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Issues paper

This report is for information

This study investigates how disability, age, sex, ethnicity and nationality are related to selection of staff for inclusion in the 2008 Research Assessment Exercise (RAE2008). It examines the question of whether the process of selecting staff was unbiased, or whether some staff were disadvantaged.

Selection of staff for inclusion in RAE2008

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Selection of staff for inclusion in RAE2008

To	Heads of publicly funded higher education institutions in the UK
Of interest to those responsible for	Equality and diversity management, Human resources management, Institutional strategic planning, Research management
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Executive summary

Purpose

1. This study investigates how disability, age, gender, ethnicity and nationality are related to selection of staff for inclusion in the 2008 Research Assessment Exercise (RAE2008).

Key points

Background and scope

2. The Research Assessment Exercise (RAE) assessed the quality of research submitted by higher education institutions (HEIs) in the UK through a process of expert review. The outcomes of the assessment inform the amount of funding each HEI will receive for its research activities.

3. In 2006, HEFCE published¹ a UK-wide equality and diversity assessment of the 2001 exercise (RAE2001), HEFCE 2006/32. This investigated how disability, gender, age

¹ HEFCE 2006/32 'Selection of staff for inclusion in RAE2001' (www.hefce.ac.uk/pubs/hefce/2006/06_32/).

and ethnicity related to the selection of staff by HEIs for inclusion in that RAE. Throughout this document 'the 2006 report' refers to HEFCE 2006/32.

4. The latest RAE was completed in 2008. This study assesses staff selected for the 2008 exercise in terms of disability status, age, gender, ethnicity and nationality. As with the 2006 report, the scope of our quantitative analysis is limited to assessing whether the process of selecting staff was unbiased from an equality and diversity perspective, or whether some staff were disadvantaged. We have not, for example, attempted to re-create the assessments of particular institutions, or assessed whether the research process as a whole is biased.

Methodology

5. Due to differences in interpretation by HEIs of the definition of eligibility for RAE2008, we were unable to reproduce the methodology used in the 2006 report to identify staff who were eligible for selection but not submitted; therefore we were unable to calculate selection rates in the same way.

6. Instead, our methodology considered four 'pools' of potentially eligible staff: All academic staff, Permanent academic staff, Grade-identified staff and Contract-identified staff (see paragraph 34). Using a range of pools meant we could consider similarities and differences in patterns of selection with regard to the five equality factors listed above (disability, age, gender, ethnicity and nationality).

7. We used statistical models to compare staff by equality factor while controlling for other factors, such as the research output quality of staff and the research environment they work in. It should be noted that there is no direct measure of research output quality of staff, therefore we have relied on other data (such as the grade of the staff considered) to estimate this measure in the models.

Results and conclusions

8. In all four pools of staff, the selection rate for staff with declared disability was lower than for those staff without declared disability. However, modelling indicates that other factors (such as differences in staff selection rates associated with the HEI, or subject area the individual is working in) may explain these differences more readily than disability status.

9. As in the 2006 report, the data shows a difference between the rate of selection for men and women in RAE2008 – for example in the 'Permanent academic staff' pool 67 per cent of men were selected compared to 48 per cent of women. When age is considered in combination with gender, the model output shows that differences continue to be most apparent in the 30-50 age range despite the changes between the RAE2001 and RAE2008 selection process to promote equal opportunities in the RAE.

10. Bibliometric evidence in the 2006 report indicated that the lower selection rate of women in the 30-50 age range may be due to a lower proportion of women having a research record that leads them to be selected, rather than bias in the selection process. While differences in selection rate between men and women may be linked to selection bias resulting from age and gender, it could equally be a result of deeply rooted inequalities in the research careers of men and women.

11. The selection rates were at similar levels for all ethnicity groups except those staff in the Black ethnic group, whose selection rate was lower in all the pools of staff. The lower selection rate was not explained when other factors (such as those mentioned in paragraph 8) were taken into account. This was the case in the 2006 report too, but is slightly more pronounced; however the change could have resulted from the changes in methodology.

12. Following this result, we additionally considered the effect of nationality on selection rates. The introduction of this factor highlighted higher selection rates for non-UK nationals compared to UK nationals.

13. The combined effect between ethnicity and nationality does not explain the low levels of selection of the Black group. However, bibliometric evidence from the 2006 report suggests that the differences may be due to a weakness in the proxies for research output quality included in the quantitative analysis rather than an unjustifiable bias in selection to the RAE.

14. Overall this analysis shows that with regard to equality and diversity, staff selection to the RAE2008 was similar in composition to that seen in RAE2001. This is not to say that the new processes and equality measures put in place since 2001 have not had an effect on selection at institutional, departmental or Unit of Assessment level. It may be that some of the differences seen in this and the 2006 report are linked to individual career choices and deeply rooted inequalities than of particular discrimination against specific groups of staff. This is an area that HEFCE and the higher education (HE) sector will continue to explore.

15. The extent to which the different selection rates observed reflect deeply rooted social inequalities is being acknowledged by the extensive work the HE sector, HEFCE and the Equality Challenge Unit (ECU) are doing to support the research careers of different groups of staff.

16. There are many projects within the HE sector which are helping to develop the understanding of gender and age equality issues for academic staff. These include: the women in academic medicine project at Imperial College London², the Athena SWAN Charter at the ECU³ and the women academic returners' programme at the University of Sheffield⁴.

17. In addition, the ECU is co-ordinating a Race Forum project supported by HEFCE's Leadership Governance and Management Fund. The project will help identify a range of possible initiatives to address issues affecting black and minority ethnic (BME) staff in the HE sector and meet race equality duties in the sector, with particular reference to recruitment, retention, promotion and development of BME staff and inclusion in structures of governance⁵.

² See www.hefce.ac.uk/lgm/build/lgmfund/projects/show.asp?id=118&cat=3 for further details.

³ See www.athenaswan.org.uk/html/athena-swan/ for further details.

⁴ See www.shef.ac.uk/hr/diversity/warp.html for further details.

⁵ See www.ecu.ac.uk/our-projects/race-forum for further details.

18. The issues arising from this and the 2006 analysis of the RAE are informing the development of the Research Excellence Framework (REF), which will continue to actively promote equality and diversity. The evidence gathered from this quantitative analysis, alongside the ECU's qualitative work on RAE2008 and other related work, will help to assess the potential impact on the sector of moving from the RAE to the REF.

19. HEFCE is shortly to publish proposals on the key features of the REF for consultation with the sector in autumn 2009, and expects to announce the outcomes in early 2010.

Action required

20. No action is required in response to this document.

Introduction

21. The Research Assessment Exercise (RAE) assesses the quality of research in higher education institutions (HEIs) in the UK through a process of expert review. The outcomes of the assessment inform the amount of funding each HEI will receive for its research activities. The first exercise took place in 1986 and was repeated, with progressive modifications, in 1989, 1992, 1996, 2001 and 2008. No further assessments will take place in this form, because the Research Excellence Framework (REF)⁶ will be used to assess the quality of research from 2008.

22. This study is based on an analysis of data from the 2008 RAE, referred to as RAE2008.

23. For RAE2008 the full range of academic disciplines taught in UK HEIs was divided into 67 subject areas, represented by a panel of nominated academics and research users, known as Units of Assessment (UOAs). HEIs could make one or more submissions within each of these UOAs. There was a two-tier panel structure, with 15 main panels overseeing the work of the 67 sub-panels. Through the expert review of evidence provided for three assessment elements – research outputs, environment and esteem – the panels awarded an overall quality profile for each submission displaying the percentage of research activity at each of the four quality levels: 4*, 3*, 2*, 1* and unclassified, with 4* being the highest rating.

24. For each of their submissions, HEIs selected ‘research-active’ staff for inclusion from their ‘eligible staff’. Eligible staff were those academic staff who met the criteria as laid out in paragraphs 76-90 of RAE 03/2005 ‘RAE 2008 Guidance on submissions’.

25. In 2006, HEFCE published⁷ a UK-wide equality and diversity assessment of the 2001 exercise (RAE2001), HEFCE 2006/32. This investigated how disability, gender, age and ethnicity related to the selection of staff by HEIs for inclusion in that RAE. (Throughout this document ‘the 2006 report’ refers to HEFCE 2006/32.) The intention had been to replicate this analysis for RAE2008. However, due to differences in interpretation by HEIs of the definition of eligibility for RAE2008, we did not use Higher Education Statistics Agency (HESA) data on whether a staff member was eligible for submission to RAE2008, and which UOA they were associated with⁸, as we felt they were not sufficiently robust.

⁶ See www.hefce.ac.uk/Research/ref/ for further information.

⁷ See HEFCE 2006/32 ‘Selection of staff for inclusion in RAE2001’ (www.hefce.ac.uk/pubs/hefce/2006/06_32/).

⁸ See HESA staff fields 021 and 022 for further details (www.hesa.ac.uk/index.php?option=com_collns&task=show_manuals&Itemid=233&r=07025&f=021).

26. As a result, we were unable to reproduce the methodology used in the 2006 report to identify the members of staff which were eligible for selection but not submitted, and thus unable to calculate selection rates in the same way.

27. In RAE2008 the following measures were taken to improve the fairness of selection of staff for inclusion as category A-D staff:

- a. HEIs were given the opportunity to identify individual staff circumstances that affected category A-D staff members' contribution to the submission in form RA5b.
- b. There was a new requirement that all submitting HEIs had in place, and followed, a code of practice that adhered to relevant equal opportunities legislation in force on the submission deadline. HEIs were required to confirm this when making their submission⁹.
- c. Guidance was supplied by the Equality Challenge Unit (ECU) on preparing a code of practice¹⁰ and access to equalities briefings drafted by the ECU¹¹.

28. The ECU has published a review of the impact of processes and practices to promote equality and diversity in RAE2008, in order to understand how codes of practice were developed and used, and to what extent they supported equality and diversity in selection of staff for the RAE. It complements the research we have undertaken here. The ECU report is available on the ECU web-site, www.ecu.ac.uk, under Publications.

Data

Methodology

29. We based our methodology on that used in the analysis of the 2001 RAE (RAE2001), but (as mentioned in paragraph 25) we were unable to use the same data. Therefore we adopted a different approach: of creating and analysing four 'pools' of potentially eligible staff for quantitative analysis. By using a range of pools we could consider similarities and differences in patterns of selection with regard to the equality and diversity measures mentioned in paragraph 1. To understand the effect of this pool methodology on the RAE2008 results, we went back and analysed the RAE2001 data, allowing us to compare the outcomes of the two approaches (see paragraphs 40-43).

⁹ See RAE 03/2005 'RAE 2008 Guidance on submissions' paragraph 38 (www.rae.ac.uk/pubs/2005/03/) for further details.

¹⁰ See RAE 03/2005 'RAE 2008 Guidance on submissions' Annex G (www.rae.ac.uk/pubs/2005/03/) for further details.

¹¹ See RAE 02/2005 'RAE2008: Equality briefing for panel chairs, members and secretaries' and RAE 02/2007 'RAE2008: Updated equality briefing for panel chairs, members, advisors and secretaries' (www.rae.ac.uk/pubs/2005/03/) for further details.

30. Following the same principles as the 2006 report, we considered the selection rates for different cross-sections of potentially eligible staff in the RAE2008 and, by using statistical models, compared staff on a 'like-for-like' basis.

31. The scope of this quantitative analysis is therefore limited to addressing whether there were specific differences for certain groups of academics in the process of being selected for inclusion in the RAE. It does not attempt to comment on the research process as a whole, the process of accepting/rejecting individual articles, or whether the RAE2008 panels assessed the work of different groups of academics consistently.

Sources

32. The main data sources used to describe and examine eligible staff for inclusion in RAE2008 were the HESA staff contract table and the HESA staff person table for 2007-08. These tables contain information on the individual staff member as well as details of contracts with the HEIs they are associated with.

33. Identification of the staff selected for the RAE2008 came from the RAE2008 database.

Population – the four pools of staff

34. The HESA staff record holds information on all contracted staff working at UK HEIs. For this analysis we looked at four sets (or pools) of staff data from this broad population. The purpose of the pools was to construct a range of representative staff groups which would strike a balance between including all staff, including those who were not eligible, and a much more restricted view where some eligible staff would be excluded from the analysis. Where possible we have used definitions from previous analyses to ensure robust and meaningful pools, the exclusions made are detailed below:

- a. **All academic staff:** Contains one record for each academic staff member per HEI, active on 31 October 2007. This is constructed in a similar fashion to Population B (academic staff with academic roles) of HEFCE 2008/26 'Staff employed at HEFCE-funded HEIs: update'¹² but using a 31 October rather than a 1 December census date.
- b. **Permanent academic staff:** A subset of the 'All academic staff' pool, this contains permanent academic staff at lecturer level or above, excluding atypical, fixed-term or low full-time equivalent (FTE) contracts (in other words, those staff not on full-time contracts with FTE less than 40 per cent). This pool is constructed in a similar fashion to Population D (permanent academic staff) of HEFCE 2008/26 but using a 31 October rather than a 1 December census date.

¹² See www.hefce.ac.uk/pubs/hefce/2008/08_26/ for further information.

- c. **Grade-identified staff:** A subset of the 'All academic staff' pool, this contains permanent/fixed-term academic staff at lecturer level or above on teaching and/or research contracts, excluding atypical or low FTE contracts.
- d. **Contract-identified staff:** A subset of the 'All academic staff' pool, this contains permanent/fixed-term academic staff at lecturer level or above not solely on teaching only contracts, excluding atypical or low FTE contracts.

Exclusions

35. In the 2006 analysis, non-submitting UOAs within HEIs¹³ were excluded, using RAE research-active and UOA HESA fields to determine this. Since this level of data was no longer available for the current analysis, it was necessary to find a proxy for UOA in the cases where the UOA was unknown; in other words, for those members of staff not selected for the RAE. There were two possible approaches available: using either cost centre or academic discipline. After considering the suggested mappings for these variables at both a sector and HEI level, the cost centre mapping was chosen. This decision was supported by the fact that 'academic discipline' details the subject area the staff member has their highest qualification in and does not reflect the area of work they are currently teaching or researching.

36. Table 1 shows how the initial data extraction and exclusions described above determined the overall numbers of staff, UOAs within HEIs, and HEIs presented in this report. Table 2 excludes staff working for UOAs within HEIs where no eligible staff were submitted to the RAE. The remainder of the report will exclude these members of staff from the analysis, details of corresponding analyses with these staff included can be found in Annex C.

Table 1: Numbers of eligible staff, UOAs within HEIs, and HEIs with staff in non-submitting UOAs included

Pool of staff	Eligible staff	UOAs within HEIs	HEIs
Eligible staff as contained in pool a – all academic staff	177,055	3,410	165
Eligible staff as contained in pool b – permanent academic staff	89,640	3,270	165
Eligible staff as contained in pool c – grade-identified staff	109,185	3,320	165
Eligible staff as contained in pool d – contract-identified staff	86,035	3,160	160

Notes: All data tables have had entries rounded to the nearest five; this may cause discrepancies between the reported total and the sum of its parts.

¹³ UOAs within HEIs where no eligible staff were submitted to the RAE.

Table 2: Numbers of eligible staff, UOAs within HEIs, and HEIs with staff in non-submitting UOAs excluded

Pool of staff	Eligible staff	UOAs within HEIs	HEIs
Eligible staff as contained in pool a – all academic staff	141,820	2,320	155
Eligible staff as contained in pool b – permanent academic staff	73,310	2,315	155
Eligible staff as contained in pool c – grade-identified staff	88,445	2,320	155
Eligible staff as contained in pool d – contract-identified staff	72,700	2,295	155

Notes: All data tables have had entries rounded to the nearest five; this may cause discrepancies between the reported total and the sum of its parts.

37. Each pool used a slightly different definition for eligible staff, creating a range of included departments/HEIs. But once ‘non-submitting UOA’ staff were excluded, the range represented in the four pools became narrower.

38. Note that in the 2006 analysis of RAE2001, it was necessary to make exclusions based on cross-checking between the RAE and HESA data sources. This was not needed in this analysis because the two data sources are now more aligned.

Re-creating the RAE2001 analysis with a pool methodology

39. To gauge the effect of using this pool methodology for the analysis of RAE2008, the methodology was applied to RAE2001 data with the four pools defined in paragraph 34, to see if:

- the four pools presented the same level and direction of any difference in selection rates
- the pools methodology produced aberrant results that conflicted with the original results from the 2006 report.

