

Wanted: women in research

Women are still underrepresented in senior academic positions in science. A fundamental restructuring of the way scientists are evaluated is essential to remedy this disparity.

March 8th marks International Women's Day. Data from the US Bureau of Labor Statistics suggests that there is much to celebrate: in the US, women made up about 47% of the overall workforce and 51% of the workforce in management and professional occupations. Closing the gender gap in the workplace represents one of the biggest social changes of the last few decades. For women in scientific research, however, the news is not all good. Women still make-up only about 19% of tenured US National Institutes of Health (NIH) staff and only about 18% of tenured academics in the European Union. Gender stereotypes alone are unlikely to explain much of this disparity. Instead, a fundamental restructuring of the way academic science is conducted and how individual scientists are evaluated is necessary if we are to fully embrace women in all walks of science.

Certainly, we have made progress in increasing the participation of women at the early stages of the research career pipeline. The National Science Foundation reports that women now account for 56% of all science and engineering undergraduate degrees. In 1973, only 20% of all science doctorates were awarded to women; the number was closer to 50% in 2005. The proportion of women employed in academic positions, however, rose only ~20% during the same period, from about 10% in 1973 to 32% in 2005. The drop-off rate is dramatic as women climb the academic ladder; for example, women received 63% and 54% of NIH and National Science Foundation's predoctoral awards, respectively, in 2007, but only 25% and 23%, respectively, of the faculty grants awarded that year.

The reasons for this attrition have been hotly debated, but it seems likely that it cannot be attributed solely to gender prejudices and stereotype. Bibliometric studies have concluded that gender has no effect on peer review (*Nature* 459, 602, 2009). We have previously reported that gender also does not seem to influence chances of publication at *Nature Neuroscience* (*Nat. Neurosci.* 9, 853, 2006).

There is even some evidence that women may be at a slight advantage when it comes to competing for faculty positions. A 2009 report by the US National Academies, based on surveys of 1,800 faculty members, found that women were more likely to have been interviewed for tenure track positions (2% more than their application rate), more likely to receive an offer (10% more than their application rate) and as likely to receive tenure. The report concluded that "at many critical transition points in their academic careers (...), women appear to have fared as well as or better than men." Despite this absence of bias, however, fewer women applied for tenure-track positions in the first place, and women were likely to remain as assistant professors for longer and to drop out in greater numbers.

Why is the pipeline then so leaky for women? Children are undoubtedly a factor; a 2007 survey concluded that women who were married with children were 35% less likely to enter a tenure-track

position after earning a PhD than married men with children and 27% less likely than men to achieve tenure on entering a tenure-track job. A 2007 survey of 1,300 NIH postdoctoral fellows found a similar trend; women, particularly those with children, were less likely to consider a principal investigator position (45% compared with 69% of men with children).

Establishing better childcare options will certainly help, but is unlikely to change the status quo much. No matter how good the quality of childcare, women still need to take time out to have children. Even if provisions like a flexible tenure clock are made, taking time away from the lab can only hinder success in a competitive research environment; for example, papers may get scooped or delayed. Unless factors other than publication record, such as mentorship, collaboration and innovation, are given prominence in measuring the productivity of a scientist, women (and men) who take time away for other obligations will invariably be at a disadvantage. Encouraging men to take similar amounts of time off for childcare responsibilities might help level the playing field.

Lack of confidence is also another key factor preventing the rise of women. In a recent survey of NIH fellows, both men and women reported a similar self-assessment of professional skills (such as grant writing, oral presentations, etc), but only 40% of women (as opposed to 59% of men) were confident that they would obtain a principal investigator position. Assuming that they were successful in obtaining a faculty position, only 45% of women (relative to 55% of men) reported confidence that they would get tenure. An analysis of research grant applications from Harvard affiliated institutions showed a similar trend; women were less likely to submit applications, applied for fewer years of funding and requested less research money, despite an absence of bias in the grant-reviewing process.

There are no quick fixes to close the gender gap, and women abandon academic science careers for complex reasons. Unless there is a drastic restructuring of the way academic research is conducted, such as encouraging part-time work, rewarding smaller labs, encouraging more collaborations and lab-sharing, and a fundamental overhaul of how scientists are evaluated and rewarded, women may never make up even close to 50% of this pipeline. Given the tremendous competition for funding and the limited funds available for research, one could argue that, so long as these highly trained women are finding attractive jobs elsewhere, there is no real urgency in demanding change. However, this would be shortsighted. A strong scientific research base is at the heart of a strong economy, and it would be foolish to keep a system in place that consistently bleeds some of its best minds. Just as we celebrate women bridging the gender gap in the general workforce, we need to ensure that the scientific enterprise welcomes women at all levels. ■