

COMMENT

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Biologist Linda Buck won the 2004 Nobel Prize in Physiology or Medicine with neuroscientist Richard Axel (left) for work on how the nose detects odours.

Women who win prizes get less money and prestige

A new analysis of biomedical awards over five decades shows men receive more cash and more respect for their research than women do, report **Brian Uzzi** and colleagues.

Scientists might gauge their success by the usual publishing metrics, or perhaps by how many *Nature* papers they have. Yet the rest of the world cares little for citation counts, publication rates or journal prestige — people are more likely to learn of a scholar's impact through the media buzz surrounding big scientific awards¹. Such prizes also catch the eye of granting agencies, influence the direction of research and bring scientists personal recognition, particularly in the formative period of their careers^{2–4}.

However, there have been surprisingly few quantitative analyses of prizewinning in science, and even fewer that consider nuances

such as prestige and financial rewards⁵.

Unfortunately, the top prizes in science are heavily biased towards men (just as women are disproportionately less likely to be first authors of research articles, and as papers with women in prominent authorship positions attract fewer citations than do those with prominent male authors⁶). Elinor Ostrom is the only woman to have won a Nobel prize for economics (in 2009), and mathematician Maryam Mirzakhani remains the sole female winner of the Fields Medal (in 2014). And until Donna Strickland's share of the physics Nobel last year, no woman had been awarded that prize for 55 years.

In biomedicine prizes, disparities between men and women are less extreme. Of the 599 Nobels awarded in all scientific disciplines since 1901, 12 of the 18 that went to women were in physiology or medicine.

The US National Center for Education Statistics reports that roughly equal numbers of men and women have graduated with advanced degrees in biology and biomedicine since the early 2000s (see go.nature.com/2bwadxj). Since 2008, the proportion of women enrolled in US MD-PhD programmes has been roughly 38% (see go.nature.com/2cke6h), and we calculate that 31% of all biomedical-science authors or ▶

► co-authors in the Web of Science database in 2008–17 are female⁷. And the number of biomedical prizes has almost tripled over the past 40 years⁷.

Have these changes led to more prizes for women? Yes. But our analysis revealed crucial differences in the types of prize that they win.

ELITE LIST

We collected and examined data on winners of prizes in biomedicine over five decades, from 1968 to 2017. We identified the list of prizes using the Wikipedia and Wikidata category of ‘science award’, which is itself determined by the prize organization’s definition. We used prizewinners’ personal Wikipedia pages to identify their gender and to establish which were biomedical scientists, on the basis of the person’s primary research area. This produced a list of 525 prizes won by 2,738 men and 437 women in the biomedical sciences (see Supplementary Information (SI), ‘Awards by year’).

We separately collected data from the official prize web pages of 103 non-overlapping prizes (1,448 men and 434 women) conferred by the ‘Big Five’ US biomedical societies: the American Association for Cancer Research (AACR), the American Society of Clinical Oncology, the Society for Neuroscience, the American Heart Association (AHA) and the Endocrine Society. Prizes include the AACR Award for Outstanding Achievement in Cancer Research and the AHA Excellence Award for Hypertension Research.

Across all 628 awards, the percentage of female prizewinners has risen steadily, from about 5% during 1968 to 1977, to 27% for the latest decade (see ‘Awards gap’, top). This reflects historical imbalances from when there were fewer women in science. Still, the 27% share of prizes is less than the almost 50% of female PhDs in biology and biomedicine, and less than the 38% of enrollees in MD–PhDs, but comparable to the 31% of biomedical papers authored or co-authored by women.

We also found gender differences when we examined the monetary value of awards (see ‘Awards gap’, bottom). For the highest-value awards across the 628 prizes (the top 5%), only 14.6% of recipients were women. Overall, female prizewinners received an average of 64.4 cents of the prize money for every dollar a man received (on average, women received US\$161,782 compared with \$251,115 for men). Dropping the top 5% and bottom 5% of monetary awards to remove outliers, female prizewinners received, on average, 60.2 cents of every prize dollar a man received — or \$64,467 for each female recipient versus \$107,091 for each male winner. (For raw data, see SI, ‘Prize money’.)

