

# Careers in Research Online Survey (CROS) 2009:

## Differences between broad disciplinary groups



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Careers in Research Online Survey (CROS) 2009: An analysis by broad disciplinary group published by The Careers Research and Advisory Centre (CRAC) Limited

Careers in Research Online Survey (CROS) 2009: Differences between broad disciplinary groups has been written on behalf of the CROS Steering Group by:

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The CROS Steering Group exists to ensure the appropriateness and sustainability of CROS and its associated activities in collecting and reporting the views and experiences of research staff employed in higher education. [www.cros.ac.uk](http://www.cros.ac.uk)

The authors would like to thank the following people for their valuable input:

- Dr Robin Mellors-Bourne, Director Research and Intelligence, CRAC, for insights as the author of the CROS 2009: analysis of aggregated UK results.
- Goska Leslie, CRAC, for data handling, analysis and cross tabulation enabling the analysis to take place.

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**ISBN: 978-1-906774-16-5**

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## Executive summary

In 2009, more than 16% of the UK's estimated 38,000 research staff population responded to the Careers in Research Online Survey (CROS). Overall the messages from CROS 2009<sup>1</sup> were positive. Most respondents felt valued, were satisfied with their work-life balance and believed their institutions were committed to equality and diversity. Institutions appeared to have recognised the importance of supporting career development and there was a clear improvement in uptake of induction, appraisal, and training and development opportunities by research staff compared to previous CROS results.

A number of key recommendations were made in relation to the Concordat to Support the Career Development of Researchers<sup>2</sup> including further analysis of the aggregate results to explore whether the experiences of research staff differed between broad disciplinary areas. This report highlights the differences observed between responses from the five disciplinary groups.

### Key findings

■ Overall the main finding was that responses to the CROS survey were remarkably similar across all five disciplinary groups.

Given the diversity of subject specialities, it was surprising that the responses were typically more uniform across a wide range of topics than anticipated. This should be encouraging news for HEIs and staff supporting researchers that the impact of their policies and practice is fairly consistent across the faculties and disciplines.

However, some differences were identified, with a varying degree of statistical significance, justifying further exploration. These are summarised under the following five key themes:

- clear differences in the demographic profiles of the groups, particularly the physical sciences. However, there were few correlations between the variation in disciplinary responses and the demographic make-up of the groups
- a trend for responses from biological, biomedical sciences and physical sciences/engineering to map together compared to arts, humanities and social sciences in regard to work experiences, understanding of departmental and institutional processes and perceptions related to equality and diversity

- arts and humanities respondents had different views about employment conditions, interview practice, induction and appraisal, training and development and career preferences
- in the biological sciences there appeared to be a lower level of researcher engagement within the institution and also with the acquisition of skills
- the physical sciences and engineering disciplinary group had distinct career aspirations linked to industry and self-employment and had significantly stronger industrial connections (funding and collaboration) than other groups.

### Recommendations

- HEIs should continue to use CROS to benchmark their progress in Concordat implementation. Although the aggregate results may provide a representative view of the experiences of research staff, institutions are encouraged to review practice at a disciplinary as well as institutional level, particularly in regard to the differences identified within this report. The CROS 2009 recommendations should form the basis of HEIs' implementation and review policies, especially where good practices could be shared across disciplines
- HEIs should reflect on their employment practices in relation to fixed term contract legislation<sup>3</sup>. In particular, the higher proportion of shorter fixed term contracts (less than 12 months) in the social sciences should be explored
- HEIs should ensure the contributions that all researchers make are recognised and valued including participation in departmental and institutional decision making processes. Specific equality and diversity concerns in the arts, humanities and social sciences should be investigated
- HEIs should investigate the use of job interviews and the level of engagement of research staff with induction and appraisal in the arts and humanities and review whether, and how, to bring this group into alignment with other disciplinary groupings
- HEIs should explore how to encourage biological science researchers to be more proactive in developing their transferable skills, widening their career focus and becoming more involved in decision making processes at the departmental and institutional level
- HEIs should identify models of good practice relating to industrial funding opportunities and non-UK collaborations in the physical sciences and engineering group and consider how these could be applied across other disciplines.

<sup>1</sup> [www.vitae.ac.uk/policy-practice/143071/Careers-in-Research-Online-Survey-CROS.html](http://www.vitae.ac.uk/policy-practice/143071/Careers-in-Research-Online-Survey-CROS.html)

<sup>2</sup> [www.researchconcordat.ac.uk/](http://www.researchconcordat.ac.uk/)

<sup>3</sup> [www.vitae.ac.uk/researchers/1272-266531/Researchers-fixed-term-contracts-and-universities-understanding-law-in-context.html](http://www.vitae.ac.uk/researchers/1272-266531/Researchers-fixed-term-contracts-and-universities-understanding-law-in-context.html)

## Introduction

The Careers in Research Online Survey (CROS) anonymously gathers data about working conditions, career aspirations and career development opportunities for research staff. It is an invaluable tool in helping institutions to achieve the aspirations of the Concordat for the Career Development of Researchers and to benchmark their progress against UK wide developments.

The success of CROS 2009, with 51 participating institutions, including strong representation from Russell Group and 1994 Group institutions, and more than 5900 respondents, allowed more detailed analyses to be performed. The 2009 respondents were representative of the research population matching the corresponding HESA data. Responding to demand from the HE sector, the 2009 aggregate results were analysed by broad disciplinary groups to explore the expectation that significant disciplinary differences would be observed.

CROS 2009 was analysed by discipline using the following five broad disciplinary groups: arts and humanities, social sciences, physical sciences and engineering (referred to in this report as physical), biological sciences, and biomedical sciences (including medicine, dentistry and subjects allied to medicine).

The number of respondents to CROS 2009 permits a robust analysis by disciplinary groups with numbers in each category ranging from almost 400 to over 1700. There is a satisfactory degree of correlation between broad disciplinary groups and HESA figures. As noted in the published CROS 2009 report there is a different representation of biomedical and biological respondents between CROS (classified by JACS subject groups) and HESA (2007/8) data. The total percentage when these two categories are combined is the same but the CROS analysis is weighted towards biological sciences. This may be due to differences in the classification systems or respondents' perception of their subject area, as there is substantial overlap between these two groups.

Although the number of respondents from individual institutions is likely to be too small to permit breakdown by disciplinary group and direct comparison with these results, it is hoped that the findings will provide useful information for staff supporting researchers.

|                 | All CROS | Biomedical sciences | Biological sciences | Physical sciences | Social sciences | Arts and humanities |
|-----------------|----------|---------------------|---------------------|-------------------|-----------------|---------------------|
| Respondents     | 5908     | 1130                | 1742                | 1645              | 596             | 398                 |
| % of total      |          | 19                  | 30                  | 28                | 10              | 7                   |
| HESA 2007/8 (%) |          | 30                  | 18                  | 31                | 8               | 5                   |

Table 1: Summary of numbers of respondents from each disciplinary group compared with known parameters of the UK research staff population (HESA 2007/8)

The total number of responses does not include other minor groups such as education, therefore the percentage responses for the five broad disciplinary groups do not add up to 100%.

## Caveats

Statistical analyses have been performed using the chi-squared test, which is used for testing whether different groups of respondents can be safely assumed to have given different sets of answers to a question. Where reported, a measure of the degree of evidence for association is given by the Pearson coefficient C. The higher the C number the stronger the evidence for association with disciplinary group and where C is lower this indicates a lower degree of evidence. There are some identified differences and trends that may be of interest, but a degree of caution must be observed as the differences in some cases are only suggestive of a possible association. In other cases the individual differences are not statistically significant, but there is a trend for one disciplinary group to stand out across a range of related questions. These trends, i.e. where the difference between a disciplinary group and the average is less than 10%, are identified to highlight potential points of interest, rather than robust statistical differences.

