THE CHRONICLE OF HIGHER EDUCATION

How Sexist Is Science?

The findings are more complicated than is often reported.

ISTOCK IMAGE

THE REVIEW | ESSAY

By Wendy M. Williams and Stephen J. Ceci

NOVEMBER 30, 2023

When it comes to women and science, portrayals in the elite science media agree: The academy is sexist. Journal and grant reviewers, tenure-track hiring committees, teaching evaluators, salary committees, and letter writers all favor men. We read that "men are preferred to women even if they have the same accomplishments"; that "female candidates are half as likely as male candidates to receive an excellent letter or to have 'standout' adjectives like 'excellent,' 'outstanding,' or 'extraordinary'"; that female scientists "earn just 82 percent of what male scientists make in the United States"; and that "women have fewer publications and collaborators and less funding, and they are penalized in hiring decisions when compared with equally qualified men."

Are these claims of pervasive gender bias true? Few would dispute that such sexism proliferated for decades. But what about today?

We have spent two decades studying women in academic science, exploring why only about one-fifth of professors are female in fields like engineering and computer science. In a recent journal article we wrote with the economist Shulamit Kahn, we discuss claims of sexism in tenure-track science positions that have appeared in the most prestigious scientific outlets, as well as in statements by top professional societies and blue-ribbon reports. These include bias against women in six key domains: tenure-track hiring, journal peer reviewing, grant funding, letters of recommendation for faculty applicants, salary, and teaching evaluations. To say that such claims are omnipresent in prestige science outlets is an understatement.

To explore these questions, we synthesized a vast, contradictory literature on women in academic science published over a 20-year period, from 2000 to 2020. We systematically examined the scientific literature in each of the six key domains and applied metanalyses and other forms of analytical dissection to synthesize the findings.

Of the six areas of gender bias we examined, we found significant evidence of bias against women in two of them, teaching evaluations and salary. Also, although grants in the United States were gender-fair, elsewhere there was bias. Concerning teaching evaluations, we synthesized a very large number of studies across all academic fields and concluded that there was some evidence that students rate female instructors less charitably than they rate men, even when the instructors give the same lecture or when students are misled into believing the lecture was prepared by an instructor of a different gender. But because of the context specificity (e.g., findings vary by discipline, gender match between instructor and student, size of class, instructor's native language, number of points on the rating scale used to evaluate instructors), the clearest example of bias is not found in the quantitative data but rather in verbal descriptions chosen by students to evaluate instructors.

Based on repositories of millions of "Rate My Professor" verbal tags, it is clear that students use negative words like "bossy" and "disorganized" significantly more often when rating female instructors; conversely, positive words are more often associated with male instructors. This alone would not convince us of bias, because it could be argued that men may have been objectively better instructors than women and thus deserved better reviews. However, the experimental evidence usually — but not always — found gender bias even when the content and delivery of lectures were the same and student learning outcomes were also the same.

Much of the truth about scientific careers is far more positive than science journalism tends to admit.

We also concluded that there is a gender gap in salary earnings. Shulamit Kahn, our co-author, began with the frequent claim that women earned only 82 cents on every dollar that men earned. Looking at all science and engineering fields at U.S. institutions, she employed the same statistical technique the American Association of University Professors uses in their annual salary reports and, like the AAUP, found that women were paid only 82 cents on every dollar that men earned.

However, this "82 cents" figure is conflated with gender differences in field of employment (women and men differentially populate high- and low-earning fields), years of experience, publishing productivity (men publish more), and type of institution (two-year, four-year, Ph.D.-granting). These factors are often overlooked in analyses of gender gap in pay, which is as large as it is, in part, because men are more numerous in higher-paying fields like engineering. Another problem: Averaging between older cohorts containing more men and newer cohorts containing more women exaggerates the gender pay gap.

After controlling for such factors, it is clear that men and women in lower-paying fields earn somewhat similar salaries, as do men and women in higher-paying fields. After controlling for differences in fields, type of institutions, and years of experience, the gender gap fell from the widely reported 18-percent wage gap to 7 percent. One study with cross-university data that also had productivity data found that only a 3.6-percent wage gap remained between men and women tenure-track faculty who were otherwise identical (and a recent analysis found that women in the top quantile of

salary actually were paid more than their male counterparts). Although 3.6 percent is far better than the 18-percent wage gap that's often reported, it is nevertheless concerning. If unchecked, a gap of this magnitude will accumulate over the course of a 35-year career into a substantial sum.

