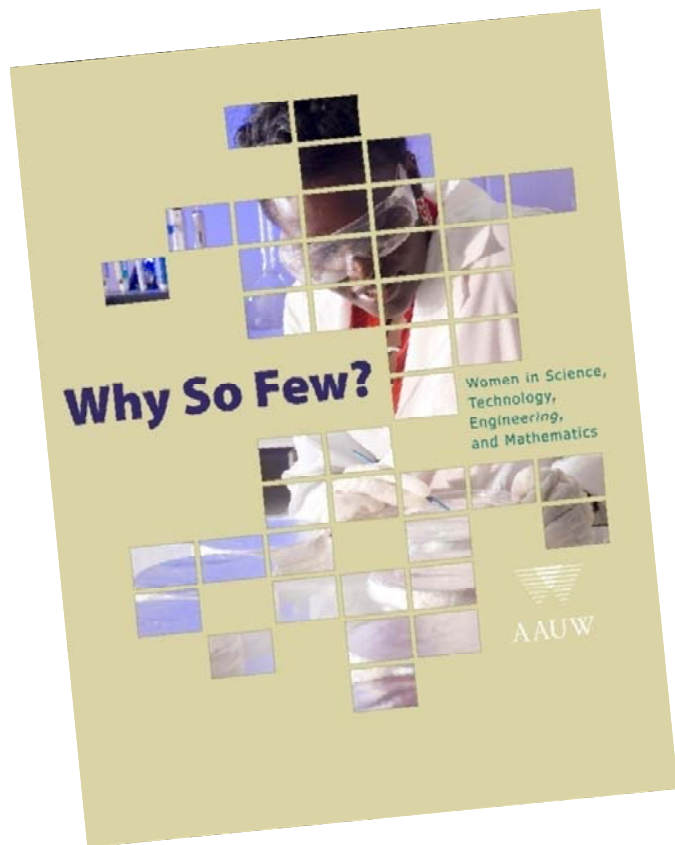




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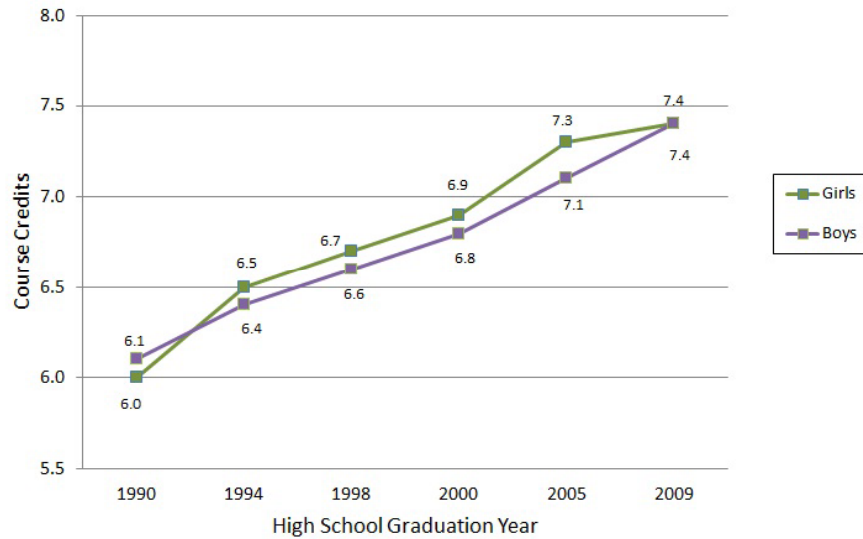
# ***Why So Few? Women in Science, Technology, Engineering, and Mathematics***