## Results

The main themes emerging from analysis of research staff responses by broad disciplinary groups are as follows:

1. overall similarity between disciplines
2. demographic differences
3. trend for biological, biomedical sciences and physical sciences/engineering to map together compared to arts, humanities and social sciences
4. trends in arts and humanities
5. trends in biological sciences
6. trends in physical sciences and engineering

## Theme 1: Overall similarity between disciplines

The main theme to highlight was the remarkable similarity between the responses of the five disciplinary groups. This contrasts with an initial pre-conception that strong disciplinary differences would be identified. In general when the key Concordat principles summarised in CROS 2009 were revisited, namely recruitment and selection, recognition and value, support and career development, researcher responsibilities and implementation and review, the results chiefly showed only minor differences in responses between the disciplinary groups. This suggests that research staff experiences and opportunities as well as the impact of research staff development programmes were relatively consistent across higher education institution (HEI) faculties, schools and departments.

### Recommendation

- HEIs should continue to use CROS to benchmark their progress in Concordat implementation. Although the aggregate results may provide a representative view of the experiences of research staff, institutions are encouraged to review practice at a disciplinary as well as institutional level, particularly in regard to the differences identified within this report. The CROS 2009 recommendations should form the basis of HEIs' implementation and review policies, especially where good practices could be shared across disciplines

## Theme 2: Demographic differences

As expected, some of the most significant differences were seen in the demographic profile of the disciplinary groups (see Figure 1). The difference in the gender balance was the most significant demographic variation observed between all the disciplinary groups (chi squared Pearson coefficient of 0.309). In physical sciences and engineering, respondents were predominantly male (70%), younger (62% under the age of 35) and more international (47% from outside the UK) compared to the other groups (with averages of 45%, 50% and 35% respectively). Biological science respondents also had a

younger age profile with a higher percentage under 35 (61%) and fewer over 45 (11%). Unlike physical sciences the proportion of female biological science respondents was above average (63% compared 30% in physical sciences and with the average of 55%). In arts, humanities and social sciences the demographic profile was of an older group (26% and 29% over the age of 45 respectively compared with an average of 16%), with more part time workers (21% had part time contracts compared with an average of 12%).

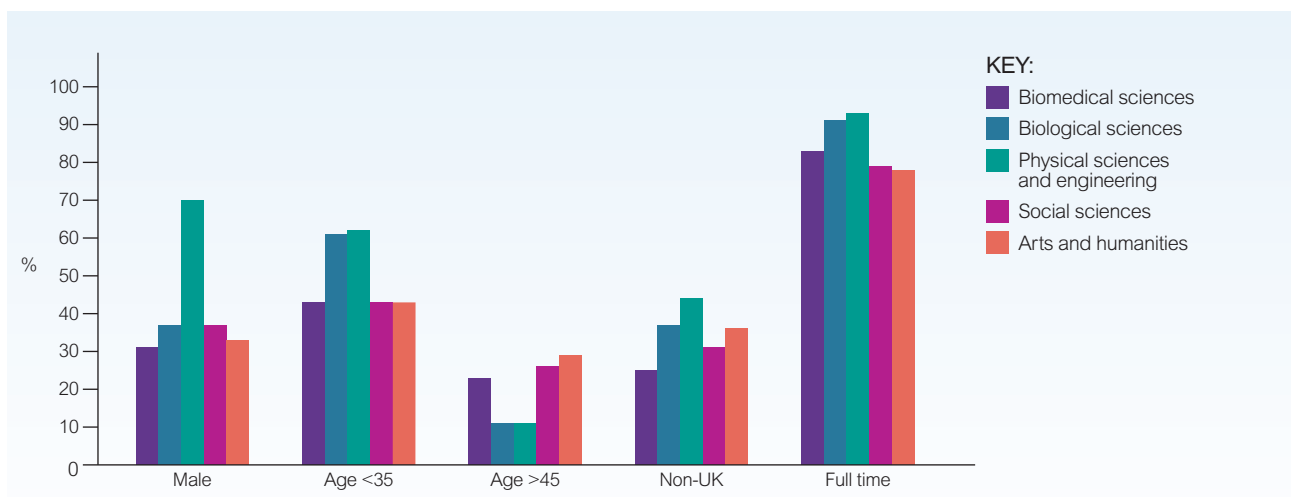


Figure 1 Demographic characteristics of CROS 2009 respondents by broad disciplinary group (responses to questions 37,38,40,41, 43 & 44)

Differences in terms of employment circumstances were also observed (see Figure 2). More than half the arts and humanities respondents were on their first contract with their current institution compared to the other disciplines, despite their older profile age. A lower percentage of respondents in biological and physical sciences (11%) were on five or more contracts with their current HEI compared to 16% across the other disciplines. This may well be a function of age, as respondents from these two disciplinary groups were significantly younger than the CROS average.

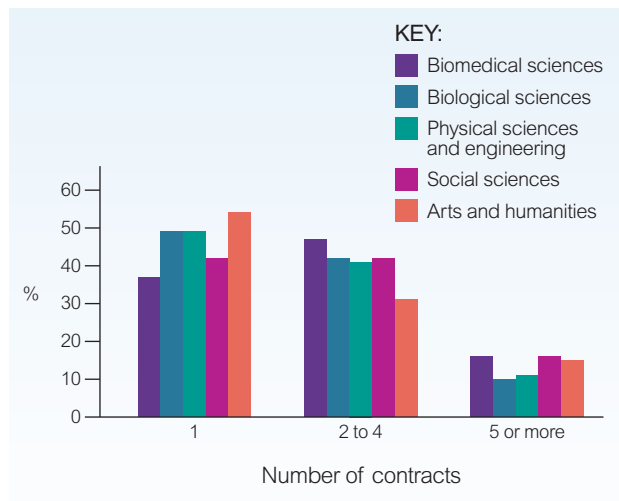


Figure 2 Number of employment contracts with current institution (responses to question 36)

Proportionally more social science respondents had open-ended contracts (29% compared with an average of 18%) (see Figure 3). However, of those on fixed term contracts in the social sciences, a higher percentage were on very short contracts: 28% on contracts of less than 12 months compared with an average of 19% across all disciplines. Social science respondents were also less likely to be named on a grant application (7% compared with the average of 11%).

