Analysis of Research Performance Through a Gender Lens

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On behalf of the report team

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Report Context
A Strong Foundation

**New Scholars Program:**
10 years, 50 grants, ca $2.5 million

Advancing women scientists: grants for family friendly policies, career skills, dual career issues, recognition awards, benchmarking studies & boosting professional visibility through childcare grants.

Elsevier Foundation Awards for Early-Career Women Scientists in the Developing World
Global Initiatives

A Call for Data

National Institutes of Health addresses the science of diversity

Hannah A. Valantine and Francis S. Collins

“...solid body of evidence to understand the impacts of diversity...”

Title of Presentation

The US biomedical research workforce does not currently mirror the nation’s population demographically, despite numerous attempts to increase diversity. This imbalance is limiting the promise of our biomedical enterprise for building knowledge and improving the nation’s health. Beyond ensuring fairness in scientific workforce representation, recruiting and retaining a diverse set of minds and approaches is vital to harnessing the complete intellectual capital of the nation. The complexity inherent in diversifying the research workforce underscores the need for a rigorous scientific approach, consistent with the ways we address the challenges of science discovery and translation to human health. Herein, we identify four cross-cutting diversity challenges ripe for scientific exploration and opportunity: research evidence for diversity’s impact on the quality and outputs of science; evidence-based approaches to recruitment and training; individual and institutional barriers to workforce diversity; and a national strategy for eliminating barriers to career transition, with scientifically based approaches for scaling and dissemination. Evidence-based data for each of these challenges should provide an integrated, stepwise approach to programs that enhance diversity rapidly within the biomedical research workforce.


NSF will continue to advance equity through data-driven decision-making.

...global equity for women in science... is a call to action...
Information Analytics Expertise

Research Intelligence
Custom and Analytical Reports from Elsevier

Analytical Services provides accurate, unbiased analysis on research performance by combining high quality data sources with technical and research metrics expertise accrued over Elsevier’s 130 years in academic publishing.

Our analytics team is experienced in serving policy makers, funders, and academic and corporate research institutions around the world. Our offerings range from simple, targeted reports to comprehensive multidimensional studies, as well as data delivery and web integration services to meet your research management needs.

Sample Reports

Gender in the Global Research Landscape
Critical issues related to gender disparity and bias must be examined by sound studies. Drawing upon our high-quality global data sources, analytical expertise, and unique gender disambiguation methodology, this report is an evidence-based examination of research performance worldwide through a gender lens. Covering 20 years, 12 geographies and all 27 Scopus subject areas, this report provides powerful insight and guidance on gender research and gender equality policy for governments, funders and institutions worldwide.

Sustainability Science in a Global Landscape
A report conducted by Elsevier in collaboration with SciVal

This report contributes to the understanding of sustainability science as a research field and the dialogue between science and society in sustainable development. In this relatively young field, this study establishes a baseline, both in the definition and the understanding of sustainability science, from which we may follow its progression and trajectory. Six key themes that encompass the 17 UN Sustainability Development Goals are examined: Dignity, People, Prosperity, Planet, Justice and Partnership.

Mapping Gender in the German Research Arena
Equality is part of equality in science. Making full use of the potential of both women and men maximizes the quantity and, more importantly, quality of research. Despite current policies and regulations, there are prominent gaps between women and men in terms of the number of scientific researchers, decision-making positions held, and other aspects of career development such as informal networks of collaboration and access to funding.

America’s Knowledge Economy: A State-by-State Review
Explores the comparative research strengths of US states, providing an understanding of the broader importance of research produced by public universities. This report helps inform the debate about academic research funding and provides a framework for identifying, showcasing, and aligning the expertise of research institutions with each state’s policy goals.

Brain Science: Mapping the Landscape of Brain and Neuroscience Research
The report focuses on brain science research output on a national level, levels of collaboration within brain research, cross-disciplinary researcher mobility, and emerging trends and themes in brain research. It provides various stakeholders in brain research - funders, governments, universities, research institutions, and policy groups - with a resource that can help inform decisions about future research strategies and funding priorities, guide international coordination and collaboration, and steer policy and advocacy efforts.

A Decade of Development in Sub-Saharan African Science, Technology, Engineering, and Mathematics (STEM) Research
The World Bank and Elsevier partnered to examine and compare the research enterprise of Sub-Saharan Africa from 2003 to 2013, with a special emphasis on research in STEM. This report focuses on research output and citation impact, regional and international research collaboration, and researcher mobility - all important indicators of the strength of the subcontinent's research enterprise.

