An Institute of Physics and Royal Society of Chemistry report | **March 2011**

Mapping the Future

Physics and Chemistry Postdoctoral Researchers' Experiences and Career Intentions

Summary Report

IOP Institute of Physics

RSC | Advancing the Chemical Sciences

Contents

1: Introduction

1. Each of the sub-headings corresponds to the appropriate section of the main report and references are also given to the appropriate pages or tables in the main report.

The Institute of Physics (IOP) and the Royal Society of Chemistry (RSC) jointly initiated a project, in conjunction with the IOP's Women in Physics Group (WiPG), which was part-funded by the UKRC's Innovative and Collaborative Grants Scheme (IGCS), to investigate the experiences of postdoctoral researchers (PDRs).

The project was designed to build upon previous work by the RSC on the experiences and career intentions of chemistry PhD students, which found that the proportion of females planning a research career in chemistry fell dramatically during the course of their PhD studies, while the proportion of males stayed the same. In contrast, follow-up work by the RSC and the Biochemical Society showed that in molecular biosciences the proportions of men and women intending to pursue a research career remained essentially the same throughout their PhD studies.

To investigate how the experiences of male and female postdoctoral physics and chemistry researchers affected their long-term career intentions and whether their experiences were different, the IOP and the RSC, with WiPG, initiated a survey of PDRs in the two disciplines.

An electronic survey was distributed to UK chemistry and physics departments and a total of 776 responses (370 physics, 376 chemistry and 30 unspecified) were received.

A detailed analysis of the survey data, which was carried out by Sean McWhinnie of Oxford Research and Policy, has been produced in a full report and is available at **www.iop.org/diversity** and **www.rsc.org**. This summary report highlights the key findings and recommendations.[1]

2: Key findings

2.1: Motivation for undertaking postdoctoral research

Respondents were questioned on issues such as how long they had spent as a PDR and the number of contracts that they had taken on. Respondents were also questioned about their motivations for undertaking postdoctoral research, and what they thought were the upsides and downsides of it.

In terms of length of time as a PDR, the most striking differences were between male physicists and female chemists (Main Report: Table 5).

- Male physicists were more than twice as likely as female chemists to have been a PDR for seven years or more (19%), and almost three times as likely as female chemists to have been a PDR for more than 10 years (figure 1).

When asked to select up to two reasons as to why they had decided to undertake postdoctoral research, the most popular reason was *Out of interest and enthusiasm for science* (74%). (Main Report: Table 7)

- Physicists were more likely to select this than chemists (80% compared with 68%).

The second most popular reason selected was *To gain a permanent academic post* (49%).

- Males (53%) were more likely to select this than females (42%).

The most commonly selected "upsides" of postdoctoral research selected by respondents were *Exciting and interesting projects* (76%) and *Flexible working hours* (73%). By far the most common "downside" selected was *No job security* (78%). (Main Report: Tables 11 and 12)

2.2: Next career steps

Respondents were then asked about their next career steps. 20% had not planned their next career move at all, and 12% reported that they had already accepted their next job offer, with most of these (80%) staying in higher education (Main Report: Table 15). Those who had not already accepted a job offer were asked whether they intended to stay in a role requiring a scientific background, and what effect doing postdoctoral research had had on their career intentions.

Figure 1: Length of time spent undertaking postdoctoral research by gender and department of respondents