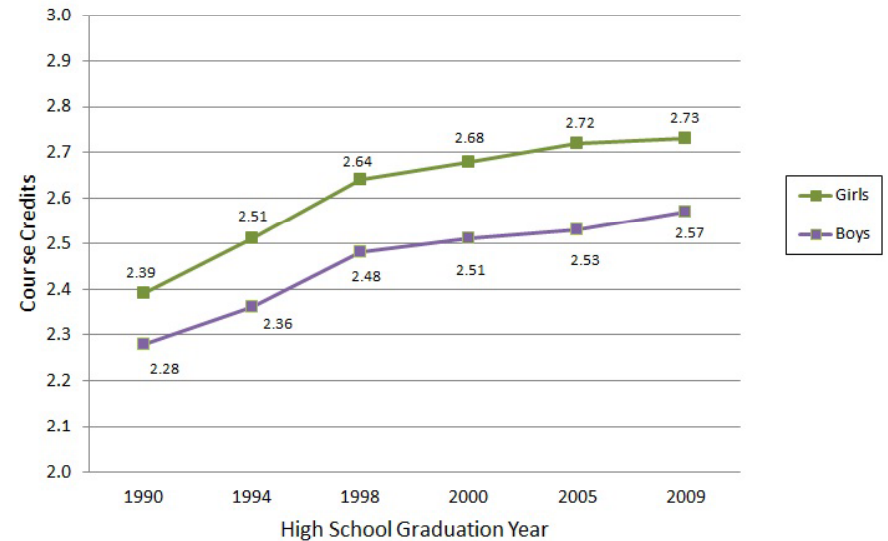
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# High School Performance