40. For gender and ethnicity, the analysis of RAE2001 data using the pool methodology produced results that were consistent to those described in the 2006 report.

41. When considering declared disability there was variation between the original results and the results from the pools. The 2006 report indicated only a negligible difference in selection rates by disability in RAE2001 but the 2009 methodology resulted in a difference

in all of the pools. Table 3 details the selection rates found (the equivalent table for inclusion of non-submitting UOA within HEIs is in Annex C).

Table 3: Selection rates for staff with declared disability using RAE2001 data (excluding non-submitting UOA within HEIs)

	Actual results RAE2001	Permanent academic staff	All academic staff	Grade- identified staff	Contract- identified staff
Without declared disability	69%	61%	44%	58%	63%
With declared disability	69%	56%	46%	53%	58%
Difference	0%	-6%	1%	-5%	-5%

42. This difference in findings using the two methodologies is an issue for the analysis of RAE2008 only if the statistical models used find significant differences in selection for RAE2008, by disability status, with some pools and not others. Considering the selection rates alone does not account for other factors that may affect the individuals' chance of being selected and the differences found here may be explained by random variation.

Variation in selection rates

Introduction

43. The aim of this analysis was to re-create the 2006 equality analysis for the RAE2001. Therefore, we used the same factors in the statistical model as before where possible (see Annex E). The exception is that we additionally analysed selection rate by nationality factor, which was done because our initial analyses showed a strong association between nationality and selection rates to RAE2008. The data have been treated in the same way as in 2006; definition and grouping details are at Annex B.

44. As discussed in HEFCE 2006/32, the attributes simultaneously allowed for in the statistical models are:

- age; sex; ethnicity; nationality; disability
- PhD holder; clinical status; highest qualification in a relevant subject
- location of the individual in the previous year
- grade; contract status (permanent or fixed-term); mode of employment (part-time or full-time).

45. The first five of these variables (age, sex, ethnicity, nationality and disability) defined the groups we were interested in. The other variables are our best available proxies for the research output quality of individuals. Some of these factors, in particular grade and other aspects of employment status, are themselves issues where equal opportunities may be in question; this makes the inclusion of such variables problematic, particularly as being selected for the RAE may in itself improve someone's chances of being promoted. We

therefore provide the results of both a 'full' statistical model which includes all these variables, and a 'restricted model' which does not allow for grade, contract status and mode of employment.

46. The following analyses focus on age, sex, ethnicity, nationality and disability. Further breakdown of the data is not reported due to the small number of individuals in each category. The four pools we consider exclude the staff in non-submitting UOAs within HEIs. The corresponding data output with these non-submitting staff included are in Annex C.

Selection rates for staff with and without declared disability

47. Table 4 shows the numbers of staff with and without declared disability in each of the four pools, and percentages of those staff that were selected for inclusion in RAE2008.

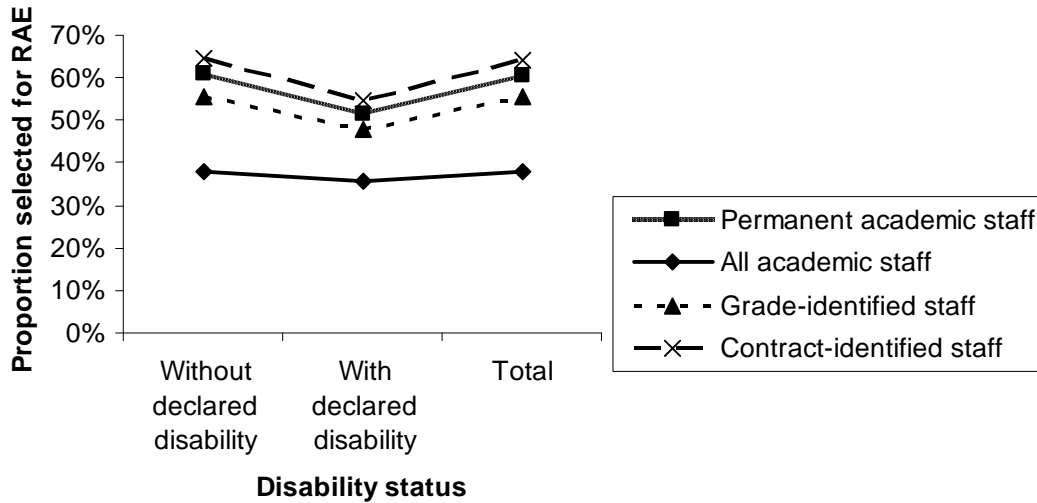
Table 4: Selection rates for staff with declared disability (excluding non-submitting UOAs within HEIs)

Disability?	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
Without declared disability	71,565	61%	138,845	38%	86,420	56%	71,015	64%
With declared disability	1,750	51%	2,975	36%	2,025	48%	1,685	55%
Total	73,310	61%	141,820	38%	88,445	56%	72,700	64%

Notes: All data tables have had entries rounded to the nearest five; this may cause discrepancies between the reported total and the sum of its parts.

48. Table 4 shows that there was a lower selection rate for staff with declared disability in all pools. The data from Table 4 is presented as a graph below but for the other equality factors we include only a table or graph in the body of the report; Annex C shows the extra tables and graphs.

Figure 1: Selection rates for staff pools by disability status (excluding non-submitting UOAs within HEIs)



49. Using statistical models we can explore the extent to which the selection rates can be compared on a 'like-for-like' basis after allowing for other factors. As in the 2006 report, the results of this statistical modelling are presented as a 'selection index'. Table 5 shows how this index is calculated for the selection rates with the 'Permanent academic staff' pool considered in Table 4.

Table 5: Derivation of the selection index for permanent academic staff by disability status

	Without declared disability (ref)	With declared disability
Percentage selected	61%	51%
Percentage not selected	39%	49%
Selected/Not selected (odds ratio)	1.56	1.04
Odds ratio relative to odds ratio of reference group (selection index)	1.56/1.56=1.00	1.04/1.56=0.67

50. If the selection rate for staff without and with declared disability had been the same, the selection index would have been equal to 1.00. The value 0.67 indicates that staff with declared disability had a lower selection rate than the reference group, staff without declared disability. These 'actual' selection indices are 'unadjusted' in that they do not allow for other factors that may affect selection. Table 6 shows the actual selection index from Table 5 next to the selection indices from the statistical models, which take other factors into account.

51. Table 6 examines two of the four pools: All academic staff and Permanent academic staff. Indices for all four pools are in Annex D.

Table 6: Selection indices comparing staff with and without declared disability (excluding non-submitting UOAs within HEIs)

Disability?	Permanent academic staff			All academic staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
Without declared disability	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
With declared disability	0.67	0.90	0.95	0.90	0.91	0.94

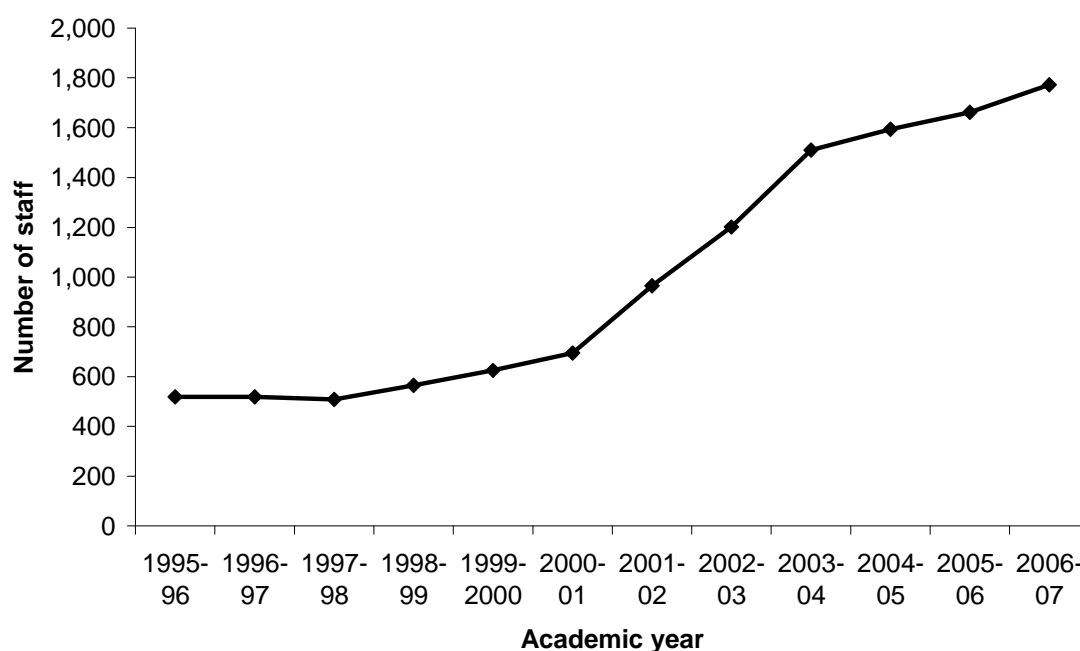
Notes: There were no significant differences from 1.00 at the 1% level.

52. Both the full and restricted (excluding some employment variables) models produce indices of around 0.9 for those with declared disability, but none of the indices are statistically significant from the reference (1.00); in other words they could be explained by random variation in the data.

53. Figure 2 is taken from the report 'Staff employed at HEFCE-funded HEIs' (HEFCE 2008/26)¹⁴ and shows the number of declared disabled staff in the permanent academic staff (using a census date of 1 December) between the academic years 1995-96 and 2006-07. The declared disabled population in 2006-07 is almost three times that reported in 2000-01, when the RAE2001 took place. Despite this growth, the result found in Table 6 is similar to that found in the 2006 report.

¹⁴ See www.hefce.ac.uk/pubs/hefce/2008/08_26/ for further details.

Figure 2: Number of permanent academic staff declared disabled



Notes: Taken from 'Staff employed at HEFCE-funded HEIs update: trends and profiles' (HEFCE 2008/26), Figure 11.

Selection rates for men and women

54. In Table 7 the raw data for selection rates for men and women are shown for the four pools considered (a corresponding table is in Annex C).

Table 7: Selection rates for staff pools by gender (excluding non-submitting UOAs within HEIs)

Gender	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
Women	26,175	48%	58,325	28%	32,895	43%	25,300	53%
Men	47,140	67%	83,495	45%	55,550	63%	47,400	70%
Total	73,310	61%	141,820	38%	88,445	56%	72,700	64%

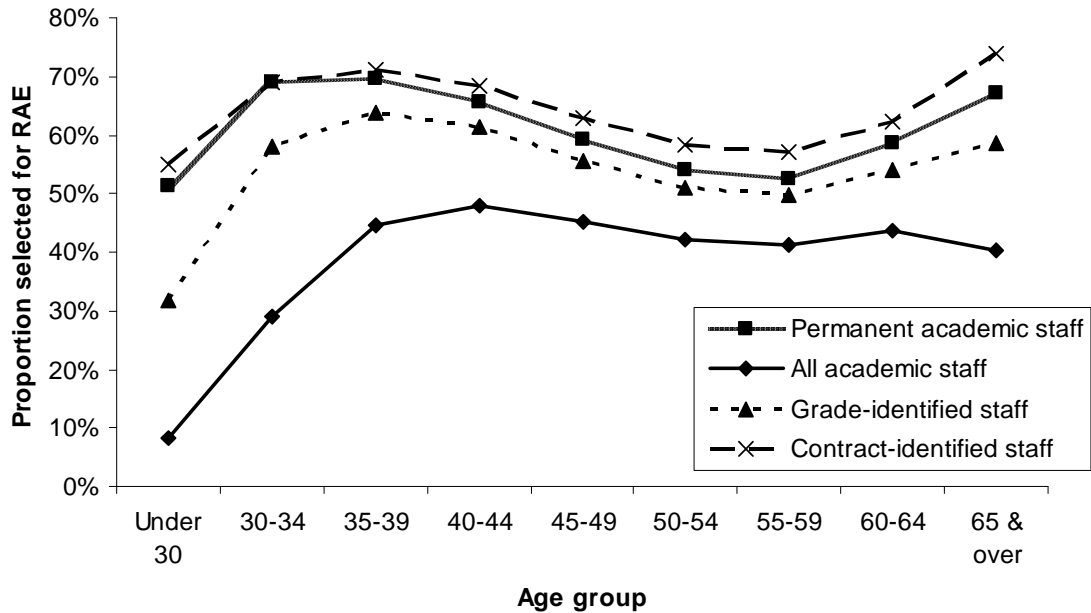
Notes: All data tables have had entries rounded to the nearest five; this may cause discrepancies between the reported total and the sum of its parts.

55. These selection rates were 'unadjusted': they do not allow for the effects of other factors. Before presenting the output from the statistical models, we first consider the effect of age on selection rates, and then the joint effect of sex and age.

Selection rates by age

56. Figure 3 shows the selection rates by age for the four pools considered (corresponding tables are in Annex C).

Figure 3: Selection rates for staff pools by age group (excluding non-submitting UOAs within HEIs)



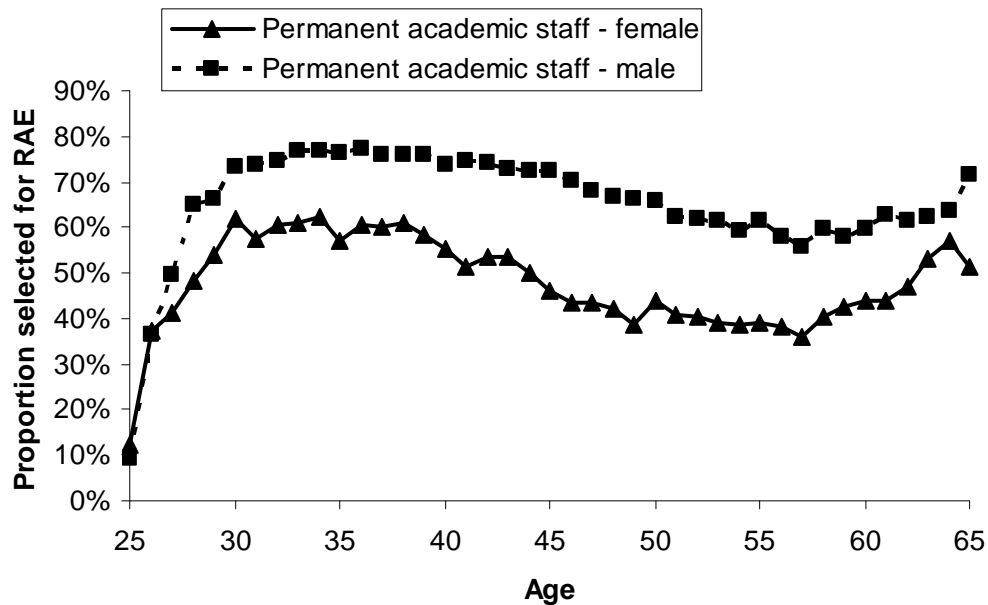
57. Figure 3 shows that while each pool had slightly different distributions of selection over age, there was a general trend across all four. The lowest rate of selection was found in the under 30s group, and peaks occurred between 30-44 years before steadily falling to a trough at 55-59 years. The pools for permanent academic, grade- and contract-identified staff all showed a slight increase in selection for staff over 50, which agrees with the conclusions drawn from the 2006 report.

58. As part of our analysis, we attempted to identify and analyse the selection of researchers in the early parts of their careers (termed 'early career researchers' or ECRs). However, we were unable to achieve this. Although the data collected for selected staff did include an early career indicator, there was no equivalent indicator for staff not selected and included in the eligible staff pools. Not only that, but the characteristics such as age and length of contract in the early careers population were very varied, and robust conclusions were unlikely to be successfully drawn. For example, the under 35s are considered to have a high proportion of ECRs but accounted for only 46 per cent of selected staff declared as having early career status.

Selection rates for men and women by age

59. Figure 4 shows that the rates of selection varied by age for both men and women in the 'Permanent academic staff' pool. The other three pools of staff show a similar trend; graphs for these are at Annex C.