### Recommendation

- HEIs should reflect on their employment practices in relation to fixed term contract legislation<sup>3</sup>. In particular, the higher proportion of shorter fixed term contracts (less than 12 months) in the social sciences should be explored

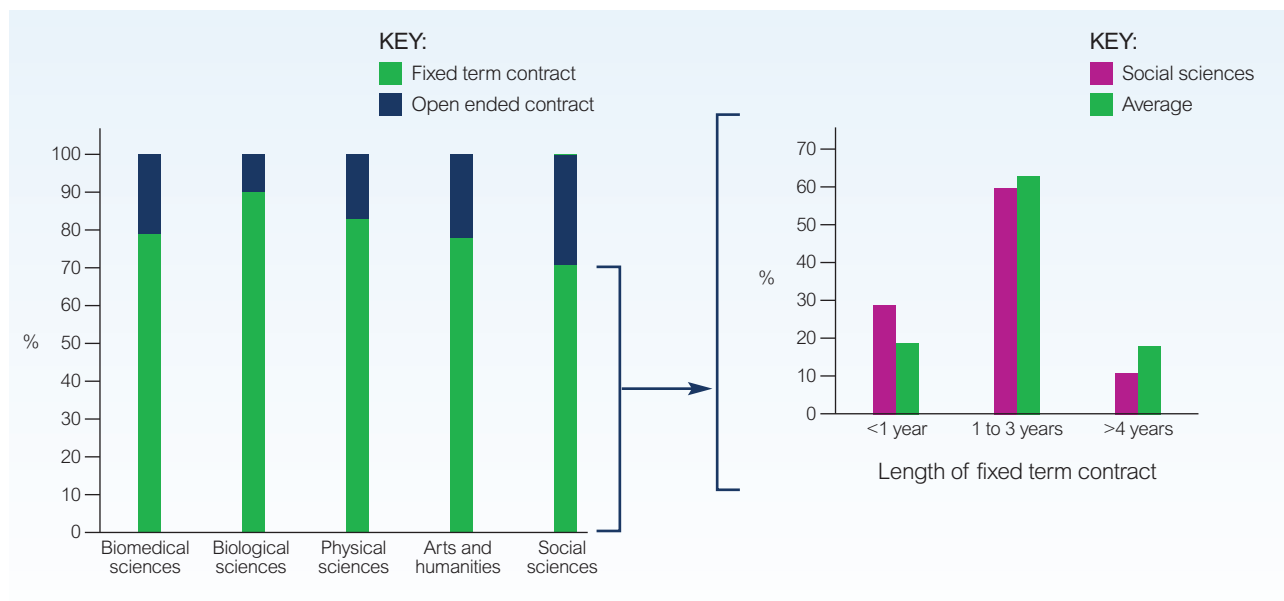


Figure 3 Nature of employment contracts including length of contract for respondents currently on fixed term contracts (from responses to question 4).

### Theme 3: Trend for biological, biomedical sciences and physical sciences/engineering to map together compared to arts, humanities and social sciences

This theme focuses on the tendency for respondents from science, technology, engineering and mathematics (STEM) disciplines as well as medicine (and subjects allied to medicine) to cluster together when compared to the other disciplines of arts, humanities and social sciences. Prior expectations predicted that respondents from biomedical, biological and physical sciences might have more in common with each other when compared to the other disciplinary groups. Respondents from biomedical, biological and physical sciences had a different profile than their colleagues in arts, humanities and social sciences in a number of categories including work experiences, understanding of departmental and institutional processes and perceptions related to equality and diversity.

Respondents in the arts, humanities and social sciences appeared to be more experienced across a broad range of work processes than their colleagues in the other disciplines. A greater number of the arts, humanities and social science groups had written grants (62% compared with an average of 48%), planned and managed projects (60% compared with an average of 48%), planned and managed projects (60% compared with an average of 52%) and managed budgets (43% compared with an average of 33%) (see Figure 4).

A significantly higher proportion of arts, humanities and social sciences respondents had good or partial understanding of institutional and departmental decision making processes compared to biological, biomedical and physical scientists (52% and 44% respectively which was 18-20% more than in the other disciplinary groups). This is reflected in a higher percentage of these groups participating in departmental and institutional decision making processes, with proportionally more (40% compared to 27% in the biomedical, biological and physical sciences) agreeing that they had as many opportunities in this area as lecturing staff at a similar level. A higher percentage had a good/partial understanding of their institutional research strategy, possibly as a direct consequence of their increased involvement in institutional processes.

There was no difference in perceived integration into the department (72%) or institution (52%) between the two groups. However, a higher percentage of respondents from the arts, humanities and social sciences agreed that they were integrated into the wider disciplinary community compared to their science colleagues (71% compared with an average of 62%). This increased level of engagement by arts, humanities and social sciences respondents may be due in part to length of service at their current institution.

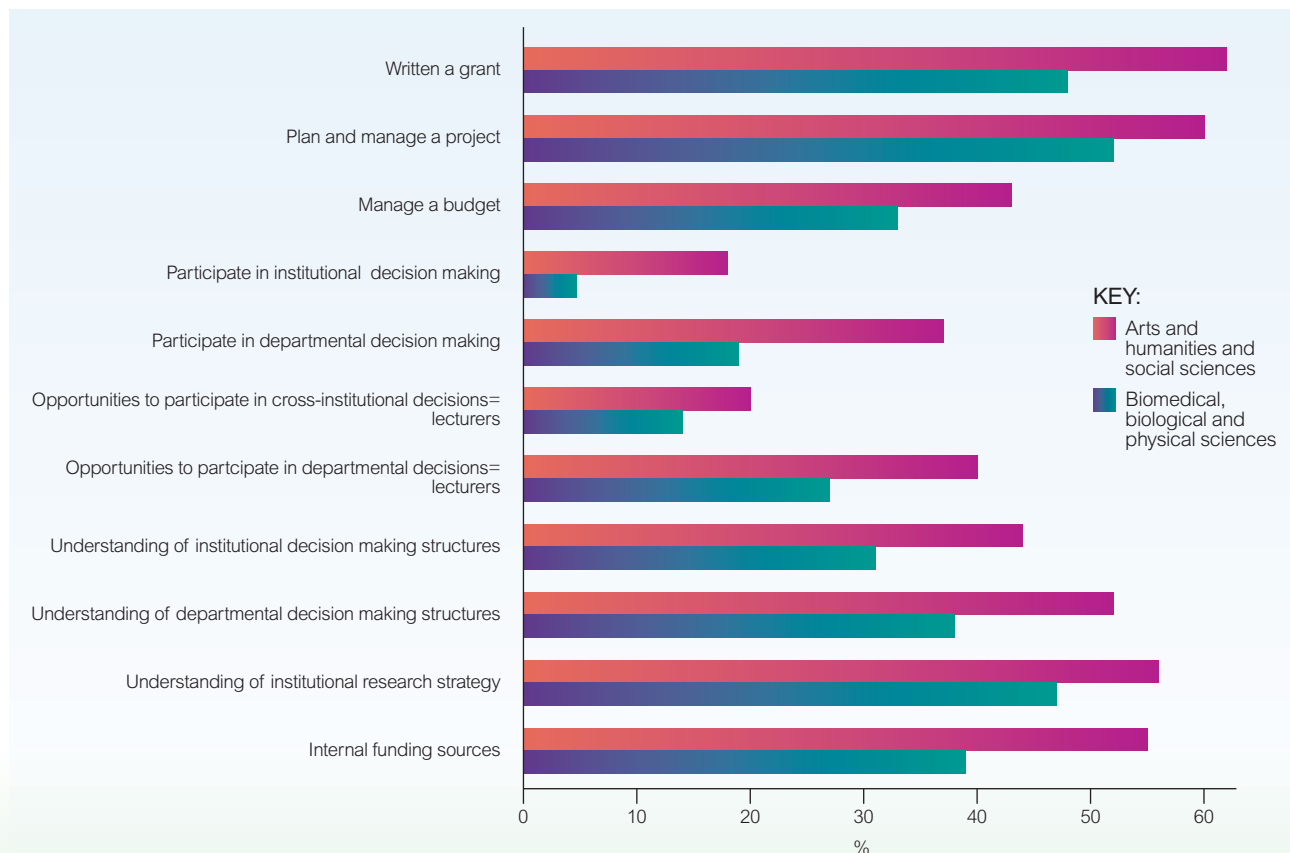


Figure 4 Knowledge and understanding of selected policies, procedures and initiatives (from responses to question 7), perceptions of equal treatment with lecturing staff (from responses to question 9) and percentage of respondents who have experience in selected activities (from responses to questions 25 and 26).