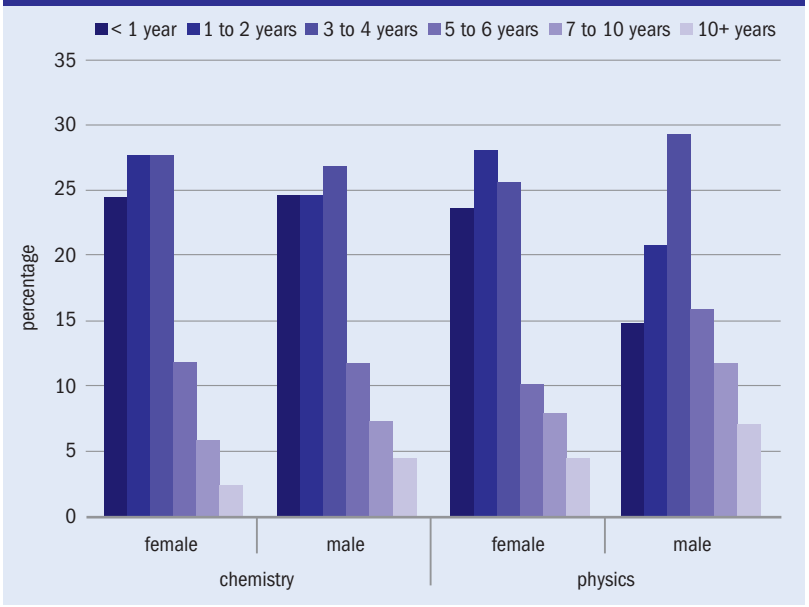
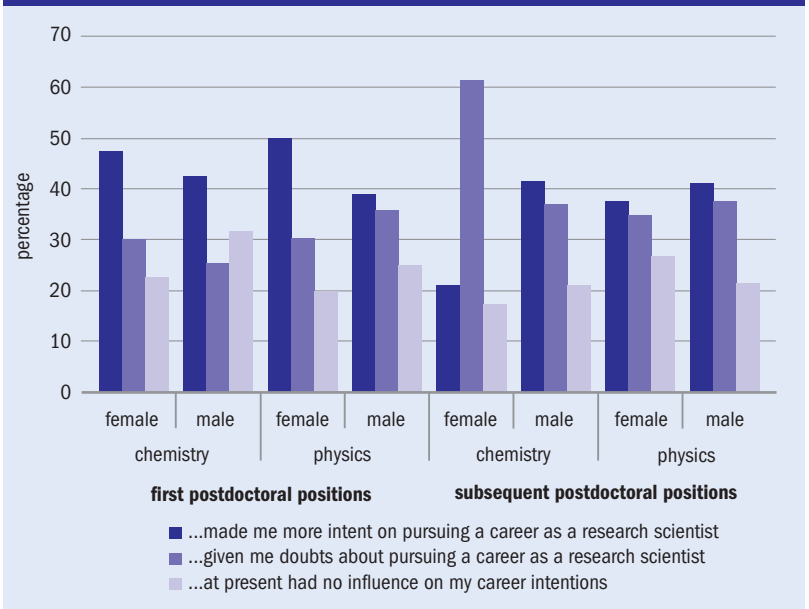


Figure 2: The effect of respondents' experiences of undertaking postdoctoral research on their intention to pursue a career as a research scientist



40% of respondents reported that undertaking postdoctoral research had made them more intent on continuing in a career as a research scientist, but 36% reported that they now had doubts about this (Main Report: Table 16; figure 2).

"The picture for physics was very different."

Responses were analysed, comparing those on their first postdoctoral research contract with those on second or subsequent contracts. (Main Report: Tables 17 and 18)

- In chemistry, similar proportions of females and males on their first contract reported that undertaking postdoctoral research had made them more intent on a career in research science (47% compared with 43%, respectively). On second/subsequent contracts the proportion of males stayed the same, but the proportion of females reporting that they were more intent on a career in research science halved to 21% and the proportion that now had doubts about this doubled from 30 to 61%.
- A similar, but not so dramatic, picture arose in physics. The proportion of females who said that they were more intent on a career in research science fell between first and subsequent contracts (from 50 to 38%), and the proportion of males stayed the same.

2.3: Long-term career plans

In the longer term, almost two-thirds (65%) of all groups of respondents selected *Academic on a permanent contract* as what they were most likely to be doing in 6–10 years' time. This was followed by *Scientist: industry or commerce*, which was selected by 28%, and *Continuing postdoctoral research* chosen by 18% (Main Report: Tables 27 and 28).

Responses were again analysed by comparing those on first contracts with those on second or subsequent contracts.

- In both physics and chemistry, among those on their first contracts, there were similar proportions (i.e. two-thirds) of both females and males who selected *Academic on a permanent contract*.
- In chemistry, for those on second and subsequent contracts, the proportion of females who selected *Academic on a permanent contract* fell from 65 to 44%, but the proportion of males stayed more or less the same, falling from 69 to 66%. Correspondingly, the proportion of females who selected *Scientist: Industry or commerce* almost doubled, from 21 to 40%.
- The picture for physics was very different. The proportion of females who chose *Academic on a permanent contract* stayed almost the same between first and second/subsequent contracts, falling from 57 to 55%, and that of males actually rose from 63 to 76%. The proportion of females who selected *Scientist: industry or commerce* also fell, from 22 to 13%, and those who selected *Continuing postdoctoral research* rose from 17 to 30%.

2.4: Career development

Respondents were questioned about the careers advice that they had sought before undertaking postdoctoral research and during their current contract. They were also questioned about their experiences of appraisal, mentoring and the development of transferable skills.