As to the charge of bias in grants, we found no systematic gender bias in the awarding of STEM grants in the United States, where women fared as well as men in getting their grants funded. (U.S. grants accounted for 81 percent of the grants we analyzed.) In Canada and Europe, however, men were funded at a higher rate than women. Women everywhere are also less likely than men to submit grant proposals, especially follow-ups on previously unfunded proposals.

In peer-review success and letters of recommendation, we found no systematic gender bias. Manuscripts by women were accepted for publication at equivalent rates to men's, and women applicants for tenure-track jobs received comparably strong letters of recommendation, despite widespread claims to the contrary.

In tenure-track hiring our analyses revealed that women applicants have a substantial advantage over comparable male applicants. In some ways, this was our most meaningful finding, since other types of bias (salary and teaching) are predicated on first being hired. In the three types of analyses we undertook, including one based on national hiring data and one based on experimental evidence (comparing hypothetical male and female job applicants with identical CVs), women did very well.

The experimental evidence reveals that somewhere between a solid to an astounding majority (56-75 percent, depending on the specific study and field) favor the hypothetical female applicant. Women were rated as significantly more competent and hirable than their identically qualified male counterparts. In one large experiment, faculty favored female over identical male applicants in three out of four contests for tenure-track positions. Of course, women Ph.D.s do not apply for tenure-track positions at the same rate as men do for a variety of reasons, some of which

undoubtedly reflect earlier systemic barriers. Other reasons for women choosing not to apply reflect the rigid (and in our view, unnecessary) system of long postdocs and tenure clocks that conflict with childbearing, coupled with our society's expectations that child care should be done more by women than men.

However, large-scale audits of actual hiring in tenure-track science positions in the United States and Canada show that when women do apply for jobs, they are consistently more likely to be invited for an interview and to be offered the job. We found this pro-female hiring advantage in every field in which women are underrepresented, including engineering, physics, computer science, mathematics, and so on, as well as in fields in which they are well-represented, such as biology.

But media coverage has persistently been one-sided. It highlights studies that purport to show evidence of significant gender bias but largely ignores studies, like ours, that complicate or disconfirm that picture. Why has science reporting gotten it so wrong? In general, the reporting errs by cherry-picking evidence from a handful of small, often older studies that became widely known and widely cited in their time, and have had a disproportionate influence. These articles also cite studies that ignore contrary evidence or fail to focus on the highly competent types of people shortlisted for tenure-track positions. They often cite only evidence congruent with the writer's position and ignore counterevidence. This is a recipe for cooking up misleading claims that may ultimately not be replicable — and could possibly even discourage women from applying for academic science positions.

Our finding that women who surmount early-career hurdles and then apply for tenure-track positions get hired at higher rates than men should be an important science story. Our finding that letters of recommendation are gender-fair, that journal reviews are gender-fair, that U.S. grants are gender-fair, and that salary differentials are one-fifth (and possibly less) of what has generally been reported all seem like worthy news stories. And the fact that teaching ratings *are* sexist is valuable information, suggesting that the use of these ratings should be carefully considered.

Nowhere have we asserted that the academy is devoid of sexism. The entire structure of the tenure probationary period and evaluation process is harder on women than men due to women's far-tighter reproductive window. This could, and should, be changed (as we have argued elsewhere). Salaries should be aggressively reviewed and gender gaps eliminated — all that is needed is an administration's will.

But much of the truth about scientific careers is far more positive than science journalism tends to admit. Women interested in tenure-track science careers need these real facts, not cherry-picked evidence and distorted narratives. *Science*, *Nature,* and the rest of science media must do a better job both of publishing and covering the diversity of findings, especially those that go against the narrative they have abetted in the past.

We welcome your thoughts and questions about this article. Please email the editors or submit a letter for publication.

Wendy M. Williams

Wendy M. Williams is a professor of psychology at Cornell University.

Stephen J. Ceci

Stephen J. Ceci is a professor of psychology at Cornell University.