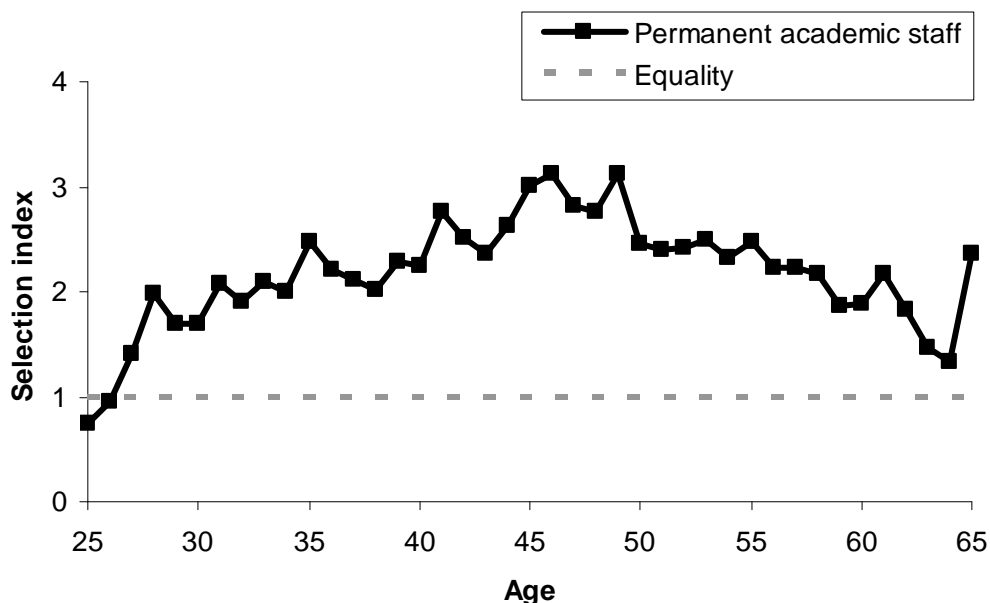
Figure 4: Selection rates for men and women by age (excluding non-submitting UOAs within HEIs)



60. The trends for males and females in Figure 4 are a similar shape to that seen in the overall age trend, in Figure 3, but there is still reasonable evidence to suggest that the relative selection rates of men compared to women varied by age; in other words the difference in male to female selection rates changes by age.

61. To explore this relationship further Figure 5 shows the actual selection indices (as calculated in Table 5) for gender by age using the ‘Permanent academic staff’ pool (graphs for all of the pools are in Annex D). Figure 5 shows that the actual selection index is greater than one for most age groups, which indicates that men were selected more often than women. The age cohort with the largest index (and hence the biggest difference in selection between men and women) was at 45-50 years-old.

Figure 5: Actual selection indices for gender by age (excluding non-submitting UOAs within HEIs)



62. Figures 6 and 7 show the output from the restricted and full statistical models (see paragraphs 44-45) where other factors such as grade and subject area were taken into account. The sections of most interest are where the error bars are completely above or below the 'equality line', as this indicates a statistically significant difference between men and women (highlighted by two vertical lines which touch the age axis).

Figure 6: Restricted model selection index for gender by age (excludes employment status variables)

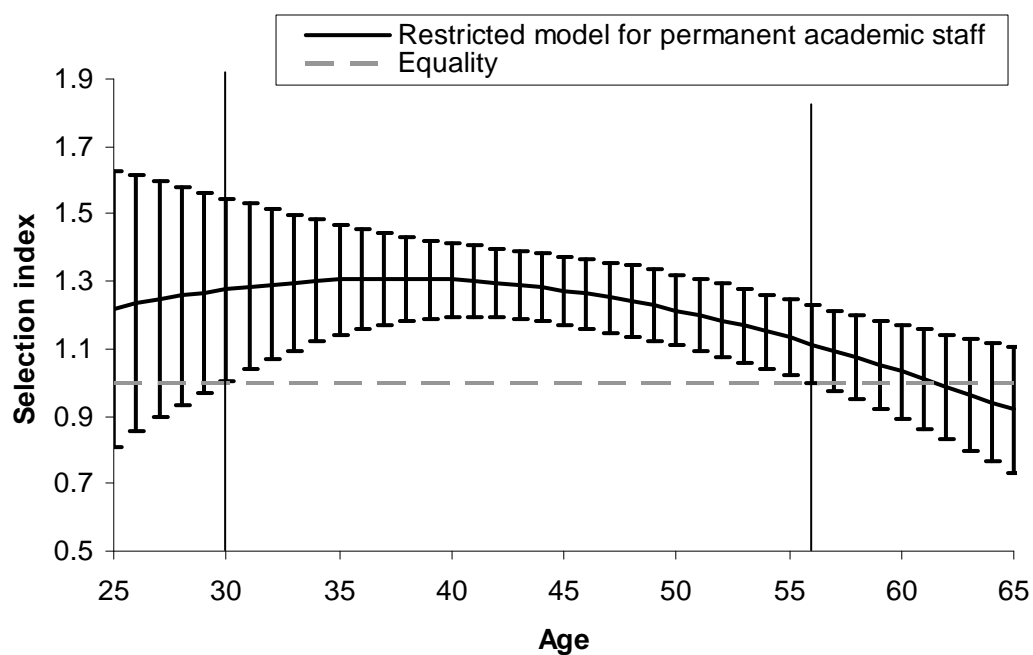
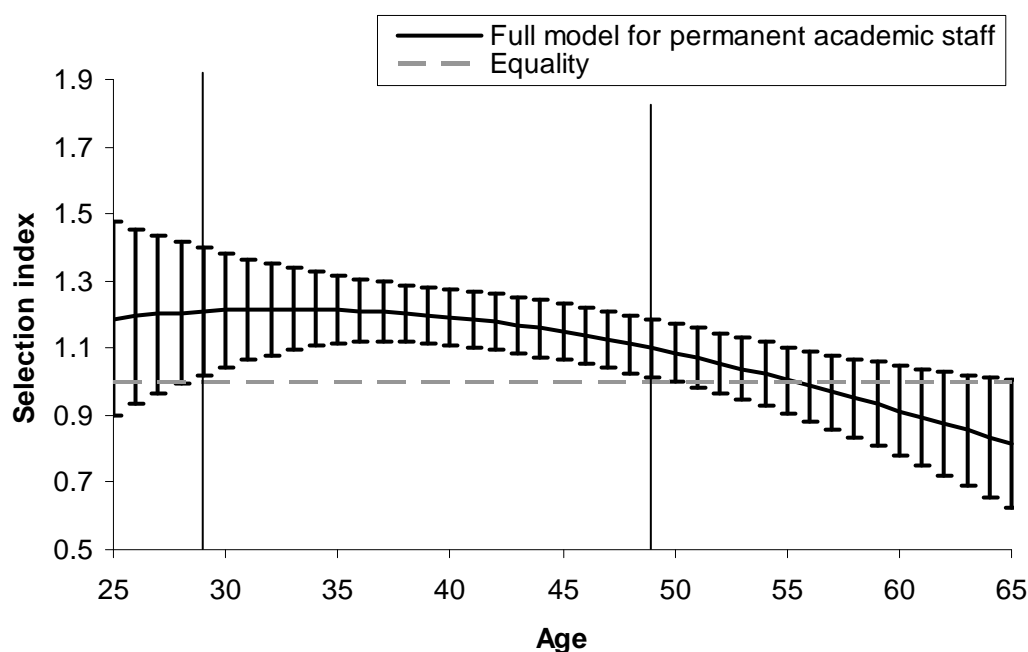


Figure 7: Full model selection index for gender by age



63. The restricted and full models both indicate a significant difference in favour of male selection rates over the middle part of the age range. The restricted model showed this to be significant between 30 and 56 years-old, while the full model suggested a narrower range of 29 to 49 years-old.

64. The 2006 report also found such differences, but actual selection indices were biggest at 40-45 years-old, slightly younger than observed in paragraph 61. A significant difference was observed in age ranges 31-59 years-old for the restricted model, and 30-47 years-old for the full model. These results suggest that the difference in selection for age by gender is similar to what was seen in the 2006 report.

Interpreting the 'like-for-like' differences

65. In addition to considering the selection indices by sex, we selected three pairs of individual members of staff and compared their expected selection rates, using the staff members from the 2006 analysis as a guide.

Table 8: Selection rates for ‘typical’ staff – Full model for permanent academic staff

	Men	Women
32 year-old lecturer in Business and Management Studies without a PhD	27%	23%
40 year-old senior lecturer in Earth Systems and Environmental Studies with a PhD	90%	80%
55 year-old professor in Education with a PhD	86%	90%

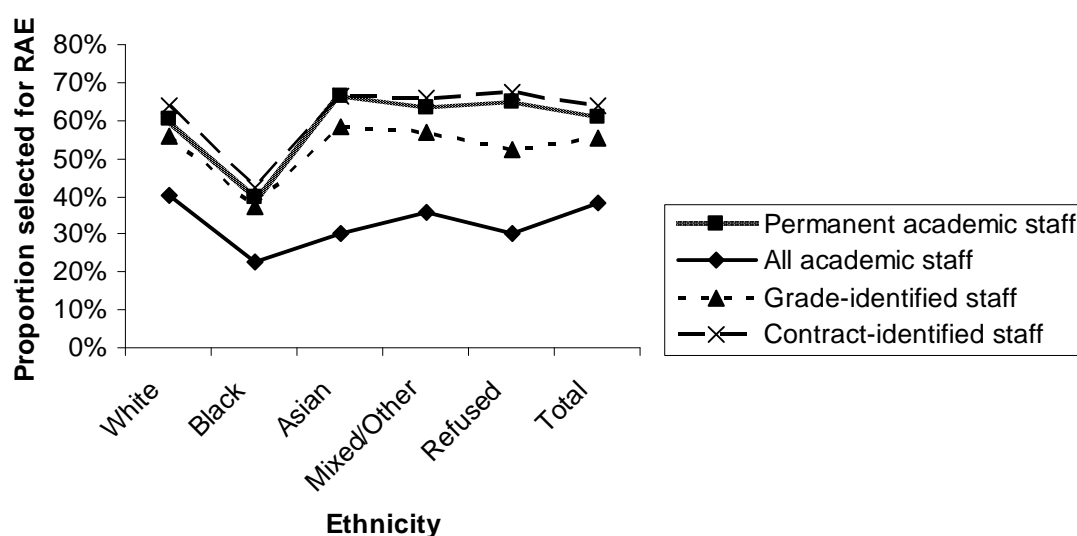
Notes: The other attributes for these examples are: full-time; permanent staff; teaching and research function; non-senior post holder; non-clinical status; and employed at the same HEI in the previous year.

Selection rates by ethnicity

66. As with the 2006 analysis, broad groupings were used to classify staff ethnicity to ensure sufficient numbers were available for robust comparison. These were: White, Black, Asian, Mixed/Other and Information refused¹⁵.

67. Figure 8 shows the unadjusted data for selection rates by broad ethnic group of staff for each of the four pools examined.

Figure 8: Selection rates by ethnicity (excluding non-submitting UOAs within HEIs)



68. Figure 8 shows that the selection rates were at similar levels for all the ethnicity groups except for those staff from the Black group, whose selection rate was lower in all the pools of staff.

¹⁵ For further information on the category groupings see Annex B.

69. Table 9 presents the results from the statistical models for the ethnic groups. As in Table 6, we include the 'All academic staff' and 'Permanent academic staff' pools here, and results on the other pools are in Annex D.

Table 9: Selection indices comparing staff from different ethnic groups (excluding non-submitting UOAs within HEIs)

Ethnicity?	Permanent academic staff			All academic staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
White	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
Black	0.44	0.66*	0.76*	0.44	0.63*	0.72*
Asian	1.30	0.91	0.96	0.65	0.78*	0.85*
Mixed/Other	1.16	0.93	0.97	0.77	0.89*	0.93
Refused	1.12	0.95	0.98	0.89	0.93*	0.99

Notes: * indicates that the result is significantly different from 1.00 at the 1% level.

70. The 'All academic staff' pool indicates that for both the full and restricted models, those from a Black or Asian ethnic group had lower selection rates after accounting for other measurable factors, such as HEI and grade. In the restricted model, the Mixed/Other and refused groups are also significantly lower than the reference group (1.00). The 2006 report gave a similar result: the restricted model showed all non-White ethnic groups to have significantly lower selection rates than the reference group. It concluded that this may be the result of there being more staff from ethnic minorities in the lower grades¹⁶: since the restricted model doesn't account for grade, and for this reason the average selection rates for these groups may look lower than expected.

71. The 'Permanent academic staff' pool shows similar results to that seen in the grade- and contract-identified pools; that the selection rate for the Black ethnic group alone is lower than expected using both the full and restricted models.

72. These results are slightly different to those found when RAE2001 was analysed. In the 2006 report, when grade was taken into account (through using the full model), no significant differences were found by ethnic group. However when the full model is applied for the analysis of RAE2008, significant selection differences remain for two groups: those from a Black or Asian ethnic group when results from the 'All academic staff' pool are considered; and those from a Black ethnic group when the 'Permanent academic staff' pool is examined.

¹⁶ As seen in Figure 14 of 'Staff employed at HEFCE-funded HEIs: update' (HEFCE 2008/26). See www.hefce.ac.uk/pubs/hefce/2008/08_26/.

73. To try and understand where this difference arose, we compared the results found for RAE2008 for the 'Permanent academic staff' pool with those found in the RAE2001 analysis, focusing on the Black ethnic group.

Table 10: Overview of selection for the RAE2001 analysis compared with the results from the 'Permanent academic staff' pool of staff for the Black ethnic group (excluding non-submitting UOAs within HEIs)

Analysis	Group	Selected	Eligible	% selected	Actual index	Full model index	Significance level
RAE 2001	Black	267	723	37%	0.44	0.87	6%
	Total	43,604	74,358	59%	n/a	n/a	n/a
RAE 2008	Black	315	792	40%	0.44	0.76	0%
	Total	44,502	73,317	61%	n/a	n/a	n/a

74. Table 10 shows that while the unadjusted (or actual) selection indices are the same in both analyses, the model selection indices are different, which results in a difference in significance levels. The RAE2008 result is less than 1 per cent, hence it is statistically significant, while the RAE2001 is still quite low but not statistically significant. The difference may be a result of adding nationality as a factor to the RAE2008 model; this is considered in the next section.

75. For the Asian ethnic group, there are significant differences in the results when the different pools of potentially eligible staff are considered. Part of these differences are a result of difficulties in accurately identifying eligible staff. The 'All academic staff' pool inevitably includes a higher proportion of non-eligible staff included in the analysis (compared to the other pools) and there is a higher proportion of staff who are Asian in this larger pool than in the other pools¹⁷. The combination of these means that a higher relative proportion of non-eligible Asian staff will be flagged as eligible when the 'All academic staff' pool is examined.

76. Other non-White ethnic groups showed a similar pattern to that observed in paragraph 76; although the differences between pools were not significant.

Selection rates by nationality

77. Table 11 shows the raw data for selection rates for the four pools of staff split by nationality of individual. Staff were assigned to the broad groups of UK national and Non-UK national.

¹⁷ See Table C7, Annex C. Proportion of staff who are Asian in permanent academic staff was 4.9 per cent compared to 6.8 per cent in all academic pool.

Table 11: Selection rates by nationality (excluding non-submitting UOAs within HEIs)

Nationality	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
UK national	59,695	57%	108,350	38%	71,255	52%	58,020	61%
Non-UK national	13,615	77%	33,470	40%	17,190	69%	14,680	77%
Total	73,310	61%	141,820	38%	88,445	56%	72,700	64%

Notes: All data tables have had entries rounded to the nearest five; this may cause discrepancies between the reported total and the sum of its parts

78. Table 11 shows that the selection rate was higher for non-UK nationals over all pools. The 'All academic staff' pool showed the lowest difference in UK and non-UK selection rates.

79. Table 12 shows the restricted and full model indices for two of the four pools of staff. Equivalent indices for the grade- and contract-identified staff pools are in Annex D.

Table 12: Selection indices comparing staff with UK and Non-UK nationality (excluding non-submitting UOAs within HEIs)

Nationality?	Permanent academic staff			All academic staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
UK national	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
Non-UK national	2.46	1.20*	1.31*	1.09	1.04	1.15*

Notes: * indicates that the result is significantly different from 1.00 at the 1% level.

