect on first class degree achievement, this suggests the benefits to minority students are concentrated among lower achievers or those with weaker attachment to Higher Education.

Relating these findings back to the mechanisms proposed in the literature, the absence of impacts on White or minority students' degree classes, or on White students' graduation probability, means there is no evidence that a higher share of minority staff improves the effectiveness of a department's teaching. However, the preventive effect against dropout or delayed graduation may be consistent with the presence of role models, or provision of advice, encouragement, or structural changes that persuade or enable minority students not to give up.

In Table 4, we present the results on post-graduation outcomes. This sample is again restricted to students in entry cohorts 2012-2014, and is now also restricted to students who do graduate. The outcome is always as observed on a snapshot day 6 months after graduation, the timing of which relative to entry in turn depends on program length and whether the student graduated on time. The rows of this table follow the same structure as Table 3. The outcomes in the first two columns, for the graduate's main activity being "Employed" or "Any Study" are mutually exclusive, with the omitted category being "Not in Education, Employment or Training". The outcomes in columns 3, 4 and 5 do not condition on anything further, so for example "Grad Study" is equal to one for those in graduate-level study, and zero for those in non-graduate study or not in study; and "Grad Job" is equal to for those in graduate-level employment, and zero for those in non-graduate employment or not in employment.

For White students, exposure to more minority academic staff has no significant effect on their likelihood of being in employment or study, but White students are somewhat more likely to secure a graduate-level job. For minority students, a 10% increase in exposure to minority academic staff decreases their likelihood of being in employment by 1.69 percentage points but increases their chances of pursuing further study by 1.36 percentage points and their likelihood of entering graduate study by 1.08 percentage points, all statistically significant. These effect sizes represent 2.64%, 5.28%, and 6.56% of the respective means. A 10% increase in exposure reduces minority students' chances of securing a graduate-level job or a high SOC job by 1.52 and 2.11 percentage points, respectively. Looking only at students who are employed in columns (6-7), these negative effects become smaller

[22]For simplicity and to be consistent with the literature, we define dropout as equivalent to not ever graduating from university. This captures all potential reasons for non-graduation, which could include realized or anticipated academic failure, mental or physical ill-health or any manner of personal circumstances.

and lose statistical significance.[23]

Altogether, this presents a picture in which minority staff increase minority students' progression to further study (including graduate-level study), and reduces their immediate progression to employment by a very similar margin (we cannot reject that the treatment effects in columns 1 and 2 are of equal but opposite magnitudes), with no robust evidence that the quality of job they find is affected, conditional on entering work straight away. While labor market entry is delayed, postgraduate qualifications offer significant advantages in the UK labor market due to the skills gained and the signaling value of these degrees (Lindley & Machin, 2016). However, we are unable to track graduates in our sample through their postgraduate studies to analyze their outcomes after completing graduate study, so we cannot rule out that minority students do not experience any longer-term labor market premium from exposure to minority academics. For example, credit constraints may limit their geographical mobility and hence ability to access jobs their postgraduate study would qualify them for. This may mean they enter a similar job to that which they would have obtained without further study, having incurred a period of foregone income, and potentially tuition fees.

Again, relating this finding back to the mechanisms proposed in the literature, it may stem from exposure to minority academics acting as role models, or providing effective advice and guidance that encourages or enables minority students to pursue further education, such as masters or PhD programs. A plausible explanation is that minority academics, often immersed in academic career trajectories themselves, may unintentionally project their own success experiences onto students (Dahlberg & Byars-Winston, 2020). This can lead to a form of misaligned incentives: staff members, rewarded institutionally for cultivating high-achieving graduate students or research assistants, may prioritize academic pathways that align more closely with their own professional identities. For students who trust these mentors, the well-meaning guidance may not reflect the full spectrum of viable career options. In this sense, there is potential for unintended consequences, where advice that is meant to empower ends up narrowing choices or delaying engagement with the labor market. While minority students might also be more likely to seek employment advice from minority instructors, these academics could be limited in offering practical job guidance if they lack experience outside of academia. This may explain why we do not see significant differences in the job characteristics of minority students who do find employment. The beneficial impact on White students' job attributes is consistent with a more diverse environment inculcating more prosocial attitudes among students from the majority ethnic group, that may be perceived favourably in their job search (Bartanen & Grissom, 2023; Wells *et al.*, 2016).

5.2 Effects of same-race academics

There are significant differences in academic and labor market outcomes and in levels of representation among academic staff by race. For example, Advani *et al.* (2020) indicate Black graduates are less likely to pursue PhD studies compared to other racial groups, while Appendix Table A1 shows lower representation of Black than non-

[23] Appendix Table C10 checks for any mediating role of graduating on time in students' post-graduation outcomes. This is generally a significant predictor of more positive post-graduation outcomes, but we show controlling away this potential mechanism does not materially change our estimates of the direct benefits of minority-minority or own-race representation.

Chinese Asian academics in UK universities, particularly those of higher status. This means that the effects of minority academics on students might vary by the students' and academics' own race, and these such difference may be of policy interest.

If students only see academics from their own race as role models, or if only the advice from same-race academic staff is perceived as culturally appropriate and useful students may not benefit from having academics from other racial minority backgrounds. For example, a Black student might not see a non-Chinese Asian academic as a role model because they might believe that non-Chinese Asian academics are more represented in their field (for example in STEM fields). Previous literature shows that students are generally affected from stereotype threat, being at the risk of conforming a negative stereotype relating to one's own identity (Steele & Aronson, 1995) and this threat affects their academic outcomes (Good *et al.*, 2003; Dee, 2014). In order to understand if such mechanisms may be at play, we run additional set of regressions to understand how exposure to minority academics from one's own racial group affects students' academic, employment, and study outcomes.

We first analyze academic outcomes in Table 5. The results indicate that both Black and non-Chinese Asian students benefit from having academic staff of their own race, with similar effect sizes for both groups in terms of ever obtaining a good degree class, ever graduating or doing so on-time. However, for Black students, their smaller population and hence higher standard errors mean the only significant impact is a higher likelihood of obtaining a good degree. The own-race treatment effect on Black students of 0.278 means that a one standard deviation increase in the proportion of Black academic staff (3.17%) would increase Black students' likelihood of achieving a good degree by 0.9 percentage points (1.71% of the average). Similarly, the own-race treatment effect on non-Chinese Asian students of 0.236 translates to a one standard deviation increase in the proportion of non-Chinese Asian academic staff (4.81%) increasing non-Chinese Asian students' likelihood of graduating with a good degree by 1.14 percentage points (2.16% of the average). Inspecting the impacts conditional on graduation, these provide tentative (for Black) and significant (for non-Chinese Asian), evidence of own-race effects on academic achievement not just by preventing dropout, although this does not extend to higher-achieving students.

In Table 6, we analyze post-graduation outcomes. We find a negative and significant own-race effect on Black students' employment probability, though no evidence of any impact on job quality conditional on this. Black graduates exposed to more Black academic staff are more likely to progress into further study, but these effects are not statistically significant, and taking point-estimates at face-value, are not enough to offset their lower employment probability. There is no significant own-race impact on employment or either type of study for non-Chinese Asian students, but a negative and significant impact on attaining graduate or high SOC employment, even conditioning on being in work. There is however a notable negative effect of Black academic staff on White students' progression to graduate study.

We are under-powered to say with confidence that own-race representation improves minority progression to postgraduate study, but these results do not contradict our evidence from Table 4, that increasing minority representation in general, increases minority progression to graduate study. These findings are also consistent with the earlier discussion that minority students turning to minority or same-race academic staff for employment-

related advice, rather than university career centres, may receive less effective guidance on obtaining jobs outside academia.

6 Robustness and heterogeneity

We run several robustness and heterogeneity checks to see if the results hold under different assumptions or for different sub-samples, and assess what these differences tell us about the mechanisms driving the impact of minority or same-race staff on student outcomes. Here, we focus on the effect of all minority instructors on White students and on all minority students, and of same-race instructors on Black and South Asian students.

Clustering of standard errors

The standard errors in the main specification are clustered at department level. In Appendix Table C1, we show standard errors clustered at university, year and year-department level. The clustering specification is shown to affect the significance of some specific coefficients. For example, the beneficial effect of same race staff on South Asian students academic performance loses significance when clustering at the University level; and the positive coefficient of minority staff on minority students' attainment of a good degree turns significant with clustering by year or cohort-department. However, the conclusions that would be drawn from this paper from any of these choices would be broadly the same: Benefits of exposure to minority staff for the academic and labor market outcomes of White students; no benefits to these outcomes from same-race representation for Black students; but benefits to same-race representation for both Black and South Asian students' progression into graduate study.

Adding controls on student peer-group composition

In Appendix Table C2, we show our main results for the impact of minority or same-race academic staff, alongside the results obtained when the ethnic-by-sex composition of the student's peer-group is also controlled for. Broadly (with just the exception of First class degree), comparing treatment effects in columns 1 and 2 in the top panel shows that adding these controls attenuates slightly both the positive and negative effects of minority staff on minority students already documented, without significantly altering them. The same applies when comparing columns 1 and 3 (for Black staff on Black students) and 2 and 5 (non-Chinese Asian staff on non-Chinese Asian students). This attenuation is consistent with exposure to minority peers being positively and negatively associated with student and post-graduation outcomes in the same directions as exposure to minority staff, and with minority students tending to be exposed to more of both (Appendix Table A3). However, this does not affect the overall interpretation of our results.

Different measures of exposure to minority academics

Academic staff with different profiles and job roles might impact students in varying ways. For instance, British academics might have a better understanding of the UK education system compared to foreign academics with limited experience in UK academia and the job market. Academics on research-only contracts, who are not required to teach or advise, might interact less frequently with students, meaning students would need to actively seek out

their guidance. To address these potential variations, we create alternative measures of minority exposure by restricting our staff pool to i) British nationals, and ii) staff who are directly involved with students, defined as those on teaching-only or combined teaching and research contracts.

The results are presented in Appendix Table C3. Focusing on British academic staff, the effect of minority academics on minority students academic outcomes are attenuated, but our main post-graduation result of a shift towards study and away from (high quality) employment is slightly intensified. This is also the case for same-race effects of non-Chinese Asian academics and students, but not for Black.

Focusing on academic staff with a teaching role, minority-on-minority and own-race effects on academic performance are attenuated or turn negative. Own-race impacts on employment and study are not markedly changed for Black students, but the benefits to further study are substantially attenuated for non-Chinese Asian students.

Weakened effects of teaching staff on graduation and degree class suggest that our main results are not predominantly driven by more effective or culturally appropriate within-classroom interactions, but structural changes or role modelling that benefits minority students but is driven by non-teaching staff. The results on progression into graduate study also tentatively suggest some differences in who these different groups perceive as role models or seek out for advice, with non-Chinese Asian students seeming to be seeking out British nationals of the same race, whom they may perceive to have shared culture and institutional reference points.

Our findings on the impacts on White students remain consistent, except in both cases we now find a significant negative effect on graduation. Our sample is restricted to British students, the majority of whom are White. Aligning these result with our main results may reflect that distinctions by nationality as well as ethnicity are important for this group, such that both White academics from continental Europe and non-White academics from the UK, particularly those in the classroom, may not be considered role models or foster a sense of belonging that reduces likelihood of dropping out.

Heterogeneity by subject group and university cluster

Since teaching methods and techniques, levels of selectivity and underrepresentation of minority staff and students vary across different subject areas and university clusters, we conduct a heterogeneity analysis by subject groups and university types. These split sample analyzes sometimes produce large confidence intervals, especially where there are few minority (especially Black) staff or students. This limits our ability to be precise about mechanisms, but a few informative themes emerge.

Examining the results by university cluster in Appendix Table C5, we observe less beneficial, or even detrimental minority-minority and own-race effects on degree class in the higher status institutions, with the largest benefits reliably seen in the medium status institutions. Our main analysis had shown benefits mainly through retention rather than academic performance, and no impact through retention of students at the top of the ability (degree class) distribution. This heterogeneity result is consistent with academic performance becoming more likely to be the binding constraint for degree completion in the higher than medium or lower status institutions, and the benefits

of minority or own-race representation not operating through this mechanism.

Own-race effects on progression to graduate study are largest in the very high status institutions. This result may derive from exposure to academic role models being more influential to students' aspirations where the student's own race is most rarely represented, but also the likelihood that students graduating from the very high status institutions are best equipped to convert any change in aspirations to acceptance onto a graduate study programme. Moreover although no coefficients are statistically significant, we also see our main result of benefits to future study and detrimental effects on employment flipped in the case of low-status institutions. These results are consistent with an important role for students seeking domain-specific advice and guidance from same-race academic staff. The low status university cluster is oriented towards vocational subjects and training. It is in these fields that advice on job, rather than study opportunities and applications, may be most relevant and informed.

We present the results by subject group in Appendix Table C4. We restrict our focus to Allied to Health, STEM and Social Science degrees, since the Humanities and Arts, Education and Others groupings have much smaller samples, and lower shares of minority (and specific-race) staff leading to more limited identifying variation.

Qualitatively, our main results on academic outcomes hold. The largest point estimates effects on graduation and degree class for minority and for Black students are in Allied to Health, and non-Chinese Asian students in Social Sciences. On post-graduation outcomes, our main result showing own-race or minority representation shifts students into further study and away from employment appears mainly to be driven by STEM degrees. As in the Bettinger & Long (2005) study of female academics' impacts on female students' subject choices, there is no clear pattern to these results, associated for example with prevailing representation levels or intensity of interactions.