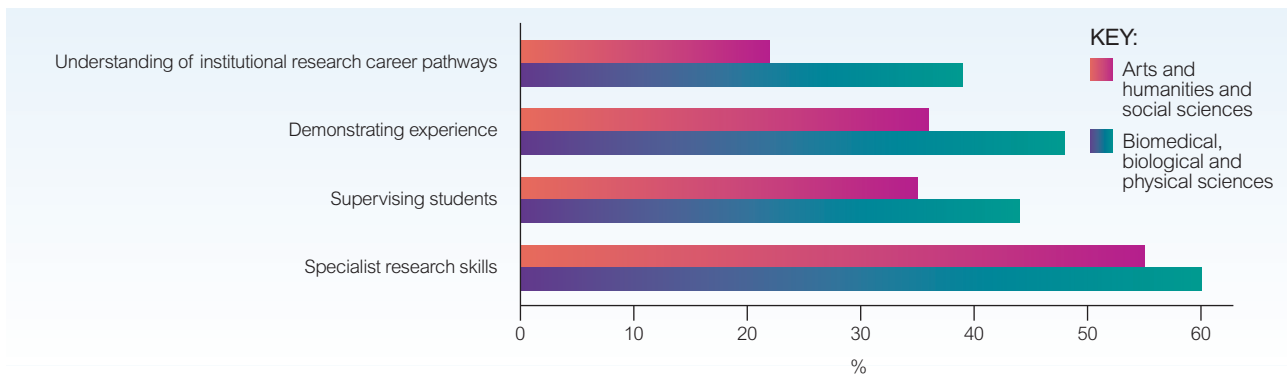


Figure 5 Skill set for biomedical, biological and physical sciences respondents compared to other groups (responses to questions 7, 26 and 27).

Respondents from the arts, humanities and social sciences were also more aware of internal funding sources (55% compared with an average of 39%). This may be because twice as many were funded by their institution (36%) compared to their science colleagues (18%). Alternatively, respondents from the arts, humanities and social sciences were perhaps using their increased knowledge of institutional processes to maximise internally-derived funding. Respondents from the sciences tended to be more dependent on money from charities (37% in biomedical science and 29% biological sciences compared to 12% in arts, humanities and social sciences) and research councils (51% in physical sciences and 39% biological sciences compared with an average of 35%).

Although biomedical, biological and physical sciences respondents were less involved at departmental and institutional levels than the social science and arts and humanities respondents, they have a better understanding of research career pathways within their HEI (39% compared to 22%) (see Figure 5). Perhaps this reflects differences in the availability of 'research only' positions compared to teaching and research roles between disciplines.

Less surprisingly, there was a difference in the skill sets between those in arts, humanities and social sciences compared to responses from biomedical, biological and physical sciences. The latter claimed to have more experience with demonstrating, supervising students and a higher percentage had developed specialist research skills. Significantly more respondents were offered health and safety training in the sciences (80% compared to 61% in arts, humanities and social sciences).

Respondents from arts, humanities and social sciences were more likely to identify equality and diversity concerns than their peers in other disciplines. Overall there was a trend for respondents from the arts, humanities and social sciences to feel discriminated against (13% compared with an average of 9%) and to feel less fairly treated across a range of factors including gender, age and religion (see Figure 6). It is important to note that the percentage differences are very small (4-6%) however these differences were observed over 12 statements, suggesting a trend. Conversely equality and diversity training and information were provided more often in the sciences (57% compared to 48% in the arts, humanities and social sciences).

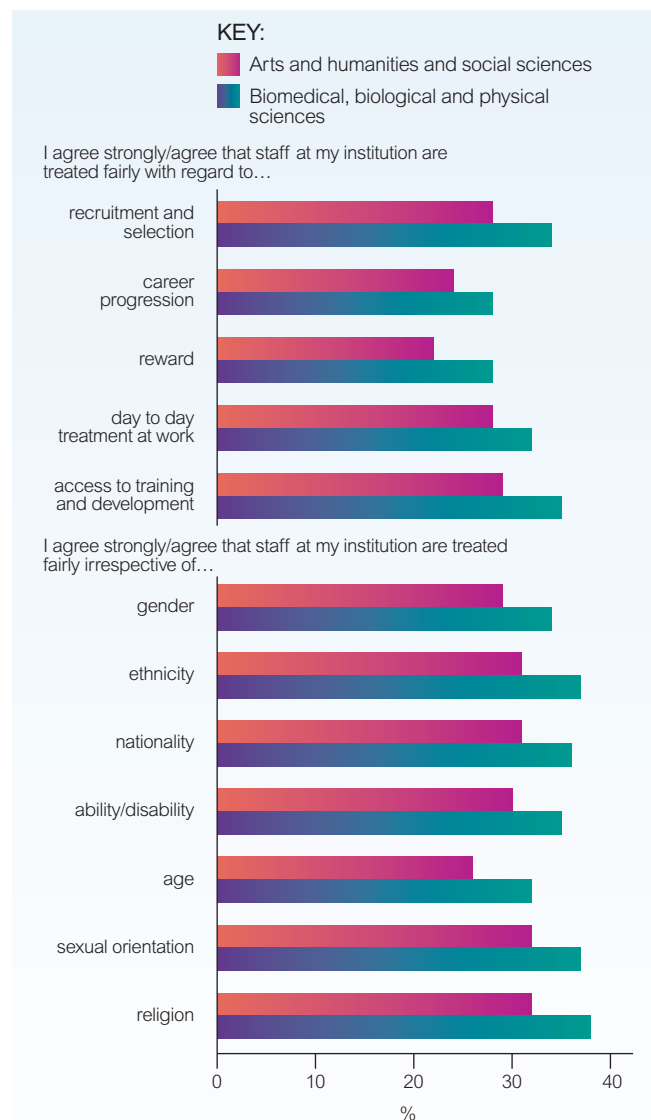


Figure 6 Comparison of equality and diversity perceptions between arts, humanities and social sciences respondents with the other disciplinary groups (responses to questions 30-33).

## Recommendation

- HEIs should ensure the contributions that all researchers make are recognised and valued, including participation in departmental and institutional decision making processes. Specific equality and diversity concerns in the arts, humanities and social sciences should be investigated

## Theme 4: Trends in arts and humanities

This section investigated trends in responses from the arts and humanities disciplinary group, which contains the lowest proportion of researchers in the UK (less than 7%). The views of this disciplinary group differed from the other four groups with particular reference to employment conditions, interview practice, induction and appraisal, training and development and career preferences.

At 22%, there were more respondents employed on part time contracts in the arts and humanities compared with the 12% average and only 7% in physical sciences. This does not appear to be a gender effect, as there was a higher percentage of females in the biomedical sciences group (70% compared to 67% in arts and humanities) but who had a lower proportion in part time work (17%). A high percentage of arts and humanities respondents were on their first contract with their current institution (54% compared with an average of 46%), which suggests either that part time contracts are more prevalent in the arts and humanities, or that this cohort may move between institutions to find part time work.

