

Gazing at the future

The experiences of male and female physics and astronomy doctoral students in the UK

This policy briefing¹ is part of a wider project initiated by the Institute of Physics (IOP) in collaboration with the Royal Astronomical Society (RAS) to look at the overall experience of physics and astronomy doctoral students in the UK².

There are around 4000 doctoral students studying physics or astronomy in the UK³. As well as their research, doctoral students provide a vital source of talent for a huge range of complex industries. Meanwhile, a doctorate remains the primary route into academic and research careers in the UK. The average salary of doctoral students from physical sciences 7–9 years from graduation is £40,000 according to RCUK⁴ and, as such, a doctorate in physics or astronomy remains a route towards a well-paid and productive career.

The underrepresentation of women in physics and astronomy is an ongoing concern and although there are proportionally more women studying towards doctorates than those studying at undergraduate level, women still only make up 25% of doctoral students⁵. The gender imbalance in science potentially holds back a significant cohort from using their talent and potential in physics, both in academia and industry. The reasons for the under-representation of girls and women in physics and astronomy are being explored and tackled at all levels. But women's experiences of doctoral study in physics and astronomy has been the subject of less focus until now.

The findings presented here are derived from a survey conducted by Oxford Research and Policy between March and May 2014, and completed by 995 physics and astronomy doctoral students at UK institutions⁶. Of those who responded, 70% were male and 30% were female⁷. The survey had two primary aims: firstly, to better understand the effects on student experience of the changing landscape of PhD provision in the UK with the recent introduction of Centres for Doctoral Training (CDTs); and secondly, to investigate any differences in the experiences of doctoral students from under-represented groups.

This briefing considers findings on the latter aim, providing a snapshot of the differing experiences of male and female physics and astronomy doctoral students in the UK. It includes a set of recommendations that draw on these findings and are targeted at physics and astronomy departments, funders and professional societies.

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Findings

Overall experience of physics and astronomy PhD students

A clear majority of both male and female doctoral students in physics and astronomy report that they are happy with their doctorate; however, on average, female doctoral students rate the overall experience of their doctorate lower than their male peers. Female doctoral students also report far lower levels of satisfaction and across a number of substantive areas related to their doctorate⁸. For example, the proportion of female doctoral students who say they are happy with their doctorate is on average 7% lower than for male doctoral students, and there appears to be a drop in satisfaction over the course of their degree. Female doctoral students also report lower levels of satisfaction with departmental culture, and are more likely to report a lack of diversity within departments.

Departmental culture

There are noticeable differences in attitudes to diversity issues within departments between male and female doctoral students. While 73% of female doctoral students strongly agree or agree that there should be more female academics, only 52% of male doctoral students hold similar views. Similarly, 45% of female doctoral students and only 29% of male doctoral students agree that a more diverse mix of people and staff in their department would be beneficial. While 70% of male doctoral students agree there was a strong equality and diversity culture in their department, only 58% of female doctoral students do.

Female doctoral students' relationship with their main supervisor appears to deteriorate more over the course of their doctorate compared to their male peers. Only 70% of female doctoral students in their fourth year rate their relationship as good or excellent compared to 93% in their first year of study. Among male doctoral students, the figures were 85% and 91% for fourth and first years respectively.

Career paths

Despite reporting as much confidence in their technical, transferable and general skills as their male counterparts, only just over half (55%) of female doctoral students across all years of study agree that they would make good research scientists, with the proportion agreeing dropping to 46% in the third year. In contrast, male doctoral students remain consistently confident that they would make good research scientists throughout their doctorate, with 70% overall agreeing on average across all years of study.

There is a significant decline across the four years of a doctorate in female doctoral students' expectations of a research position, while male doctoral students' expectations remain stable and relatively high compared to the number of positions available⁹. When asked if they envisage that they might have a university role in 3–5 years' time, in the first year, 78% of male doctoral students feel that this is likely compared to 65% in the fourth year of study. In contrast, 82% of female doctoral students in their first year share these expectations, falling to 48% in the fourth year.

Key recommendations

Departments should:

- Work closely with equality and diversity/Juno committees to provide training on unconscious bias for all staff and students, including highlighting its effects on diversity within departments.
- Scrutinise the support provided to doctoral students, particularly female doctoral students, to avert falling levels of satisfaction during PhDs, including regularly collecting feedback, involving students in departmental decision-making and working more closely with students to assess skills and career options; include doctoral students on equality and diversity/Juno committees.
- Provide closer monitoring of doctoral students' career intentions across their degrees through dedicated, continuous and consistent CPD; provide opportunities for female doctoral students to formally network with one another and women in science and academia.
- Develop mechanisms to ensure closer scrutiny of doctoral students' relationships with supervisors, take measures to ensure greater transparency in the level of support offered and ensure supervisors are proactive in identifying when support is needed.
- Improve the access to, and quality of, information on doctorates for applicants, as well as providing clarity on what students should expect in pursuing a PhD, particularly for those students entering a new institution.
- Explore ways to address the significant minority of doctoral students who report feeling socially isolated, by looking at ways to improve departmental cohesion and promotion of social activities.

Funders should:

- Explore ways to provide greater funding for courses to prepare doctoral students without a postgraduate master's qualification for the rigours of doctoral research.
- Work with departments and professional societies to explore ways of financing improved and impartial careers advice for doctoral students in order to improve the knowledge of, and aspirations towards, a range of relevant careers.

Professional societies should:

- Work with departments and funders to develop improved and coordinated impartial careers advice from undergraduate to PhD level to ensure students have access to the best possible information on their choices and to make more informed decisions.
- Work closely with Juno/equality and diversity committees to assess the needs of female doctoral students and provide dedicated support, such as mentoring, networking sessions (both within and between departments and elsewhere) and bespoke careers advice to improve satisfaction and widen career aspirations.
- Support departments and Juno/equality and diversity committees with guidance and resources to aid the provision of unconscious bias training.

Footnotes

- 1 A policy summary with further detail on the findings in this briefing is also available www.iop.org/publications/iop/2015/file_65624.pdf
- 2 We use the term “doctoral students” to refer to all students conducting doctoral study, including those registered on DPhil courses
- 3 HESA statistics
- 4 *The Impact of a Doctoral Researcher: Physical Science and Engineering Doctoral Graduate* (2014), a RCUK report
www.rcuk.ac.uk/RCUK-prod/assets/documents/skills/timodc_sb_psaedg.pdf
- 5 *Physics Students in UK Higher Education Institutions* (2012), an IOP report
www.iop.org/publications/iop/2012/file_54949.pdf
- 6 *Survey of Physics and Astronomy Doctoral Research Students' Experiences and Career Intentions* (2015), an IOP report
www.iop.org/publications/iop/2015/file_65623.pdf
- 7 There were eight respondents who did not specify their gender
- 8 In a number of cases, female doctoral students' level of satisfaction starts off at a similar level to male doctoral students in the first year but fall significantly over the course of their degree
- 9 68% of male doctoral students for example believe that they would most likely be in a postdoc/research assistant position in 3–5 years. A Vitae study (*What Do Researchers Do?* 2013, www.vitae.ac.uk/impact-and-evaluation/what-do-researchers-do) finds that only around 20% of doctoral students from the physical sciences and engineering are in positions as researchers in higher education after 3.5 years

For further information contact:

Daniel Lee

IOP Institute of Physics

76 Portland Place, London W1B 1NT

Tel +44 (0)20 7470 4826

E-mail daniel.lee@iop.org

www.iop.org

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