Careers advice

38% of researchers reported that they had taken careers advice before undertaking their first contract (Main Report: Tables 37 and 38).

- 76% of them said that careers advice had come from their PhD supervisor.
- Nearly half (45%) had also received advice from the HEI careers service.

A slightly higher proportion of respondents (45%) had received careers advice during their current postdoctoral contract, with the two primary sources being their PI/Group Leader and other academic staff (Main Report: Tables 39 and 40).

- Overall, 21% of respondents had received careers advice from the HEI careers service during their current contract.

More than half (54%) of respondents rated their awareness of career options within academia as good or very good, but only 23% gave a similar rating for career opportunities outside academia. One-third (34%) of chemists and more than half (52%) of physicists described their knowledge of the latter as poor or very poor (Main Report: Tables 33 and 35).

Appraisal

More than half (56%) of all respondents had never been appraised during their postdoctoral research careers. Indeed, even within the same department there was a great deal of uncertainty among both physics and chemistry PDRs as to whether PDRs were appraised or entitled to be appraised (Main Report: Tables 41, 42, 43, 45 and 49).

- Around a third of those who had been appraised found the appraisal process useful and/or relevant. The main reasons given for why appraisals were not seen as useful were that it was merely a box-ticking exercise or a formality, or that the appraiser did not seem to take the process seriously.
- Around two-thirds of respondents who had not been appraised said that they would like to be.

Mentoring

As was the case for appraisal, even within the same department there was a great deal of uncertainty among physics and chemistry PDRs as to whether there was a mentoring scheme (Main Report: Table 53). Overall, less than 5% of PDRs had participated in a mentoring scheme in their current HEI.

Transferable skills

64% of respondents reported that they were encouraged to undertake activities to develop their transferable skills, such as attending conferences, undertaking training courses, networking, teaching, giving presentations, etc (Main Report: Tables 50 and 52).

- Physicists (76%) were more likely than chemists (57%) to undertake activities that may be seen to be supporting academic careers (external presentations, teaching, attending conferences, etc).

Supervising PhD students and teaching

When asked about supervising PhD students, more than half (56%) of respondents said they were expected to supervise students, and a further 25% reported that they did so even though they were not expected to (Main Report: Tables 68, 69, 70 and 71).

- Only 12% of respondents stated that this responsibility was formalised and recognised.
- 65% said they would like it to be.
- 6% of respondents had received training on how to supervise.

82% of researchers in physics and 63% of chemists reported having the opportunity to teach (Main Report: Tables 72 and 75).

- One-third (34%) had received teaching training.

2.5: Culture of departments

Respondents were asked various questions relating to overall departmental culture, including whether they had received an induction and how they felt that research staff were generally regarded.

Induction

Half (50%) of all PDRs reported having an induction and, of these, 66% found it useful (Main Report: Table 61).

The main differences found were between those who stayed in the same group as their PhD and those who moved groups or institutions (Main Report: Table 60).

- 59% of those who stayed in the same group in which they did their PhD reported that they did not have an induction; however, this figure was 90% for female chemists who stayed in the same group.
- 47% of those who were in a different group from where they did their PhD reported that they did not have an induction.

"Physicists (76%) were more likely than chemists (57%) to undertake activities that may be seen to be supporting academic careers."

Figure 3: Respondents' views on whether they feel more like staff members or students

