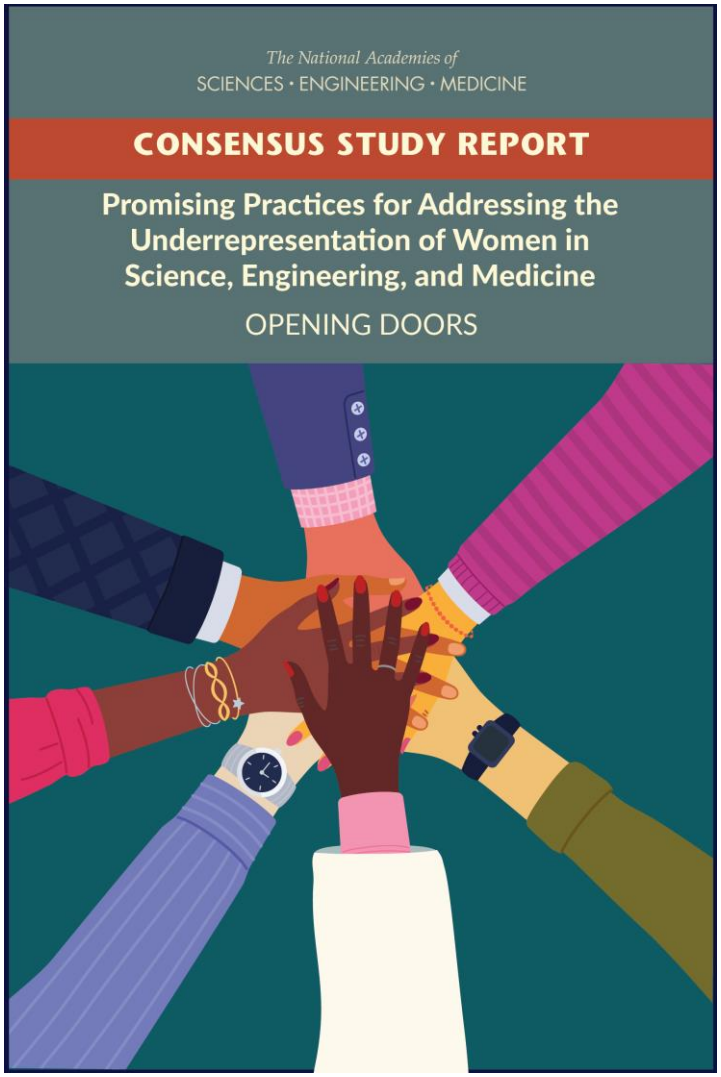
The National Academies of SCIENCES ENGINEERING MEDICINE

COMMITTEE ON WOMEN IN SCIENCE, ENGINEERING, AND MEDICINE



Promising Practices Presentation for Women & COVID-19 Committee Meeting

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Program Officer

Study Statement of Task

An ad hoc committee will undertake the following activities:

- A comparative examination of research on why women are more underrepresented in some STEMM disciplines than others, with a particular focus on computer science, engineering, physics, mathematics, medicine, chemistry, and biology.
- A review, analysis, and synthesis of existing research on the policies, practices, programs, and other interventions for improving the recruitment, retention, and sustained advancement into leadership roles of women in these disciplines and at different stages in career trajectories.
- An exploration of why effective interventions have not been scaled up or adopted by more institutions.
- The development of recommendations for implementing promising policies and practices to improve both the representation and leadership of women within specific STEMM disciplines.