Recruitment practice appeared to be different in arts and humanities compared to the other disciplinary groups. More than a quarter of respondents were not interviewed at all (compared with an average of 19%). This was not as a result of higher re-deployment rates (2% compared with an average of 3%) or contract extensions (7% compared with an average of 10%), although respondents were more likely to be named on a grant (15% compared with an average of 12%). Of those who were interviewed, it was more likely to be by an institutional panel (23% compared with an average of 14%) rather than face to face with their principal investigator (PI) (24% compared with an average of 35%).

Respondents from arts and humanities were less likely than the other groups to be provided with a range of information when they started work with their employer, from copies of institutional policies and procedures to probationary requirements. They were also less likely to be offered a departmental induction

(61% not offered compared with an average of 47%), despite more than half of respondents from this group being on their first contract (Figure 7). Conversely, they were twice as likely to be involved in decision making processes within their institution as the other disciplines (41% compared to an average of 21% at departmental level and 19% compared with an average of 9% at institutional level).

There was also a trend in the arts and humanities for a lower proportion of respondents to engage with appraisals (42% compared to 60% in biomedical sciences and an average of 50%). This lower rate was not related to ineligibility, i.e. respondents still on probation or recently appointed. Instead, a higher percentage of respondents were not invited to participate in appraisal (53% compared with an average of 47%) or had not heard of the process (11% compared with the 7% average) (Figure 8). Additionally, of those who had participated in appraisal in the arts and humanities, a slightly lower than average number found the process useful (40% compared with the average of 44%).

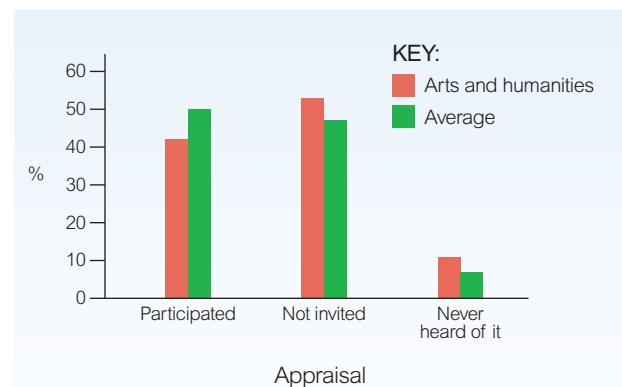


Figure 8 Participation in appraisal/review process and reasons stated for non-participation (from responses to question 15).

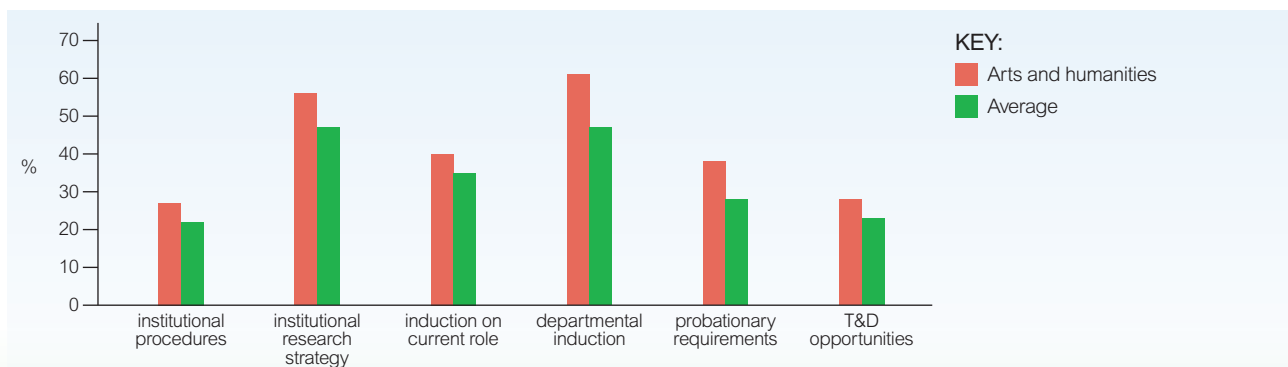


Figure 7 Comparison of lack of information provision between respondents from arts and humanities and the other disciplinary groups on appointment (information not offered responses plotted from question 5).

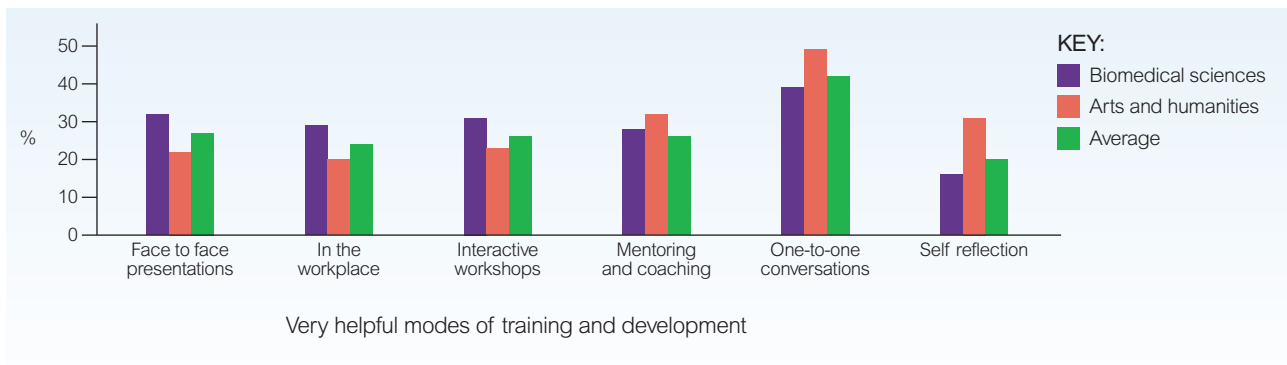


Figure 9 Preferences in modes of training and development (responses to question 21).

When considering personal and career development, there was also a slightly different trend observed in the arts and humanities discipline. Respondents had a greater preference for consulting mentors and colleagues for training and development needs. Indeed, self-reflection, as opposed to discussions with their PI or a careers advisor, was used more often than by the other disciplinary groups.

Despite a slightly increased proportion of arts and humanities respondents having considered their career options and generated a clear development plan (58% compared with an average of 50%), there was a slightly reduced uptake on both internal and external courses from this group (4% lower participation than the average). A higher percentage of arts and humanities respondents however had spent more than twenty days on continuing professional development (12% compared with an average of 7%). This would suggest that training courses are not playing a leading role in the career development of this group. Arts and humanities respondents were more likely to have consulted a mentor about career development than their peers (23% compared with an average of 17%) and were less likely to consult a careers advisor (43% unlikely to consult compared with an average of 34%).

This finding was supported by different preferences for modes of training and development for arts and humanities respondents compared to the other disciplines. Self-reflection, mentoring, coaching and one to one conversations were rated more highly than face to face presentations and interactive workshops. The difference was particularly clear when compared to biomedical sciences respondents whose preferences are in direct opposition (Figure 9).

Compared to the other disciplinary groups there were also distinct career preferences for arts and humanities respondents. A higher education career incorporating both research and teaching was more highly aspired to by arts and humanities respondents than the other disciplinary groups (again particularly in comparison to biomedical sciences) (see Figure 10). This may be a reflection of the nature of HE jobs in the arts and humanities, where there are considerably fewer opportunities for research only posts.