80. These indices show that generally non-UK nationals had a significantly higher selection rate than UK nationals after taking our measured factors into account. This new finding led us to consider the combined effect of nationality and ethnicity.

Selection rates for nationality by ethnicity

81. We examined selection rates by ethnicity and nationality of staff in combination. For ease of reporting, we focus on selection rates for one pool of staff (Permanent academic staff). Results for other pools are in Annex C.

82. Table 13 shows the unadjusted selection rates by nationality and ethnicity for those in the 'Permanent academic staff' pool.

Table 13: Selection rates for nationality by ethnicity (excluding non-submitting UOAs within HEIs)

Nationality	Ethnicity – Permanent academic staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	57%	32%	62%	60%	61%
Non-UK national	78%	53%	70%	69%	84%
Total	60%	40%	66%	63%	65%

83. These results are similar to those seen in the grade- and contract-identified staff pools; the non-UK national group reports consistently higher selection rates over all ethnicities. The 'All academic staff' pool is not so distinct. The White, Black and Refused groups have higher selection rates for non-UK nationals while the Asian and Mixed/Other groups have higher selection for UK nationals (see tables in Annex C).

84. These results indicate that the differences in selection rates for particular ethnic minority groups are not due to the nationality profile.

Discussion – are there biases in selection?

85. As with the 2006 analysis it is important to appreciate the limitations of our work. A difference in selection rates between one group of staff and another does not necessarily mean that one group has been treated unfairly. Conversely, even if there has been no reported difference in selection rates, this does not mean that there have been no cases of bias.

86. The statistical models we have used to measure the effect of individual factors account for many variables that are thought to affect selection to the RAE. But not everything can be accounted for. With this in mind, we discuss the evidence for sector-wide bias below with respect to the equality factors we have analysed.

Disability

87. In all four pools of staff, the selection rate for staff with declared disability was lower than for those staff not declared as having a disability. Modelling indicates that measured factors – such as the differences in staff selection rates associated with the HEI, or subject area the individual is working in – may explain these differences more readily than their disability status. For example, more than half the staff with a declared disability work in arts and vocational subjects, but this area of subjects have the lowest overall staff selection rates when compared to other subject areas (such as engineering and sciences or humanities and languages). So, the choice of subject area could explain some of the lower selection rate observed for staff with a declared disability.

Age and gender

88. Overall, there was a difference in the selection rate of men and women in RAE2008 – for example in the ‘Permanent academic staff’ pool 67 per cent of men were selected compared to 48 per cent of women.

89. As with RAE2001, having accounted for other measurable factors, differences between selection of men and women continue to be observed over the age range 30-50 despite the changes between RAE2001 and RAE2008 to promote equal opportunities in the RAE.

90. Bibliometric evidence from the 2006 report is consistent with the suggestion that lower selection rate of women in the 30-50 age range was due to a lower proportion of women having a research record that leads them to be selected, rather than bias in the selection process. While this behaviour may be linked to selection bias resulting from age and gender, it could equally be a result of deeply rooted inequalities in the research careers of men and women.

Ethnicity and nationality

91. The selection rates were at similar levels for all the ethnicity groups except for those staff from the Black group, whose selection rate was lower in all the pools of staff. The lower selection rate was not explained when other measured factors were taken into account. This result is slightly more pronounced for the analysis of RAE2008 than RAE2001, but this could be due to changes in the methodology.

92. For the first time we considered the effect of nationality on selection rates. The introduction of this factor highlighted the higher selection rates for non-UK nationals compared to UK nationals.

93. The combined effect between ethnicity and nationality does not help us to explain the low levels of selection seen with the Black group. Bibliometric evidence from the 2006 report suggested that the unexplained differences may have been due to a weakness in the proxies for research output quality included in the quantitative analysis rather than an unjustifiable bias in selection to the RAE.

Discussion – the context of responses to equality issues

94. Our analysis shows that with regard to equality issues, staff selection to the RAE2008 was similar in composition to that seen in RAE2001. This is not to say that the new processes and equality measures put in place since 2001 have had no effect on selection at institutional, departmental or UOA level. It may be that some of the differences seen in this and the 2006 report are linked to individual career choices and deeply rooted inequalities than of particular discrimination against specific groups of staff. This is an area that HEFCE and the higher education (HE) sector will continue to explore.

95. The extent to which the different selection rates observed reflect deeply rooted social inequalities is being acknowledged by the extensive work the HE sector, HEFCE and the ECU are doing to support the research careers of different groups of staff. For example, work is being conducted to implement the Research Concordat, and HEFCE is undertaking research on workforce planning¹⁸. There is also an increasing consideration of equality issues in other initiatives, as seen with the recent revision to Universities UK guidelines on appointments of vice-chancellors and other senior staff¹⁹, and the University of Salford's HEFCE-funded project looking at the management of academic workloads²⁰.

96. There are also many projects within the HE sector which are helping to develop the understanding of gender and age equality issues for academic staff. HEFCE funded one such project through its Leadership, Governance and Management Fund²¹; it was based at Imperial College to support women in academic medicine, and completed in early 2008. The study aimed to examine issues connected with the barriers to women's career progression in academic medicine, identify solutions, and develop a baseline database for future studies to evaluate future improvements²².

97. Other projects include the Athena SWAN Charter, based at the Equality Challenge Unit, which has conducted research into the potential causes leading to female academic staff leaving the HE workforce²³. Also, the Women Academics Returners' Programme at the University of Sheffield provides a grant of £10,000 to women academics and researchers who return to work after maternity leave, to cover teaching duties or to support research activities. The university has committed £1.5 million to the programme, and 54 women have participated to date²⁴.

98. In addition, the ECU is co-ordinating a Race Forum project supported by HEFCE's Leadership, Governance and Management Fund. The project will help identify a range of possible initiatives to address issues affecting black and minority ethnic (BME) staff in the HE sector and meet race equality duties in the sector, with particular reference to recruitment, retention, promotion and development of BME staff and inclusion in structures of governance²⁵. The first stage of this project is under way and a literature review on the experiences of BME staff working in higher education has been published²⁶.

¹⁸ See www.hefce.ac.uk/Pubs/hefce/2006/06_21/ for details of the 2006 report.

¹⁹ See www.hefce.ac.uk/lgm/build/lgmfund/projects/show.asp?id=161&cat=7 for more details.

²⁰ See www.hefce.ac.uk/lgm/build/lgmfund/projects/show.asp?id=145&cat=7 for further details.

²¹ See www.hefce.ac.uk/lgm/build/lgmfund/ for more information on their aims and projects funded to date.

²² See www.hefce.ac.uk/lgm/build/lgmfund/projects/show.asp?id=118&cat=3 for further details.

²³ See www.athenaswan.org.uk/html/athena-swan/ for further details.

²⁴ See www.shef.ac.uk/hr/diversity/warp.html for further details.

²⁵ See www.ecu.ac.uk/our-projects/race-forum for further details.

²⁶ See www.ecu.ac.uk/publications/experience-of-bme-staff-in-he for further details.

99. Our analysis is a separate project from that of the qualitative analysis carried out by the ECU, see paragraph 28, and we make no attempt to assess the combined evidence in this document. However, we did compare the ECU's preliminary finding that HEI type was important to selection against the data used in our analysis. The 'HEI type' indicator identifies 'pre-1992' institutions; HEIs included in this group are commonly associated with being 'research intensive' organisations where staff are more likely to be selected for the RAE. Our data confirmed this; showing that 'pre-1992' HEIs had a higher staff selection rate both overall and within the equality categories covered in this report.

100. The issues arising from this and the 2006 analysis of the RAE are informing the development of the Research Excellence Framework, which will continue to actively promote equality and diversity. The evidence gathered from this quantitative analysis, alongside the Equality Challenge Unit's qualitative work on RAE2008 and other related work, will help to assess the potential impact on the sector of moving from the RAE to the REF.

101. HEFCE is shortly to publish proposals on all the key features of the REF for consultation with the sector in autumn 2009, and expects to announce the outcomes in early 2010.

Annex A Terminology and abbreviations

Terminology

Academic staff	Staff employed under a contract of salaried employment with the HEI whose primary employment function is teaching, research or both.
Eligible staff	This term refers to staff that are eligible for inclusion in the submission to the RAE, that is staff whose research outputs may be included in the submission . Eligible staff were those academic staff who met the criteria as laid out in paragraphs 76-90 of RAE 03/2005, 'RAE 2008 Guidance on submissions'.
Non-submitting department	A department where there are no submissions .
Quality profile	This is a measure of the quality of research described by submissions from a UOA within an HEI. The profile gives the proportion of research activity found at each quality level on a five-point scale: 4*, 3*, 2*, 1* and unclassified, where 4* is the highest.
Research outputs	Publicly available assessable outcomes of the research of selected staff or, if confidential, available to be assessed. Each selected staff may submit up to a maximum of four research outputs for the RAE.
Selected staff	Eligible staff whose research outputs are included in an RAE submission .
Selection index	When using simple summary statistics, this is a ratio of odds ratios based on the selection rate of one particular group of staff and the selection rate of a reference group of staff. $S_j \times (100 - S_r) / S_r \times (100 - S_j)$ Where S_j = selection rate of j^{th} staff group S_r = selection rate of reference staff group When based on a model the selection index is the exponential of the coefficient identifying the staff group.
Selection rate	$100 \times (\text{Number of } \mathbf{selected\ staff}) / (\text{Number of } \mathbf{eligible\ staff})$

Submission	A set of information provided to the RAE by an HEI pertaining to a UOA . The submissions are assigned a quality profile . In a few cases HEIs made more than one submission for one UOA; these are referred to as multiple submissions .
Unit of Assessment (UOA)	One of 67 discipline areas to which 2008 RAE submissions may have been made by an HEI.
UOA within HEI	The submissions associated with a UOA for a particular HEI. Usually identical to a submission . Used as an approximation to a submission for most of the analysis in this report.

Abbreviations

BME	Black and minority ethnic
ECU	Equality Challenge Unit
FTE	Full-time equivalent
HEFCE	Higher Education Funding Council for England
HE	Higher education
HEI	Higher education institution
HESA	Higher Education Statistics Agency
n/a	Not applicable
RAE	Research Assessment Exercise
RAE2001	Research Assessment Exercise that took place in 2001
RAE2008	Research Assessment Exercise that took place in 2008
Ref	The reference group used to calculate the selection index
UOA	RAE Unit of Assessment

Annex B

HESA data – definitions and groups

Introduction

1. This annex gives details of the derivation of the base data used in constructing the data set used in the modelling. Throughout the annex, fields taken from the HESA record are given in capitals using the field names from the HESA coding manual. Data used in the modelling were derived from modified versions of the 2007-08 HESA Staff Person and Staff Contract tables.

Creating UOA and rating fields

2. RAE2008 used 67 Units of Assessment (UOAs) to group the subject areas of research; these were recorded for all selected staff members. For UOAs to be built into the model, it was necessary to create a map from cost centre to 'estimated UOA' for members of staff where we did not know the actual UOA. Using the selected staff, we were able to create maps for all groups with sufficient numbers and a lead cost centre (where the top cost centre proportion is more than 5 per cent greater than the next best proportion). For groups which fell outside these parameters, we split them out by HEI and followed the mapping indicated by the majority of HEIs. The final mapping is in Table B1.

Table B1: Mapping for non-selected staff from cost centre to Unit of Assessment

Unit of assessment	Name	Cost centre	Name
4	Other Hospital Based Clinical Subjects	1	Clinical Medicine
10	Dentistry	2	Clinical Dentistry
11	Nursing and Midwifery	5	Nursing and Paramedical Studies
13	Pharmacy	8	Pharmacy and Pharmacology
14	Biological Sciences	10	Biosciences
15	Pre-clinical and Human Biological Sciences	4	Anatomy and Physiology
16	Agriculture, Veterinary and Food Science	3	Veterinary Science
16	Agriculture, Veterinary and Food Science	13	Agriculture and Forestry
17	Earth Systems and Environmental Sciences	14	Earth, Marine and Environmental Sciences
18	Chemistry	11	Chemistry
19	Physics	12	Physics
21	Applied Mathematics	24	Mathematics
23	Computer Science and Informatics	25	IT and Systems Sciences, Computer Software Engineering

24	Electrical and Electronic Engineering	20	Electrical, Electronic and Computer Engineering
25	General Engineering and Mineral & Mining Engineering	16	General Engineering
26	Chemical Engineering	17	Chemical Engineering
27	Civil Engineering	19	Civil Engineering
28	Mechanical, Aeronautical and Manufacturing Engineering	21	Mechanical, Aero and Production Engineering
29	Metallurgy and Materials	18	Mineral, Metallurgy and Materials Engineering
30	Architecture and the Built Environment	23	Architecture, Built Environment and Planning
32	Geography and Environmental Studies	28	Geography
33	Archaeology	37	Archaeology
36	Business and Management Studies	26	Catering and Hospitality Management
36	Business and Management Studies	27	Business and Management Studies
38	Law	29	Social Studies
38	Law	54	Central Administration and Services
40	Social Work and Social Policy & Administration	6	Health and Community Studies
44	Psychology	7	Psychology and Behavioural Sciences
45	Education	34	Education
45	Education	41	Continuing Education
45	Education	51	Total Academic Services
46	Sports-Related Studies	38	Sports Science and Leisure Studies
52	French	35	Modern Languages
57	English Language and Literature	31	Humanities and Language Based Studies
63	Art and Design	33	Design and Creative Arts
66	Communication, Cultural and Media Studies	30	Media Studies
99	Staff with academic contract but no academic duties	55	Staff and Student Facilities
99	Staff with academic contract but no academic duties	56	Premises

3. Table B1 shows that by using the information from the selected staff we map 39 cost centres to 31 UOAs. The remaining UOAs are in Table B2 and will be modelled to have a 100 per cent selection rate. As we are only considering the overall selection rates this should not affect the power of the model to identify selection differences within our equality areas.

Table B2: UOAs with no cost centre mapping

Unit of assessment	Name
1	Cardiovascular Medicine
2	Cancer Studies
3	Infection and Immunology
5	Other Laboratory Based Clinical Subjects
6	Epidemiology and Public Health
7	Health Services Research
8	Primary Care and Other Community Based Clinical Subjects
9	Psychiatry, Neuroscience and Clinical Psychology
12	Allied Health Professions and Studies
20	Pure Mathematics
22	Statistics and Operational Research
31	Town and Country Planning
34	Economics and Econometrics
35	Accounting and Finance
37	Library and Information Management
39	Politics and International Studies
41	Sociology
42	Anthropology
43	Development Studies
47	American Studies and Anglophone Area Studies
48	Middle Eastern and African Studies
49	Asian Studies
50	European Studies
51	Russian, Slavonic and East European Languages
53	German, Dutch and Scandinavian Languages

54	Italian
55	Iberian and Latin American Languages
56	Celtic Studies
58	Linguistics
59	Classics, Ancient History, Byzantine and Modern Greek Studies
60	Philosophy
61	Theology, Divinity and Religious Studies
62	History
64	History of Art, Architecture and Design
65	Drama, Dance and Performing Arts
67	Music

4. With all staff assigned to a UOA the appropriate rating profile could be added from the RAE2008 database. It was necessary to reduce this multi-level profile to a single indicator as part of the modelling process, so we used the 'percentage of research activity rated as 4*' because this had an overall profile most similar to that used for the RAE2001 analysis; the groupings are in Table B3. 4* represents work whose quality was world-leading in terms of originality, significance and rigour²⁷.

Table B3: Grouping the quality rating

Rating group	Percentage of research activity rated as 4*
0	0
1	5
2	10
3	15
4	20
5	25
6	30
7	35, 40, 45, 50, 55, 60, 65

²⁷ See <http://submissions.rae.ac.uk/results/intro.aspx> for further details.

Ethnicity groupings

5. In this analysis six ethnicity groupings were used. The groupings were derived from the more detailed classification used on the HESA staff record²⁸ using the mapping given in Table B3.