Study Statement of Task: The Short Version

In short, the report addresses four questions:

1.) What is the problem? (Chapters 1 and 2)

2.) What are possible solutions? (Chapters 3 and 4)

3.) Why don't we see more progress? (Chapter 5)

4.) What can be done? (Chapter 6, Recommendations)

Study Committee Members

- **RITA COLWELL**, Ph.D. (Chair) [NAS],* Distinguished University Professor, University of Maryland at College Park and Johns Hopkins University Bloomberg School of Public Health
- **GILDA A. BARABINO**, Ph.D. [NAE],* Daniel and Francis Berg Professor and Dean, The Grove School of Engineering, The City College of New York
- **MAY R. BERENBAUM**, Ph.D. [NAS],* Swanlund Professor of Entomology, University of Illinois at Urbana-Champaign; Editor-in-Chief, Proceedings of the National Academy of Sciences
- **VIVIAN W. PINN**, M.D. [NAM],* Founding Director (retired), Office of Research on Women's Health, National Institutes of Health
- **BILLY WILLIAMS**, M.S., Senior Vice President for Ethics, Diversity, and Inclusion, American Geophysical Union

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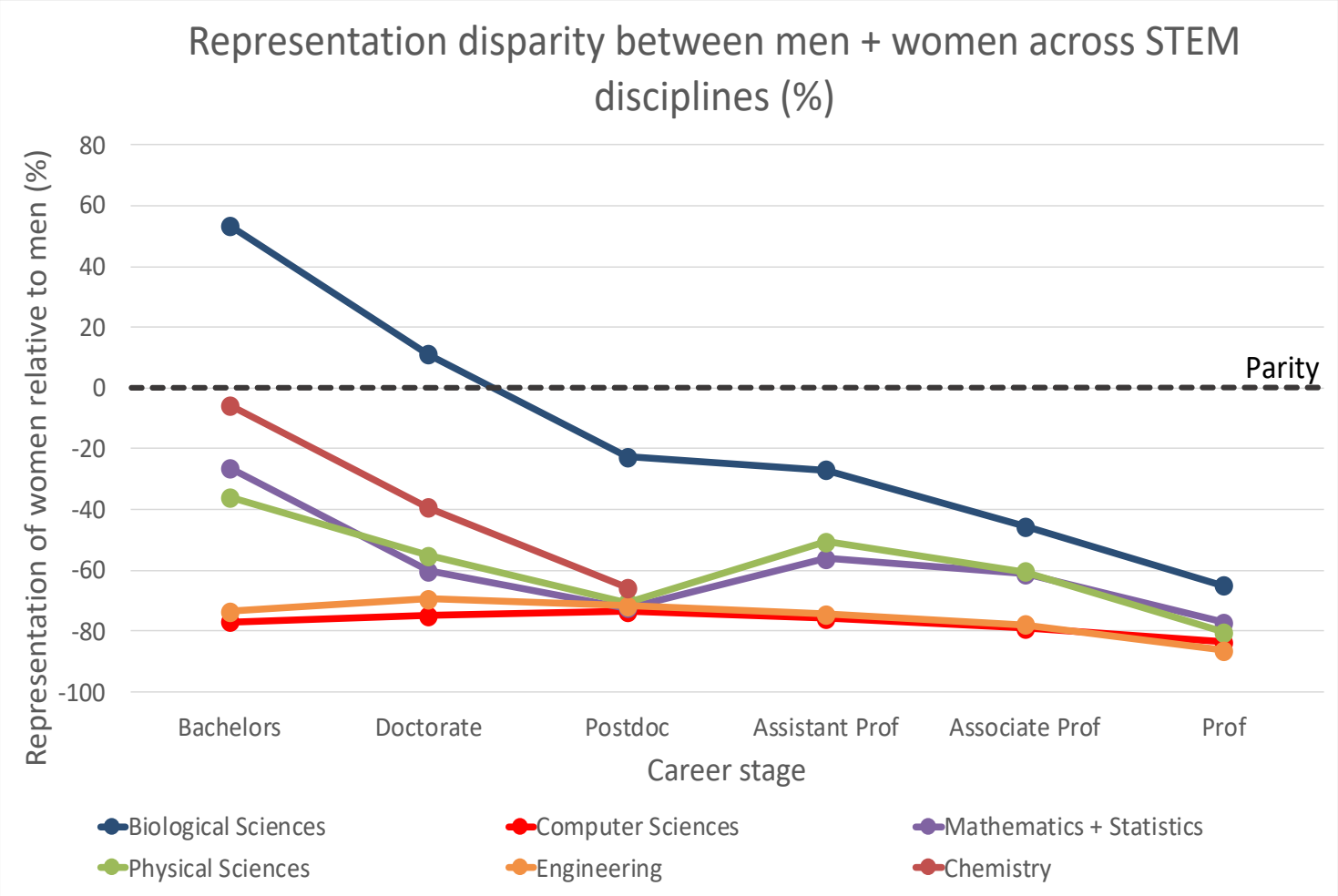
What is the Problem?