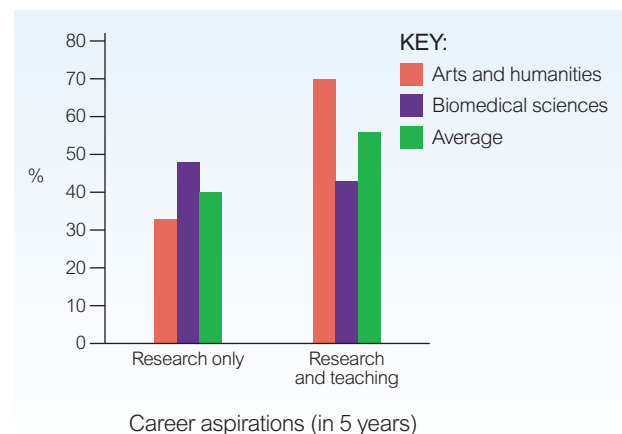


Figure 10 Future career aspirations (from responses to question 17, multiple responses were allowed).

## Recommendation

- HEIs should investigate the level of engagement of research staff with job interviews, induction and appraisal in the arts and humanities and review whether, and how, to bring this group into alignment with other disciplinary groupings.

## Theme 5: Trends in biological sciences

Biological sciences, which included subjects ranging from agriculture to sports science, was the most highly represented discipline in CROS 2009 with more than 1700 respondents. There were a number of trends worthy of comment for this group with respect to knowledge and understanding of policies, processes and initiatives, continuing professional development, experiences of work and opinions on integration and value. Again it must be noted that the percentage differences were not highly significant, but responses to a range of questions identified noteworthy trends.

Like their colleagues in the physical sciences group, respondents from biological sciences were predominantly under the age of 35 (61%). This disciplinary group also had the highest number of fixed term contracts, 90% compared with an average of 80%.

Despite induction being offered to, and found useful by, a similar number of their peers, respondents from biological sciences had a lower rate of knowledge and understanding of a wide range of policies compared to the other disciplinary groups. These included their terms and conditions of employment, promotions criteria, and job evaluation/probation processes (see Figure 11).

A noteworthy observation for this discipline was the lower percentage with a good or partial understanding of the RAE/REF (61% compared with a 72% average and more than 80% in the arts and humanities). A significantly higher percentage had never heard of these initiatives (16% compared with an 11% average and only 4% in social sciences).

There was also a trend for less participation by biological science respondents in continuing professional development (CPD). The majority of biological scientists (57%) spent fewer than five days on CPD compared to only 47% in physical sciences. Significantly, only 18% of biological scientists participated in more than ten days, as recommended in 'SET for success'<sup>4</sup>, (compared with an average of 23% and 29% in physical sciences). Although a higher proportion of biological science respondents than the average wanted to be more engaged in personal development activities, fewer had developed a personal development plan or maintained a professional development record. The percentage participating in appraisal was also lower than average (C=0.117; 45% compared with an average of 50%) with fewer finding this process useful for identifying strengths and weaknesses or reviewing personal progress.

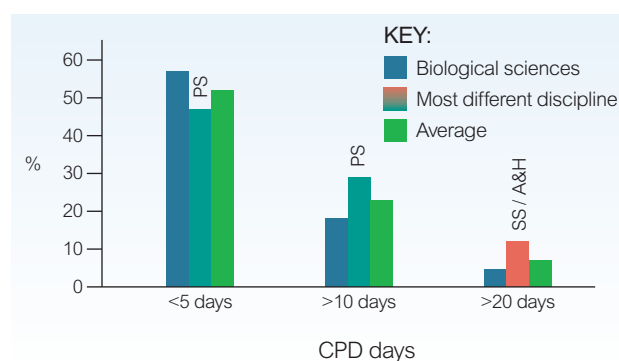


Figure 12 Number of days spent on continuing professional development (CPD) in the last year (from responses to question 19).

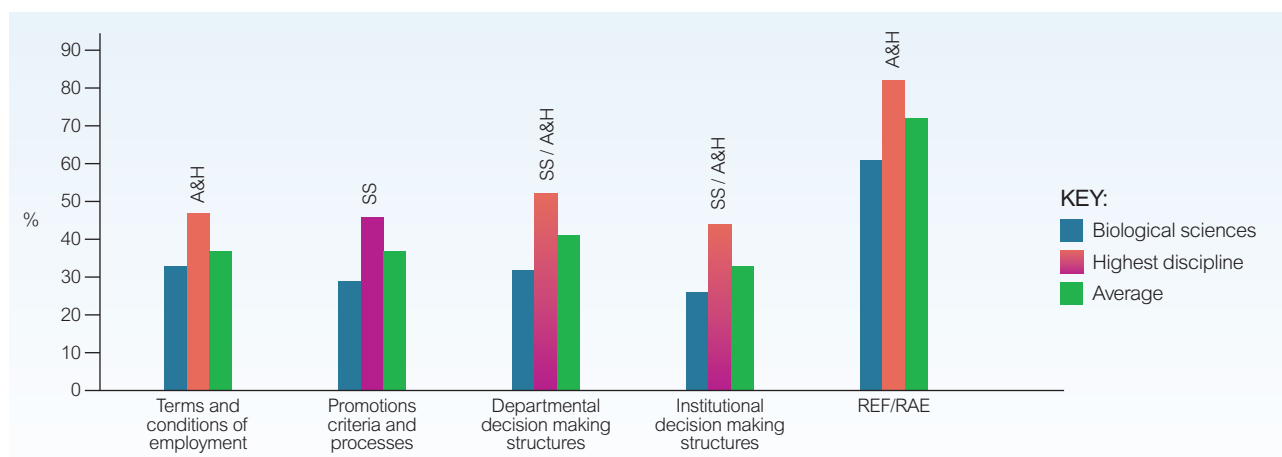


Figure 11 Percentage of respondents who have a good or partial understanding of a range of policies, procedures and initiatives (responses to questions 7 & 8).

In Figures 11 to 13 biological science responses are compared to both the average and the most different discipline.

KEY: (A&H) Arts and humanities  
(SS) Social sciences  
(BMS) Biomedical sciences  
(PS) Physical sciences

<sup>4</sup> [http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/set\\_for\\_success.htm](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/set_for_success.htm)

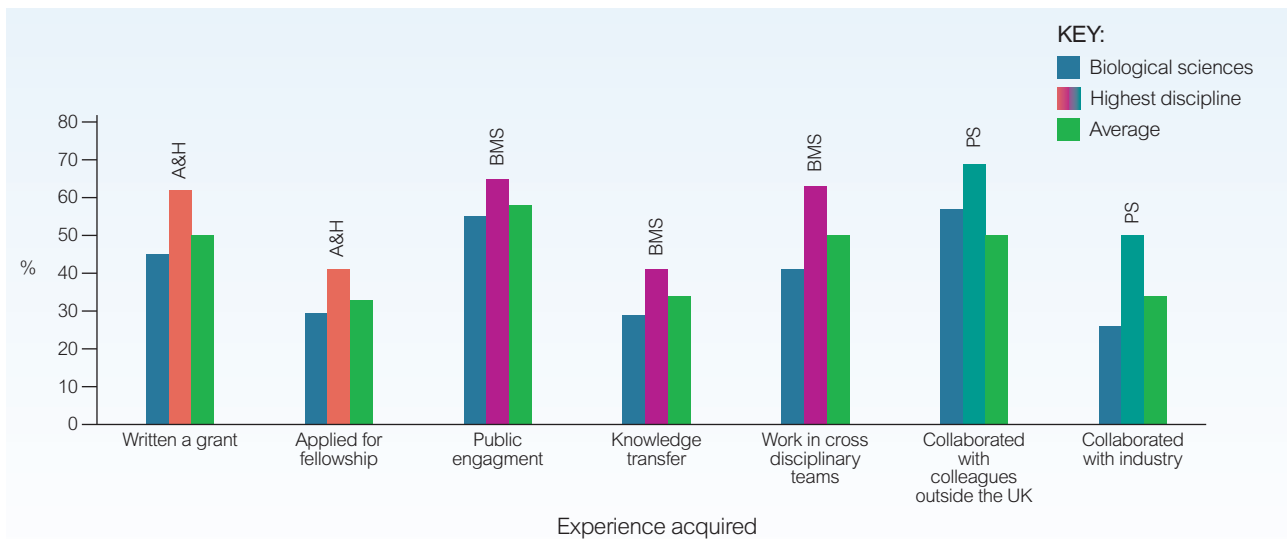


Figure 13 Experience acquired in a range of work processes as part of current role (from responses to questions 24-27).