Table B3: Mapping to ethnicity groups

Ethnicity group	Ethnicity fields
White	White – British White – Irish White Scottish Irish Traveller Other White background
Black	Black or Black British – Caribbean Black or Black British – African Other Black background
Asian	Asian or Asian British – Indian Asian or Asian British – Pakistani Asian or Asian British – Bangladeshi Chinese Other Asian background
Other	Mixed – White and Black Caribbean Mixed – White and Black African Mixed – White and Asian Other Mixed background Other Ethnic background
Information refused	Not known Information refused

Staff classification

6. When creating the staff pools it was necessary to use staff classification. There are four groups, derived from historical grades: professors; senior lecturers and researchers; lecturers; and researchers. The full details of this classification are in Annex A of ‘Staff employed at HEFCE-funded HEIs: update’ (HEFCE 2007/36²⁹).

²⁸ See

www.hesa.ac.uk/index.php?option=com_collns&task=show_manuals&Itemid=233&r=07025&f=007 for further details.

²⁹ See www.hefce.ac.uk/pubs/hefce/2007/07_36/ (Annex A) for further details.

Other groupings

7. Two modes of employment were used in the model: full-time and part-time staff. Atypical staff were removed for all pools of staff. Table B4 maps the HESA staff record³⁰ to the modes used.

Table B3: Mapping to ethnicity groups

Mode	Mode of employment
Full-time	Full-time Full-time, term-time only
Part-time	Part-time Part-time, term-time only

8. All staff who were not declared as having a disability were treated as not disabled.

9. Staff recorded with 'unknown' nationality were grouped into the reference group 'UK national'.

³⁰ See

www.hesa.ac.uk/index.php?option=com_collns&task=show_manuals&Itemid=233&r=07026&f=007 for further details.

Annex C

Additional tables for equality factors

Table C1: Selection rates for staff with declared disability using RAE2001 data (including non-submitting UOAs within HEIs)

	RAE2001	Permanent academic staff	All academic staff	Grade-identified staff	Contract-identified staff
Without declared disability	59%	53%	40%	51%	55%
With declared disability	58%	48%	41%	47%	51%
Difference	-1%	-5%	1%	-4%	-4%

Table C2: Selection rates for staff with declared disability (including non-submitting UOAs within HEIs)

Disability?	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
Without declared disability	87,360	50%	173,175	31%	106,545	45%	83,930	54%
With declared disability	2,275	39%	3,880	27%	2,640	37%	2,105	44%
Total	89,640	50%	177,055	30%	109,185	45%	86,035	54%

Figure C1: Selection rates for staff pools by disability status (including non-submitting UOAs within HEIs)

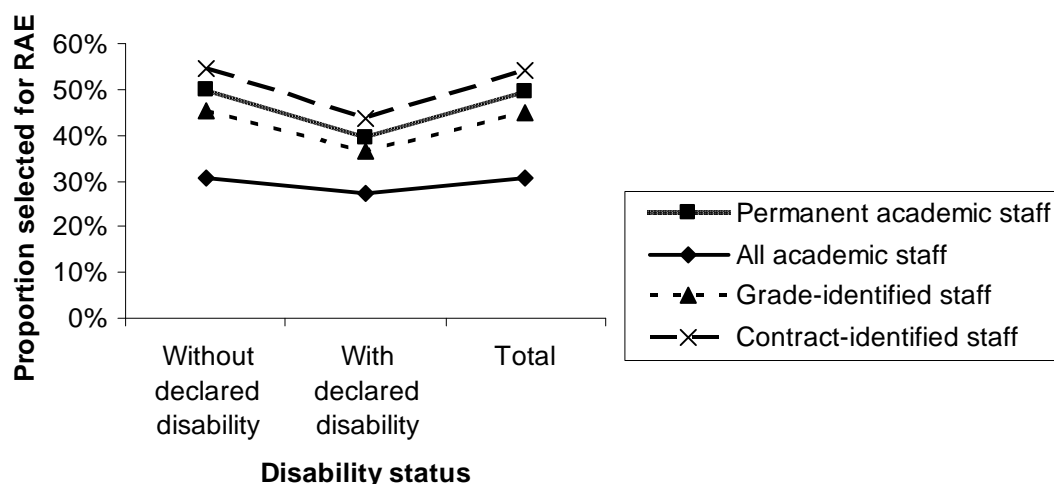


Table C3: Selection rates for staff pools by gender (including non-submitting UOAs within HEIs)

Gender	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
Women	33,945	37%	75,490	21%	42,945	33%	31,630	43%
Men	55,695	57%	101,570	37%	66,240	53%	54,405	61%
Total	89,640	50%	177,055	30%	109,185	45%	86,035	54%

Table C4: Selection rates for age group (including non-submitting UOAs within HEIs)

Age group	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
Under 30	2,090	37%	19,700	7%	4,265	23%	2,175	43%
30-34	6,935	58%	23,955	25%	9,770	48%	7,515	60%
35-39	12,325	59%	25,000	37%	15,385	54%	12,710	62%
40-44	15,635	55%	25,755	39%	18,440	51%	15,150	59%
45-49	15,755	48%	23,715	35%	18,035	44%	14,550	52%
50-54	14,965	43%	21,815	33%	16,780	40%	13,435	48%
55-59	13,490	42%	19,930	32%	15,295	40%	12,080	47%
60-64	7,690	49%	13,090	34%	9,355	44%	7,325	53%
65 & over	755	60%	4,090	30%	1,855	48%	1,095	67%
Total	89,640	50%	177,055	30%	109,185	45%	86,035	54%

Table C5: Selection rates for age group (excluding non-submitting UOAs within HEIs)

Age group	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
Under 30	1,530	51%	16,090	8%	3,135	32%	1,685	55%
30-34	5,790	69%	20,275	29%	8,025	58%	6,495	69%
35-39	10,465	70%	20,735	45%	12,930	64%	11,125	71%
40-44	13,065	66%	20,760	48%	15,245	61%	13,065	68%
45-49	12,695	59%	18,495	45%	14,435	56%	12,065	63%
50-54	11,920	54%	16,810	42%	13,300	51%	11,035	58%
55-59	10,810	53%	15,365	41%	12,165	50%	9,995	57%
60-64	6,365	59%	10,235	44%	7,680	54%	6,240	62%
65 & over	670	67%	3,050	40%	1,530	59%	995	74%
Total	73,310	61%	141,820	38%	88,445	56%	72,700	64%

Figure C2: Selection rates for staff pools by age group (including non-submitting UOAs within HEIs)

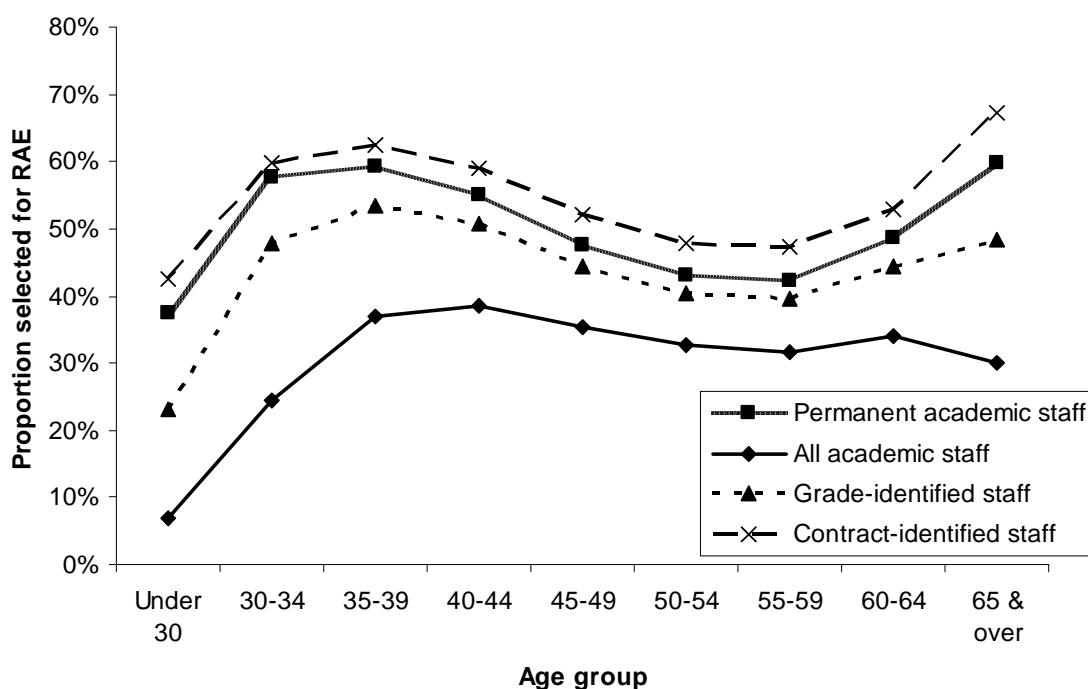


Figure C3: Selection rates for men and women by age in the 'Permanent academic staff' pool (including non-submitting UOAs within HEIs)

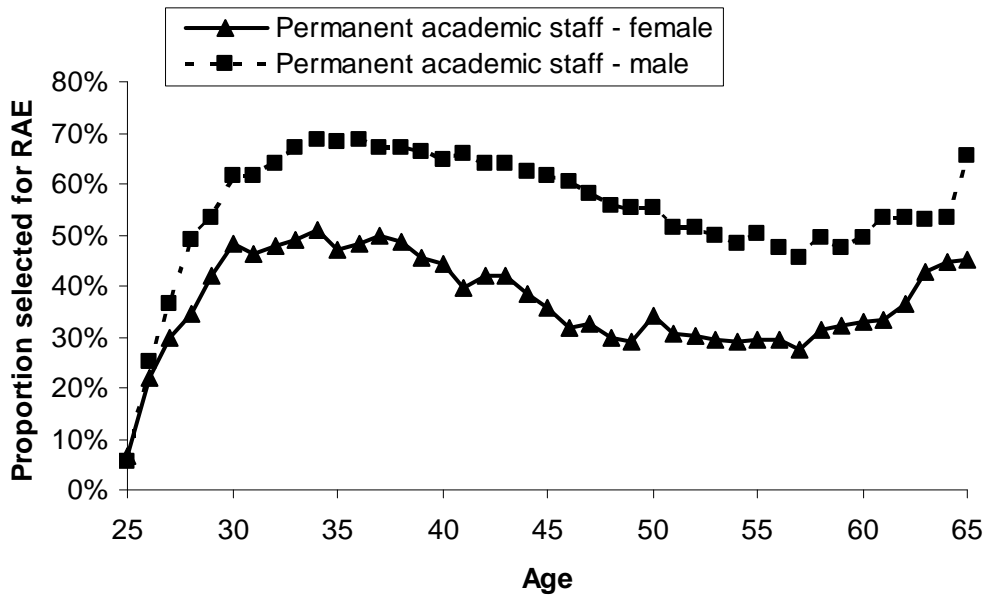


Figure C4: Selection rates for men and women by age in the 'All academic staff' pool (including non-submitting UOAs within HEIs)

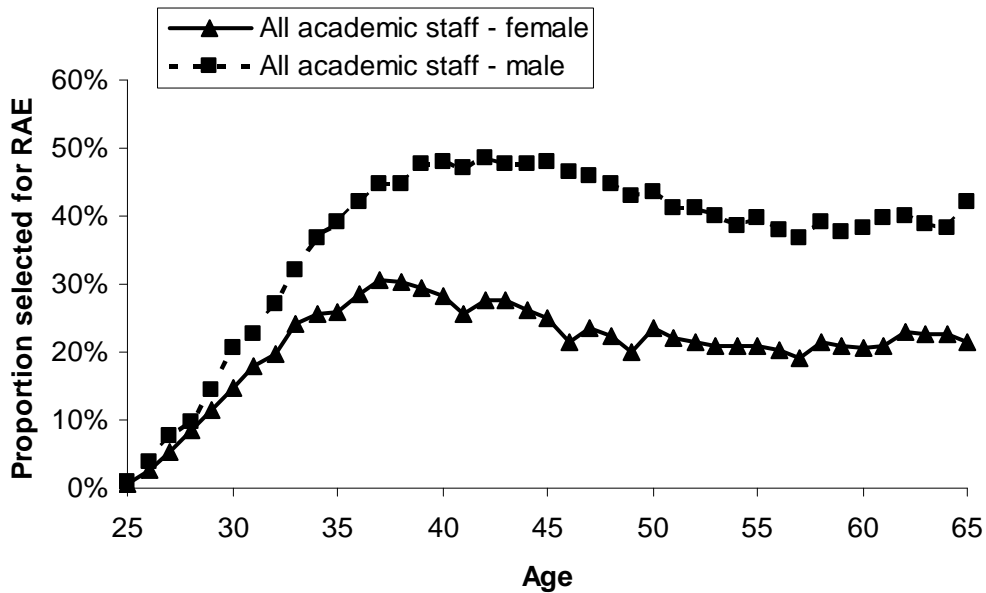


Figure C5: Selection rates for men and women by age in the 'All academic staff' pool (excluding non-submitting UOAs within HEIs)

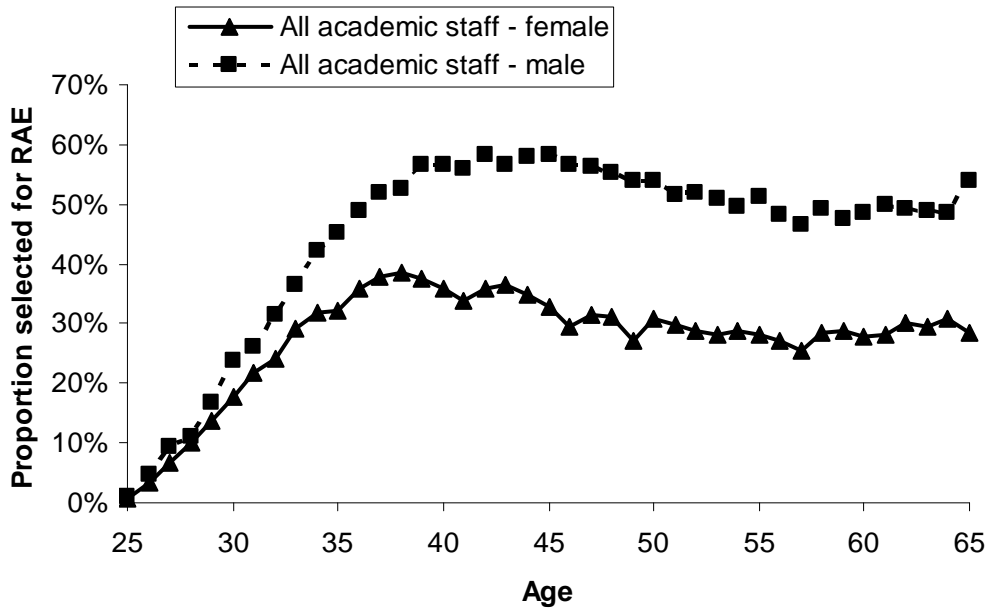


Figure C6: Selection rates for men and women by age in the 'Grade-identified staff' pool (including non-submitting UOAs within HEIs)

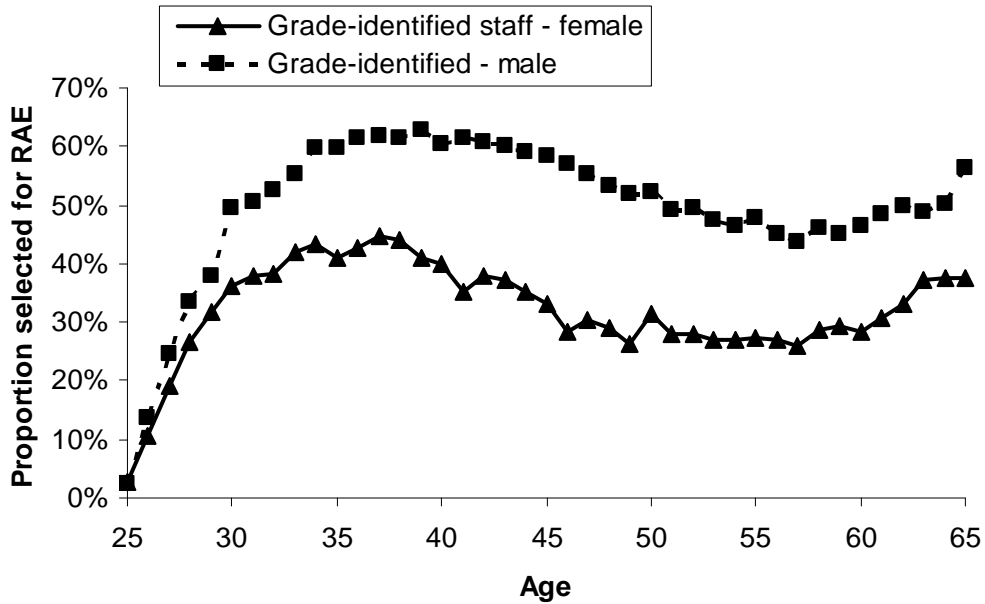


Figure C7: Selection rates for men and women by age in the 'Grade-identified staff' pool (excluding non-submitting UOAs within HEIs)