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Finding: Why Women are Underrepresented

- **Bias, discrimination, and harassment** are major drivers of the underrepresentation of women in science, engineering, and medicine).
- Women of color experience isolation, exclusion, cumulative disadvantages, and more.

Biology and Medicine

- "hustle" culture that encourages work-life blurring
- commitment to job
- ideal worker norm

Physics, Engineering, and Computer Science

- "innate brilliance"
- gender disparities in pay
- lack of recognition and advancement opportunities

Step 1: Diagnose your Problem

- Collect and monitor department-level data over time on the:
  - Demographic composition of the students currently enrolled and recently graduated in a given department or college. These data should be disaggregated by gender and race/ethnicity.
  - Longitudinal demographic composition of the faculty disaggregated by faculty rank, department, gender, and race/ethnicity.
  - Longitudinal demographic composition of postdoctoral researchers, residents, clinical fellows and staff scientists, disaggregated by department, gender, and race/ethnicity.

Tenure-Track Faculty Composition by Gender, Race-Ethnicity, and Rank.

Academic Year 1979-2018.

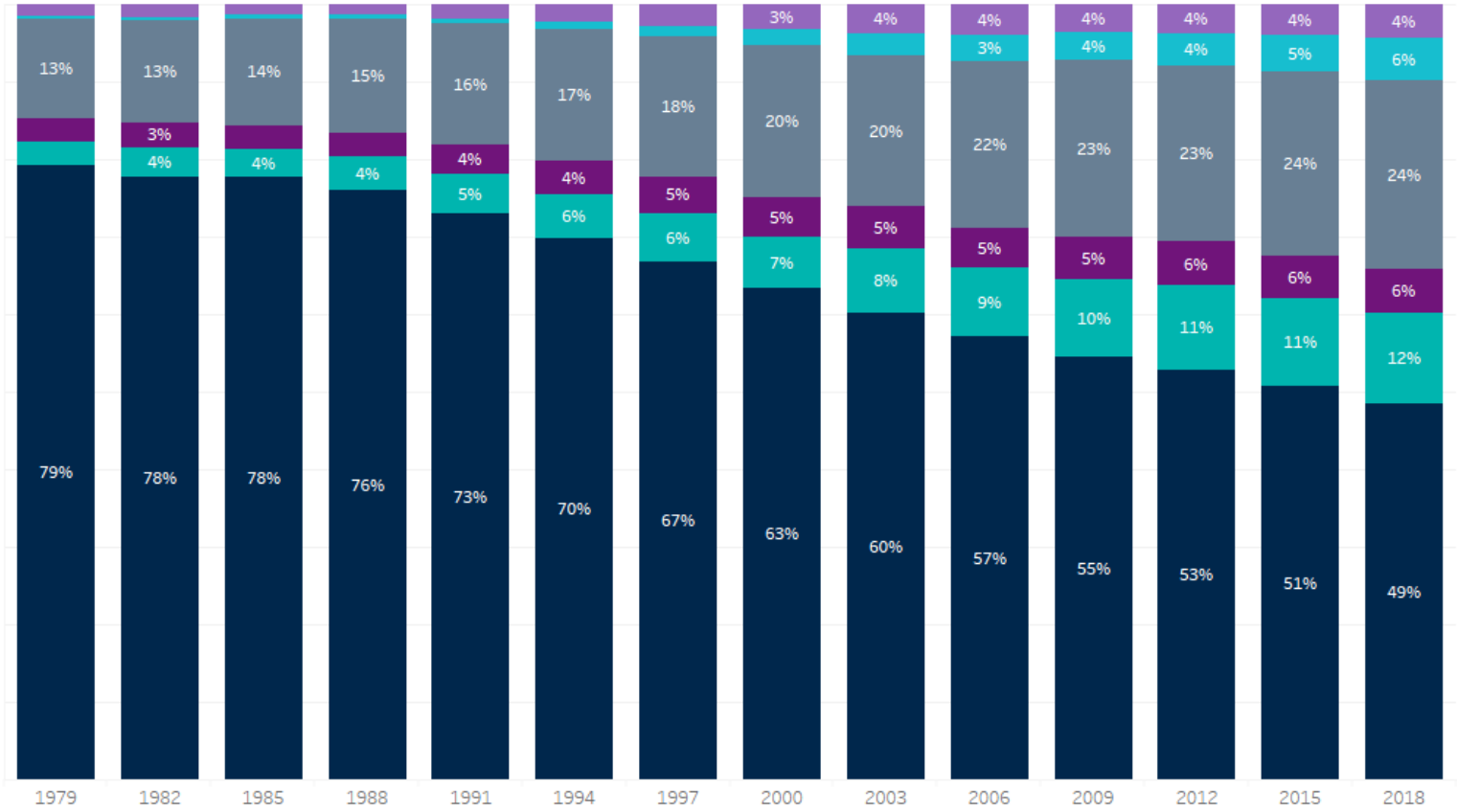
This figure illustrates changes in the demographic composition of tenure-track faculty at the University of Michigan from AY1979 through AY2018. We define six gender/race-ethnicity groups: underrepresented minority (URM) women and men (including African American, Hispanic/Latino, and Native American), Asian/Asian American (A/AA) women and men (including Pacific Islander and Hawaiian), and white women and men. This figure displays percentages of the faculty; hover over each bar for more information about size of the faculty.

