



Promising Practices For Addressing the Underrepresentation of Women in Science, Engineering, and Medicine: Opening Doors

In recent years, the absolute number of women earning degrees across science, engineering, and medical fields has increased relative to men. Despite these gains, women—especially women of color—are underrepresented with respect to their presence in the workforce and the U.S. population. Disparities in representation vary by discipline and field, yet even in professions in which women are at parity or overrepresented, as is the case in certain sub-disciplines within biology and medicine, there remains a dearth of women among the senior ranks. The underrepresentation of women in these fields has consequences, including:

- **A national labor shortage** in many science, engineering, and medical professions, particularly in technical fields, that cannot be filled unless institutions and organizations recruit from a broad and diverse talent pool.
- **Lost opportunities for innovation and economic gain**, since research shows that more diverse teams generate more innovative solutions to problems, publish higher-impact articles, and raise a company's bottom line. In other words, there are opportunity costs to perpetuating a scientific workforce that lacks diversity.
- **Lost talent** as a result of discrimination, unconscious bias, and sexual harassment, which often prevent women from pursuing or remaining in careers in science, engineering, and medicine.

To address this issue, the National Academies of Sciences, Engineering, and Medicine published a report that offers a comprehensive overview of strategies for improving recruitment, retention, and advancement of women in science, engineering, and medical fields. Importantly, the focus of this report was not on “fixing the women,” but rather on promoting systemic change in the scientific enterprise in an effort to mitigate structural inequities, bias, discrimination, and harassment—all of which research shows significantly undermines the education and careers of women in these fields. Below we highlight several of the report's recommendations that outline actions that should be taken by government, which are organized into four categories: 1.) **Driving transparency and accountability**; 2.) **Data-driven approaches**; 3.) **Rewarding, recognizing, and resourcing equity, diversity, and inclusion efforts**; and 4.) **Filling knowledge gaps**.



RECOMMENDATIONS FOR CONGRESS AND FEDERAL AGENCIES

DRIVING TRANSPARENCY AND ACCOUNTABILITY

RECOMMENDATION 1: The legislative and executive branches of the U.S. government should work together to increase transparency and accountability among federal agencies by requiring data collection, analysis, and reporting on the nature, impact, and degree of investment in efforts to improve the recruitment, retention, and advancement of women in STEMM, with an emphasis on existing efforts that take an intersectional approach.

IMPLEMENTATION ACTIONS

Action 1-A: The Director of the White House OSTP, in collaboration with NIH and NSF co-chairs of the Subcommittee on Safe and Inclusive Research Environments of the Joint Committee on the Research Environment, should annually catalogue, evaluate, and compare efforts by the federal agencies to support the recruitment, retention, and advancement of women in STEMM. The director should task the subcommittee with publishing an annual, open-access report, modeled after [NSF's summary table on programs to broaden participation](#) in their annual budget request to Congress, that documents existing programs at each agency, especially those that take an intersectional approach to account for women of color and women of other intersecting identities (e.g., women with disabilities, LGBTQIA individuals), and the qualitative and quantitative impact of these programs, using program evaluation metrics and data, when collected.¹

Action 1-B: Congress should commission a study by an independent entity (e.g., GAO), to offer an external evaluation of the existing federal programs focused on supporting greater equity, diversity, and inclusion in STEMM. This study should produce a publication that documents the nature, impact across various groups, and prioritization of these programs across federal agencies.

RECOMMENDATION 2: Federal agencies should hold grantee institutions accountable for adopting effective practices to address gender disparities in recruitment, retention, and advancement and carry out regular data collection to monitor progress.

IMPLEMENTATION ACTIONS

Action 2-A: Federal funding agencies should conduct an "equity audit" for grantee institutions that have received a substantial amount of funding over a long time periods to ensure that the institution is addressing gender and racial disparities in recruitment, retention, and advancement. Equity audits should evaluate the representation of women among leadership, and hold institutions accountable based on their particular institutional context (e.g., geography, resource limitations, and mission). It should also account for progress over time in improving the representation and experiences of underrepresented groups in STEMM and should indicate remedial actions to improve the findings of the audit. The equity audit should result in a public-facing report.

Action 2-B: Federal agencies should consider institutional and individual researchers' efforts to support greater equity, diversity, and inclusion as part of the proposal compliance, review, and award process. Agencies should work within existing proposal requirements to accomplish this goal. For example, NSF's "Broader Impact" statements and NIH's "Significance" section should be expanded to not only document the societal impacts of the research, but also include an explicit statement on efforts by the prospective grantee and/or institution to promote greater equity, diversity, and inclusion in STEMM. These sections of proposals should be scored and taken seriously in funding recommendations by review panels and funding decisions by agency personnel. Efforts should be made to standardize the weight given to these sections of the proposal across the agency. For example, the National Science Board could review past NSF awards to determine how NSF Directorates have accounted for gender equity, diversity, and inclusion among the metrics evaluated in NSF proposals.