Heterogeneity by student characteristics

In Appendix Table C6, we show results by socio-economic status of the students. We might hypothesise that minority students from high SES backgrounds are more likely already to possess the role models, social capital, sense of belonging in HE, or family financial resources that would deter them from dropping out or help facilitate progression into further study. In this case, we would expect bigger effects of exposure to minority or own-race on low SES students. In fact, Appendix Table C6 shows very similar effects of minority staff on minority students, and non-Chinese Asian staff on non-Chinese Asian students of different SES. We do find a statistically significant own-race benefit to Black students' attainment of a good degree only for those of low SES Black students, and this effect is bigger than that which would be accounted for only through graduation probability. This suggests that while in general, minority students' academic performance does not benefit through more effective communication with fellow-minority or same-race academic staff, this mechanism could matter for low SES Black students.

We also narrow our analysis to non-mature students, who comprise 12.23% of the overall student population, 12.74% of minority students, 20.51% of Black and 8.89% of non-Chinese Asian students. Mature students might have additional responsibilities, such as caring for family or working more hours to support themselves. They are older and returning to university later in life, and are less likely to be from a background where participation in HE was always expected. Other things equal, we would hypothesise that access to role models, domain-specific advice and

guidance, and culturally-appropriate communication, or the impacts of reforms aimed at reducing ethnic disparities, would be greater for this group. Appendix Table C7 shows that excluding these students makes no material difference to our estimates of the impact of minority staff on minority students, or non-Chinese Asian staff on non-Chinese Asian students. However, the table provides a tentative indication (no coefficients are statistically significant or statistically different from our main results) that excluding the larger proportion of Black mature students attenuates the estimated benefits to on-time graduation, degree class, and graduate study. This is consistent with the result above, also suggesting that own-race represenation matters especially for Black students whit weakest likely attachment to HE.[24]

DLHE survey and attrition

Finally, we examine whether exposure to minority academic staff affects the likelihood of graduates participating in the DLHE survey. This analysis is detailed in Appendix Table C8. DLHE participation is lower among ethnic minority graduates and those exposed to more minority staff, though the minority-White gap is smaller where minority staff representation is higher. Similar patterns apply for Black and non-Chinese Asian graduates and own-race staff.

To address any concern about the representativeness of our survey sample, we apply an inverse probability weighting approach, where the weights are derived from a LPM model estimating the probability of being observed in the DLHE survey, conditional on observed characteristics, including the students' own ethnicity, staff minority (or own-race representation) and their interaction. The results are detailed in Appendix Table C9. Our findings indicate some variations between the coefficients from the main analysis and those from the attrition-corrected analysis, but most differences between the main and attrition-corrected analyses are quantitatively small and not statistically significant. The main important difference is that the impact of own-race-representation on Black graduates' employment and future study prospects each less than half in magnitude, becoming materially less negative and positive respectively. However, this does not change our overall story of deleterious employment but positive study (especially graduate study) effects of own-race representation for minority students.

7 Conclusion

Increasing ethnic minority representation among academic staff is a measure, within the control of universities, that could plausibly help reduce the major and persistent disparities in academic and labor market outcomes experienced by ethnic minority students, relative to White students. Using administrative data on the universe of Higher Education students and academic staff in the UK, linked with survey data on the post-graduation outcomes of students, we estimate the impact of academic staff ethnicity on the educational and, for the first time to our knowledge, labor market outcomes of students of matching and other ethnicities. We control for several dimensions of fixed effects across subjects, universities and cohorts, note the institutional details of the UK system that make

[24] In Table C10 we show results for post-graduation outcomes, in which we control for on-time graduation as a potential mediator. This is generally a significant predictor of more positive post-graduation outcomes, but controlling away this potential mechanism does not materially change our estimates of the direct benefits of minority-minority or own-race representation.

additional selection biases (conditional on these fixed-effects) unlikely in theory, and show tests of balancing and differential selection by students of different ethnicities that indicate any such biases will be minimal in practice.

Our results suggest that increasing ethnic minority representation among academic staff is beneficial to the academic outcomes of ethnic minority students. These effects are mainly driven through increasing graduation probability rather than performance conditional on graduation, and do not tend to extend to students at the margin of a first-class degree. We find no evidence of minority staff representation significantly impacting the academic outcomes of White students.

We interpret this as finding no evidence that a higher share of minority staff improves the effectiveness of a department's teaching in general, but the preventive effect against dropout or delayed graduation may be consistent with the presence of role models, or provision of advice, encouragement, or structural changes that persuade or enable minority students not to give up. We find tentative evidence of bigger benefits of own-race representation for low-SES and mature Black students who we hypothesise would begin with the weakest sense of belonging, social capital and financial safety net. We find beneficial effects of minority representation for minority students' progression to graduate study, particularly among graduates in STEM fields. If this feeds through to increased representation among university academic staff in future this may assist a virtuous cycle of relative improvements in minority students' degree completion and degree class. If this increases diversity in research and development industries, this may increase innovation in non-academic settings (Parrotta *et al.*, 2014). However, these impacts on graduate study do not offset a negative effect on minority students' employment probability and job attributes. This result suggest that the main mechanism through which same-race representation supports Black students is through providing a model and advice or guidance that is domain-specific to academia. minority students who are able to do so may be turning to minority academic staff rather than university careers services. This may persuade them to make further educational investments that may or may not pay off in the long-run (Lindley & Machin, 2016; Gershenson *et al.*, 2022), and they may forego more specialised advice about job search and application.

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Figures

Figure 1: Proportion of minority academics by university-department-year - unweighted

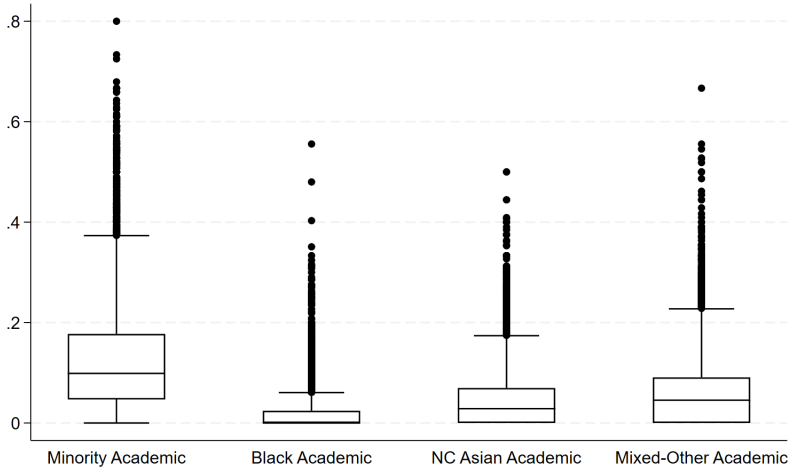
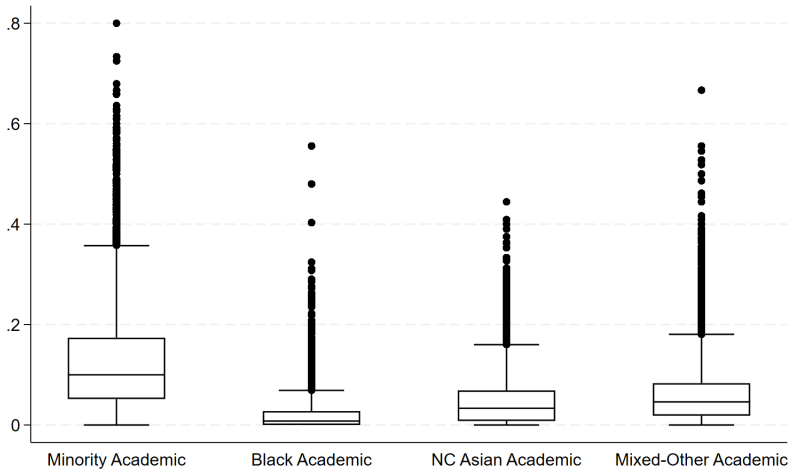
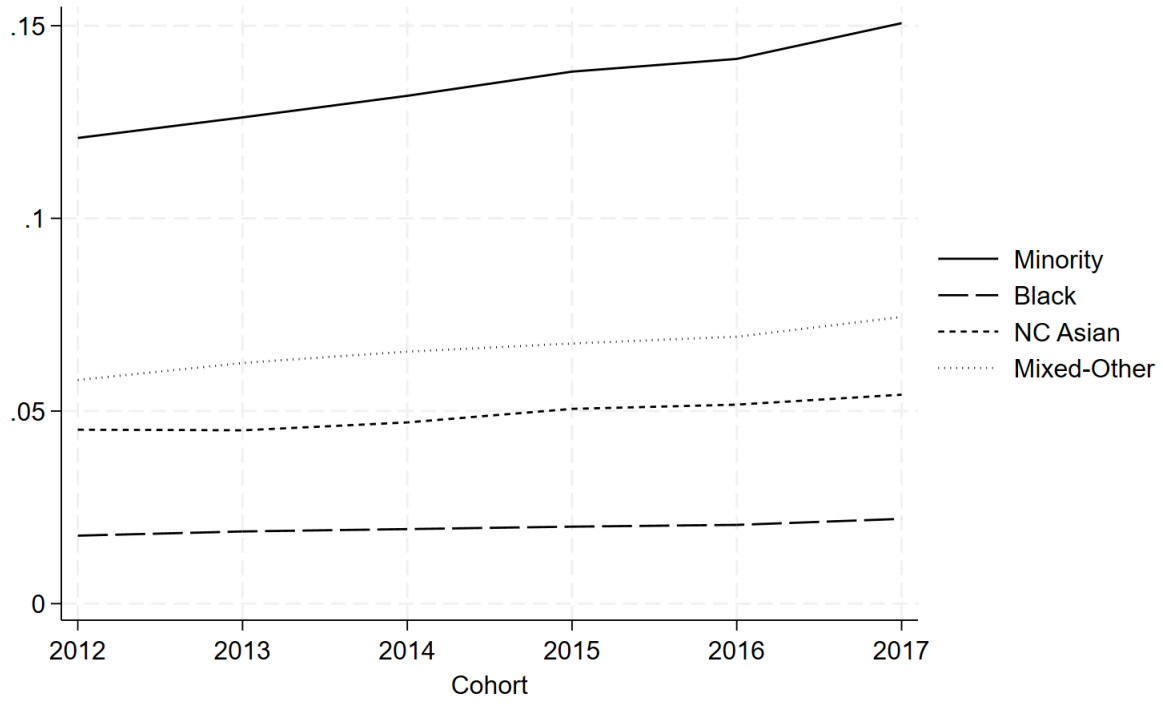


Figure 2: Proportion of minority academics by university-department-year - weighted by student numbers



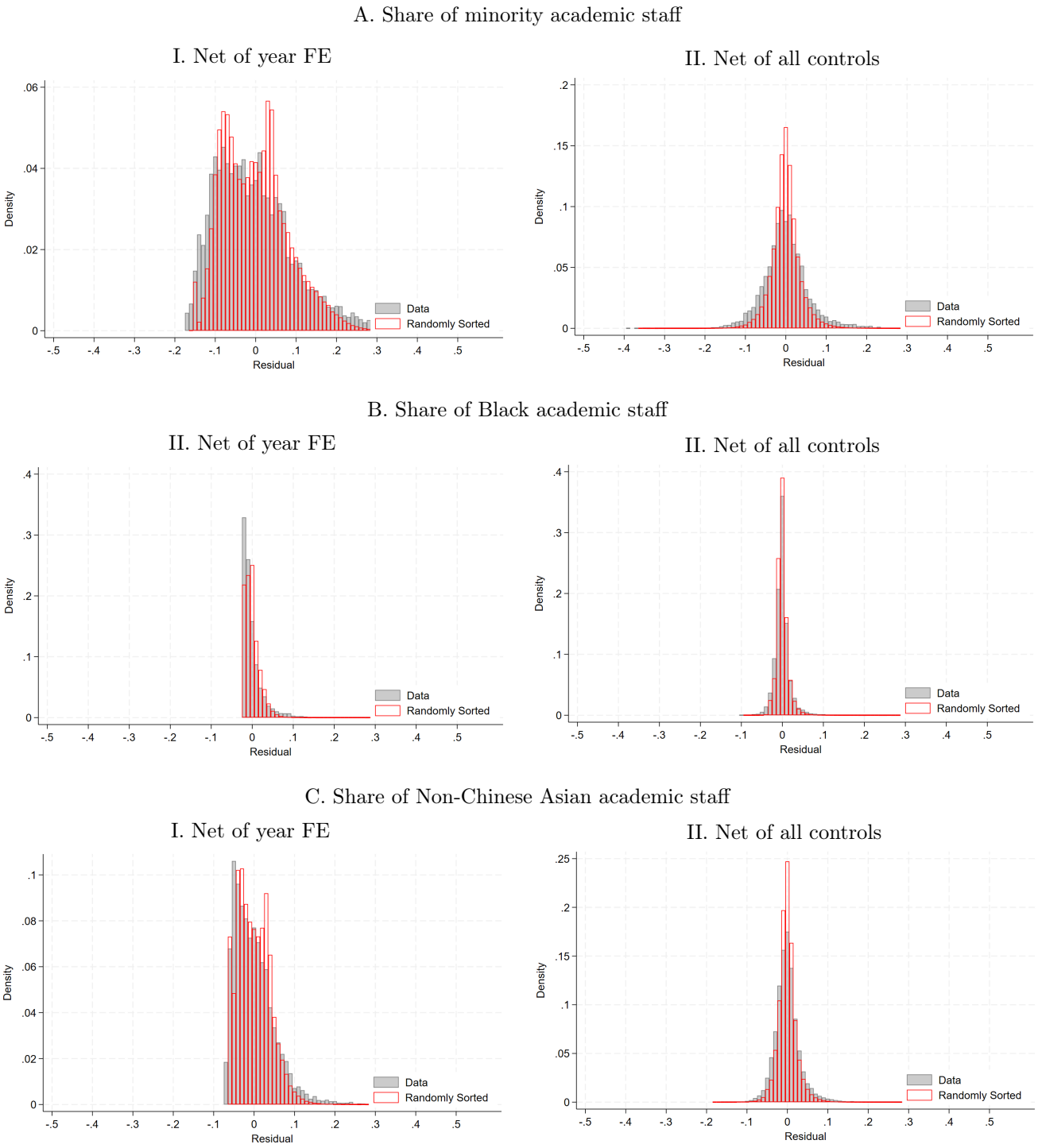
Notes: Source: HESA Staff and Student Records. The boxes show the proportion of ethnic minority academic staff, Black academic staff, non-Chinese Asian academic staff and Mixed-Other racial academic staff. The line in the box shows the median. The upper and lower hinges of the box show 75th and 25th percentiles. Upper and lower lines whiskers show upper and lower adjacent values (75th percentile plus 1.5 × interquartile range; 25th percentile minus 1.5 × interquartile range respectively). Markers outside of the adjacent lines are outliers.