Group

- Under-represented Minority Women
- Under-represented Minority Men
- Asian/ Asian American Women
- Asian/ Asian American Men
- White Women
- White Men

Select a Faculty Rank: All

Select a School/College: All



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Diagnose your Problem, continued

- Carry out qualitative research on the climate of the school or department
  - Use an evaluator outside of the relevant unit to support periodic climate research to assess the climate in the school or department
  - Protect the anonymity of individuals, but accurately capture their experiences through interviews, or conduct research across an institutional system.

What are Possible Solutions?

The scholarly research and real world examples point to promising practices that can support women in STEMM. In the report we consider such promising practices as they relate to:

1. **Educational approaches** (Chapter 3)
   - *Active learning, growth mindset, changing the image of STEMM fields, role models, mentoring*

2. **Practices and strategies that can support improved recruitment, retention, and advancement** of women in STEMM (Chapter 4)

EDUCATIONAL APPROACHES

Research on women in STEMM education demonstrates that approaches that challenge stereotypes about the essential attributes of a successful STEMM professional and about the nature of work in STEMM can increase interest, improve performance, and instill a sense of belonging in these fields among white women, women of color, and other underrepresented groups.

1 REORGANIZE STEMM COURSES TO INCORPORATE ACTIVE LEARNING EXERCISES

Active learning generally improves learning among all students and is particularly beneficial for women in STEMM.

2 INCORPORATE GROWTH MINDSET INTERVENTIONS

Impress upon students that skills and intelligence are not fixed, but rather, are increased by learning, help all students, including those who have traditionally been underrepresented in STEM, including women and underrepresented minorities.

3 ENCOURAGE INDIVIDUALS TO INTROSPECT ON WHY AS, OPPOSED TO HOW, SCIENTISTS CONDUCT RESEARCH

Such interventions increase beliefs that STEMM careers broadly satisfy communal ambitions and enhances both male and female students' positive attitudes towards those careers.

