House of Commons Science and Technology Committee Inquiry - Women in academic STEM careers

Submission from the Physiological Society September 2013

Summary

- Unconscious gender bias and widely held expectations of what jobs/roles women should have in academia have produced barriers to progression for women in STEM.
- The difficulties associated with combining a family and an academic STEM career is another significant reason why women are underrepresented in STEM academia.

The Physiological Society

1. The Physiological Society brings together over 3,200 scientists from over 60 countries, over 1/3 of our members are women. Since its foundation in 1876, our members have made significant contributions to our knowledge of biological systems and the treatment of disease.

2. We promote physiology and support those working in the field by organising world-class scientific meetings and by publishing the latest developments in our three leading scientific journals, *The Journal of Physiology, Experimental Physiology and Physiological Reports*.

Qu. 1: Why do numbers of women in STEM academic careers decline further up the career ladder?

3. It is well established that the proportion of women to men decreases at every stage along the STEM academic career track[1]. While the gender gap becomes more pronounced the further up the career ladder, one of the critical points is in the period between completing the PhD and obtaining a permanent academic post.

4. In the main scientists will be in their mid-to-late twenties upon completion of their PhD, at which stage the 'standard' career pathway usually requires the scientist to take a fixed term research contract for a period of two to four years, which tend to be followed by either an additional fixed term research contract or a research fellowship.

5. The majority of the prestigious fellowship schemes, which are a crucial stepping stone to achieving a permanent academic post, require researchers to spend a prolonged period abroad (often one to two years). Even for those who don't travel abroad, it is generally expected that these positions should be held at different institutions.

6. This requirement often disenfranchises scientists of both genders with partners, family plans or responsibilities from this career path. Some female scientists feel they have

to choose between science and having a family. This results in many talented female scientists either leaving the academic career track at this stage or finding themselves disadvantaged when applying for permanent academic posts as they have not been in a position to follow the standard, expected career path.

7. For those who obtain a permanent academic post, women continue to face barriers throughout their career that affect their progress to the higher levels of the career ladder. There is evidence that there is widespread unconscious gender bias against women, evident in both genders, which affects both employment prospects[2] and assessment of academic success, although this appears to have reduced in some STEM areas[3].

8. Promotion of women in STEM subjects is assessed by criteria such as research income and publication output, metrics that have been recently shown to discriminate against women[4]. The reasons why women tend to generate less research income, and fewer publications are many and varied but can include different job expectations of women compared to men that often divert them from research to other responsibilities, such as teaching or administration, and other choices (either free or constrained), centring around family/lifestyle/work-life balance issues. The majority of women leave STEM academic positions as a result of 'family concerns'[4]. As a result of these myriad factors, women are more likely to have career paths that lead them to have less access to resources that might enable them to build larger research teams and to generate larger numbers of publications.

9. Income generation is often judged in track record, which is assessed by publication output and citation rate – the latter is strongly correlated with the former, and in both areas men outcompete women. Use of these measures as criteria for success therefore discriminates against women in promotions, and leads to a lower female representation at the most senior grades. While academic institutions continue to value research success, which are now more frequently judged by these metrics as the major criteria, for promotion to senior management positions, the underrepresentation of women in these positions will continue.

Qu. 2: When women leave academia, what careers do they transition into?

10. The majority of science graduates, regardless of gender, leave academia. Approximately 30% of PhD students will take up a permanent research post, with only 0.45% obtaining a professorship[1]. However, the figures for women show that the fall off is much greater. Women account for just over 50% of science subject area graduates[5], but they only account for 30% of lecturers and only 11% of professors[1].

11. We are unaware of a specific career track for women upon leaving academia. In some cases women will transition into fields related to academia; for instance there is a preponderance of women in academic publishing, often in editorial positions, and many move into administration in funding agencies, or within academic institutions. Women may also move into graduate entry into health care professions, positions in biotech and pharmaceutical industries, law (e.g. patent law), in addition to many careers not directly related to science – just as male leavers do.

Qu. 3: What are the consequences of scientifically trained women applying their skills in different employment sectors?

12. The consequences are the same as men applying skills in these different employment sectors. When a scientific training is relevant or useful, the presence of a scientifically trained person in a position increases the appreciation of the value of science in the sector. There are many areas in which this is very useful, for example there is widespread ignorance of science in many parts of the media, and entry of scientists and health care professions into these areas can have a dramatic effect on the quality of science reporting for example. Scientifically trained personnel have a plethora of skills other than their scientific knowledge that can be valuable in a range of professions/careers.