Figure 3: Variation over time in proportion of minority academics



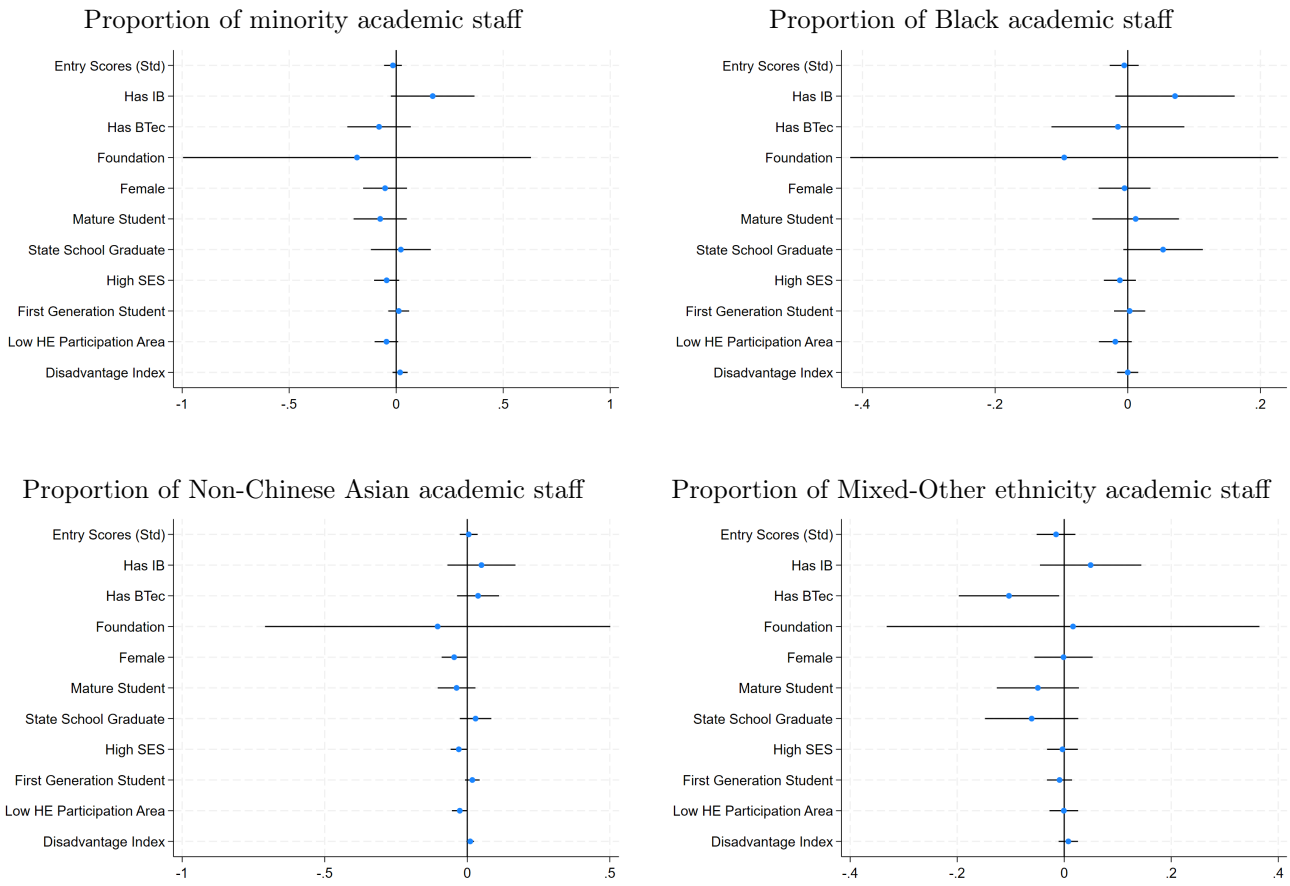
Notes: Source: HESA Staff Records. The lines show the proportion of minority academics, Black academic staff, non-Chinese Asian academic staff, and Mixed-Other racial academic staff across years in all the UK universities.

Figure 4: Observed and simulated random distribution of residual exposure to minority academic staff



Notes: Source: Linked HESA Student Records and HESA Staff Records. Gray bars show distribution of residual variation in exposure to minority, Black, or non-Chinese Asian academic staff across students. Red bars show the mean of this distribution across 5000 replications of randomly shuffling all academic staff within their subject area and academic year. 'All controls' means year, university, department, and cluster by subject fixed effects, department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract.

Figure 5: Selection into departments with minority academic staff by observable student characteristics



Notes: Source: Linked HESA Student Records - HESA Staff Records. The graphs show coefficients with confidence intervals on the variables listed on the y-axis, each from a separate regression of the proportion minority (or Black, non-Chinese Asian, or Mixed-Other ethnicity) staff on this student characteristic, plus subject, university, cohort and university cluster x subject group fixed effects, department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract; and students' prior qualifications, as shown in equation 2. Disadvantage index is created using the method proposed by Anderson (2008) and includes parental socio-economic status, being a first generation university student and coming from a low higher education participation area. Higher disadvantage index indicates greater disadvantage, population mean zero, standard deviation 1. Standard errors are clustered at department level.

Tables

Table 1: Descriptive statistics: student characteristics and outcomes

	All	White	Black	NC Asian	Other
Personal Characteristics					
Female	0.5346	0.5413	0.5502	0.4857	0.5364
State School	0.9071	0.9008	0.9684	0.9335	0.8969
Mature Student	0.1223	0.1206	0.2051	0.0889	0.1226
FT Student	0.8585	0.8638	0.8465	0.8238	0.8581
First Generation	0.4800	0.4649	0.4190	0.6499	0.4723
High SES	0.6622	0.6930	0.6143	0.4671	0.6125
Low HE Participation Area	0.4754	0.4641	0.6042	0.4950	0.4691
Disadvantage Index	-0.0156	-0.1117	0.0842	0.2618	0.0091
Previous Outcomes					
Tariff	117.7796	118.8539	108.3293	113.9718	117.4307
BTEC	0.1354	0.1199	0.2583	0.1859	0.1486
IB	0.0108	0.0079	0.0086	0.0056	0.0148
Foundation	0.0319	0.0238	0.0680	0.0623	0.0460
Tariff Missing	0.2412	0.2266	0.3457	0.2446	0.2458
University Group					
Very High Status	0.0156	0.0166	0.0035	0.0076	0.0198
High Status	0.3588	0.3736	0.2168	0.2869	0.3812
Medium Status	0.5459	0.5332	0.6434	0.6272	0.5224
Low Status	0.0797	0.0767	0.1363	0.0783	0.0767
Subject					
Allied to Health	0.2132	0.2160	0.2367	0.2089	0.1827
STEM	0.2637	0.2600	0.2144	0.3056	0.2761
Social Sciences	0.2871	0.2603	0.4035	0.3922	0.3190
Humanities	0.1155	0.1301	0.0447	0.0519	0.1039
Arts, Education, and Other	0.1206	0.1337	0.1007	0.0415	0.1183
Academic Outcomes					
First	0.1769	0.1933	0.0686	0.1315	0.1493
Good	0.5248	0.5516	0.3338	0.4528	0.4866
Graduated on Time (Conditional)	0.9350	0.9431	0.8792	0.9067	0.9180
Graduated on Time (Unconditional)	0.6134	0.6332	0.4635	0.5694	0.5782
Graduated	0.6560	0.6714	0.5273	0.6280	0.6298
N (Admin)	753,208	574,573	41,843	78,728	46,173
Post-Graduation Outcomes					
Employed	0.6431	0.6532	0.6361	0.6034	0.6004
Any Study	0.2575	0.2543	0.2553	0.2661	0.2710
Grad Study	0.1646	0.1626	0.1713	0.1561	0.1854
Grad Job	0.3768	0.3813	0.3548	0.3766	0.3406
High SOC	0.4687	0.4757	0.4416	0.4490	0.4389
N (Survey)	238,284	188,205	10,508	24,403	13,304

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012-2014. Sample sizes are rounded to the nearest multiple of 5. Disadvantage index is created using the method proposed by Anderson (2008) and includes parental socio-economic status, being a first generation university student and coming from a low higher education participation area. Higher disadvantage index indicates greater disadvantage, population mean zero, standard deviation 1. BTEC refers to vocational qualifications, IB refers to International Baccalaureate. Tariff is conditional on tariff score not missing. First is a dummy for graduating with a first class honours degree, Good is a dummy for graduating with a first or an upper second class honours degre. They are both coded 0 if a student does not achieve the grades for the honours or if they drop out. Graduated on time is a dummy for graduating in 3 or 4 years (depending on the program length). In the "conditional" row this is coded 0 for those who finish later and as missing for those who dropout. In the "unconditional" row this is coded as 0 both for those who finish later and for those dropout. Academic outcomes are given conditional on stopping their education (either by graduating or dropping out) Post-graduation outcomes are given conditional on graduation, but not conditional on subsequent activity. (e.g. Students not in employment are also coded as not being in a Graduate Job, rather than as missing a job type).

Table 2: Variation in exposure to minority staff - weighted by student numbers by university-department-year

		Controlling for:					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Staff Ethnicity/Race	All	Year	Year +University	Year +University +Department	Year +University +Department +Dept Chars	Year +University +Department +Dept Chars +Cluster × Subject G	Year +University × Dept +Dept Chars
Minority							
Mean	0.1247						
Residual SD	0.1001	0.0999	0.0877	0.0626	0.0616	0.0613	0.0254
Black							
Mean	0.0195						
Residual SD	0.0317	0.0317	0.0275	0.0257	0.0255	0.0254	0.0102
NC Asian							
Mean	0.0456						
Residual SD	0.0481	0.0481	0.0437	0.0346	0.0344	0.0342	0.0148
Mixed - Other							
Mean	0.0596						
Residual SD	0.0582	0.0581	0.0518	0.0420	0.0415	0.0413	0.0198
Observations (Students)	693,660						

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012-2014. Sample sizes are rounded to the nearest multiple of 5. Column 1 shows the raw mean, standard deviation, minimum and maximum. Further columns control for the fixed effects listed in column headings. Column 2 controls for year fixed effects while column 3 controls for year and university fixed effects, and so on. For a list of clusters and subject groups, see Appendix Tables B1 and B2. Department characteristics refers to department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract.