4 ENSURE THAT WOMEN SEE RELATABLE ROLE MODELS

Role models could come in the form of an instructor or guest lecturer, but could also be featured in media (e.g. podcasts, television shows, textbooks, movies, etc.). The advantage of the latter is that it eases the service burden on women in STEMM.

5 PROVIDE EFFECTIVE MENTORS

Having mentors during college is one of the best predictors of women's reported involvement in their STEMM major. Lack of mentorship is a particular challenge for women in engineering, chemistry, and mathematics. Mentorship for women of color is particularly important.

Limitations to research

- Research has failed to take into account the intersection of gender with other marginalized identities
- Information on institutional context is lacking
- These strategies will not get rid of biases, but can help mitigate them

Recruitment

1. Actively recruit year-round and expand networks of candidates
2. Represent the organization, program, and position in terms that make evident how it might appeal to a broad range of applicants
3. Examine job and admissions requirements to assess vulnerability to bias, adequacy as accurate indicators of talent, and relevance to success
4. Explicitly establish criteria for evaluation before assessing the pool of applicants

Candidate Evaluation Template

The following offers a method for department faculty to provide evaluations of job candidates. It is meant to be a template for departments that they can modify as necessary for their own uses. The proposed questions are designed for junior faculty candidates; however, alternate language is suggested in parentheses for senior faculty candidates.

Candidate's Name: _____

Please indicate which of the following are true for you (check all that apply):

- ☐ Read candidate's CV and statements (e.g. teaching diversity)
- ☐ Read candidate's scholarship
- ☐ Read candidate's letters of recommendation
- ☐ Attended candidate's job talk
- ☐ Met with candidate
- ☐ Attended lunch or dinner with candidate
- ☐ Other (please explain): _____

Please comment on the candidate's scholarship as reflected in the job talk.

Please comment on the candidate's teaching ability as reflected in the job talk:

Please rate the candidate on each of the following:	excellent	good	neutral	fair	poor	unable to judge
Potential for (evidence of) scholarly impact in the classroom	☐	☐	☐	☐	☐	☐
Potential for (evidence of) research productivity	☐	☐	☐	☐	☐	☐
Potential for (evidence of) research funding	☐	☐	☐	☐	☐	☐
Potential for (evidence of) collaboration	☐	☐	☐	☐	☐	☐
Potential for (evidence of) contribution to department's priorities	☐	☐	☐	☐	☐	☐
Ability to make positive contribution to department's climate	☐	☐	☐	☐	☐	☐
Potential (demonstrated ability) to attract and supervise diverse graduate students	☐	☐	☐	☐	☐	☐
Potential (demonstrated ability) to teach and supervise diverse undergraduates	☐	☐	☐	☐	☐	☐
Potential (demonstrated ability) to be a conscientious university community member	☐	☐	☐	☐	☐	☐

Other comments? _____

Recruitment Continued

5. Hold those responsible for admissions and hiring decisions accountable for outcomes at every stage of the application and selection process

6. Educate evaluators about best practices to mitigate biases in hiring and admissions

7. Use structured interviews and avoid asking inappropriate or illegal questions

Advancement

1. Sponsor women in senior leadership
2. Establish clear metrics for promotion and advancement and mitigate bias
   a) appoint a “bias interrupter”
   b) have more than one person carry out the evaluation
   c) use clear and specific performance criteria
   d) provide a “bounceback”
3. Recognize and reward outstanding contributions to STEMM
4. Encourage and Reward Contributions to Diversity, Equity, and Inclusion