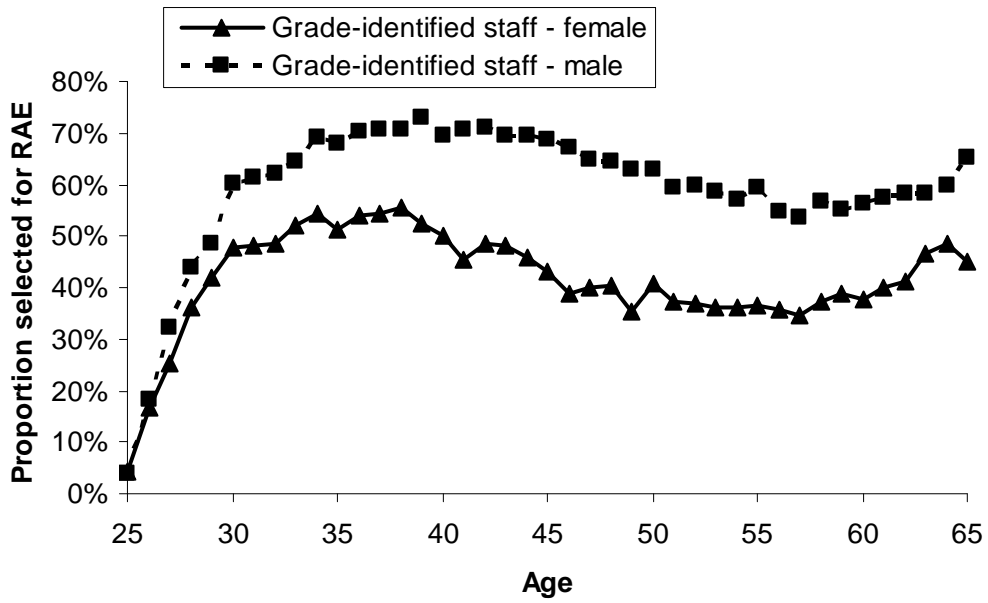


Figure C8: Selection rates for men and women by age in the 'Contract-identified staff' pool (including non-submitting UOAs within HEIs)

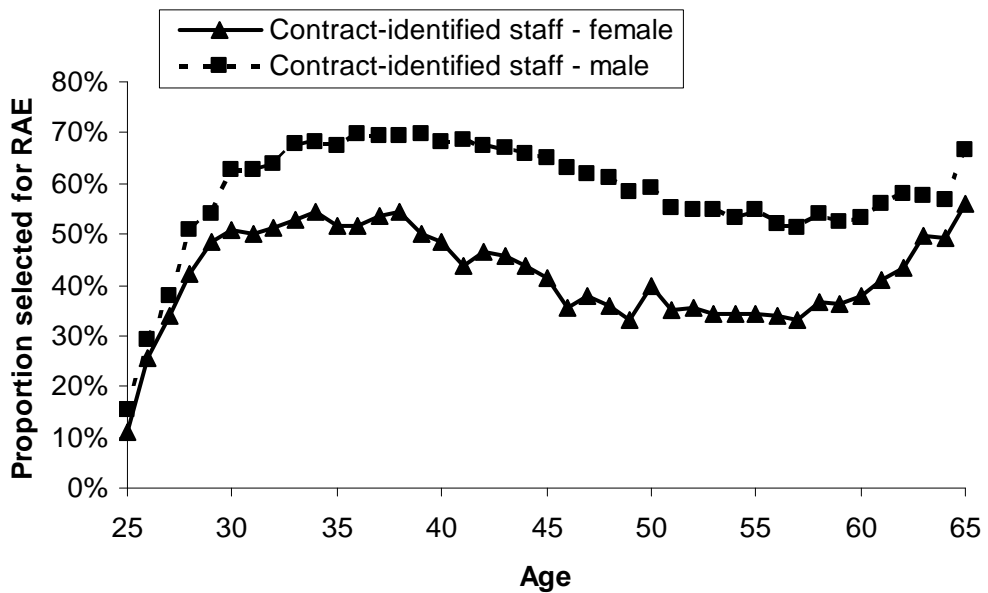


Figure C9: Selection rates for men and women by age in the 'Contract-identified staff' pool (excluding non-submitting UOAs within HEIs)

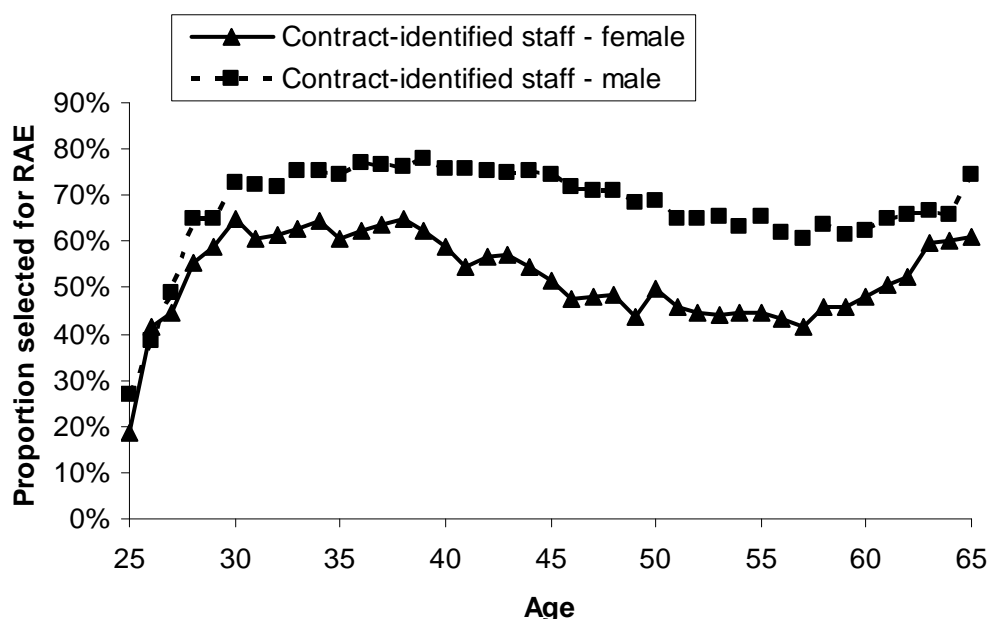


Table C6: Selection rates by ethnicity (including non-submitting UOAs within HEIs)

Ethnicity	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
White	76,755	49%	141,510	32%	91,535	45%	72,765	54%
Black	1,100	29%	2,290	17%	1,340	27%	1,060	32%
Asian	4,205	57%	11,485	25%	5,465	49%	4,465	58%
Mixed/Other	1,930	53%	4,245	29%	2,405	47%	1,940	56%
Refused	5,645	58%	17,525	25%	8,440	45%	5,800	62%
Total	89,640	50%	177,055	30%	109,185	45%	86,035	54%

Table C7: Selection rates by ethnicity (excluding non-submitting UOAs within HEIs)

Ethnicity	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
White	62,300	60%	112,340	40%	73,615	56%	61,075	64%
Black	790	40%	1,690	23%	965	37%	805	42%
Asian	3,605	66%	9,635	30%	4,580	58%	3,880	66%
Mixed/Other	1,625	63%	3,465	36%	1,985	57%	1,660	66%
Refused	4,990	65%	14,685	30%	7,300	52%	5,280	68%
Total	73,310	61%	141,820	38%	88,445	56%	72,700	64%

Figure C10: Selection rates by ethnicity (including non-submitting UOAs within HEIs)

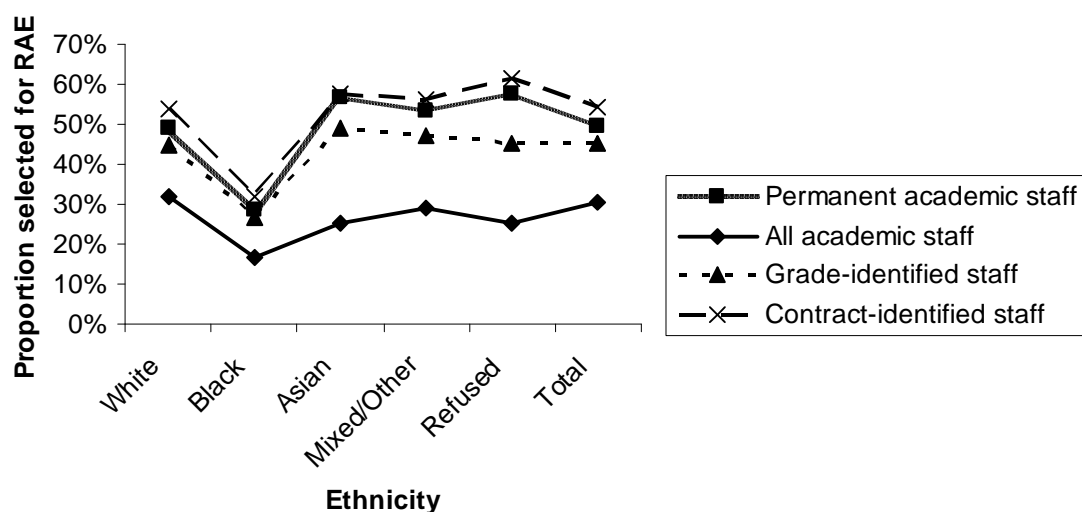


Table C8: Selection rates by nationality (including non-submitting UOAs within HEIs)

Nationality	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
UK national	74,485	46%	138,490	29%	89,645	42%	69,865	51%
Non-UK national	15,155	69%	38,565	34%	19,535	60%	16,170	70%
Total	89,640	50%	177,055	30%	109,185	45%	86,035	54%

Table C9: Selection rates by nationality (excluding non-submitting UOAs within HEIs)

Nationality	Permanent academic staff		All academic staff		Grade-identified staff		Contract-identified staff	
	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected	Eligible staff	Selected
UK national	59,695	57%	108,350	38%	71,255	52%	58,020	61%
Non-UK national	13,615	77%	33,470	40%	17,190	69%	14,680	77%
Total	73,310	61%	141,820	38%	88,445	56%	72,700	64%

Figure C10: Selection rates for nationality by ethnicity (including non-submitting UOAs within HEIs)

Nationality	Ethnicity – permanent academic staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	45%	23%	52%	50%	53%
Non-UK national	70%	40%	63%	59%	80%
Total	49%	29%	57%	53%	58%

Figure C11: Selection rates for nationality by ethnicity (including non-submitting UOAs within HEIs)

Nationality	Ethnicity – all academic staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	30%	14%	29%	31%	24%
Non-UK national	39%	20%	23%	27%	33%
Total	32%	17%	25%	29%	25%

Figure C12: Selection rates for nationality by ethnicity (excluding non-submitting UOAs within HEIs)

Nationality	Ethnicity – all academic staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	39%	20%	36%	38%	29%
Non-UK national	45%	26%	27%	33%	35%
Total	40%	23%	30%	36%	30%

Figure C13: Selection rates for nationality by ethnicity (including non-submitting UOAs within HEIs)

Nationality	Ethnicity – grade-identified staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	42%	22%	46%	45%	41%
Non-UK national	63%	36%	52%	50%	65%
Total	45%	27%	49%	47%	45%

Figure C14: Selection rates for nationality by ethnicity (excluding non-submitting UOAs within HEIs)

Nationality	Ethnicity – grade-identified staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	53%	31%	56%	55%	49%
Non-UK national	71%	46%	61%	60%	69%
Total	56%	37%	58%	57%	52%

Figure C15: Selection rates for nationality by ethnicity (including non-submitting UOAs within HEIs)

Nationality	Ethnicity – contract-identified staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	50%	25%	54%	53%	57%
Non-UK national	72%	43%	62%	62%	79%
Total	54%	32%	58%	56%	62%

Figure C16: Selection rates for nationality by ethnicity (excluding non-submitting UOAs within HEIs)

Nationality	Ethnicity – contract-identified staff				
	White	Black	Asian	Mixed/Other	Refused
UK national	61%	35%	63%	62%	64%
Non-UK national	79%	54%	70%	71%	81%
Total	64%	42%	66%	66%	68%

Annex D

Tables for selection index

1. All tables and figures in this annex refer to the staff pools excluding non-submitting UOAs within HEIs.

Table D1: Selection indices for declared disability

Disability?	Permanent academic staff			All academic staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
Without declared disability	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
With declared disability	0.67	0.90	0.95	0.90	0.91	0.94

Disability?	Grade-identified staff			Contract-identified staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
Without declared disability	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
With declared disability	0.73	0.90	0.93	0.67	0.91	0.94

Figure D1: Actual selection indices by age (excluding non-submitting UOAs within HEIs)

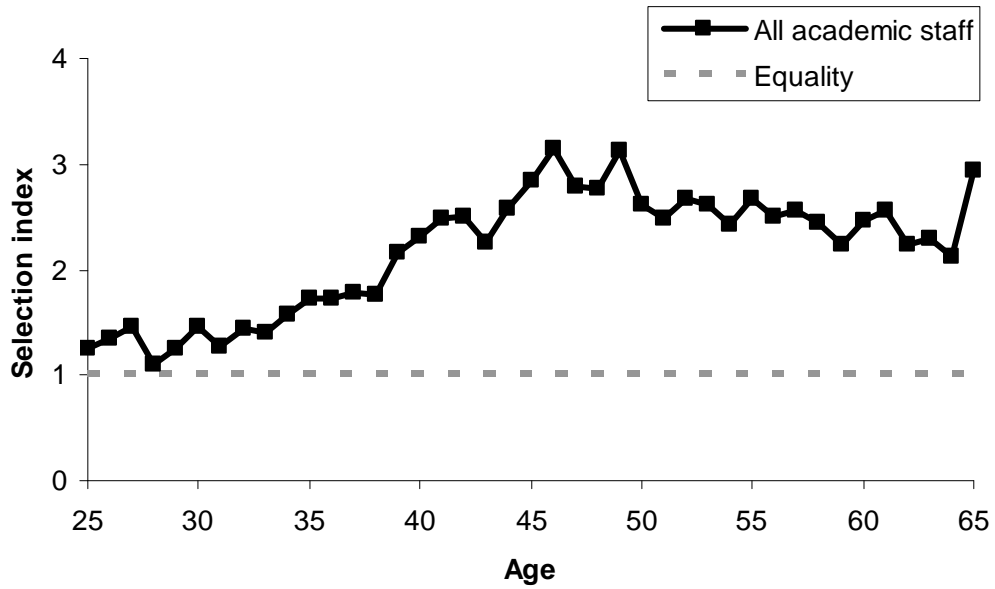


Figure D2: Actual selection indices by age (excluding non-submitting UOAs within HEIs)

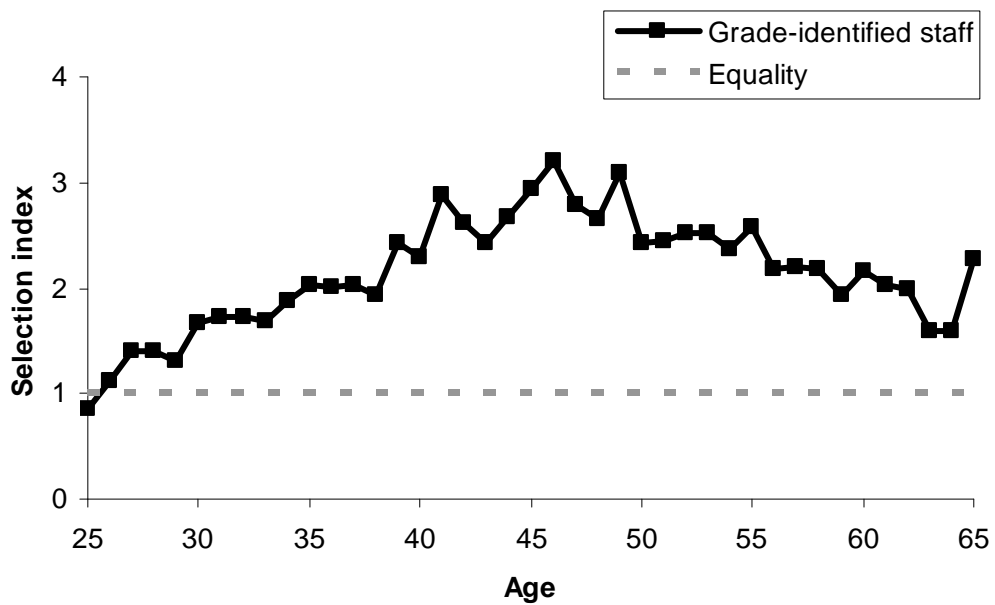


Figure D3: Actual selection indices by age (excluding non-submitting UOAs within HEIs)

