Are women contributing enough to their own career advancement?

Role Model Meeting
Panel Discussion
Women in Physics - Germany

Frauenanteil an Abschlüssen im Fach Physik

Source: DPG
Women in Physics - Germany

Source: DPG
Women in Physics

Source: Stat. Bundesamt

Datenquelle: Statistisches Bundesamt: Personal an Hochschulen, Fachserie 11/Reihe 4.4
Grafik: B. Sandow, Freie Universität Berlin, Institut für Experimentalphysik

Source: Stat. Bundesamt
Women in Natural Sciences and Engineering

Source: DPG
Women in Humanities and Social Sciences

Source: DPG

<table>
<thead>
<tr>
<th>Academic Rank</th>
<th>2001</th>
<th>2005</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full professor</td>
<td>11</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Associate professor</td>
<td>12</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Assistant professor</td>
<td>12</td>
<td>20</td>
<td>27</td>
</tr>
<tr>
<td>Research assistant</td>
<td>24</td>
<td>34</td>
<td>43</td>
</tr>
</tbody>
</table>

Source: IUPAP country reports 2008
<table>
<thead>
<tr>
<th></th>
<th>Female Physics Professors</th>
<th>Female professors (all)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portugal</td>
<td>26%</td>
<td>17%</td>
</tr>
<tr>
<td>Turky</td>
<td>11%</td>
<td>22%</td>
</tr>
<tr>
<td>Germany</td>
<td>3%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Source: IUPAP country reports 2008
Women in Science – Other countries

- Assistant professor
- Associate professor
- Full professor

Source: IUPAP 2002
## Women in Physics – Civil Status

<table>
<thead>
<tr>
<th>Civil Status</th>
<th>Male</th>
<th>Female</th>
<th>Male &gt; 45 y</th>
<th>Female &gt; 45 y</th>
</tr>
</thead>
<tbody>
<tr>
<td>married or with partner</td>
<td>70.9%</td>
<td>63.1%</td>
<td>84.3%</td>
<td>60.9%</td>
</tr>
<tr>
<td>single</td>
<td>29.2%</td>
<td>36.9%</td>
<td>15.7%</td>
<td>39.1%</td>
</tr>
<tr>
<td>with physicist partner</td>
<td>9%</td>
<td>54.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with non-working partner</td>
<td>25%</td>
<td>~ 0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with children</td>
<td>50.9%</td>
<td>29.4%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Women in Science – Family and Children

Source: IUPAP 2010
Women in Physics

Anglo-Saxon Europe

Regional Averages

Source: IUPAP 1990-2002
Despite efforts to recruit and retain more women, a stark gender disparity persists within academic science. Abundant research has demonstrated gender bias in many demographic groups, but has yet to experimentally investigate whether science faculty exhibit a bias against female students that could contribute to the gender disparity in academic science. In a randomized double-blind study (n = 127), science faculty from research-intensive universities rated the application materials of a student—who was randomly assigned either a male or female name—for a laboratory manager position. Faculty participants rated the male applicant as significantly more competent and hirable than the (identical) female applicant. These participants also selected a higher starting salary and offered more career mentoring to the male applicant. The gender of the faculty participants did not affect responses, such that female and male faculty were equally likely to exhibit bias against the female student. Mediation analyses indicated that the female student was less likely to be hired because she was viewed as less competent. We also assessed faculty participants’ preexisting subtle bias against women using a standard instrument and found that preexisting subtle bias against women played a moderating role, such that subtle bias against women was associated with less support for the female student, but was unrelated to reactions to the male student. These results suggest that interventions addressing faculty gender bias might advance the goal of increasing the participation of women in science.

A 2012 report from the President’s Council of Advisors on Science and Technology indicates that training scientists and engineers at current rates will result in a deficit of 1,000,000 workers to meet United States workforce demands over the next decade (1). To help close this formidable gap, the report calls for the increased training and retention of women, who are starkly underrepresented within many fields of science, especially among the professoriate (2–4). Although the proportion of science degrees granted to women has increased (5), there is a persistent disparity between the number of women receiving PhDs and those hired as junior faculty (1–4). This gap suggests that the problem will not resolve itself solely by more generations of women moving through the academic pipeline but that instead, women’s advancement within academic science may be actively impeded.

With evidence suggesting that biological sex differences in aptitude and performance (6–8), the efforts of many researchers and academic leaders to identify causes of the science gender disparity have focused instead on the life choices that may compete with women’s pursuit of the most demanding positions. Some research suggests that these lifestyle choices (whether free or constrained) likely contribute to the gender imbalance (9–11), but because the majority of these studies are correlational, whether lifestyle factors are solely or primarily responsible remains unclear. Still, some researchers have argued that women’s preference for nonscience disciplines and their tendency to take on a disproportionate amount of child- and family-care are the primary causes of the gender disparity in science (9–11), and that it “is not caused by discrimination in these domains” (10). This assertion has received substantial attention and generated significant debate among the scientific community, leading some to conclude that gender discrimination indeed does not exist nor contribute to the gender disparity within academic science (e.g., refs. 12 and 13).

Despite this controversy, experimental research testing for the presence and magnitude of gender discrimination in the biological and physical sciences has yet to be conducted. Although acknowledging that various lifestyle choices likely contribute to the gender imbalance in science (9–11), the present research is unique in investigating whether faculty gender bias exists within academic biological and physical sciences, and whether it might exert an independent effect on the gender disparity as students progress through the pipeline to careers in science. Specifically, the present experiment examined whether, given an equally qualified male and female student, science faculty members would show preferential evaluation and treatment of the male student to work in their laboratory. Although the correlational and related laboratory studies discussed below suggest that such bias is likely (contrary to previous arguments) (9–11), we know of no previous experiments that have tested for faculty bias against female students within academic science.

If faculty express gender biases, we are not suggesting that these biases are intentional or stem from a conscious desire to impede the progress of women in science. Past studies indicate that gender discrimination by faculty against female students is as prevalent as gender discrimination against male students. The fact that these prevalent biases often remain undetected highlights the need for an experimental investigation to determine whether they may be present within academic science and, if so, raise awareness of their potential impact.

Whether these gender biases operate in academic sciences remains an open question. On the one hand, although considerable research demonstrates gender biases in a variety of other domains (9–25), science faculty members may not exhibit this bias.
- Male Student
- Female Student

- Competence
- Hireability
- Mentoring