	Individual impact: Equity work with individual students, faculty, community members or organizations	**Programmatic impact**: Equity work establishing or providing significant leadership to a formalized program	**Institutional impact:** Contributing to efforts that strengthen institutional policy or practice
RESEARCH	*Research agenda incorporates equity and inclusion issues and/or diversity in objects of study (e.g. Psychology faculty incorporates diverse individuals within theirsubject pool)	*Leading or participating in a research group that addresses equity and inclusion(e.g. Law school faculty leads a research group on gender and labor)	*Establishing or supporting the creation of new academic initiatives(e.g. Education faculty establishes a disability studies research initiative)
TEACHING	*Efforts toward equity, diversity and inclusion in undergraduate and graduate teaching and mentoring(e.g. Journalism faculty incorporates themes of equity and inclusion within introductory course assignments)	*Participating in a disciplinary mentorship or pipeline program(i.e. PPPM faculty attends mentorship conference for underrepresented graduate students)	*Creating a new academic program, courses or graduate specialization focused on equity(e.g. Ethnomusicologist leads development of a new MA program in music of the African diaspora)
SERVICE	*Work with diverse groups of individual students and/or organizations on and off campus(e.g. Business faculty advises undergraduate Women in Business group)	*Participating in program building efforts (e.g. Environmental studies faculty collaborates with indigenous groups to produce multiple environmental impact studies)	*Creation or leadership role in new UO program serving community constituencies(e.g. Economist establishes summer pipeline program for low income high school students)

Retention and Organizational Climate

Create a supportive working environment for a diverse group of students and employees by:

- Devoting resources to support research, teaching, advancement, and career development.
- Creating structures that promote fairness and transparency.
- Treating employees with respect in both their personal and professional lives

Retention and Organizational Climate Continued

1. Ensure fair and **equitable access to resources** for all employees and students such as:
   a) Equal knowledge of institutional resources
   b) Transparency about how resources are allocated
   c) Institutionalize effective policies and practices
2. Create a **respectful and equitable organizational climate by:**
   a) Being transparent about decisions making
   b) Create a shared set of values and beliefs
   c) Make use of facilitators of positive organizational climates such as:
      i. Mentoring and social networks
      ii. Individuals' involvement
      iii. The culture and climate within particular disciplines
      iv. Climate assessments
3. Policies and resources should work to **address** the **family-related needs** of students and employees

Why Don't We See More Progress?

Research points to a common set of conditions that support successful institutional adoption of practices to improve the recruitment, retention, and advancement of women, including:

- **Committed leadership at all levels**
- **Dedicated financial and human resources**
- **Accountability and data collection**
- **Adoption of an intersectional approach**

Committed Leadership at all Levels

"I think a lot of times people know what the best practices are, and would personally be supportive of them, but they feel like they're going to incur too much backlash…if they're not secure in their base of power, they feel like rocking the boat too much isn't something that they want to push for… 'Why am I going to go out on a limb to do this? There's no real incentive for me to do it, for me personally as the leader.' And so, they're just unwilling to go up against the very strong faculty members who are loud, and don't want to make the changes."

-focus group participant

Dedicated Financial and Human Resources

"We had funds that were put aside for opportunity hires for underrepresented women and underrepresented minority men and women. And over time they were used for all kinds of things. Whoever the provost was who came in or whatever the president wanted, the funds got used, and they eventually disappeared."

-focus group participant

Accountability and Data Collection

"We're all so data driven. Yes, we're all in the science field. For us, if you could provide data you can get people interested in solving the problem. I would love to learn more about how we systematically make sure [that] we're collecting the data in similar ways. That might be an outcome that will benefit us all. Clearly, that's how we set our organizational priorities: somebody has to show me the data."

-focus group participant

Adoption of an Intersectional Approach

"Most colleagues, I think, are reluctant to engage it…the indifference or resistance to hiring underrepresented minorities. It's quite astonishing that in some schools they've just hired their first African American. In fact, if you look at African American or Latino women, in some cases there are whole segments of higher education, STEMM fields, that haven't hired any."

-focus group participant

Recommendations

The interconnected and mutually reinforcing recommendations from *Promising Practices for Addressing the Underrepresentation of Women in Science, Engineering, and Medicine*

Questions?