Table 3: Impact of minority academic staff share on students' academic outcomes

					Cond. on Graduation	
	(1)	(2)	(3)	(4)	(5)	(6)
	First	Good	Graduated On Time	Ever Graduated	First	Good
Prpn Minority Ac	0.001	-0.024	-0.032	-0.031	0.043	0.012
	(0.020)	(0.031)	(0.033)	(0.028)	(0.029)	(0.024)
Minority	-0.065***	-0.093***	-0.047***	-0.035**	-0.085***	-0.099***
	(0.003)	(0.012)	(0.015)	(0.014)	(0.006)	(0.007)
Minority × Prpn Minority Ac	-0.013	0.127***	0.120**	0.118**	-0.103***	0.017
	(0.018)	(0.037)	(0.051)	(0.047)	(0.026)	(0.034)
TE on Minorities	-0.011	0.103**	0.088*	0.087*	-0.060	0.030
	(0.022)	(0.040)	(0.051)	(0.050)	(0.036)	(0.039)
Observations	643,435	643,435	643,435	643,435	428,520	428,520

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table shows the results from independent OLS regressions where each outcome is seperately regressed agains the independent variable of interest and controls. First is a dummy for graduting with a GPA of over 70, Good is a dummy for graduating with a GPA of over 60, graduating on time is a dummy for graduating in 3 or 4 years (depending on the program length). For students who dropout or are not observed to graduate, these variables are coded as 0. Ever graduated is a dummy for completing a degree at any point (including late graduation). Columns (5) and (6) are conditional on ever graduating from university, hence the outcomes 0 if and only if they completed their studies but have not achieved these outcomes. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table 4: Impact of minority academic staff share on post-graduation outcomes

						Cond. on Employment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employed	Any Study	Grad Study	Grad Job	High SOC	Grad Job	High SOC
Prpn Minority Ac	0.031	-0.001	-0.013	0.079**	0.067	0.090**	0.082*
	(0.036)	(0.032)	(0.028)	(0.032)	(0.048)	(0.034)	(0.044)
Minority	-0.031**	0.007	0.007	-0.018	-0.026*	-0.002	-0.008
	(0.012)	(0.009)	(0.007)	(0.012)	(0.014)	(0.012)	(0.011)
Minority × Prpn Minority Ac	-0.200***	0.137***	0.121***	-0.231***	-0.278***	-0.156**	-0.171*
	(0.052)	(0.040)	(0.031)	(0.058)	(0.085)	(0.068)	(0.084)
TE on Minorities	-0.169***	0.136***	0.108***	-0.152**	-0.211**	-0.066	-0.089
	(0.046)	(0.037)	(0.027)	(0.058)	(0.080)	(0.066)	(0.082)
Observations	198,700	198,700	198,700	198,700	198,700	128,880	128,760

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Table shows the results from independent OLS regressions where each outcome is seperately regressed agains the independent variable of interest and controls. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Employed is a dummy for being in employment and takes the value of 0 if not employed, any study is a dummy for being in any kind of study program and takes the value of 0 if not in study, grad study is a dummy for studying for a program that is higher than undergraduate level (masters, graduate diploma, PhD, etc.) and takes the value of 0 if a graduate does not study for such a program. Graduate job is a dummy for working at a job where subject or level of study is important or qualification is needed and takes the value of 0 if the graduate works for no such job or if they are not working at all. High SOC is a dummy for working in managerial, professional or intermediate occupations and takes the value of 0 if the graduate works for no such job or if they are not working at all. Controls include gender, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table 5: Impact of minority academic staff share on students' academic outcomes by staff and student race

					Cond. on Graduation	
	(1)	(2)	(3)	(4)	(5)	(6)
	First	Good	Graduated On Time	Ever Graduated	First	Good
Prpn Black Ac	-0.027	0.036	-0.037	-0.057	0.048	0.143**
	(0.055)	(0.098)	(0.108)	(0.114)	(0.092)	(0.063)
Prpn NC Asian Ac	0.022	-0.016	-0.031	-0.013	0.069	0.007
	(0.041)	(0.056)	(0.057)	(0.050)	(0.048)	(0.038)
Black	-0.093***	-0.164***	-0.102***	-0.083***	-0.124***	-0.173***
	(0.006)	(0.017)	(0.020)	(0.018)	(0.005)	(0.012)
NC Asian	-0.068***	-0.076***	-0.015	-0.005	-0.101***	-0.108***
	(0.005)	(0.014)	(0.019)	(0.019)	(0.008)	(0.007)
Black × Prpn Black Ac	0.051	0.242	0.197	0.186	-0.141	0.001
	(0.082)	(0.160)	(0.143)	(0.143)	(0.092)	(0.121)
NC Asian × Prpn NC Asian Ac	0.038	0.253***	0.145	0.147*	-0.032	0.184***
	(0.049)	(0.070)	(0.099)	(0.081)	(0.057)	(0.064)
TE - Academics from Own Race						
Black Students	0.024	0.278*	0.161	0.128	-0.093	0.144
	(0.076)	(0.138)	(0.114)	(0.123)	(0.097)	(0.130)
NC Asian Students	0.060*	0.236***	0.114	0.134*	0.036	0.191***
	(0.030)	(0.061)	(0.087)	(0.074)	(0.047)	(0.069)
Observations	643,435	643,435	643,435	643,435	428,520	428,520

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table shows the results from independent OLS regressions where each outcome is seperately regressed agains the independent variable of interest and controls. First is a dummy for graduting with a GPA of over 70, Good is a dummy for graduating with a GPA of over 60, graduating on time is a dummy for graduating in 3 or 4 years (depending on the program length). For students who dropout or are not observed to graduate, these variables are coded as 0. Ever graduated is a dummy for completing a degree at any point (including late graduation). Columns (5) and (6) are conditional on ever graduating from university, hence the outcomes 0 if and only if they completed their studies but have not achieved these outcomes. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table 6: Impact of minority academic staff share on post-graduation outcomes by staff and student race

						Cond. on Employment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employed	Any Study	Grad Study	Grad Job	High SOC	Grad Job	High SOC
Prpn Black Ac	0.045	-0.026	-0.152***	0.092	0.135	0.040	0.103
	(0.073)	(0.066)	(0.056)	(0.097)	(0.126)	(0.075)	(0.110)
Prpn NC Asian Ac	0.020	-0.006	0.004	0.100	0.070	0.144**	0.113
	(0.074)	(0.058)	(0.050)	(0.060)	(0.082)	(0.065)	(0.068)
Black	-0.004	-0.010	0.008	-0.017	-0.028	-0.016	-0.028
	(0.017)	(0.013)	(0.011)	(0.020)	(0.019)	(0.022)	(0.018)
NC Asian	-0.051***	0.016	-0.005	-0.011	-0.040**	0.026***	-0.012
	(0.011)	(0.011)	(0.007)	(0.011)	(0.015)	(0.009)	(0.012)
Black × Prpn Black Ac	-0.382**	0.224*	0.287**	-0.281	-0.466*	-0.057	-0.201
	(0.177)	(0.129)	(0.113)	(0.212)	(0.261)	(0.260)	(0.284)
NC Asian × Prpn NC Asian Ac	-0.185	0.072	0.096	-0.365***	-0.420***	-0.405***	-0.413***
	(0.136)	(0.098)	(0.071)	(0.086)	(0.129)	(0.083)	(0.116)
TE - Academics from Own Race							
on Black Students	-0.337**	0.198	0.134	-0.189	-0.331	-0.018	-0.098
	(0.163)	(0.118)	(0.099)	(0.217)	(0.245)	(0.271)	(0.260)
on NC Asian Students	-0.165	0.066	0.100	-0.265***	-0.350***	-0.261***	-0.300***
	(0.119)	(0.090)	(0.060)	(0.076)	(0.103)	(0.079)	(0.111)
Observations	198,700	198,700	198,700	198,700	198,700	128,880	128,760

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includesentry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table shows the results from independent OLS regressions where each outcome is seperately regressed agains the independent variable of interest and controls. Employed is a dummy for being in employment and takes the value of 0 if not employed, any study is a dummy for being in any kind of study program and takes the value of 0 if not in study, grad study is a dummy for studying for a program that is higher than undergraduate level (masters, graduate diploma, PhD, etc.) and takes the value of 0 if a graduate does not study for such a program. Graduate job is a dummy for working at a job where subject or level of study is important or qualification is needed and takes the value of 0 if the graduate works for no such job or if they are not working at all. High SOC is a dummy for working in managerial, professional or intermediate occupations and takes the value of 0 if the graduate works for no such job or if they are not working at all. Controls include gender, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Appendix A - Additional Descriptive Statistics

Table A1: Descriptive statistics - by university clusters

	All	Cluster 1 *Very High Status*	Cluster 2 *High Status*	Cluster 3 *Medium Status*	Cluster 4 *Low Status*
Academics' Race					
Proportion Minority	0.1247	0.1057	0.1312	0.1224	0.1144
Proportion Black	0.0195	0.0048	0.0111	0.0239	0.0316
Proportion NC Asian	0.0456	0.0435	0.0480	0.0448	0.0404
Proportion Mixed - Other	0.0596	0.0574	0.0721	0.0536	0.0424
Students' Race					
Proportion Minority	0.2017	0.1482	0.1867	0.2469	0.2591
Proportion Black	0.0478	0.0125	0.0336	0.0655	0.0950
Proportion NC Asian	0.0952	0.0509	0.0836	0.1201	0.1026
Proportion Mixed - Other	0.0550	0.0777	0.0651	0.0587	0.0590
Personal Characteristics					
Female	0.5359	0.4791	0.5250	0.5383	0.5632
State School	0.8999	0.5865	0.8211	0.9625	0.9817
Mature Student	0.2135	0.0107	0.0520	0.1535	0.2466
FT Student	0.8642	0.9999	0.9115	0.8046	0.9609
First Generation	0.4674	0.1530	0.3595	0.5493	0.6221
High SES	0.6739	0.8989	0.7702	0.5985	0.5462
Low HE Participation Area	0.4586	0.2265	0.3538	0.5414	0.6108
Disadvantage Index	0.0189	-0.4183	-0.2667	0.1162	0.2912
Previous Outcomes					
Tariff	117.7796	143.9178	130.9829	107.4944	103.2981
BTEC	0.0897	0.0001	0.0342	0.1824	0.2957
IB	0.0099	0.0487	0.0214	0.0040	0.0022
Foundation	0.0204	0.0000	0.0152	0.0400	0.0581
Tariff Missing	0.2627	0.0963	0.1113	0.3063	0.4081
Academic Outcomes					
First	0.1769	0.2763	0.2101	0.1567	0.1463
Good	0.5248	0.7523	0.6179	0.4720	0.4229
Graduated on Time (Conditional)	0.9350	0.9627	0.9543	0.9217	0.9197
Graduated on Time (Unconditional)	0.6134	0.8011	0.6758	0.5766	0.5478
Graduated	0.6560	0.8322	0.7082	0.6256	0.5956
N (Admin)	753,208	11,737	270,250	411,185	60,036
Post-Graduation Outcomes					
Employed	0.6431	0.5207	0.5876	0.6766	0.6963
Any Study	0.2575	0.3318	0.3034	0.2317	0.2081
Grad Study	0.1646	0.2182	0.2033	0.1456	0.1068
Grad Job	0.3768	0.3751	0.3904	0.3736	0.3385
High SOC	0.4687	0.4667	0.4741	0.4691	0.4430
N (Survey)	238,284	4,665	85,754	128,370	19,495

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records.Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Disadvantage index is created using the method proposed by Anderson (2008) and includes parental socio-economic status, being a first generation university student and coming from a low higher education participation area. Higher disadvantage index indicates greater disadvantage, population mean zero, standard deviation 1. BTEC refers to vocational qualifications, IB refers to International Baccalaureate. Tariff is conditional on tariff score not missing. Graduated on time is a dummy for graduating in 3 or 4 years (depending on the program length) and is coded 0 for those who dropout and/or finish later. "Conditional" row conditions on ever graduating while the row "Unconditional" also records those who dropout or are not observed to graduate as 0 for graduated on time variable. For the definition of the academic and post graduation outcomes and sample conditions, see Table 3 and Table 4. For university group classifications, see Appendix Table D2.

Table A2: Descriptive statistics - by departments' proportion of minority academics

	All	Below Median	Above Median
Students' Race			
Proportion Minority	0.2249	0.3289	0.1565
Proportion Black	0.0556	0.0804	0.0385
Proportion NC Asian	0.1045	0.1659	0.0640
Proportion Mixed - Other	0.0613	0.0764	0.0519
Personal Characteristics			
Female	0.5346	0.4268	0.6085
State School	0.9071	0.9004	0.9110
Mature Student	0.1223	0.1126	0.1284
FT Student	0.8585	0.7885	0.9057
First Generation	0.4800	0.4828	0.4779
High SES	0.6622	0.6595	0.6645
Low HE Participation Area	0.4754	0.4560	0.4887
Disadvantage Index	-0.0156	-0.0011	-0.0259
Previous Outcomes			
Tariff	117.7796	117.9509	117.9509
BTEC	0.1354	0.1391	0.1337
IB	0.0108	0.0114	0.0105
Foundation	0.0319	0.0426	0.0213
Tariff Missing	0.2412	0.2319	0.2450
Academic Outcomes			
First	0.1769	0.1877	0.1702
Good	0.5248	0.4959	0.5453
Graduated on Time (Conditional)	0.9350	0.9223	0.9426
Graduated on Time (Unconditional)	0.6134	0.5677	0.6448
Graduated	0.6560	0.6156	0.6841
N (Admin)	753,208	280,697	412,962
Post-Graduation Outcomes			
Employed	0.6431	0.6373	0.6373
Any Study	0.2575	0.2691	0.2691
Grad Study	0.1646	0.1728	0.1728
Grad Job	0.3768	0.3543	0.3543
High SOC	0.4687	0.4455	0.4455
N (Survey)	238,284	80,343	138,448

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records.Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Disadvantage index is created using the method proposed by Anderson (2008) and includes parental socio-economic status, being a first generation university student and coming from a low higher education participation area. Higher disadvantage index indicates greater disadvantage, population mean zero, standard deviation 1. BTEC refers to vocational qualifications, IB refers to International Baccalaureate. Tariff is conditional on tariff score not missing. Graduated on time is a dummy for graduating in 3 or 4 years (depending on the program length) and is coded 0 for those who dropout and/or finish later. "Conditional" row conditions on ever graduating while the row "Unconditional" also records those who dropout or are not observed to graduate as 0 for graduated on time variable. For the definition of the academic and post-graduation outcomes and sample conditions, see Table 3 and Table 4.