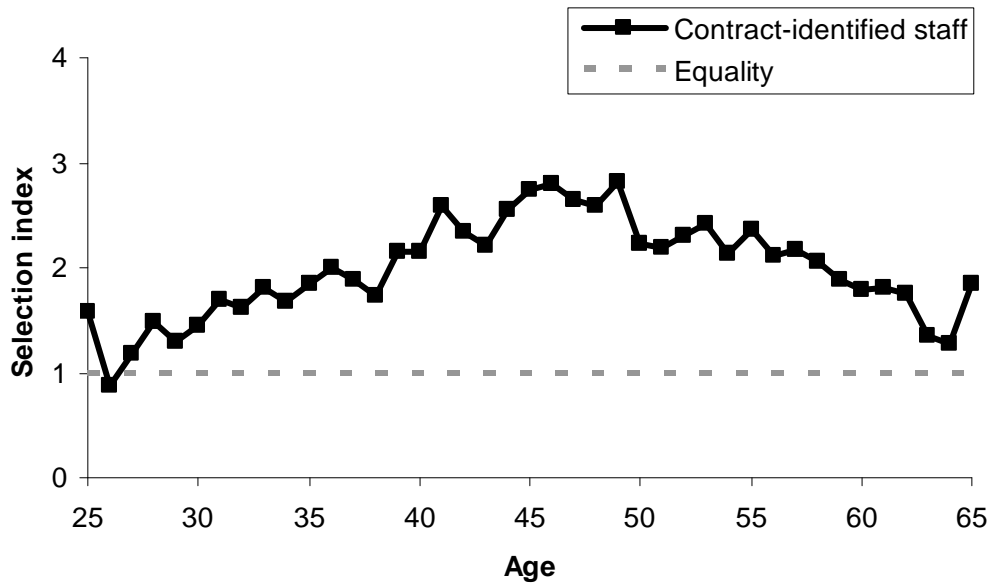


Figure D4: Restricted model selection index by age (excludes employment status variables)

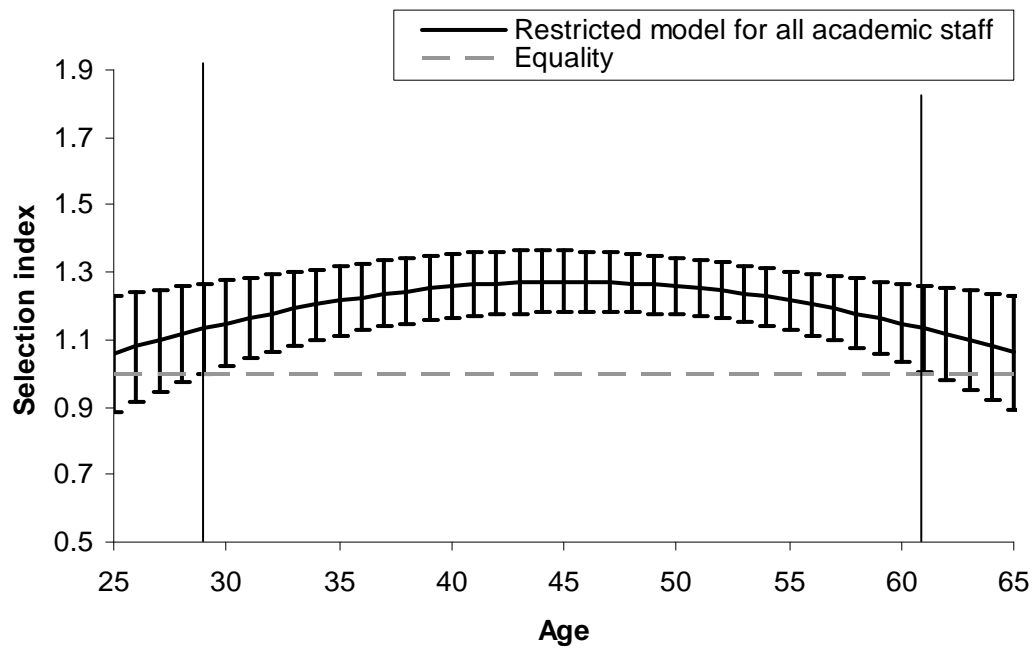


Figure D5: Full model selection index by age

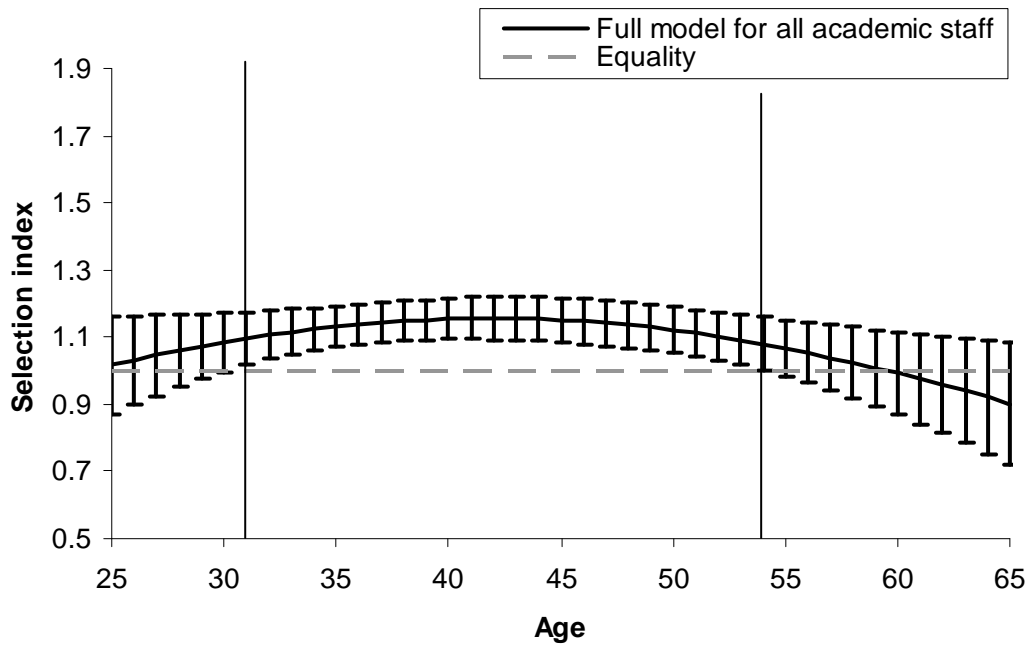


Figure D6: Restricted model selection index by age (excludes employment status variables)

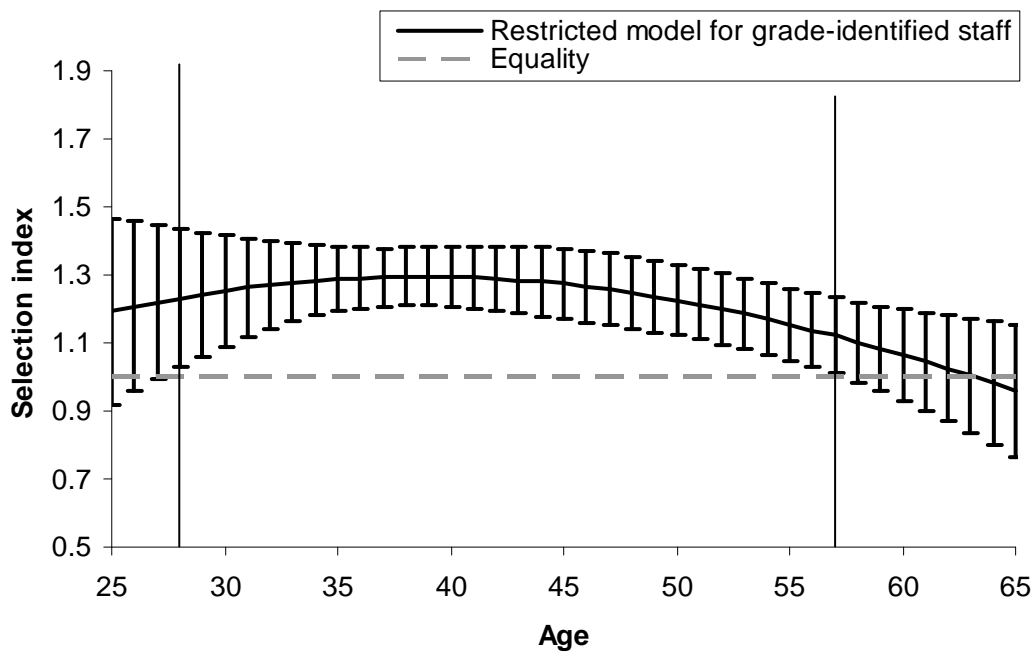


Figure D7: Full model selection index by age

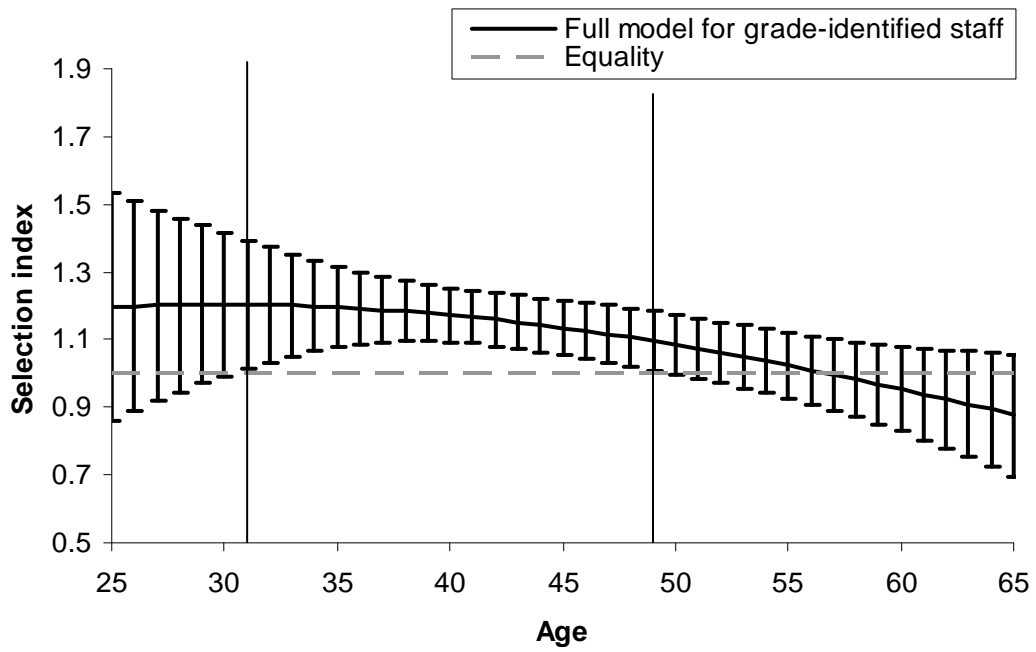


Figure D8: Restricted model selection index by age (excludes employment status variables)

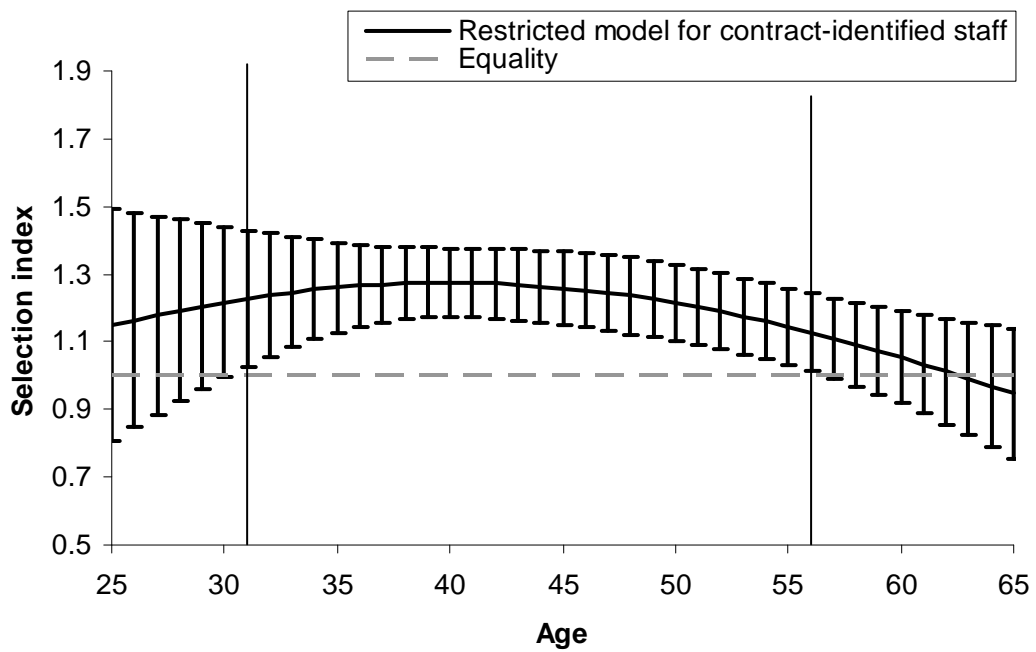


Figure D9: Full model selection index by age

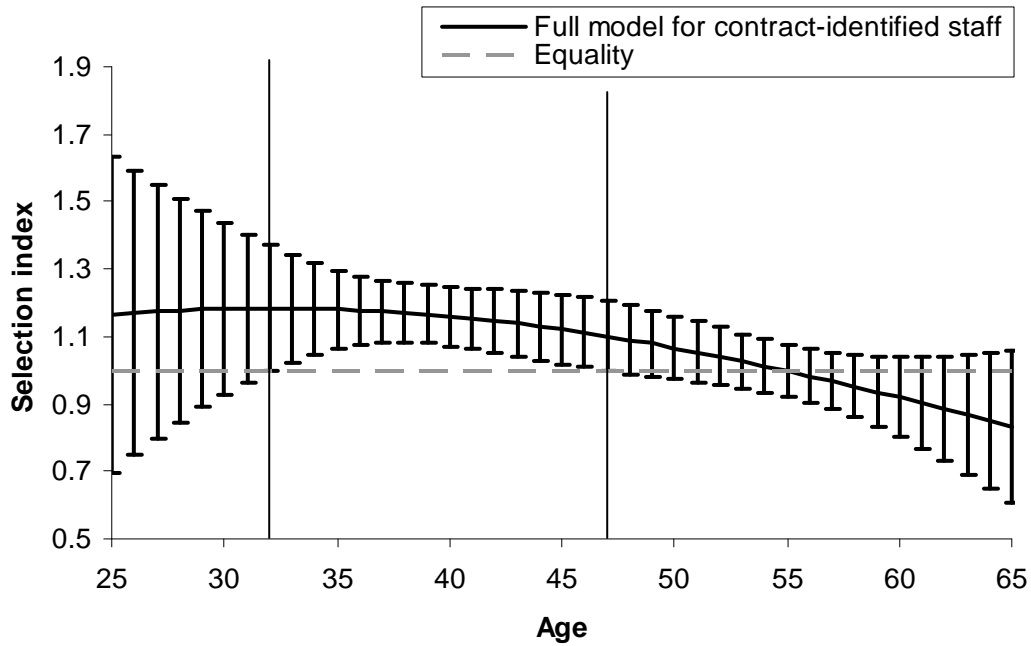


Table D2: Selection indices for ethnicity

Ethnicity?	Permanent academic staff			All academic staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
White	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
Black	0.44	0.66*	0.76*	0.44	0.63*	0.72*
Asian	1.30	0.91	0.96	0.65	0.78*	0.85*
Mixed/Other	1.16	0.93	0.97	0.77	0.89*	0.93
Refused	1.12	0.95	0.98	0.89	0.93*	0.99

Ethnicity?	Grade-identified staff			Contract-identified staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
White	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
Black	0.47	0.67*	0.75*	0.42	0.67*	0.76*
Asian	1.11	0.90*	0.96	1.11	0.91	0.97
Mixed/Other	1.04	0.93	0.96	1.08	0.94	0.97
Refused	1.04	0.93	0.98	1.08	0.93	0.97

Notes: * indicates that the result is significantly different from 1.00 at the 1% level.