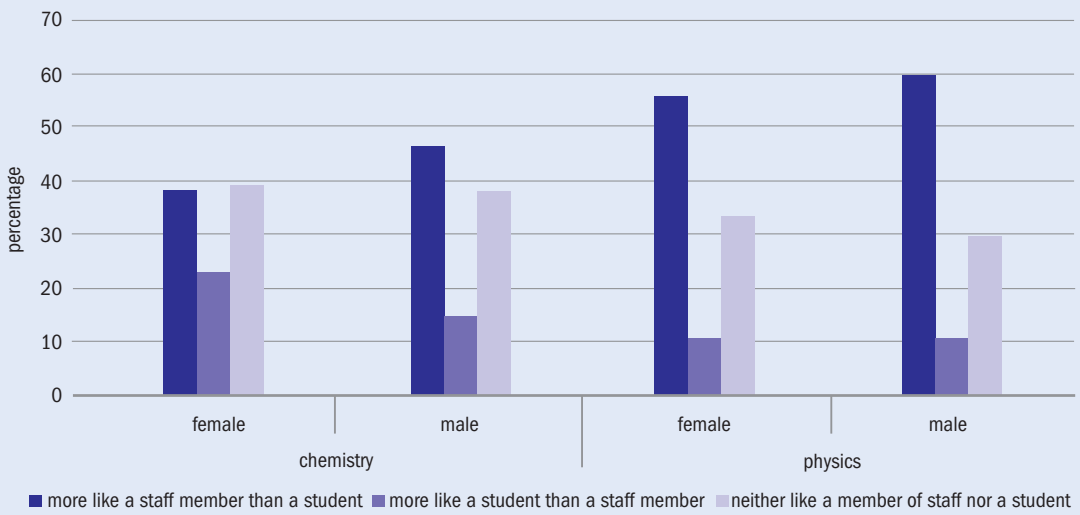
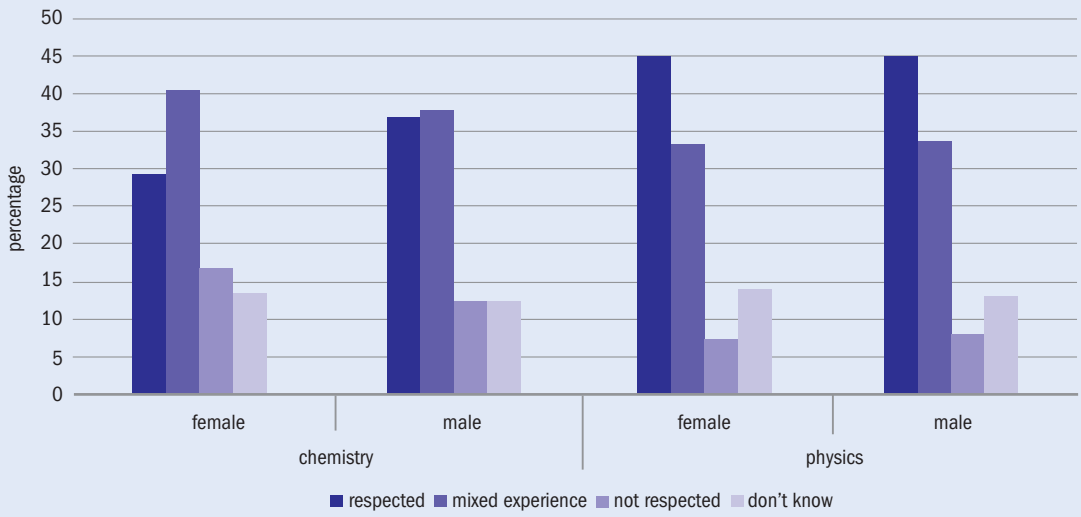


Figure 4: Respondents' opinions as to the regard with which PDRs are held



Status of PDRs in their department

Almost half (47%) of respondents reported that they did not know whether PDRs' views were represented on decision-making bodies in their department (Main Report: Table 63).

When asked if they felt more like staff than students in their department, half (51%) reported feeling more like staff members than students (Main Report: Table 62; figure 3).

- Physicists (59%) were significantly more likely to report this than chemists (43%).
- 23% of female chemists and 15% of male chemists reported feeling more like students than staff (compared with 10% of male and 11% of female physicists).

40% of PDRs felt that they were respected and well regarded in their department (Main Report: Table 64; figure 4).

- Chemists were less likely to feel respected and well regarded than physicists (34% compared with 45%, respectively).
- 29% of female chemists felt respected and well regarded, compared with 45% of female physicists.

3: Conclusions

More differences have been found between chemists and physicists than between the genders, confirming important cultural differences between the disciplines. Where gender differences were found, they were generally greater between male and female chemists than between male and female physicists. However, the gender differences were less dramatic than those found in previous RSC studies of PhD chemists.

Nevertheless, female chemists do appear to develop more doubts than any of the other gender-subject groups about a long-term career as an academic and are more likely to look towards a career in industry. However, for all postdoctoral researchers, awareness of the career options outside academia is low.

The research also suggests that practices vary considerably as to how PDRs are viewed and treated, even within the same department, and female chemists are the least likely to feel well regarded.

"Overall there needs to be greater collaboration between all those involved in the career development and welfare of PDRs at a local level to develop appropriate policies, procedures and services to best support and nurture these staff."

4: Recommendations

A number of recommendations have been developed to improve the experience of PDRs in physics and chemistry, regardless of gender or discipline. Each recommendation is followed by the names of the key stakeholder(s) considered to be the most appropriate to take it forward.