**High School Credits Earned in Mathematics and Science, by Gender, 1990 - 2009**



**Grade Point Average in High School Mathematics, by Gender, 1990 - 2009**

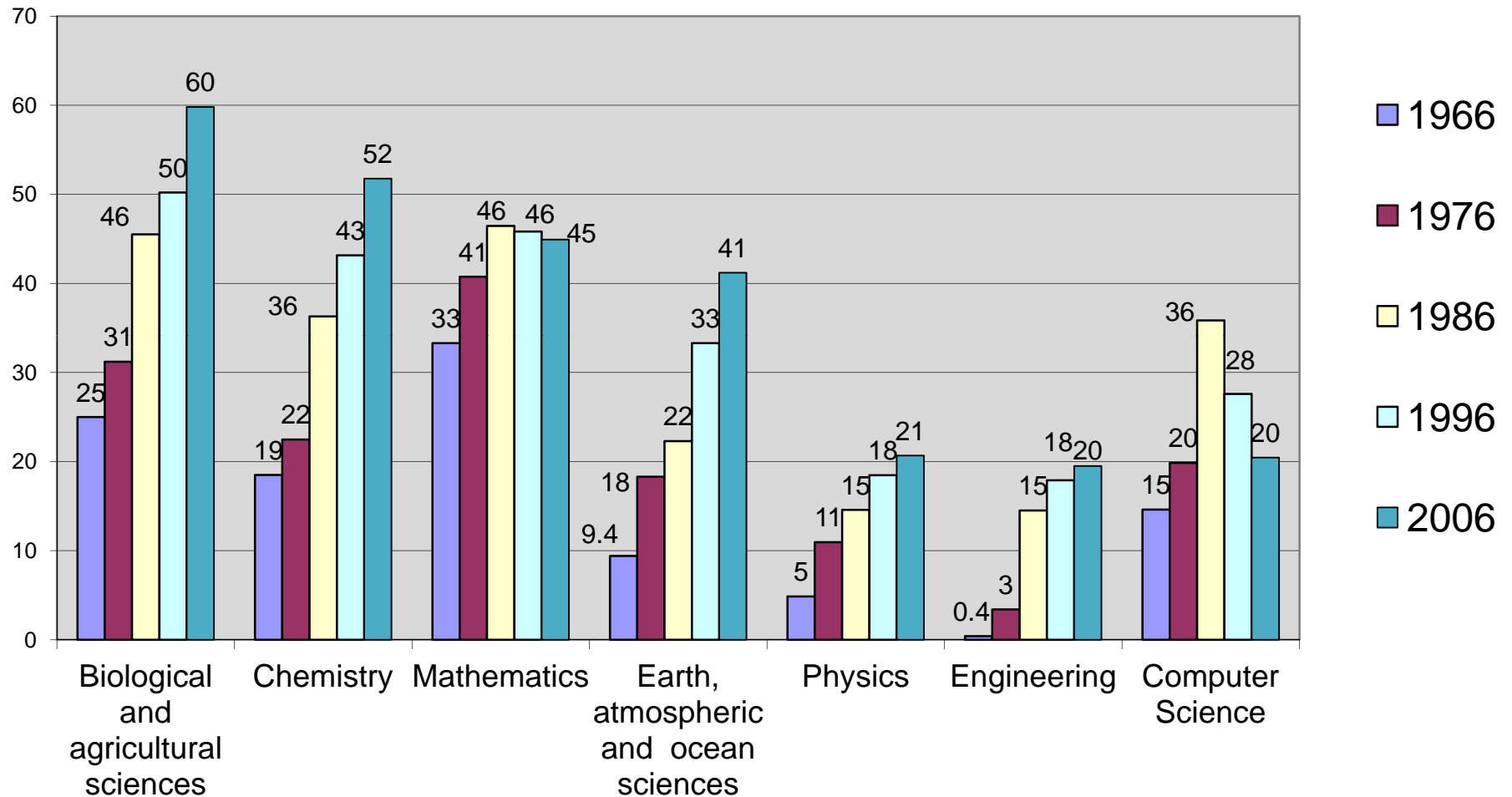


SOURCE: Nord, C., Roey, S., Perkins, R., Lyons, M., Lemanski, N., Brown, J., and Schuknecht, J. (2011). *The Nation's Report Card: America's High School Graduates* (NCES 2011-462). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.



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## Percentage of Bachelor's Degrees Earned by Women in selected STEM fields, 1966 to 2006