Biological science respondents were also less experienced in a range of work opportunities than other disciplines. This included experiences that are essential for developing an academic research career; including writing grants and applying for fellowships, which were most likely to have been done by arts and humanities respondents. Experiences that could enhance generic skills, such as collaboration and public engagement, were more likely to have been done by respondents from the social sciences or physical sciences than from biological sciences (see Figure 13). For example, social science respondents were significantly more likely to have gained experience of working in a cross-disciplinary team than respondents from the biological sciences (63% compared to 41%).

There was also some evidence that biological science respondents were less engaged with their institution, felt less valued and recognised, with a perception that they were not treated equally with academic lecturing colleagues. Although the actual percentage differences were very small, there was a

consistent trend across a range of responses (see Figure 14). Only 42% of biological scientists agreed that they felt integrated into their institutional research community compared to more than half (52%) of respondents on average from other disciplines.

Taken together these results suggest that the biological science disciplinary group were the least integrated at both the departmental and institutional level and were not gaining as much experience as their peers, either in terms of training or work-related knowledge and skills that could aid their personal and professional development.

### Recommendation

- HEIs should explore how to encourage biological science researchers to be more proactive in developing their transferable skills, widening their career focus and becoming more involved in decision making processes at the departmental and institutional level

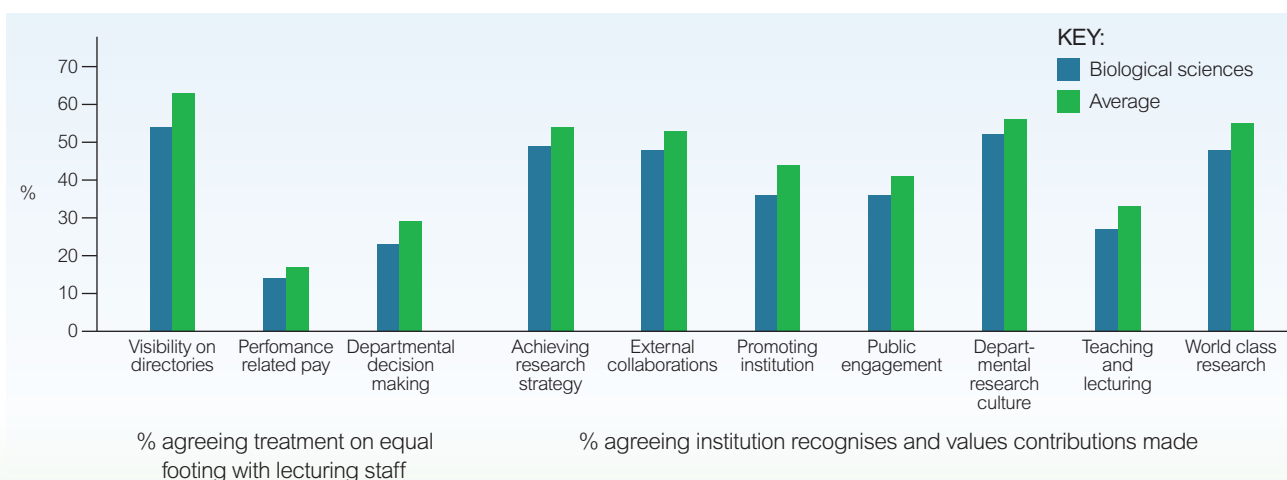


Figure 14 Perception of equal treatment with lecturing staff and institutional recognition of value (from responses to questions 9 & 10)

## Theme 6: Trends in physical sciences and engineering

Physical sciences and engineering encompassed the second largest group of CROS respondents at more than 1600. Responses varied with respect to demographic profile, career aspirations and connections with industry.

As previously described, respondents from physical sciences and engineering had a distinct demographic profile (see Figure 15). Despite this, the most striking trend for physical sciences and engineering was their similarity to the other disciplines. This sector was most often closest to the CROS average and rarely stood out from the other disciplines. Remote interviews were more prevalent (14% compared with an average of 4%), which could be expected for a population of respondents with a higher proportion of researchers from outside of the UK.

The other major differences for this discipline were their level of integration with industry and career aspirations. More physical sciences respondents had experience in collaborating with industry (50% compared with an average of 34%), which may be related to the higher rate of industrial funding (12% compared with a 5% average and only 1% in arts and humanities). A higher proportion indicated that information on business skills and enterprise would be useful (23% compared with an average of 16%) and had already undertaken knowledge transfer training (13% compared with an average of 9%).

While the majority of physical sciences respondents still aspired to a career in research and teaching within academia in 5 years time (62% compared with an average of 56%), alternative career options were focused within industry (42% compared with an average of 33% and only 21% in arts and humanities) and self employment particularly in five years time (18% compared with an average of 13% and only 10% in biological sciences).

Given that knowledge exchange and commercialisation of research are becoming increasingly important, this outward facing disciplinary group are in a strong position to take advantage of industry partnerships and collaborations. In response to increasing government focus on the importance of multidisciplinary research and collaborations with research users and external organisations it should be noted that the greater prevalence of cross-disciplinary projects in the social sciences is also valuable in this context.

### Recommendation

- HEIs should identify models of good practice relating to industrial funding opportunities and non-UK collaborations in the physical sciences and engineering group and consider how these could be applied across other disciplines.

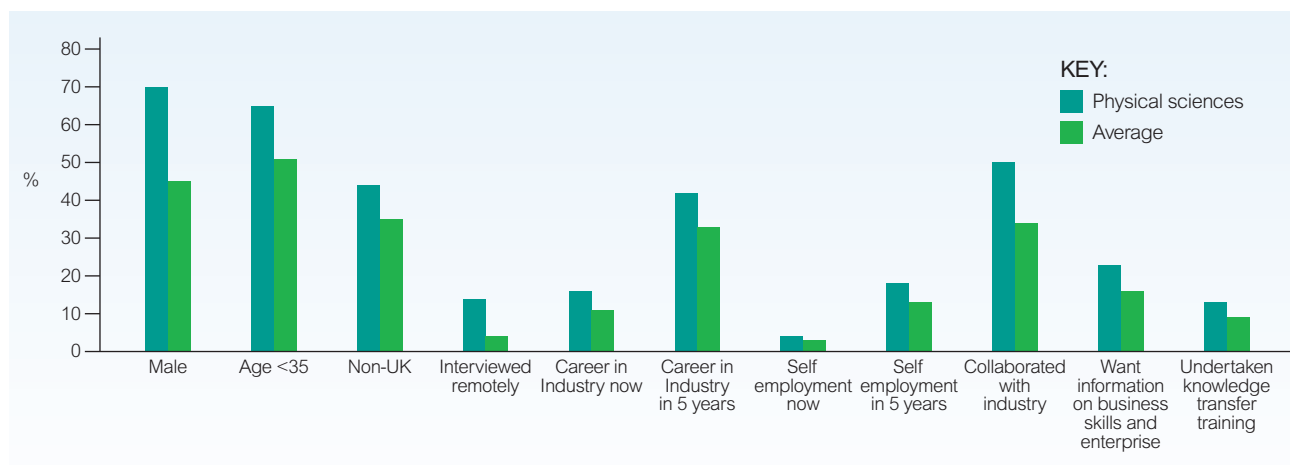


Figure 15 Demographic profile, career intentions and industry connections for physical sciences respondents (responses to questions 17, 20, 23, 40, 41 and 44)

## Key findings

The respondents to CROS 2009 are broadly representative of the UK's research staff population and the numbers made a sub-analysis by broad disciplinary group viable. Six key themes emerged from this analysis.