Qu 4: What should universities and the higher education sector do to retain women graduates and PhD students in academic careers? Are there examples of good practice?

13. There are many ways in which the HE sector could act in a positive manner to retain women in the sector[3]. These include -

14. Institute appropriate mentoring of researchers at junior as well as senior grades[4]. Women need support in the earliest stages of their careers – 50% more women leave science after graduate studies than men[6] - in addition to later on. Mentoring schemes need to be appropriately run, with institutional backing, and training and support for mentors and mentees. Importantly such schemes should not exclude or discourage active advocacy, which has been recognised to be the most significant advantage of a mentor:mentee relationship in career progression.

15. Commitment to the provision of true flexible working arrangements that are viewed positively by the institution. Many women are reluctant to work part-time as they consider their contributions will be de-valued, as it is often perceived to be 'impossible to work part-time in science and be successful'.

16. Recognition of the inherent potential for discrimination in the metrics currently used to judge academic success (income, number of output) and demonstration of sincere efforts to define and implement other parameters by which success can be more objectively judged.

17. Where possible, introduction of processes that mitigate against unconscious gender bias. These can be as simple as, for example: a requirement to assess whether there have been any gender issues arising in any meeting, by a standing agenda item or tick box on evaluation forms; written affirmation that gender balance has been considered for decisions relating to e.g. allocation of internal funding/PhD studentships, promotions, job allocations within Schools/Faculties/Senior Management teams, show case presentations, training, symposia. If possible gender blind review of applications/promotions could be introduced. At the very least, raising the awareness of the evidence that unconscious gender bias exists in both sexes, and

that elimination of this is a worthwhile aim, would be something achievable across the sector. Increasing awareness of the potential for unconscious bias in both genders in itself mitigates against bias.

18. Provision of adequate local childcare for staff, in addition to students, including school holiday time care for children of all ages.

19. Funded supervisory cover for the period of absence (which would have the advantage that the progress of the research group, and their career development would also not be compromised), followed by fully supported research leave post-maternity leave. This should include reduced, or preferably no teaching and administrative responsibilities for a period of the same length of time as the maternity leave.

20. Provision of funding to help with childcare to enable attendance at international conferences (either at the meeting, or to help with extended childcare in their absence).

Qu. 5: What role should the Government have in encouraging the retention of women in academic STEM careers?

21. Provision of funding to enable HE institutions to provide support detailed above.

22. Government should institute closer scrutiny of the decisions made relating to HE and monitor the decisions made to ensure that they do not adversely affect either gender.

23. Government should recognise its responsibilities as a funder of higher education, and set an example, introducing double blind reviewing/decision making in as far as possible (e.g. at peer review stage of the science alone prior to review of the individual), making decisions introducing flexible funding to accommodate family leave, such as easy no-cost extensions to allow for time away from research.

24. Most importantly they should be looking at their methods of assessing academic ‘success’ with greater scrutiny to ensure that truly unbiased measures are used and supported by Government. Government should also support research in this area.

For any queries, please contact Ed Hayes at The Physiological Society, Hodgkin Huxley House, 30 Farringdon Lane, London, EC1R 3AW. Email: policy@physoc.org

[1] The scientific century – securing our future prosperity, The Royal Society, 2010. http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2010/4294970126.pdf

[2] Moss-Racusin CA, Dovidio JF, Brescoll VL, Graham MJ, Handelsman J. (2012) Science faculty's subtle gender biases favor male students. PNAS 109(41) 16474-16479

[3] Ceci SJ, Williams WM (2011) Understanding current causes of women's underrepresentation in science. PNAS 108(8) 3157-3162. doi: 10.1073/pnas.1014871108

[4] Symonds MR, Gemmell NJ, Braisher TL, Gorringe KL, Elgar MA (2006) Gender Differences in Publication Output: Towards an Unbiased Metric of Research Performance. PLoS ONE 1(1): e127. doi:10.1371/journal.pone.0000127

[5] HESA data for 2011/12. Women made up 52.6% (114,135) of science subject area graduates, with 47.4% (102,715) male. http://www.hesa.ac.uk/dox/pressOffice/sfr183/6995_SFR183_Student_2011_12_Table_7.xls

[6] Ceci SJ Williams WM (2011) Reply to Drago: Culture and history are important in understanding the low number of women PNAS 108(21) E115. doi: 10.1073/pnas.1103900108