PRESTIGE PROBLEM

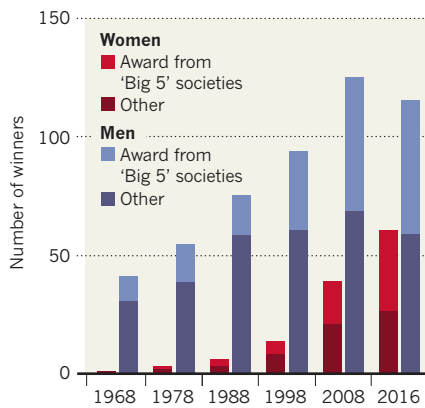
Women win fewer prestigious prizes than men do. To assess prestige in the 525-prize sample, we used a crude proxy: the

AWARDS GAP

Despite gains in the past 50 years, women win fewer prizes, less money and less prestige than men do.

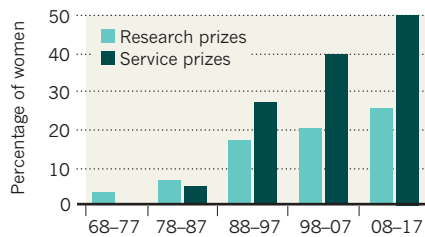
MORE PRIZES, BUT NOT PARITY

The proportion of women receiving biomedical prizes has increased since 1968, but is still under 30%.



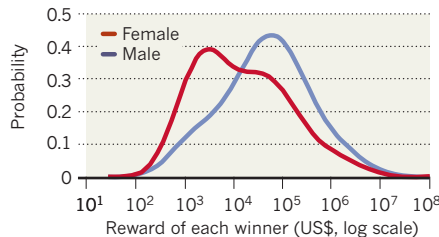
MORE FOR SERVICE

Women are over-represented in awards for advocacy, teaching and so on.



WOMEN GET LESS CASH

Female prizewinners receive an average of 64 cents for every dollar won by men.



average monthly Wikipedia page views for a particular prize from July 2015 to December 2017 (ref. 5). For example, the page for the Nobel Prize in Medicine or Physiology averaged 21,479 views each month, whereas the Breakthrough Prize in Life Sciences averaged 2,348. Of the top 50% most-prestigious prizes, women received only 11.3% of awards across all 5 decades. By comparison, the percentage of women who received this prize subset was 5.1% between 1968 and 1977, and 17.4% between 2008 and 2017.

We found that women are over-represented as recipients of prizes mainly awarded for non-research reasons — including advocacy, education, mentoring, support, teaching and public service — and under-represented as recipients of research prizes (see ‘Awards gap’, middle). For the 103-prize sample, we classified awards as ‘research’ or ‘service’ using the description on the prize

website (see SI, ‘Big 5 prizes’). Service prizes made up about one-fifth of this sample.

In 2008–17, women won 50% of the service prizes and 27% of the research prizes. This pattern is consistent with science historian Margaret Rossiter’s 1993 ‘Matilda hypothesis’ — that women receive less credit for their scientific work than they deserve, which can unduly hamper their advancement^{8,9}. Moreover, the trend has intensified with time. Thirty years ago, women won 27% of service prizes.

Taking all the data together, these patterns suggest that female biomedical scientists are now winning prizes at approximately five times the rate of five decades ago. Yet when compared with their male counterparts, female scientists win awards that receive less money, get less public attention and are less likely to promote career advancement. Although the data do not allow us to pinpoint the causes of gender differences in scientific prizewinning, they do reinforce the findings of case studies and self-reported research on the under-recognition of women’s contribution to science and technology^{10,11}.

Prizewinning puts a scientist on the radar of their peers, the media, funding agencies, tenure committees and the public. Thus, the tracking of prizes could help to raise awareness and to correct gender imbalances in recognition, providing another baseline against which to check progress. That in itself would be a win for the scientific community. ■

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Supplementary information accompanies this article: see go.nature.com/2shcqtq.