Download these FREE reports and more at www.elsevier.com/solutions/analytical-services
Overview & Key Findings
The Report

- **Evidence-informed** introduction

- **Data** chapters
  - Overview of research performance (outputs, quality, and impact) through a gender lens;
  - Gender comparison of social aspects of research, including leadership, collaboration, and mobility;
  - Snapshot of published gender research as a discipline

- **Interviews** with global experts and influencers for context
Interviews

Miyoko O. Watanabe
Deputy Executive Director, Office for Diversity and Inclusion, Japan Science and Technology Agency (JST), Japan

James Stirling
Provost, Imperial College, United Kingdom

Vladimir Šucha
Director-General, Joint Research Centre European Commission, European Union

Londa Schiebinger
The John L. Hinds Professor of History of Science and Director, Gendered Innovations in Science, Health & Medicine, Engineering, and Environment, Stanford University, United States
Key Findings: United States

• Proportion of women researchers in the US is 40% (2011-2015)
• Women tend to specialize in the life and health sciences
• Women’s citation and download impact is very slightly higher than men’s
• Proportion of women among inventors is 14%
• 23% of patent applications list a women among their authors
• Women collaborate internationally less than men
• Women collaborate across the academic and corporate sectors at a similar rate to men
• 8% of women’s scholarly output belongs to the top 10% interdisciplinary papers
Methodology
# Global Advisers and Subject Experts

## United States

- Harvard University
- Stanford University
- Reed College

## EU

- Fraunhofer IAO
- GenPORT
- Joint Research Centre (JRC)
- WIPO

## Asia Pacific

- Japan Science and Technology Agency
- Australian National University
- Gender Institute
Gender Disambiguation Methodology

Scopus

genderize.io

NamSor

SOCIAL MEDIA

Mass culture

Sociolinguistics

Variation

Style

Critical

Text

Media
Comparator Selection

- Global coverage
- Countries/regions with high research output
- Each with at least one comparable comparator
- Applicability of our gender disambiguation methodology
- At least two countries from each major region
- A practical limit in a single report given our analyses
The Results
CHAPTER 1
The global research landscape through a gender lens
Proportion of women among researchers and inventors is increasing.

Women comprise more than 40% of researchers in nine regions in 2011-15.

In the US, 40% of researchers are women, an increase of 9 percentage points since 1996-2000.

Researchers = Authors who have published articles, reviews, and conference proceedings indexed in Scopus.
Proportion and Number of US Researchers
by gender and subject area

- Lower proportion of women among researchers for most comparators:
  - Energy (18%)
  - Engineering (21%)
  - Mathematics (21%)
  - Physics & Astronomy (21%)

- Majority of researchers are women in:
  - Nursing (62%)
  - Psychology (57%)

- Fields in which women comprise nearly half of researchers:
  - Social Sciences (48%)
  - Veterinary Sciences (48%)
  - Medicine (46%)
  - Health Professions (45%)
  - Arts & Humanities (45%)

Sources: Scopus, Genderize, NamSor, and Wikipedia
Scholarly Output Per Researchers

by gender and comparator

- Men publish slightly more papers on average than women in the majority of comparators and the US
- Both men and women see a minute decline in average number of papers per researcher over time

Sources: Scopus, Google, Namsor, and Wikipedia
Citation Impact by gender and comparator

- Women and men tend to have similar citation and download rates
- The US is the only comparator country in which the FWCI for women is higher than for men
- In the UK and EU, the FWCI is about equal for men and women. Brazil, Portugal, Mexico, and Chile all show slightly higher FWCI values for men researchers than for women researchers.
Proportion and Number of Inventors by gender and comparator

- Amongst inventors, women are generally under-represented: women represent no more than 26% (Portugal) of inventors in 2011-2015.
- In the US, women represent 14% of inventors in 2011-2015, up from 12% in 1996-2000.
- The number of women named on patent applications is nearly 3X as high in 2011-2015.
- For all reported comparators, there is an improvement in gender balance between the analyzed periods.
Proportion of Patent Applications by gender and comparator

- For the US, the percentage of patent applications that include at least one woman among inventors increased from 19% to 23% in 2011-2015 (globally 19% to 28%)

- Higher proportion than the EU, UK, Canada, Australia, Brazil, Japan, Denmark, Mexico, Chile

- Observe an increase for all comparator countries and regions

- For most, the share of patents with at least one woman named among the inventors is about twice as high as the share of women among inventors
CHAPTER 2

Gender and research leadership, collaboration, interdisciplinarity, and mobility
Leadership
First & corresponding authorship
Engineering (2011-2015)

• Women researchers significantly outnumbered by men in engineering: 79% of researchers in the US are men

• When men appear as authors in Engineering papers, they are more likely to take the first or corresponding author position

• In the US, women are first or corresponding author on 20% fewer papers than men

Sources: Scopus, Gendence, NamSor, and Wikipedia
Academic-Corporate Collaboration

- The US has relatively high shares of papers reflecting academic-corporate collaboration for both men and women.