### 1. Overall similarity between disciplines

Overall the messages delivered in CROS 2009 hold true when examined by individual disciplinary groups. Recommendations from the aggregate report therefore apply across all the disciplines. Generally, the responses were highly analogous suggesting that the experiences of researchers across the disciplines were broadly similar despite the heterogeneity of subject specialities.

### 2. Demographic differences

There were some demographic differences between the disciplinary groups, particularly in the physical sciences who are younger, predominantly male and have more respondents originating from outside the UK. However, demographic variation did not appear to correlate with any differences in responses between disciplinary groups. Although a higher proportion of social science respondents had open ended contracts the nature of fixed term contracts in this group was biased towards very short contracts (less than 12 months).

### 3. Trend for biological, biomedical sciences and physical sciences/engineering to map together compared to social sciences and arts and humanities

Responses from the biological, biomedical sciences and physical sciences/engineering on some broad themes tended to group together when compared to their colleagues in arts, humanities and social sciences. Researchers in the STEM disciplines (here including medicine) could do more to become aware of opportunities for broadening their work experiences. There is also scope for these groups to be more involved and engaged with their institutions to an extent more aligned with respondents from arts, humanities and social sciences. There was an increase in equality and diversity concerns in the arts and humanities compared to the other disciplines.

### 4. Trends in arts and humanities

Differences in responses from arts and humanities compared to the other disciplinary groups were varied. These ranged from responses that might have been predicted, for example higher aspirations for an HE career that includes teaching and research, to more surprising differences, for example differences in the types of interviews for recruiting researchers. A clear finding from this disciplinary analysis was that the availability and quality of induction and appraisal processes in the arts and humanities could be improved.

### 5. Trends in biological sciences

Those in biological sciences provided distinctive replies in a number of areas. Although the percentage differences were relatively small, there were key trends suggesting this disciplinary group was less broadly engaged than other groups. They were less likely to be involved with institutional decision making processes and were not gaining as many experiences that could be important for careers both inside and outside of HE. There may be some scope for encouraging researchers in this area to be more proactive in seeking out information and widening job experience. One finding which may be of concern to HEIs was the lower percentage of biological scientists who have a degree of understanding of the RAE/REF, particularly compared to respondents from the arts and humanities.

### 6. Trends in physical sciences

Despite a distinctive demographic profile, the responses from this group in general did not stand out from the other disciplines. As might have been expected for this disciplinary group, industrial connections were stronger than for other disciplines and may prove advantageous in the coming years as external collaborations and commercialisation of research become increasingly important.

## Summary

The main recommendations from the aggregate CROS 2009 report were presented under the principles of the Concordat and these can be applied to this review of differences between broad disciplinary groups.

### Recruitment and selection

Institutions should ensure that all recruitment policies are open and transparent and that where possible applicants should be interviewed by their PI. All departments should be striving toward establishing best practice but extra focus in this area should be applied by the arts and humanities discipline to ensure vacancies are advertised and promoted externally and that interviews are conducted with line managers as well as institutional representatives. In addition, arts and humanities departments and PIs should re-examine awareness of recruitment policies and procedures, especially in the provision of job-related information and the importance of induction.

### Recognition and value

All eligible researchers should undertake regular reviews and appraisals. Generally the percentage of researchers undergoing appraisal could be raised, but particularly in biological sciences and arts and humanities disciplines.

Biological science respondents felt less integrated into their departmental or institutional communities. Institutions could explore strategies for engaging these researchers at all levels including the department, faculty and university.

### Support and career development

Although disciplinary differences in the source of careers advice were shown, e.g. arts and humanities respondents preferring mentors rather than careers advisors, generally research staff should be encouraged to engage more actively in career development planning, using the experience from their managers, staff developers and careers advisors. Careers services should be exploring ways to increase engagement with researchers across all disciplines.

Important lessons could be learned from the experiences of physical science and engineering respondents with their strong external and industrial connections and from social science researchers regarding working in multidisciplinary teams. The learning could be distributed across all disciplines, providing information on alternative funding sources, cross-disciplinary projects and widening career aspirations within and beyond academia.

### Researchers' responsibilities

CROS recommended that researchers need to take responsibility for their own development and career planning and be proactive in seeking out information and advice on career progression. In particular, researchers from the biological science disciplinary group need to be more active in planning their career and widening job experiences. Overall, there may be value in following up some of the findings for this group more specifically, perhaps in association with one of the biological science professional or learned bodies.

### Diversity and equality

Institutions should ensure that their commitment to valuing researchers is communicated effectively and implemented in practice. Reported inequalities by biological science respondents with respect to treatment compared to lecturing staff should be reviewed. The more general diversity and equality concerns reported by the arts, humanities and social sciences respondents should also be explored.

### Conclusion

Overall, it appeared that despite their differences in disciplinary background and demographics, respondents were first and foremost researchers, with many common opinions and experiences that transcend subject specialities.

The Careers in Research Online Survey (CROS) aims to anonymously gather data about working conditions, career aspirations and career development opportunities for research staff employed in higher education (HE). It was relaunched in 2009 with a new question set to reflect the principles of the Concordat to Support the Career Development of Researchers.

The CROS Steering Group exists to ensure the appropriateness and sustainability of CROS and its associated activities, ensuring that CROS meets the needs of the HE sector in collecting research staff views and in making these views available to the sector.

Vitae provides administrative support and resources for the CROS Steering Group. It has analysed the CROS 2009 results by broad disciplinary group and produced this publication on behalf of and under the direction of the CROS Steering Group.

CROS is hosted on the Bristol Online Survey (BOS) tool provided by the Institute of Learning and Research Technology (ILRT), based at the University of Bristol. BOS provides a secure web environment for the design, delivery, administration and analysis of online surveys. [www.cros.ac.uk](http://www.cros.ac.uk)

Vitae is supported by Research Councils UK,(RCUK), managed by CRAC: The Career Development Organisation and delivered in partnership with regional Hub host universities.

Vitae works with UK higher education institutions (HEIs) to embed professional and career development in the research environment. Vitae plays a major role in innovating, sharing practice and enhancing the capability of the higher education sector to provide professional development and training for researchers.

Our vision is for the UK to be world-class in supporting the personal, professional and career development of researchers.

Our aims:

- building human capital by influencing the development and implementation of effective policy relating to researcher development
- enhancing higher education provision to train and develop researchers
- empowering researchers to make an impact in their careers
- evidencing the impact of professional and career development support for researchers.

For further information about the range of Vitae activities go to [www.vitae.ac.uk](http://www.vitae.ac.uk) or contact [website@vitae.ac.uk](mailto:website@vitae.ac.uk)

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