Table D3: Selection indices for nationality

Nationality?	Permanent academic staff			All academic staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
UK national	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
Non-UK national	2.46	1.20*	1.31*	1.09	1.04	1.15*

Nationality?	Grade-identified staff			Contract-identified staff		
	Actual	Restricted model	Full model	Actual	Restricted model	Full model
UK national	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00	(ref) 1.00
Non-UK national	1.98	1.17*	1.28*	2.18	1.17*	1.29*

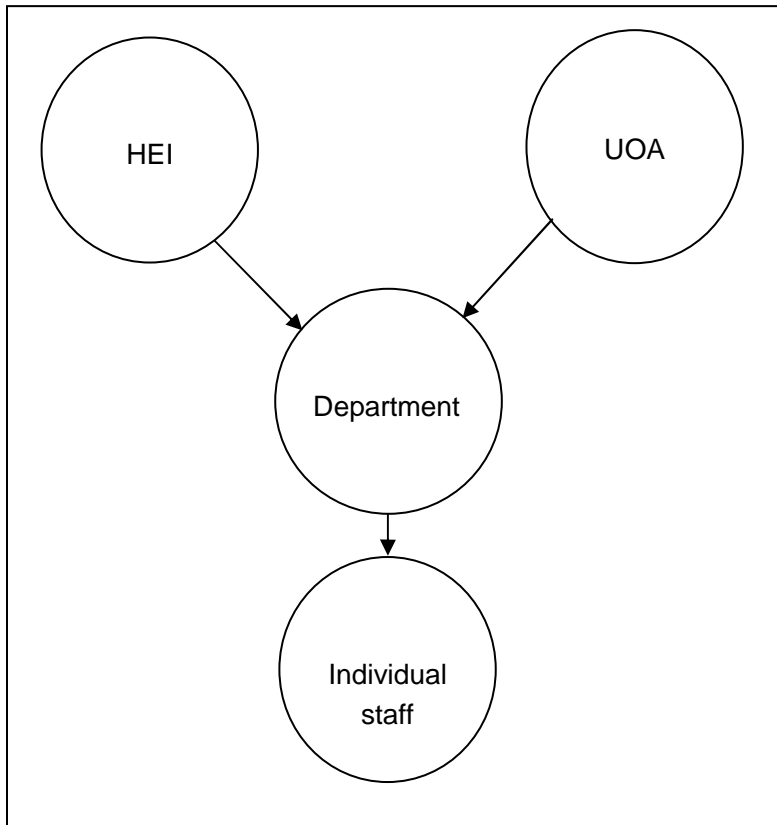
Notes: * indicates that the result is significantly different from 1.00 at the 1% level.

Annex E

Statistical models for staff selection

1. The statistical models from which these results are derived were intended to be the same as in the 2006 report with the addition of the nationality variable. But, due to the way that the pools of staff have been created, the variables selected are different for each pool. The same cross-classified multi-level structure is used and the schematic is given in Figure E1.

Figure E1: Schematic of the structure for the model



2. Figure E1 shows that individual staff are assumed to be within a department within a higher education institution. Individual departments are also assumed to be within a Unit of Assessment, giving a cross-classification at the highest level.

3. The statistical form of the full model is given in Figure E2.

Figure E2: Full model form – all academic staff

$$\text{selected}_{ijkl} \sim \text{Binomial}(\text{const}_{ijkl}, \pi_{ijkl})$$

$$\begin{aligned} \text{probit}(\pi_{ijkl}) = & \beta_{0ijkl} \text{const} + \beta_1 \text{age}_{ijkl} + \beta_2 \text{age.age}_{ijkl} + \beta_3 \text{age.age.age.100}_{ijkl} + \beta_4 \text{t1}_{ijkl} + \\ & \beta_5 \text{rating1}_{ijkl} + \beta_6 \text{rating2}_{ijkl} + \beta_7 \text{rating3}_{ijkl} + \beta_8 \text{rating4}_{ijkl} + \beta_9 \text{rating6}_{ijkl} + \\ & \beta_{10} \text{rating7}_{ijkl} + \beta_{11} \text{grade gp1}_{ijkl} + \beta_{12} \text{grade gp2}_{ijkl} + \beta_{13} \text{grade gp3}_{ijkl} + \\ & \beta_{14} \text{parttime}_{ijkl} + \beta_{15} \text{pfl}_{ijkl} + \beta_{16} \text{pf2}_{ijkl} + \beta_{17} \text{pf3}_{ijkl} + \beta_{18} \text{male}_{ijkl} + \beta_{19} \text{univ}_i + \\ & \beta_{20} \text{NonUK}_{ijkl} + \beta_{21} \text{age.rating6}_{ijkl} + \beta_{22} \text{rating3.grade gp3}_{ijkl} + \\ & \beta_{23} \text{rating6.grade gp1}_{ijkl} + \beta_{24} \text{rating6.grade gp2}_{ijkl} + \beta_{25} \text{rating6.grade gp3}_{ijkl} + \\ & \beta_{26} \text{rating7.grade gp3}_{ijkl} + \beta_{27} \text{rating2.pf2}_{ijkl} + \beta_{28} \text{rating3.pfl}_{ijkl} + \\ & \beta_{29} \text{rating4.pfl}_{ijkl} + \beta_{30} \text{rating7.pfl}_{ijkl} + \beta_{31} \text{t1.rating4}_{ijkl} + \beta_{32} \text{t1.rating6}_{ijkl} + \\ & \beta_{33} \text{age.grade gp2}_{ijkl} + \beta_{34} \text{age.grade gp3}_{ijkl} + \beta_{35} \text{age.parttime}_{ijkl} + \\ & \beta_{36} \text{age.pfl}_{ijkl} + \beta_{37} \text{age.age.pfl}_{ijkl} + \beta_{38} \text{age.pf2}_{ijkl} + \beta_{39} \text{grade gp2.pfl}_{ijkl} + \\ & \beta_{40} \text{grade gp3.pfl}_{ijkl} + \beta_{41} \text{grade gp2.pf2}_{ijkl} + \beta_{42} \text{parttime.pf2}_{ijkl} + \\ & \beta_{43} \text{age.male}_{ijkl} + \beta_{44} \text{age.age.male}_{ijkl} + \beta_{45} \text{withphd}_{ijkl} + \beta_{46} \text{ug1.withphd}_{ijkl} + \\ & \beta_{47} \text{ug2.withphd}_{ijkl} + \beta_{48} \text{ug3.withphd}_{ijkl} + \beta_{49} \text{withphd.age}_{ijkl} + \\ & \beta_{50} \text{withphd.age.age}_{ijkl} + \beta_{51} \text{univ.withphd}_{ijkl} + \beta_{52} \text{parttime.withphd}_{ijkl} + \\ & \beta_{53} \text{commonsub}_{ijkl} + \beta_{54} \text{commonsub.withphd}_{ijkl} + \beta_{55} \text{senior}_{ijkl} + \\ & \beta_{56} \text{clinical}_{ijkl} + \beta_{57} \text{pe_otherres}_{ijkl} + \beta_{58} \text{pe_other}_{ijkl} + \\ & \beta_{59} \text{grade gp1.pe_otherres}_{ijkl} + \beta_{60} \text{grade gp2.pe_otherres}_{ijkl} + \\ & \beta_{61} \text{grade gp3.pe_otherres}_{ijkl} + \beta_{62} \text{grade gp1.pe_other}_{ijkl} + \\ & \beta_{63} \text{grade gp2.pe_other}_{ijkl} + \beta_{64} \text{grade gp3.pe_other}_{ijkl} + \beta_{65} \text{black}_{ijkl} + \\ & \beta_{66} \text{asian}_{ijkl} + \beta_{67} \text{other}_{ijkl} + \beta_{68} \text{refused}_{ijkl} + \beta_{69} \text{disable}_{ijkl} + \beta_{70} \text{rating0}_{ijkl} \end{aligned}$$

$$\beta_{0ijkl} = \beta_0 + f_{0i} + v_{0kl} + u_{0jkl}$$

$$\begin{bmatrix} f_{0i} \end{bmatrix} \sim N(0, \Omega_f) : \Omega_f = \begin{bmatrix} \sigma_{f0}^2 \end{bmatrix}$$

$$\begin{bmatrix} v_{0kl} \end{bmatrix} \sim N(0, \Omega_v) : \Omega_v = \begin{bmatrix} \sigma_{v0}^2 \end{bmatrix}$$

$$\begin{bmatrix} u_{0jkl} \end{bmatrix} \sim N(0, \Omega_u) : \Omega_u = \begin{bmatrix} \sigma_{u0}^2 \end{bmatrix}$$

$$\text{var}(\text{selected}_{ijkl} | \pi_{ijkl}) = \pi_{ijkl}(1 - \pi_{ijkl}) / \text{const}_{ijkl}$$

Deviance(MCMC) = 68559.500(141819 of 141819 cases in use)

where i represents the individual, j represents the sector-wide Unit of Assessment, k represents a particular Unit of Assessment within a particular HEI (l). The variables in the model are defined in Table E2.

4. The statistical form of the restricted model is given in Figure E3.

Figure E3: Restricted model form – all academic staff

$$\text{selected}_{ijkl} \sim \text{Binomial}(\text{const}_{ijkl}, \pi_{ijkl})$$

$$\begin{aligned} \text{probit}(\pi_{ijkl}) = & \beta_{0ijkl} \text{const} + \beta_1 \text{age}_{ijkl} + \beta_2 \text{age.age}_{ijkl} + \beta_3 \text{age.age.age.100}_{ijkl} + \beta_4 \text{rating1}_{ijkl} + \\ & \beta_5 \text{rating2}_{ijkl} + \beta_6 \text{rating3}_{ijkl} + \beta_7 \text{rating4}_{ijkl} + \beta_8 \text{rating6}_{ijkl} + \beta_9 \text{rating7}_{ijkl} + \\ & \beta_{10} \text{pfl}_{ijkl} + \beta_{11} \text{pf2}_{ijkl} + \beta_{12} \text{pf3}_{ijkl} + \beta_{13} \text{male}_{ijkl} + \beta_{14} \text{univ}_i + \beta_{15} \text{NonUK}_{ijkl} + \\ & \beta_{16} \text{age.rating6}_{ijkl} + \beta_{17} \text{rating2.pf2}_{ijkl} + \beta_{18} \text{rating3.pfl}_{ijkl} + \beta_{19} \text{rating4.pfl}_{ijkl} + \\ & \beta_{20} \text{rating7.pfl}_{ijkl} + \beta_{21} \text{age.pfl}_{ijkl} + \beta_{22} \text{age.age.pfl}_{ijkl} + \beta_{23} \text{age.pf2}_{ijkl} + \\ & \beta_{24} \text{age.male}_{ijkl} + \beta_{25} \text{age.age.male}_{ijkl} + \beta_{26} \text{withphd}_{ijkl} + \beta_{27} \text{ug1.withphd}_{ijkl} + \\ & \beta_{28} \text{ug2.withphd}_{ijkl} + \beta_{29} \text{ug3.withphd}_{ijkl} + \beta_{30} \text{withphd.age}_{ijkl} + \\ & \beta_{31} \text{withphd.age.age}_{ijkl} + \beta_{32} \text{univ.withphd}_{ijkl} + \beta_{33} \text{commonsub}_{ijkl} + \\ & \beta_{34} \text{commonsub.withphd}_{ijkl} + \beta_{35} \text{clinical}_{ijkl} + \beta_{36} \text{pe_otherres}_{ijkl} + \\ & \beta_{37} \text{pe_other}_{ijkl} + \beta_{38} \text{black}_{ijkl} + \beta_{39} \text{asian}_{ijkl} + \beta_{40} \text{other}_{ijkl} + \beta_{41} \text{refused}_{ijkl} + \\ & \beta_{42} \text{disable}_{ijkl} + \beta_{43} \text{rating0}_{ijkl} \end{aligned}$$

$$\beta_{0ijkl} = \beta_0 + f_{0i} + v_{0ki} + u_{0jki}$$

$$[f_{0i}] \sim N(0, \Omega_f) : \Omega_f = [\sigma_{f0}^2]$$

$$[v_{0ki}] \sim N(0, \Omega_v) : \Omega_v = [\sigma_{v0}^2]$$

$$[u_{0jki}] \sim N(0, \Omega_u) : \Omega_u = [\sigma_{u0}^2]$$

$$\text{var}(\text{selected}_{ijkl} | \pi_{ijkl}) = \pi_{ijkl}(1 - \pi_{ijkl}) / \text{const}_{ijkl}$$

Deviance(MCMC) = 76264.670(141819 of 141819 cases in use)

All subscript and variable definitions are as in the full model.

5. Since the four pools of staff were created using some of the variables used in the model, it was necessary to add/remove variables from the models described above depending on what pool it was used for. Table E1 details the amendments made to the 'All academic staff' models to generate the associated models for the three remaining pools.

Table E1: Differences in the model for the other staff pools

Pool	Model type	Terms added	Terms removed
Academic	Full	age.age.age.age	t1 t1.rating4 t1.rating6
	Restricted	age.age.age.age	
RAE	Full	age.age.age.age	pf1 pf3 rating3.pf1 rating4.pf1 rating7.pf1 age.pf1 age.age.pf1 gradegp2.pf1 gradegp3.pf1
	Restricted	age.age.age.age	pf1 pf3 rating3.pf1 rating4.pf1 rating7.pf1 age.pf1 age.age.pf1
	Full	age.age.age.age	
Characteristic	Full	age.age.age.age	
	Restricted	age.age.age.age	

6. Table E2 gives details of all the variables used in the models.

Table E2: All variables used in the models

Type	Model variable name	Description
Continuous	Age	Individual's age (in years)
Dummy/Categorical	T1	Terms of employment: Permanent(1); Fixed term(REF)
	Rating	RAE level of 4* rated research: 0(0), 5(1), 10(2), 15(3), 20(4), 25(REF), 30(6), 35-65(7)
	GradeGp	Individual's grade: Professor (1); Senior lecturer(2); Lecturer(3); Researcher(REF)
	PF	Primary employment function: Teaching only (1); Research only (2); T and R(3); not T and R(REF)
	PE	Employment in previous year: Current HEI (REF); Other research HEI (pe_otherres); Other (pe_other)
	UG	Group of UOAs: Arts & vocational (1); Clinical (2); Humanities, social sciences & languages (3); Engineering & sciences(REF)
	Refused, Black, Asian, Mixed/Other	Ethnicity of individual: Black; Refused; Asian; White(REF); and Mixed/Other
Single dummy	PartTime	On a part-time contract [Full time-contract(REF)]
	Male	Male [Female(REF)]
	Univ	Pre-1992 HEI [Post-1992 HEI(REF)]
	WithPhD	Individual holds a PhD as their highest qualification [Does not hold a PhD(REF)]
	CommonSub	An individual's subject of highest qualification is common to individuals in the associated UOA [Not associated(REF)]
	Clinical	Staff on clinical rates [Not on clinical rates(REF)]
	Senior	Senior management post holder [Not a senior management post holder(REF)]
	Disable	With declared Disability [without declared Disability (REF)]
	NonUK	Non-UK national [UK national(REF)]
Structural	Cons	One for all individuals
	F	Random effect relating to a particular HEI
	V	Random effect relating to the sector wide Unit of Assessment
	U	Random effect relating to a particular Unit of Assessment within an HEI

Notes: Those categories marked with '(REF)' are the reference categories for each categorical or dummy variable and are not formally included in the model structure.