- The proportion of scholarly output resulting from academic-corporate collaboration is similar for women and men.

- For most comparators, the proportion of cross-sector collaboration increases slightly between periods for both men and women.

Sources: Scopus, Gendex, Namsor, and Wikipedia.
Interdisciplinary Research

- The proportion of output that belongs to the top 10% interdisciplinary output is 8% for both women and men in the US.

- Women tend to have the same or a slightly higher share than men of interdisciplinary research across all comparators.

- For most, the proportion decreases for women and increases for men between over time.
Next Steps & Additional Resources
STMJ Gender Graphing Tool

STMJ now have access to the author data used for the report + an Excel-based graphing tool.

Select and compare subjects and countries/regions of interest to see the representation of women and men among researchers (examples below):

- Access to the shares of women and men among researchers for **27 subject areas (ASJC 27)** across **43 countries/regions**
- Generate **charts and tables** showing comparisons of subjects/regions at the click of a button
- The tool provides subject-specific benchmarks to help us **analyse and contextualise gender balance on our editorial boards**.

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**Engineering:**

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Women %</th>
<th>Men %</th>
<th>Women Authors</th>
<th>Men Authors</th>
<th>Total Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>23%</td>
<td>77%</td>
<td>68,444</td>
<td>258,025</td>
<td>326,469</td>
</tr>
<tr>
<td>EU28</td>
<td>24%</td>
<td>76%</td>
<td>123,356</td>
<td>388,253</td>
<td>511,609</td>
</tr>
<tr>
<td>Japan</td>
<td>10%</td>
<td>90%</td>
<td>13,730</td>
<td>121,451</td>
<td>135,181</td>
</tr>
</tbody>
</table>

**EU28:**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Women %</th>
<th>Men %</th>
<th>Women Authors</th>
<th>Men Authors</th>
<th>Total Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>41%</td>
<td>59%</td>
<td>985,025</td>
<td>1,389,772</td>
<td>2,354,797</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>42%</td>
<td>58%</td>
<td>124,113</td>
<td>173,725</td>
<td>297,838</td>
</tr>
<tr>
<td>Chemistry</td>
<td>38%</td>
<td>62%</td>
<td>122,524</td>
<td>202,089</td>
<td>324,613</td>
</tr>
<tr>
<td>Medicine</td>
<td>48%</td>
<td>52%</td>
<td>567,539</td>
<td>816,840</td>
<td>1,384,379</td>
</tr>
</tbody>
</table>

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*Gender in the Global Research Landscape*
Gender Working Group

Trans-business unit

- **Gender diversity** for journal editorial boards, speakers/panelists at Elsevier conferences, and award selection committees
- Enhanced editorial policies and guidance to authors on reporting about sex and gender in research
- Address issues of bias in review
- **Promote research** on i) sex & gender studies in research and ii) diversity in STEM
Economic Dividends for Gender Equality (EDGE) Certification

Elsevier Attains EDGE Assess Certification for Gender Equality

Reinforces commitment to maximizing talent, innovation and becoming a lead technology employer in gender equity

Report and Other Materials

- **Download the Report & Infographic**
  - [https://www.elsevier.com/research-intelligence/campaigns/gender-17](https://www.elsevier.com/research-intelligence/campaigns/gender-17) – Infographics

- **Access the Data**
  - The raw data behind the report is shared on the [Mendeley Data platform](https://data.mendeley.com/datasets/bb3cjfgm2w/draft?a=142e523e-4b73-4829-99a8-ebb5c526c103)

- **Access the References**
  - Public [Mendeley group](https://www.mendeley.com/community/gender-in-the-global-research-landscape/), a powerful community resource for anyone to join and contribute

- **Gender & Research Resource Center**
  - Dynamic resource with information about gender and women in STEM activities, initiatives, and programs
Thank you!

www.elsevier.com/research-intelligence

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