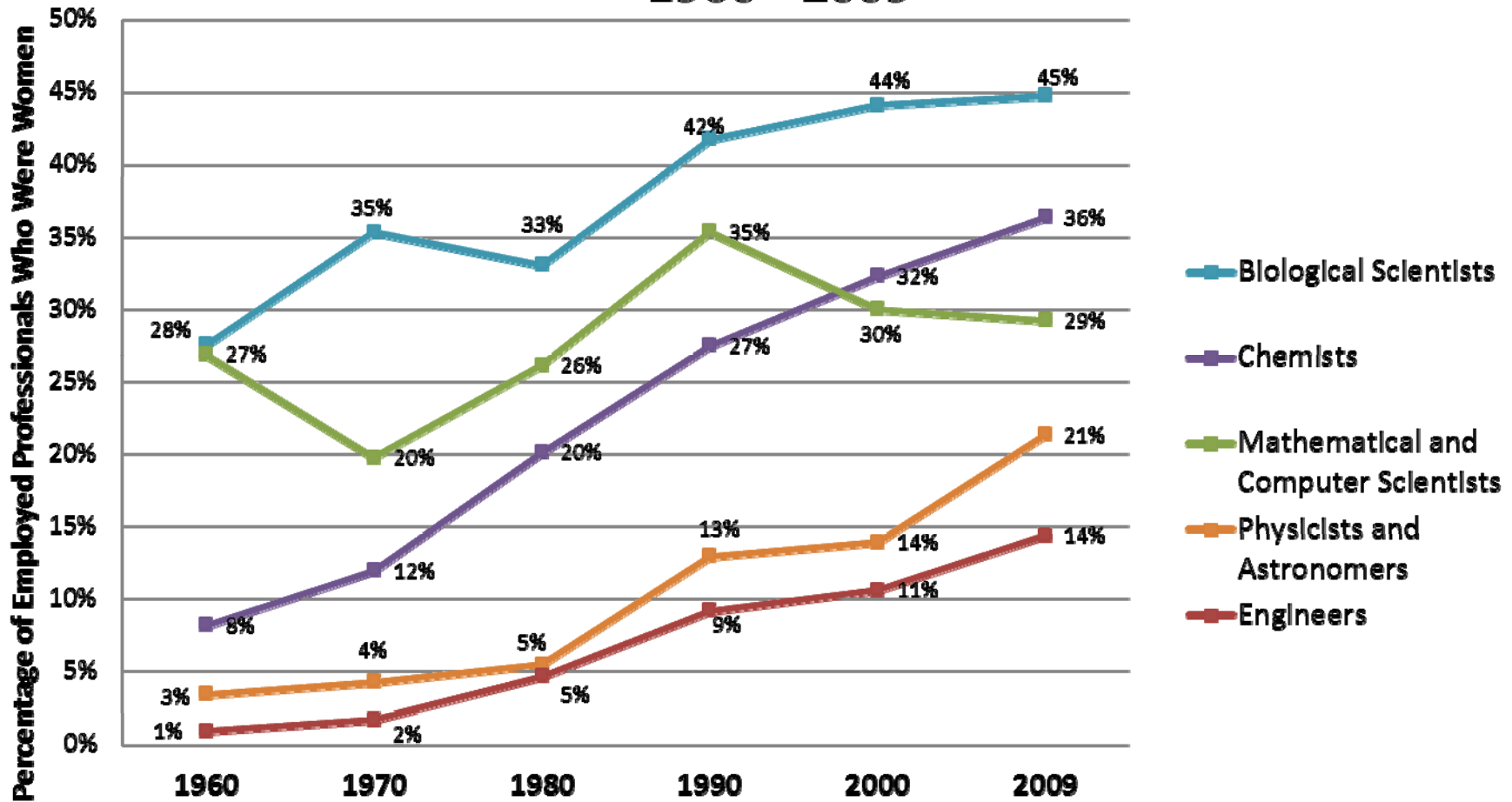


Source: National Science Foundation/Division of Science Resources Statistics; data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey.



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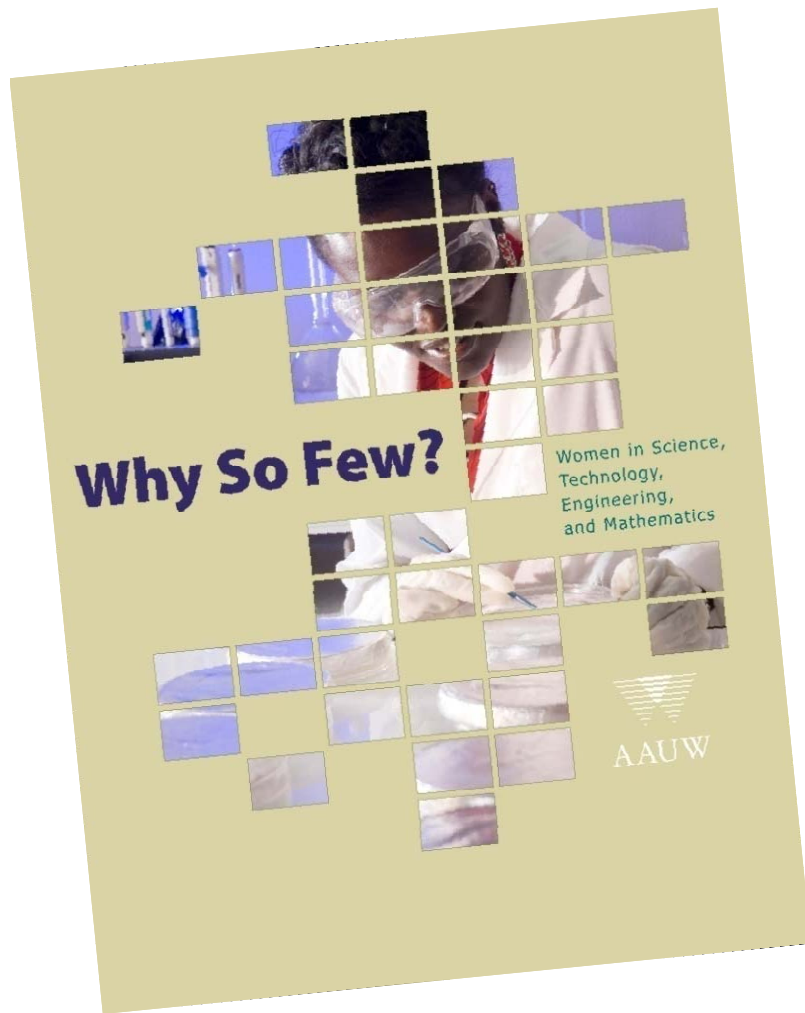
## Women in Selected STEM Occupations, 1960 - 2009



Source: US Census Bureau, Decennial Census of the Population, 1960, 1970, 1980, 1990, and 2000. American Community Survey, 2009.