4.1: General issues

Overall there needs to be greater collaboration between all those involved in the career development and welfare of PDRs at a local level to develop appropriate policies, procedures and services to best support and nurture these staff.

Significant numbers of PDRs did not feel like staff members and did not feel well regarded in their departments, and this is especially true for female chemists.

1. Consideration should be given to how schemes such as the Institute of Physics' Project Juno and Athena SWAN can enable and encourage the implementation of good practice for PDRs. Best practice should be shared among HEIs in the training, treatment and management of PDRs. Vitae are already taking the lead in this, and the Institute of Physics should continue to promote and use Project Juno as a tool for enabling best practice to be shared among physics departments.
   - *ECU, UKRC, IOP, Concordat Strategy Group and Vitae*

4.2: Careers advice

The PDRs' knowledge of the careers available outside academia was generally reported as poor or very poor.

2. Making impartial careers advice available for all PDRs is essential in ensuring that individuals have a realistic view of their likelihood of, and suitability for, gaining a permanent academic position. Mechanisms need to be explored to ensure that PDRs have access to independent, alternative sources of advice on careers outside academia, and the uptake of this should be monitored by gender.
   - *HEIs, Professional Bodies, Vitae and Concordat Strategy Group*

4.3: Policies and practices

Better and more consistent application of policies and practices, together with individual research units or groups paying more attention to their overarching cultures with regard to PDRs, may improve the experience for those researchers.

"The benefits and impact of mentoring schemes should be actively promoted, and it should be recognised as a valid activity through the dissemination of guidance, communication and awareness-raising."

3. While many institutions are implementing the Concordat to Support the Career Development of Researchers principles at senior levels, implementation must also be monitored at the departmental level to ensure that institutional and departmental policies and practices for PDRs, both formal and informal, are communicated and applied consistently.
- *Vitae, HEIs and Concordat Strategy Group*

4. Mechanisms should be implemented to allow PDRs to be consulted on departmental issues, and they should, as a matter of course, be represented on relevant departmental committees. As part of this, appropriate and effective departmental mechanisms need to be in place to communicate directly with all PDRs.
- *HEIs, Heads of Departments and Concordat Strategy Group*

5. All PDRs, whether they are new to a department or not, should have a targeted induction covering their role and responsibilities as a member of staff, the appraisal system, flexible working, training opportunities, careers advice, the institution's expectations of them, and other relevant departmental/institution staff policies and procedures. PDRs who are new to a department should also have an appropriate departmental induction covering general issues of how they should carry out their research role (e.g. access to services, etc).
- *HEIs, Departments and Concordat Strategy Group*

6. PDRs should have regular, timely, independent appraisals covering their personal development. During appraisals, clear and impartial feedback on career options (including suitability for an academic career) should be provided. The person carrying out the appraisal should have the appropriate training to run appraisals for research staff.
- *HEIs, Departments, Research Funders and Concordat Strategy Group*

7. Resources should be made available to make mentoring schemes more widely available for PDRs. Universities UK should consider the role it can play in national mentoring initiatives for PDRs. The benefits and impact of mentoring schemes should be actively promoted, and it should be recognised as a valid activity through the dissemination of guidance, communication and awareness-raising.
- *Universities UK, HEIs, ECU and Concordat Strategy Group*

Transferable skills

8. Opportunities should be provided for PDRs to gain experience of teaching, where they wish to and it is deemed appropriate, and appropriate training should be provided for this. PDRs should not be able to teach without this training.
- *HEIs, Departments, Staff Development Units, Vitae and Concordat Strategy Group*

9. Where it is expected that PDRs will play a significant role in the supervision of PhD students, that activity should be formally recognised as part of their role and appropriate training, including diversity awareness, should be provided.
- *HEIs, Departments, Staff Development Units, Vitae*

Mapping the Future

Physics and Chemistry Postdoctoral Researchers' Experiences and Career Intentions

Summary Report

An Institute of Physics and Royal Society of Chemistry report

For further information contact:
Diversity Team
IOP Institute of Physics
76 Portland Place, London W1B 1NT
Tel +44 (0)20 7470 4800, Fax +44 (0)20 7470 4848
E-mail diversity@iop.org
www.iop.org

The report is available to download from our website and if you require an alternative format please contact us to discuss your requirements.

The RNIB clear print guidelines have been considered in the production of this document. Clear print is a design approach that considers the requirements of people with visual impairments. For more information, visit **www.rnib.org.uk**.