Table A3: Descriptive statistics - students' exposure to academic staff and peers from each ethnic Group - by student race

		Student Race			
	All	White	Black	NC Asian	Other
Peers					
Prpn Ethnic Minority Students	0.1986	0.1601	0.3731	0.3778	0.2739
Prpn Female Ethnic Minority Students	0.1039	0.0845	0.2019	0.1892	0.1424
Prpn Male Ethnic Minority Students	0.0946	0.0756	0.1712	0.1886	0.1314
Prpn Black Students	0.0552	0.0400	0.1539	0.0996	0.0788
Prpn Female Black Students	0.0308	0.0225	0.0883	0.0532	0.0434
Prpn Male Black Students	0.0244	0.0175	0.0656	0.0463	0.0354
Prpn NC Asian Students	0.0999	0.0701	0.1811	0.2518	0.1390
Prpn Female NC Asian Students	0.0483	0.0346	0.0885	0.1171	0.0669
Prpn Male NC Asian Students	0.0516	0.0356	0.0925	0.1346	0.0720
Prpn Mixed-Other Students	0.0620	0.0544	0.0881	0.0856	0.0891
Prpn Female Mixed-Other Students	0.0333	0.0295	0.0485	0.0440	0.0475
Prpn Male Mixed-Other Students	0.0286	0.0249	0.0396	0.0416	0.0416
Academic Staff					
Prpn Ethnic Minority Staff	0.1247	0.1117	0.1711	0.1791	0.1469
Prpn Black Staff	0.0195	0.0164	0.0362	0.0313	0.0233
Prpn NC Asian Staff	0.0456	0.0396	0.0643	0.0728	0.0550
Prpn Mixed-Other Staff	0.0596	0.0557	0.0706	0.0750	0.0686
Observations	741,320	574,575	41,845	78,730	46,175

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. The table shows the proportion of minority students that students from each racial group is exposed to.

Table A4: Descriptive statistics - Students' exposure to academic staff and student proportions - by subject

	All	Allied to Health	STEM	Social Sciences	Humanities	Arts, Education, Other
Academics						
Prpn Minority Academic Staff	0.1247	0.0770	0.1745	0.1592	0.0790	0.0683
Prpn Black Academic Staff	0.0195	0.0163	0.0187	0.0309	0.0060	0.0143
Prpn NC Asian Academic Staff	0.0456	0.0291	0.0659	0.0609	0.0246	0.0172
Prpn Mixed – Other Academic Staff	0.0596	0.0316	0.0900	0.0674	0.0484	0.0368
Students						
Minority	0.2249	0.2189	0.2345	0.2947	0.1258	0.1442
Black	0.0556	0.0617	0.0452	0.0781	0.0215	0.0464
NC Asian	0.1045	0.1024	0.1211	0.1428	0.0470	0.0360
Mixed – Other	0.0613	0.0525	0.0642	0.0681	0.0552	0.0601
Observations	753,210	160,570	198,620	216,210	86,975	90,835

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. The table shows the proportion of minority students that students from each racial group is exposed to.

Appendix B - Additional Balance Check

We first examine whether students' exposure to minority instructors can be predicted by their level of disadvantage, analyzed separately by race. This approach is based on the observation that disadvantage levels vary across racial groups (see Appendix Table 1). To test this, we perform the same analysis as in Figure 5, but run the regressions by race instead of using one regression with interaction terms for race and disadvantage. This method allows us to account for potential differences in how disadvantage factors and race affect students' outcomes, which may vary by university or subject area. Using interaction terms would assume these effects are uniform across institutions and disciplines. Our findings indicate that disadvantage factors do not predict students' exposure to minority (or same-race) instructors, regardless of their race.

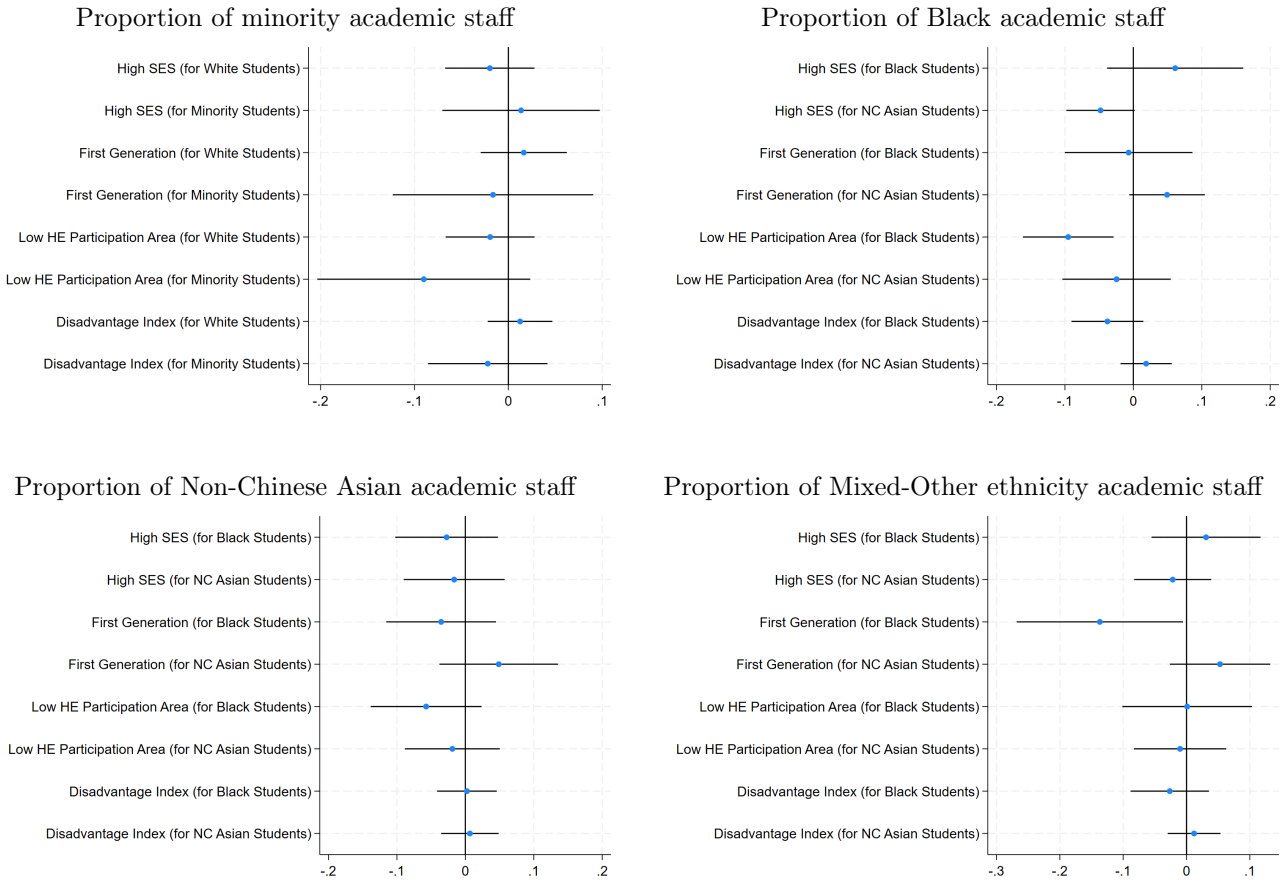
We also follow Fairlie *et al.* (2014) and look at several demographic characteristics as well as students' entry tariff scores. Here, the important point is to examine variables that are highly correlated with the outcome variables. If we find that minority students are significantly different than White students in courses where there are higher proportion of minority academics, then the results that we find would be biased. If we find positive (negative) selection, the effect of minority academics on minority students would be under(over)estimated.

In Appendix Table B1, we present evidence on whether the share of minority academics predicts racial differences in student characteristics. In order to create this table, first we calculate minority-specific predetermined student characteristics (i.e. calculating the university-department-year specific average tariff score, proportion holding a BTEC, who are full-time etc, among White students, among minority students, and among each minority group, $\overline{X}_{cjt\Gamma}$). As shown in equation (3), we regress these outcomes against the share of minority instructors they are exposed to ($PMin_{cjt}$), a dummy for the minority group (Γ), and the interaction between the two ($\Gamma \times PMin_{cjt}$), along with other controls and fixed-effects. We report the coefficient, α_3 in the equation, its standard error and p-value. Then, we do this separately by students' racial group for White versus Black, White versus non-Chinese Asian, and White versus Other racial minority comparisons.

$$\overline{X}_{cjt\Gamma} = \alpha_0 + \alpha_1\Gamma_\Gamma + \alpha_2 PMin_{cjt} + \alpha_3\Gamma_\Gamma \times PMin_{cjt} + \alpha_4\mathbf{D}_{cjt} + \alpha_5\delta_s + \alpha_6\theta_j + \alpha_7\tau_t + \alpha_8\lambda_g \times \psi_c + \epsilon_i \quad (3)$$

The table shows that differences between minority and White, Black and White, or non-Chinese Asian and White students in the same departments, based on previous academic outcomes, gender, and mature student status, are not significantly associated with the proportion of minority academics they encounter. However, there is some evidence that non-Chinese Asian and other ethnic minority students become more disadvantaged (in terms of state schooling, parental SES and being first generation students and the disadvantage index) relative to their White peers, the higher the share of minority academics

Figure B1: Selection into departments with minority academic staff by observable student characteristics



Notes: Source: Linked HESA Student Records - HESA Staff Records. Sample includes entry cohorts 2012 - 2014. The graphs show coefficients separately estimated for each ethnicity, with confidence intervals on the variables listed on the y-axis, each from a separate regression of the proportion minority (or Black, non-Chinese Asian, or Mixed-Other ethnicity) staff on this student characteristic, plus subject, university, cohort and university cluster x subject group fixed effects, department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract; and students' prior qualifications, as shown in equation 2. Disadvantage index is created using the method proposed by Anderson (2008) and includes parental socio-economic status, being a first generation university student and coming from a low higher education participation area. Higher disadvantage index indicates greater disadvantage, population mean zero, standard deviation 1. Standard errors are clustered at department level.

Table B1: Association of minority instructors with ethnic differences in student characteristics

	Tariff	Tariff M	BTEC	Female	State	Mature	High SES	First Gen	LPA	Dis Index
Ethnic Minority vs White										
α_3	-0.674	0.009	0.040	0.059	0.058	-0.002	-0.159	0.163	0.030	0.278
se	3.655	0.032	0.033	0.050	0.019	0.026	0.035	0.047	0.040	0.085
p-value	0.855	0.776	0.238	0.245	0.004	0.943	0.000	0.001	0.446	0.002
Separately										
Black vs White										
α_3	-2.628	0.051	-0.014	0.119	0.033	-0.009	-0.020	0.047	0.113	0.112
se	5.128	0.045	0.065	0.071	0.028	0.036	0.049	0.059	0.059	0.113
p-value	0.611	0.262	0.829	0.101	0.244	0.810	0.685	0.437	0.063	0.330
NC Asian vs White										
α_3	4.749	-0.041	0.042	0.017	0.049	0.015	-0.090	0.140	0.001	0.163
se	5.553	0.049	0.035	0.057	0.020	0.039	0.042	0.048	0.054	0.097
p-value	0.398	0.412	0.238	0.769	0.019	0.705	0.038	0.006	0.990	0.100
Other vs White										
α_3	-7.681	0.070	0.007	0.086	0.040	0.018	-0.236	0.102	0.027	0.370
se	3.992	0.037	0.027	0.053	0.022	0.024	0.035	0.032	0.041	0.073
p-value	0.062	0.068	0.810	0.112	0.080	0.459	0.000	0.003	0.510	0.000

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. α_3, se and p-value indicate the coefficient, standard errors and p-value associated with α_3 of equation (3). "Tariff M" = "tariff missing". Disadvantage index is created using the method proposed by Anderson (2008). The index includes parental socio-economic status, being a first generation university student, and coming from a low higher education participation area (LPA). BTEC refers to vocational qualifications, IB refers to International Baccalaureate. Controls include department level controls and university, cohort, subject as well as cluster × subject group fixed effects. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Appendix C - Robustness and Heterogeneity Checks

Table C1: Impact of minority staff share on students' outcomes with alternative clustering of standard errors

	(1) TE from Minority Academics on White Students	(2) TE from Minority Academics on Minority Students	(3) TE from Black Academics on Black Students	(4) TE from NC Asian Academics on NC Asian Students
First	0.001	-0.011	0.024	0.060
se-University	(0.026)	(0.026)	(0.055)	(0.054)
se-Year	(0.039)	(0.032)	(0.043)	(0.063)
se-Cost-Year	(0.023)	(0.026)	(0.065)	(0.042)
Good	-0.024	0.103	0.278	0.236
se-University	(0.031)	(0.038)***	(0.118)**	(0.111)**
se-Year	(0.035)	(0.052)	(0.043)**	(0.080)*
se-Cost-Year	(0.030)	(0.051)**	(0.121)**	(0.075)***
On Time Grad	-0.032	0.088	0.161	0.114
se-University	(0.037)	(0.035)**	(0.106)	(0.113)
se-Year	(0.039)	(0.058)	(0.047)*	(0.135)
se-Cost-Year	(0.030)	(0.055)	(0.104)	(0.095)
Graduated	-0.031	0.087	0.128	0.134
se-University	(0.034)	(0.030)***	(0.104)	(0.098)
se-Year	(0.043)	(0.052)	(0.044)	(0.111)
se-Cost-Year	(0.027)	(0.049)*	(0.105)	(0.081)*
Employed	0.031	-0.169	-0.341	-0.170
se-University	(0.033)	(0.034)***	(0.120)***	(0.109)
se-Year	(0.008)*	(0.016)***	(0.141)	(0.052)*
se-Cost-Year	(0.032)	(0.038)***	(0.128)***	(0.101)*
Any Study	-0.001	0.136	0.202	0.072
se-University	(0.030)	(0.032)***	(0.104)*	(0.067)
se-Year	(0.010)	(0.002)***	(0.152)	(0.021)*
se-Cost-Year	(0.028)	(0.034)***	(0.114)*	(0.080)
Grad Study	-0.013	0.108	0.140	0.109
se-University	(0.021)	(0.025)***	(0.098)	(0.060)*
se-Year	(0.008)	(0.002)***	(0.185)	(0.006)***
se-Cost-Year	(0.025)	(0.028)***	(0.101)	(0.055)*
Grad Job	0.079	-0.152	-0.199	-0.270
se-University	(0.034)**	(0.038)***	(0.146)	(0.104)**
se-Year	(0.023)*	(0.019)**	(0.179)	(0.008)***
se-Cost-Year	(0.030)**	(0.046)***	(0.188)	(0.079)***
High SOC	0.067	-0.211	-0.342	-0.354
se-University	(0.040)*	(0.045)***	(0.160)**	(0.106)***
se-Year	(0.019)*	(0.043)**	(0.024)***	(0.038)**
se-Cost-Year	(0.039)*	(0.062)***	(0.201)*	(0.086)***
Observations (Admin)	643,435	643,435	643,435	643,435
Observations (Survey)	198,700	198,700	198,700	198,700