¹ The committee recognizes that programs will have different metrics of success, depending on what the goals of the program are and that direct comparison of programs across agencies will not be possible. However, the evaluation will examine the data collected on the outcomes of the programs included and the extent to which the program met its goals.

SUPPORT TARGETED, DATA-DRIVEN INTERVENTIONS BY COLLEGES AND UNIVERSITIES

RECOMMENDATION 6: Federal agencies should support efforts and research targeted at addressing different profiles of underrepresentation in particular scientific, engineering, and medical disciplines throughout the educational and career life course.

IMPLEMENTATION ACTIONS

Action 6-A: Given that women are underrepresented in computer science, engineering, and physics as early as the undergraduate level, agencies that support these fields should incentivize institutions to adopt educational practices that research shows can improve interest and sense of belonging among women. For instance, the NSF director should direct NSF Directorates for Engineering, Computer and Information Science and Engineering, and Mathematical and Physical Sciences to allocate funding and work collaboratively with the Education and Human Resources Directorate to support education grants that address the following:

- a. Adoption of educational practices that achieve the following:
 - i. incorporate **growth mindset** interventions that convey that skills and intelligence are not fixed and can be increased by learning;
 - ii. emphasize that scientists and engineers are able to do work that has a **positive societal impact**;
 - iii. **highlight the current and historical contributions of diverse scientists** to the STEMM enterprise.
- b. Research and development of **new models of curriculum development in engineering, computer science, and physics that take into account the different educational backgrounds of students** and employ lessons learned from successful institutional programs (e.g., Harvey Mudd, Dartmouth, Carnegie Mellon University).
- c. **Development of new media (e.g., podcasts, videos, television, graphics, and instructional materials) that provide students with diverse role models** and feature the diversity of individuals whose contributions to STEMM are substantial but may be unknown by the public. Such an effort could benefit from an interagency collaboration between NSF and the National Endowment for the Arts.

Action 6-B: Across all STEMM disciplines, federal agencies should:

- a. **Address funding disparities** for women researchers, particularly for women of color.
- b. Directly (e.g., through supplements) and indirectly (e.g., through specific programs) **support the work-life integration needs of women** (and men) in STEMM.
- c. **Support investigation into the impact of sponsorship** on advancement of both white women and women of color into leadership roles in STEMM.

REWARDING, RECOGNIZING, AND RESOURCING EQUITY, DIVERSITY, AND INCLUSION EFFORTS

RECOMMENDATION 8: Federal agencies and private foundations should work collaboratively to recognize and celebrate colleges and universities that are working to improve gender equity.

IMPLEMENTATION ACTIONS

Action 8-A: NIH and NSF should collaborate to develop a recognition program that provides positive incentives to STEMM departments and programs to prioritize diversity, equity, and inclusion efforts. Departments and programs would compete to be recognized for their success in closing gender gaps in STEMM. Such a program would include multiple rounds: 1) allow departments and programs to develop plans to self-assess their progress and plans toward the goal; 2) create and implement new programs and practices; and 3) show improvement from the original evaluation. In order for institutions to compete equitably for this recognition, departments and programs that apply should compete against

similar institutions (e.g., those with the same Carnegie Classification). After NIH and NSF pilot this model, other federal agencies could adopt a similar model.

Action 8-B: Federal agencies should provide financial assistance to institutions that desire recognition for their efforts to improve diversity, equity, and inclusion. These grants would support the resource-intensive data collection that is required to compete for these awards, and would be granted on a needs-based justification, with priority given to under-resourced universities.

FILLING KNOWLEDGE GAPS

RECOMMENDATION 9: Although scholarly research on gender disparities in science, engineering, and medicine has yielded an abundance of information that can be applied toward reaching gender equity, critical knowledge gaps remain and require very close attention. These include:

- a. Intersectional experiences of women of color, women with disabilities, LGBTQIA women, and women of other intersecting identities.
- b. Strategies and practices that can support improved recruitment, retention, and advancement of women of color and women of other intersecting identities.
- c. Factors contributing to the disproportionate benefit accruing to white women of practices adopted to achieve gender equity.
- d. Specific factors contributing to successes and failures of institutions that have adopted policies and/or implemented programs aimed at diversifying the science, engineering, and medical workforce.
- e. Long-term evaluation of the promising practices listed in the report—specifically, how their sustained implementation influences the recruitment, retention, and advancement of women over time.
- f. Strategies and practices that have been demonstrably most effective in supporting STEM women faculty and students in non-research-intensive institutions, such as community colleges.
- g. Characteristics of effective male allies and approaches to training allies.

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