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table presents coefficients from the main overall minority and by-race specifications: Columns 1-2 correspond to Tables 3-4; Columns 3-4 correspond to Tables 5-6, with alternative standard errors in parentheses clustered by university ("se-University"), year ("se-Year") and department × year ("se-Department-Year"). . The first two columns show the impact of ethnic minority academic staff on White and minority students and the last two columns show the impact of Black academic staff on Black students and NC Asian academic staff on NC Asian students. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Stars alongside standard errors indicate significance of corresponding coefficient. * p <0.1, ** p <0.05, *** p <0.01

Table C2: Robustness to controlling for gender and ethnic composition of students

Panel A: Additionally controlling for gender and minority composition of students

	Main	Controlling for gender and minority composition of students		
	(1) TE from Minority Academics on Minority Students	(2) TE from Minority Academics on Minority Students	(3) Impact of Female Minority Students	(4) Impact of Male Minority Students
First	-0.011	-0.043*	0.064**	0.101***
	(0.022)	(0.024)	(0.028)	(0.020)
Good	0.103***	0.077*	0.042	0.086**
	(0.040)	(0.046)	(0.063)	(0.036)
On time Graduation	0.088*	0.065	0.065	0.078*
	(0.051)	(0.059)	(0.067)	(0.043)
Graduated	0.087*	0.062	0.084	0.082
	(0.050)	(0.058)	(0.069)	(0.054)
Employed	-0.169***	-0.124**	-0.121**	-0.121***
	(0.046)	(0.048)	(0.049)	(0.037)
Any Study	0.136***	0.108***	0.085**	0.076**
	(0.037)	(0.039)	(0.042)	(0.031)
Graduate Study	0.108***	0.084***	0.060**	0.057*
	(0.027)	(0.029)	(0.026)	(0.030)
Graduate Job	-0.152***	-0.112*	-0.056	-0.122**
	(0.058)	(0.061)	(0.051)	(0.048)
High SOC	-0.211***	-0.160*	-0.130*	-0.140***
	(0.080)	(0.082)	(0.066)	(0.049)
Observations (Admin)	643,435	643,435	643,435	643,435
Observations (Survey)	198,700	198,025	198,025	198,025

Panel B: Additionally controlling for gender and racial group composition of students

	Main		Controlling for gender and racial group composition of students					
	(1) TE from Black Academics on Black Students	(2) TE from NC Academics on NC Students	(3) TE from Black Academics on Black Students	(4) TE from NC Academics on NC Students	(5) Impact of Female Black Students	(6) Impact of Male Black Students	(7) Impact of Female NC Asian Students	(8) Impact of Male NC Asian Students
First	0.024	0.060**	0.008	0.010	0.020	0.131***	0.130***	0.102***
	(0.076)	(0.030)	(0.082)	(0.031)	(0.041)	(0.042)	(0.048)	(0.029)
Good	0.278**	0.236***	0.251*	0.192***	-0.026	0.156***	0.119	0.095**
	(0.138)	(0.061)	(0.147)	(0.063)	(0.083)	(0.059)	(0.110)	(0.041)
On time Graduation	0.161	0.114	0.145	0.075	-0.042	0.079	0.162	0.087*
	(0.114)	(0.087)	(0.122)	(0.093)	(0.089)	(0.090)	(0.117)	(0.046)
Graduated	0.128	0.134*	0.102	0.097	-0.036	0.083	0.175	0.094*
	(0.123)	(0.074)	(0.129)	(0.084)	(0.082)	(0.092)	(0.118)	(0.052)
Employed	-0.337**	-0.165	-0.317*	-0.128	-0.107	-0.146	-0.096	-0.104**
	(0.163)	(0.118)	(0.165)	(0.112)	(0.089)	(0.116)	(0.089)	(0.049)
Any Study	0.198*	0.066	0.180	0.049	0.102	0.095	0.072	0.052
	(0.118)	(0.090)	(0.122)	(0.085)	(0.076)	(0.089)	(0.077)	(0.039)
Graduate Study	0.134	0.100*	0.116	0.079	0.060	0.055	0.067	0.061*
	(0.099)	(0.060)	(0.101)	(0.056)	(0.044)	(0.063)	(0.049)	(0.032)
Graduate Job	-0.189	-0.265***	-0.189	-0.230***	-0.039	-0.323***	-0.029	-0.074
	(0.217)	(0.076)	(0.214)	(0.076)	(0.112)	(0.122)	(0.066)	(0.051)
High SOC	-0.331	-0.350***	-0.285	-0.298***	-0.077	-0.270**	-0.112	-0.126**
	(0.245)	(0.102)	(0.242)	(0.104)	(0.131)	(0.133)	(0.072)	(0.056)
Observations (Admin)	643,435	643,435	643,435	643,435	643,435	643,435	643,435	643,435
Observations (Survey)	198,700	198,700	198,025	198,025	198,025	198,025	198,025	198,025

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. Panel A shows the impact of minority instructors on minority students. Column (1) shows the main results using the main specification while column (2) shows the result after controlling for female minority and male minority students that each student is exposed to. Column (3) shows the p-value for the differences in coefficients in column (1) and column (2) while columns (4) and (5) shows the coefficient and standard errors for the proportion of female minority students and proportion of male minority students in the specification that includes these controls. Panel B shows the results for a similar specification but this time running the specification separately by academic staff and student race. Columns (1) and (2) show the main results using the main specification for the impact of Black academic staff on Black students and of NC Asian academic staff on NC Asian students, columns (3) and (5) shows the results after controlling for female and male Black and NC Asian students that these students are exposed to, columns (4) and (5) show the differences in coefficients between columns (1) and (3) and columns (2) and (5) and columns (7) - (10) shows the coefficients and standard errors for peer effects. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C3: Impact of minority staff share on students' outcomes by staff type

	British				Teaching				Teaching & British			
	(1) TE from Minority Academics on White Students	(2) TE from Minority Academics on Minority Students	(3) TE from Black Academics on Black Students	(4) TE from NC Asian Academics on NC Asian Students	(5) TE from Minority Academics on White Students	(6) TE from Minority Academics on Minority Students	(7) TE from Black Academics on Black Students	(8) TE from NC Asian Academics on NC Asian Students	(9) TE from Minority Academics on White Students	(10) TE from Minority Academics on Minority Students	(11) TE from Black Academics on Black Students	(12) TE from NC Asian Academics on NC Asian Students
First	0.037	-0.027	0.070	0.036	-0.014	-0.070**	-0.048	0.030	0.025	-0.029	0.077	0.036
	(0.026)	(0.034)	(0.058)	(0.038)	(0.027)	(0.033)	(0.085)	(0.041)	(0.024)	(0.032)	(0.057)	(0.036)
Good	-0.039	0.046	0.259**	0.173**	-0.055*	-0.011	0.145	0.183**	-0.038	0.032	0.260**	0.173**
	(0.032)	(0.047)	(0.106)	(0.070)	(0.029)	(0.042)	(0.124)	(0.070)	(0.030)	(0.043)	(0.102)	(0.069)
On Time Grad	-0.033	0.033	0.084	0.078*	-0.025	-0.001	0.073	0.054	-0.035	0.024	0.093	0.090*
	(0.025)	(0.023)	(0.072)	(0.045)	(0.024)	(0.024)	(0.089)	(0.036)	(0.024)	(0.023)	(0.072)	(0.045)
Graduated	-0.105***	-0.038	0.074	0.019	-0.101***	-0.057**	-0.002	0.026	-0.102***	-0.044	0.092	0.026
	(0.023)	(0.030)	(0.118)	(0.043)	(0.019)	(0.027)	(0.092)	(0.046)	(0.022)	(0.028)	(0.111)	(0.042)
Employed	0.020	-0.220***	-0.321*	-0.241***	0.001	-0.201***	-0.328**	-0.152	0.025	-0.222***	-0.297*	-0.248***
	(0.035)	(0.044)	(0.174)	(0.086)	(0.036)	(0.046)	(0.161)	(0.125)	(0.036)	(0.042)	(0.172)	(0.085)
Any Study	0.001	0.159***	0.220*	0.166**	0.021	0.157***	0.211*	0.039	-0.007	0.161***	0.216*	0.166**
	(0.030)	(0.034)	(0.129)	(0.063)	(0.032)	(0.037)	(0.109)	(0.092)	(0.031)	(0.033)	(0.125)	(0.064)
Grad Study	0.002	0.135***	0.207*	0.163***	-0.001	0.132***	0.149	0.096	0.000	0.140***	0.215*	0.180***
	(0.029)	(0.026)	(0.121)	(0.044)	(0.028)	(0.028)	(0.092)	(0.057)	(0.027)	(0.025)	(0.118)	(0.046)
Grad Job	0.033	-0.192***	-0.165	-0.298***	0.052*	-0.181***	-0.218	-0.239***	0.036	-0.202***	-0.155	-0.297***
	(0.028)	(0.058)	(0.211)	(0.073)	(0.029)	(0.057)	(0.210)	(0.081)	(0.026)	(0.057)	(0.202)	(0.073)
High SOC	0.046	-0.275***	-0.346	-0.316***	0.033	-0.249***	-0.333	-0.330***	0.039	-0.287***	-0.306	-0.324***
	(0.046)	(0.070)	(0.266)	(0.099)	(0.046)	(0.078)	(0.230)	(0.102)	(0.045)	(0.067)	(0.253)	(0.094)
Observations (Admin)	494,345	494,345	494,345	494,345	494,345	494,345	494,345	494,345	494,345	494,345	494,345	494,345
Observations (Survey)	198,700	198,700	198,700	198,700	198,700	198,700	198,700	198,700	198,700	198,700	198,700	198,700

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table presents coefficients and standard errors for outcomes using the main specification where exposure to minority instructor is defined differently. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. In Panel A, the first grouping shows the impact of minority academic staff who are British on students outcomes, the second grouping shows the impact of minority academic staff who are student-facing (i.e. not research only), and the third grouping shows the impact of minority academic staff who are British and student-facing. In Panel B, the first grouping shows the impact of minority academic staff which is weighted by the percent of working time so they show Full-time Equivalent, the second grouping shows the impact of minority academic staff who are student-facing (i.e. not research only) and weighted by the percentage of working time, and the third grouping shows the impact of minority academic staff who are British, student-facing and weighted by the percentage of working time. Within each groupings, the first two columns show the impact of ethnic minority academic staff on White and minority students and the last two columns show the impact of Black academic staff on Black students and NC Asian academic staff on NC Asian students. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C4: Impact of minority staff share on students' outcomes by subject group

Panel A

	Alllied to Health				STEM				Social Sciences			
	(1) TE from Minority Academics on White Students	(2) TE from Minority Academics on Minority Students	(3) TE from Black Academics on Black Students	(4) TE from NC Asian Academics on NC Asian Students	(5) TE from Minority Academics on White Students	(6) TE from Minority Academics on Minority Students	(7) TE from Black Academics on Black Students	(8) TE from NC Asian Academics on NC Asian Students	(9) TE from Minority Academics on White Students	(10) TE from Minority Academics on Minority Students	(11) TE from Black Academics on Black Students	(12) TE from NC Asian Academics on NC Asian Students
First	0.120	0.018	0.307***	-0.014	0.020	0.032	0.141	0.040	-0.023	-0.066	-0.141	0.059
	(0.082)	(0.071)	(0.067)	(0.103)	(0.024)	(0.047)	(0.128)	(0.079)	(0.051)	(0.038)	(0.133)	(0.088)
Good	0.284**	0.405**	0.971**	0.210	-0.029	0.071	0.188***	0.181*	-0.050	0.126**	0.245	0.360***
	(0.095)	(0.141)	(0.305)	(0.187)	(0.035)	(0.074)	(0.055)	(0.096)	(0.038)	(0.044)	(0.210)	(0.055)
On Time Grad	0.289***	0.366*	0.659	-0.077	-0.003	0.119	0.115**	0.182**	-0.036	0.133**	0.139	0.347***
	(0.078)	(0.154)	(0.358)	(0.219)	(0.051)	(0.071)	(0.047)	(0.075)	(0.039)	(0.054)	(0.174)	(0.092)
Graduated	0.299***	0.420**	0.577	0.124	-0.021	0.098	0.019	0.184**	-0.016	0.147**	0.091	0.402***
	(0.080)	(0.134)	(0.335)	(0.218)	(0.042)	(0.066)	(0.051)	(0.076)	(0.038)	(0.055)	(0.186)	(0.089)
Employed	0.111*	0.138	-0.276	0.262	-0.017	-0.231***	-0.703***	-0.246*	0.032	-0.044	-0.037	0.039
	(0.053)	(0.109)	(0.168)	(0.282)	(0.060)	(0.055)	(0.163)	(0.120)	(0.044)	(0.039)	(0.277)	(0.233)
Any Study	-0.023	-0.027	0.037	-0.046	0.060	0.202***	0.588***	0.173	0.033	0.037*	-0.024	-0.184
	(0.077)	(0.070)	(0.171)	(0.315)	(0.056)	(0.064)	(0.118)	(0.114)	(0.051)	(0.018)	(0.160)	(0.109)
Grad Study	0.029	-0.002	-0.018	-0.127	0.002	0.121**	0.448***	0.186*	-0.005	0.019	-0.110	-0.096
	(0.075)	(0.045)	(0.144)	(0.123)	(0.048)	(0.050)	(0.095)	(0.091)	(0.033)	(0.031)	(0.170)	(0.089)
Grad Job	0.003	-0.212***	-0.038	-0.173	0.101***	-0.120***	-0.397**	-0.273***	0.094*	-0.066	-0.330	0.025
	(0.060)	(0.046)	(0.375)	(0.218)	(0.032)	(0.036)	(0.151)	(0.087)	(0.044)	(0.056)	(0.306)	(0.077)
High SOC	0.095	-0.028	-0.619	0.100	0.055	-0.196***	-0.541***	-0.403***	0.103	-0.105	-0.332	-0.099
	(0.096)	(0.153)	(0.398)	(0.333)	(0.052)	(0.055)	(0.137)	(0.116)	(0.066)	(0.065)	(0.424)	(0.105)
Obs. (Admin)	135,195	135,195	135,195	135,195	168,910	168,910	168,910	168,910	178,210	178,210	178,210	178,210
Obs. (Survey)	39,220	39,220	39,220	39,220	45,780	45,780	45,780	45,780	56,430	56,430	56,430	56,430

Panel B

	Humanities				Arts, Education, and Others			
	(1) TE from Minority Academics on White Students	(2) TE from Minority Academics on Minority Students	(3) TE from Black Academics on Black Students	(4) TE from NC Asian Academics on NC Asian Students	(5) TE from Minority Academics on White Students	(6) TE from Minority Academics on Minority Students	(7) TE from Black Academics on Black Students	(8) TE from NC Asian Academics on NC Asian Students
First	-0.038	0.070	-0.287	-0.088	0.021	-0.161	-0.143	-0.659**
	(0.083)	(0.050)	(0.388)	(0.189)	(0.076)	(0.058)	(0.181)	(0.111)
Good	0.001	0.075	-0.136	0.406***	0.051	-0.132	0.157	0.036
	(0.175)	(0.110)	(0.607)	(0.077)	(0.067)	(0.047)	(0.194)	(0.047)
On Time Grad	-0.017	0.018	0.268	0.162	0.028	-0.037	0.255	-0.101
	(0.176)	(0.131)	(0.624)	(0.115)	(0.039)	(0.076)	(0.408)	(0.401)
Graduated	-0.025	0.034	-0.041	0.024	0.051	-0.023	0.440	-0.042
	(0.182)	(0.133)	(0.625)	(0.154)	(0.029)	(0.087)	(0.161)	(0.270)
Employed	-0.109	-0.090	-2.329	-0.945	-0.075	-0.002	-0.144	0.332
	(0.071)	(0.144)	(1.544)	(0.760)	(0.083)	(0.083)	(0.597)	(0.408)
Any Study	0.055	0.022	2.342	0.495	-0.030	-0.101*	-0.047	-0.149
	(0.066)	(0.098)	(1.497)	(0.580)	(0.099)	(0.024)	(0.420)	(0.107)
Grad Study	0.034	-0.057	0.597	0.393	0.064	0.001	0.090	-0.133
	(0.033)	(0.096)	(0.698)	(0.501)	(0.062)	(0.010)	(0.270)	(0.150)
Grad Job	-0.076	0.199**	-1.657**	-0.326	-0.042	0.182	0.342	0.761
	(0.115)	(0.060)	(0.582)	(0.457)	(0.060)	(0.177)	(0.265)	(0.474)
High SOC	-0.006	0.004	-1.471	-0.954**	-0.149	-0.173	0.124	-0.285
	(0.078)	(0.070)	(1.245)	(0.330)	(0.057)	(0.154)	(0.770)	(0.862)
Observations (Admin)	79,770	79,770	79,770	79,770	81,355	81,355	81,355	81,355
Observations (Survey)	28,760	28,760	28,760	28,760	28,515	28,515	28,515	28,515

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table presents coefficients and standard errors for outcomes using the main specification run separately by subject groups. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. The groupings show the subject group that the students are studying for. Within each groupings, the first two columns show the impact of ethnic minority academic staff on White and minority students and the last two columns show the impact of Black academic staff on Black students and NC Asian academic staff on NC Asian students. See Appendix Table B2 for which subject belongs to which subject group. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C5: Impact of minority staff share on students' outcomes by university clusters

	Cluster 1 Very High Status				Cluster 2 High Status			
	(1) TE from Minority Academics on White Students	(2) TE from Minority Academics on Minority Students	(3) TE from Black Academics on Black Students	(4) TE from NC Asian Academics on NC Asian Students	(5) TE from Minority Academics on White Students	(6) TE from Minority Academics on Minority Students	(7) TE from Black Academics on Black Students	(8) TE from NC Asian Academics on NC Asian Students
First	-0.739	-0.535	-4.886	-1.401**	0.026	-0.034	-0.176	-0.088
	(0.705)	(0.696)	(3.988)	(0.670)	(0.030)	(0.040)	(0.204)	(0.064)
Good	-1.384	-1.404	-6.650	-3.302**	0.013	0.017	-0.560	-0.124
	(1.300)	(1.212)	(6.158)	(1.422)	(0.045)	(0.046)	(0.347)	(0.158)
On Time Grad	-0.346	-0.299	4.584	-0.509	-0.006	0.044	0.087	-0.117
	(1.047)	(1.009)	(7.156)	(1.388)	(0.051)	(0.057)	(0.279)	(0.212)
Graduated	-0.563	-0.611	2.870	-1.105	-0.007	0.052	0.171	-0.166
	(1.051)	(1.009)	(6.250)	(1.351)	(0.048)	(0.058)	(0.261)	(0.219)
Employed	-0.112	-0.127	-5.841	0.094	0.014	-0.044	0.027	0.025
	(0.166)	(0.373)	(4.930)	(0.822)	(0.063)	(0.067)	(0.423)	(0.178)
Any Study	0.037	0.103	8.815	0.208	0.055	0.113	0.104	0.042
	(0.169)	(0.252)	(7.541)	(0.420)	(0.055)	(0.072)	(0.485)	(0.200)
Grad Study	-0.092	0.249	6.754**	1.305**	0.038	0.098*	0.467	0.038
	(0.227)	(0.257)	(3.216)	(0.623)	(0.047)	(0.049)	(0.360)	(0.139)
Grad Job	-0.063	-0.014	-3.859	-0.346	-0.021	-0.102	-1.128**	-0.268*
	(0.292)	(0.531)	(5.804)	(0.850)	(0.057)	(0.082)	(0.533)	(0.146)
High SOC	0.510	0.494	-0.802	0.835	-0.037	-0.163*	-1.131***	-0.426**
	(0.313)	(0.432)	(4.425)	(0.945)	(0.066)	(0.085)	(0.363)	(0.179)
Observations (Admin)	10,930	10,930	10,930	10,930	237,950	237,950	237,950	237,950
Observations (Survey)	4,395	4,395	4,395	4,395	75,565	75,565	75,565	75,565

	Cluster 3 Medium Status				Cluster 4 Low Status			
	(1) TE from Minority Academics on White Students	(2) TE from Minority Academics on Minority Students	(3) TE from Black Academics on Black Students	(4) TE from NC Asian Academics on NC Asian Students	(5) TE from Minority Academics on White Students	(6) TE from Minority Academics on Minority Students	(7) TE from Black Academics on Black Students	(8) TE from NC Asian Academics on NC Asian Students
First	-0.020	-0.017	-0.053	0.076**	0.020	-0.010	0.062	0.114
	(0.022)	(0.025)	(0.087)	(0.032)	(0.064)	(0.051)	(0.071)	(0.099)
Good	-0.056	0.113*	0.374**	0.297***	0.032	0.056	0.085	0.368*
	(0.044)	(0.059)	(0.171)	(0.081)	(0.071)	(0.062)	(0.121)	(0.209)
On Time Grad	-0.063	0.073	0.180	0.108	0.009	0.084	0.182	0.204
	(0.041)	(0.054)	(0.140)	(0.079)	(0.054)	(0.052)	(0.157)	(0.231)
Graduated	-0.057	0.078	0.161	0.159**	-0.019	0.035	0.011	0.137
	(0.036)	(0.050)	(0.156)	(0.073)	(0.054)	(0.044)	(0.156)	(0.234)
Employed	0.050	-0.189***	-0.160	-0.206*	-0.081	-0.271***	0.106	0.037
	(0.037)	(0.057)	(0.193)	(0.121)	(0.093)	(0.087)	(0.493)	(0.317)
Any Study	-0.036	0.128**	0.019	0.053	0.084	0.164**	-0.123	-0.019
	(0.037)	(0.050)	(0.166)	(0.088)	(0.067)	(0.077)	(0.421)	(0.264)
Grad Study	-0.035	0.092***	-0.033	0.061	0.053	0.128*	-0.146	0.029
	(0.029)	(0.033)	(0.137)	(0.063)	(0.059)	(0.068)	(0.359)	(0.261)
Grad Job	0.101***	-0.182***	-0.013	-0.266***	0.120	-0.027	0.452	0.357
	(0.031)	(0.066)	(0.205)	(0.083)	(0.130)	(0.137)	(0.744)	(0.226)
High SOC	0.104**	-0.203**	0.019	-0.276***	0.103	-0.221	0.313	0.105
	(0.045)	(0.084)	(0.235)	(0.096)	(0.177)	(0.153)	(0.881)	(0.313)
Observations (Admin)	347,990	347,990	347,990	347,990	46,570	46,570	46,570	46,570
Observations (Survey)	104,290	104,290	104,290	104,290	14,450	14,450	14,450	14,450

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table presents coefficients and standard errors for outcomes using the main specification run separately by university groups groups. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. The groupings show the university group that the students are studying at. Within each groupings, the first two columns show the impact of ethnic minority academic staff on White and minority students and the last two columns show the impact of Black academic staff on Black students and NC Asian academic staff on NC Asian students. See Appendix Table B1 for which university belongs to which university group. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Standard errors are cluster at department level. presented in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C6: Impact of minority staff share on students' outcomes by student socio-economic status and racial group

	(1) TE from Minority Academics on White *High SES* Students	(2) TE from Minority Academics on White *Low SES* Students	(3) TE from Minority Academics on Minority *High SES* Students	(4) TE from Minority Academics on Minority *Low SES* Students	(5) TE from Black Academics on Black *High SES* Students	(6) TE from Black Academics on Black *Low SES* Students	(7) TE from NC Asian Academics on NC Asian *High SES* Students	(8) TE from NC Asian Academics on NC Asian *Low SES* Students
First	0.000	0.003	-0.040	0.007	-0.141*	0.018	0.117**	0.071*
	(0.020)	(0.022)	(0.031)	(0.024)	(0.070)	(0.088)	(0.051)	(0.036)
Good	-0.060*	0.025	0.120**	0.148***	0.043	0.359**	0.279***	0.291***
	(0.032)	(0.032)	(0.050)	(0.044)	(0.150)	(0.152)	(0.065)	(0.065)
On Time Grad	-0.056	-0.001	0.104*	0.113**	-0.048	0.186	0.211*	0.128
	(0.033)	(0.035)	(0.054)	(0.055)	(0.120)	(0.130)	(0.108)	(0.083)
Graduated	-0.053*	-0.002	0.104**	0.109*	-0.076	0.163	0.219**	0.157**
	(0.030)	(0.029)	(0.050)	(0.057)	(0.122)	(0.143)	(0.088)	(0.070)
Employed	0.036	0.022	-0.162***	-0.171***	-0.177	-0.235	-0.261	-0.139
	(0.038)	(0.040)	(0.050)	(0.049)	(0.233)	(0.201)	(0.185)	(0.126)
Any Study	-0.016	0.020	0.144***	0.135***	0.086	0.162	0.089	0.096
	(0.036)	(0.033)	(0.046)	(0.036)	(0.209)	(0.144)	(0.185)	(0.077)
Grad Study	-0.018	-0.005	0.105***	0.110***	-0.038	0.172	0.198	0.071
	(0.029)	(0.032)	(0.032)	(0.029)	(0.166)	(0.145)	(0.128)	(0.067)
Grad Job	0.075*	0.083***	-0.085	-0.186***	-0.260	0.032	-0.363***	-0.225***
	(0.038)	(0.030)	(0.057)	(0.059)	(0.259)	(0.251)	(0.133)	(0.075)
High SOC	0.068	0.063	-0.171**	-0.222***	-0.466	-0.054	-0.413**	-0.318***
	(0.050)	(0.050)	(0.077)	(0.081)	(0.330)	(0.244)	(0.170)	(0.094)
Observations (Admin)	643,435	643,435	643,435	643,435	643,435	643,435	643,435	643,435
Observations (Survey)	198,700	198,700	198,700	198,700	198,700	198,700	198,700	198,700

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table presents coefficients and standard errors for the outcomes separately by socio-economic status. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. The first 4 columns show the impact of minority academic staff on White (1-2) and minority students (3-4). The last 4 columns show the impact of Black academic staff on Black students (5-6) and of NC Asian academic staff on NC Asian students. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C7: Impact of minority staff share on students' outcomes using only non-mature students

	(1) TE from Minority Academics on White Students	(2) TE from Minority Academics on Minority Students	(3) TE from Black Academics on Black Students	(4) TE from NC Asian Academics on NC Asian Students
First	0.001	-0.012	0.005	0.050
	(0.020)	(0.022)	(0.084)	(0.034)
Good	-0.032	0.097**	0.173	0.216***
	(0.030)	(0.040)	(0.125)	(0.065)
On Time Grad	-0.037	0.085	0.091	0.089
	(0.031)	(0.053)	(0.097)	(0.095)
Graduated	-0.039	0.081	0.052	0.114
	(0.026)	(0.049)	(0.106)	(0.078)
Employed	0.037	-0.160***	-0.282*	-0.171
	(0.035)	(0.044)	(0.139)	(0.120)
Any Study	-0.007	0.130***	0.116	0.061
	(0.033)	(0.037)	(0.111)	(0.092)
Grad Study	-0.020	0.105***	0.056	0.092
	(0.028)	(0.027)	(0.095)	(0.062)
Grad Job	0.079**	-0.134**	-0.312*	-0.252***
	(0.031)	(0.053)	(0.154)	(0.071)
High SOC	0.063	-0.197**	-0.463**	-0.330***
	(0.045)	(0.073)	(0.188)	(0.095)
Observations (Admin)	578,930	578,930	578,930	578,930
Observations (Survey)	183,385	183,385	183,385	183,385

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table presents coefficients and standard errors for the outcomes using the main specification by only keeping full-time and non-mature students. Academic outcomes are not conditional on graduation and post-graduation outcomes are not conditional on being in employment or being in study. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C8: Predictors of attrition from estimation sample

	Observed in DLHE	
	(1)	(2)
Minority	-0.040***	
	(0.010)	
Prpn Minority Ac	-0.393***	
	(0.033)	
Minority × Prpn Minority Ac	0.163***	
	(0.036)	
Black		-0.080***
		(0.012)
NC Asian		-0.012
		(0.011)
Prpn Black Ac		-0.274**
		(0.105)
Black × Prpn Black Ac		0.250**
		(0.123)
NC Asian × Prpn Black Ac		0.120
		(0.146)
Prpn NC Asian Ac		-0.309***
		(0.080)
Black × Prpn NC Asian Ac		0.203**
		(0.084)
NC Asian × Prpn NC Asian Ac		0.051
		(0.107)
TE - Academics from Own Race		
on Minorities	-0.230***	
	(0.042)	
on Black Students		-0.023
		(0.112)
on NC Asian Students		-0.258**
		(0.120)
Observations	643,435	643,435

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table shows coefficients from linear model for the probability of being observed in the DLHE, conditional on being present in the the graduating population. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C9: Robustness to non-response weighting

	TE from Minority Academics on White Students		TE from Minority Academics on Minority Students		TE from Black Academics on Black Students		TE from NC Asian Academics on NC Asian Students	
	(1) Main	(2) Attrition Corrected	(3) Main	(4) Attrition Corrected	(5) Main	(6) Attrition Corrected	(7) Main	(8) Attrition Corrected
Employed	0.031	0.017	-0.169***	-0.167***	-0.337**	-0.161	-0.165	-0.161
	(0.036)	(0.038)	(0.046)	(0.045)	(0.163)	(0.117)	(0.119)	(0.117)
Any Study	-0.001	0.014	0.136***	0.139***	0.198	0.065	0.066	0.065
	(0.032)	(0.034)	(0.037)	(0.038)	(0.118)	(0.087)	(0.090)	(0.087)
Graduate Study	-0.013	-0.002	0.108***	0.111***	0.134	0.099	0.100	0.099
	(0.028)	(0.030)	(0.027)	(0.029)	(0.099)	(0.062)	(0.060)	(0.062)
Graduate Job	0.079**	0.082**	-0.152**	-0.146**	-0.189	-0.254***	-0.265***	-0.254***
	(0.032)	(0.031)	(0.058)	(0.058)	(0.217)	(0.072)	(0.076)	(0.072)
High SOC	0.067	0.060	-0.211**	-0.202**	-0.331	-0.336***	-0.350***	-0.336***
	(0.048)	(0.049)	(0.080)	(0.079)	(0.245)	(0.096)	(0.103)	(0.096)
Observations	198,700	198,700	198,700	198,700	198,700	198,700	198,700	198,700

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records.Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Table presents coefficients and standard errors when the main regressions are run with inverse probability weighting where the weights are the predicted probability that a student will be observed in the DLHE survey which is calculated after running a LPM model. The odd columns present the main results while even columns present attrition corrected results. The first two groupings show the impacts of minority academics on White and minority students while the last two groupings show the impacts of Black academics on Black students and non-Chinese Asian academics on non-Chinese Asian students. Controls include gender, tariff, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, and department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For academic outcomes, the regressions also control for tariff and type of qualification a student comes to university with. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Table C10: Impact of minority staff share on students' post-graduation outcomes controlling for graduation on time

Panel A: Main Results

						Cond. on Employment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employed	Any Study	Grad Study	Grad Job	High SOC	Grad Job	High SOC
Prpn Minority Ac	0.031	-0.002	-0.014	0.078**	0.067	0.090**	0.081*
	(0.036)	(0.031)	(0.028)	(0.032)	(0.048)	(0.034)	(0.044)
Minority	-0.031***	0.007	0.007	-0.018	-0.026*	-0.002	-0.008
	(0.012)	(0.009)	(0.007)	(0.012)	(0.014)	(0.012)	(0.011)
Minority × Prpn Minority Ac	-0.201***	0.138***	0.123***	-0.230***	-0.278***	-0.155**	-0.170*
	(0.052)	(0.040)	(0.031)	(0.058)	(0.085)	(0.068)	(0.084)
On time Graduation	-0.008	0.027***	0.026***	0.022**	0.008	0.027***	0.007
	(0.008)	(0.008)	(0.007)	(0.010)	(0.011)	(0.010)	(0.010)
TE on Minorities	-0.169***	0.136***	0.108***	-0.152**	-0.211**	-0.065	-0.089
	(0.046)	(0.037)	(0.027)	(0.058)	(0.080)	(0.067)	(0.082)
Observations	198,700	198,700	198,700	198,700	198,700	128,880	128,760

Panel B: by Race

						Cond. on Employment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employed	Any Study	Grad Study	Grad Job	High SOC	Grad Job	High SOC
Prpn Black Ac	0.046	-0.027	-0.154***	0.091	0.135	0.039	0.103
	(0.073)	(0.066)	(0.056)	(0.097)	(0.126)	(0.075)	(0.110)
Prpn NC Asian Ac	0.020	-0.006	0.003	0.100	0.070	0.144**	0.113
	(0.074)	(0.058)	(0.050)	(0.061)	(0.082)	(0.065)	(0.068)
Black	-0.004	-0.009	0.009	-0.017	-0.028	-0.016	-0.028
	(0.017)	(0.013)	(0.011)	(0.020)	(0.019)	(0.022)	(0.018)
NC Asian	-0.052***	0.016	-0.004	-0.010	-0.040**	0.026***	-0.012
	(0.011)	(0.011)	(0.007)	(0.011)	(0.015)	(0.009)	(0.012)
Black × Prpn Black Ac	-0.382**	0.225*	0.288**	-0.280	-0.466*	-0.056	-0.201
	(0.176)	(0.129)	(0.113)	(0.212)	(0.261)	(0.260)	(0.284)
NC Asian × Prpn NC Asian Ac	-0.186	0.075	0.099	-0.363***	-0.420***	-0.402***	-0.412***
	(0.136)	(0.098)	(0.071)	(0.086)	(0.129)	(0.084)	(0.116)
On time Graduation	-0.008	0.027***	0.027***	0.022**	0.007	0.026***	0.006
	(0.008)	(0.008)	(0.007)	(0.009)	(0.011)	(0.010)	(0.010)
TE - Academics from Own Race							
on Black Students	-0.336**	0.198	0.134	-0.189	-0.331	-0.017	-0.098
	(0.163)	(0.118)	(0.098)	(0.218)	(0.245)	(0.272)	(0.260)
on NC Asian Students	-0.166	0.068	0.102*	-0.264***	-0.349***	-0.258***	-0.299***
	(0.118)	(0.090)	(0.060)	(0.076)	(0.102)	(0.079)	(0.111)
Observations	198,700	198,700	198,700	198,700	198,700	128,880	128,760

Notes: Source: Linked HESA Student Records - Destination of Leavers from Higher Education Survey and HESA Staff Records. Sample includes entry cohorts 2012 - 2014. Sample sizes are rounded to the nearest multiple of 5. Columns (6) and (7) are conditional on being in employment. Outcomes are measured 6 months after graduation. Grad study is a dummy for studying for a program that is higher than undergraduate level (masters, graduate diploma, PhD, etc.). Graduate job is a dummy for working at a job where subject or level of study is important or qualification is needed. High SOC is a dummy for working in managerial, professional or intermediate occupations. Controls include gender, type of qualification, qualification subject, coming from state school, disadvantage index, as well as subject, university, cohort and university cluster × subject group fixed effects, department level controls such as proportion of female academics, proportion of academics that are on teaching or teaching and research contracts, proportion of academics that are reader or above, proportion of full-time academics, and proportion of academics on permanent contract. Disadvantage index is created using the method proposed by Anderson (2008) and consists of socio-economic status, being a first generation university student, coming from a low HE participation area. For the definition of the variables, see Table 3 and Table 4. Standard errors are clustered at department level. Standard errors are in parentheses. * p <0.1, ** p <0.05, *** p <0.01

Appendix D - University and Subject Groupings

Table D1: Subject Groups

Subject Group	Subject
Allied to Health	Nursing and Allied Health Professions
	Psychology & Behavioral Sciences
	Health & Community Studies
	Anatomy & Physiology
	Pharmacy & Pharmacology
	Sports Science & Leisure Studies
	Veterinary Science
STEM	Agriculture, Forestry & Food Science
	Earth, Marine & Environmental Sciences
	Biosciences
	Chemistry
	Physics
	General Engineering
	Chemical Engineering
	Mineral, Metallurgy & Materials Engineering
	Civil Engineering
	Electrical, Electronic & Computer Engineering
	Mechanical, Eero & Production Engineering
	IT, Systems Sciences & Computer Software Engineering
	Mathematics
	Architecture, Built Environment & Planning
Social Sciences	Geography & Environmental Studies
	Area Studies
	Archaeology
	Anthropology & Development Studies
	Politics & International Studies
	Economics & Econometrics
	Law
	Social Work & Social Policy
	Sociology
	Business & Management Studies
	Catering & Hospitality management
Humanities	Modern languages
	English Language & Literature
	History
	Classics
	Philosophy
	Theology & Religious Studies
Art, Education and Others	Art & design
	Music, Dance, Drama & Performing Arts
	Education
	Continuing Education

Table D2: University Clusters, from Boliver (2015).

Cluster 1 ("Very High Status")	Cluster 2 ("High Status")	Cluster 3 ("Medium Status")		Cluster 4 ("Low Status")
University of Cambridge	University of Aberdeen	Abertay Dundee University	Keele University	Anglia Ruskin University
University of Oxford	University of Bath	Aberystwyth University	Kingston University	Bishop Grosseteste University
	University of Birmingham	Aston University	Leeds Beckett University	University College Birmingham
	University of Bristol	Bangor University	University of Lincoln	University of Bolton
	Cardiff University	Bath Spa University	Liverpool John Moores University	Buckinghamshire New University
	University of Dundee	University of Bedfordshire	London South Bank University	University of Cumbria
	Durham University	Birmingham City University	Manchester Metropolitan University	University of East London
	University of East Anglia	Bournemouth University	Middlesex University	Edge Hill University
	University of Edinburgh	University of Bradford	Newman University	Glyndwr University
	University of Exeter	University of Brighton	University of Northampton	Leeds Trinity University
	University of Glasgow	Brunel University London	Nottingham Trent University	Liverpool Hope University
	Goldsmiths, University of London	Cantenbury Christ Church University	Northumbria University	London Metropolitan University
	Heriot-Watt University	Cardiff Metropolitan University	Oxford Brookes University	University of Wales, Newport
	Imperial College London	University of Central Lancashire	Plymouth University	University of St Mark and St John
	University of Kent	University of Chester	University of Portsmouth	Solent University
	King's College London	University of Chichester	Queen Margaret University	University Campus Suffolk
	Lancaster University	City University of London	Robert Gordon University	University of Wales Trinity Saint David
	University of Leeds	Coventry University	University of Roehampton	University of Wolverhampton
	University of Leicester	De Montfort University	University of Salford	York St John University
	University College London	University of Derby	Sheffield Hallam University	
	LSE	Edinburgh Napier University	Staffordshire University	
	Loughborough University	University of Essex	University of Stirling	
	University of Manchester	Falmouth University	University of Sunderland	
	Newcastle University	University of Glamorgan	Swansea University	
	University of Nottingham	Glasgow Caledonian University	Teeeside University	
	Queen Mary University of London	University of Gloucestershire	Ulster University	
	Queen's University Belfast	University of Greenwich	University of West of England	
	University of Reading	Harper Adams University	University of West London	
	Royal Holloway, University of London	University of Hertfordshire	University of West of Scotland	
	University of St Andrews	University of Highlands and Islands	University of Westminster	
	SOAS, University of London	University of Huddersfield	University fof Winchester	
	University of Sheffield	University of Hull	University of Worcester	
	University of Southampton			
	University of Strathclyde			
	University of Surrey			
	University of Sussex			
	University of Warwick			
	University of York			