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*Why So Few?*  
presents evidence  
that social and  
environmental factors  
contribute to the  
underrepresentation of  
women and girls in STEM.



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## Finding 1

### **Beliefs about Intelligence**

Believing in the potential for intellectual growth, in and of itself, improves outcomes.



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In math and science, a growth mindset benefits girls.

Fixed Mindset	Growth Mindset
Intelligence is static.	Intelligence can be developed.
Leads to a desire to <i>look smart</i> and therefore a tendency to	Leads to a desire to <i>learn</i> and therefore a tendency to
• <b>avoid challenges</b>	• <b>embrace challenges</b>
• <b>give up easily due to obstacles</b>	• <b>persist despite obstacles</b>
• <b>see effort as fruitless</b>	• <b>see effort as path to mastery</b>
• <b>ignore useful feedback</b>	• <b>learn from criticism</b>
• <b>be threatened by others' success</b>	• <b>be inspired by others' success</b>

- Teach children that intellectual skills can be acquired.
- Praise children (and adults) for effort.



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## Finding 2 **Stereotypes**

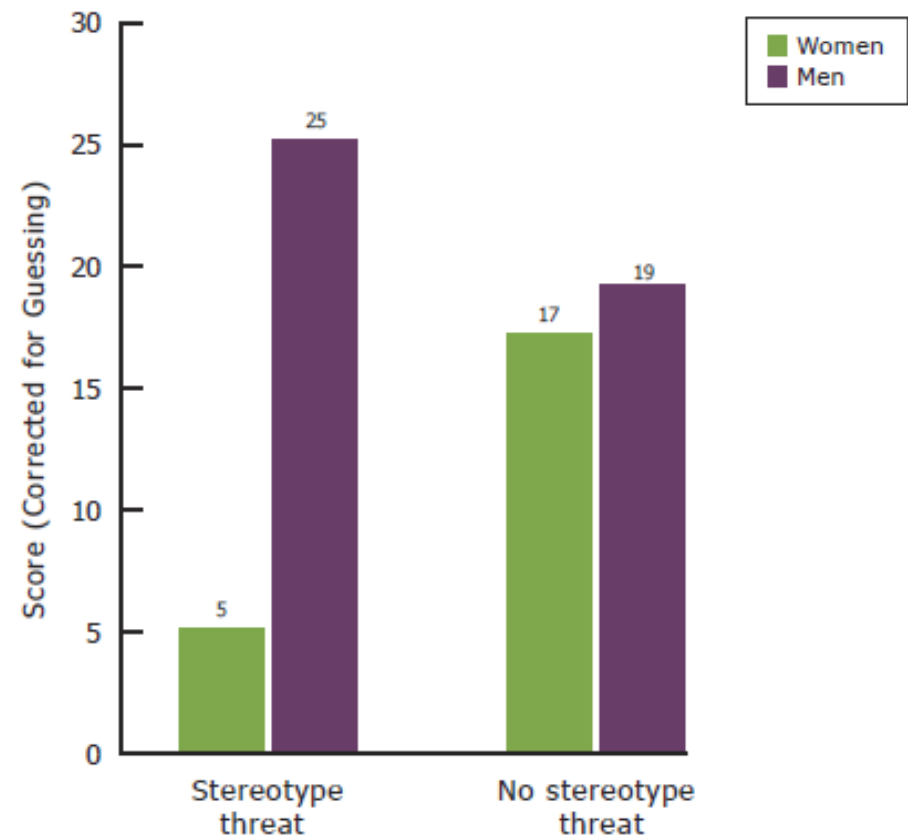
Negative stereotypes  
about girls' math abilities  
can adversely affect girls' performance in math



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## Performance on a Challenging Math Test, by Stereotype Threat Condition and Gender

- Expose girls to successful female role models in math and science.
- Teach students about stereotype threat.



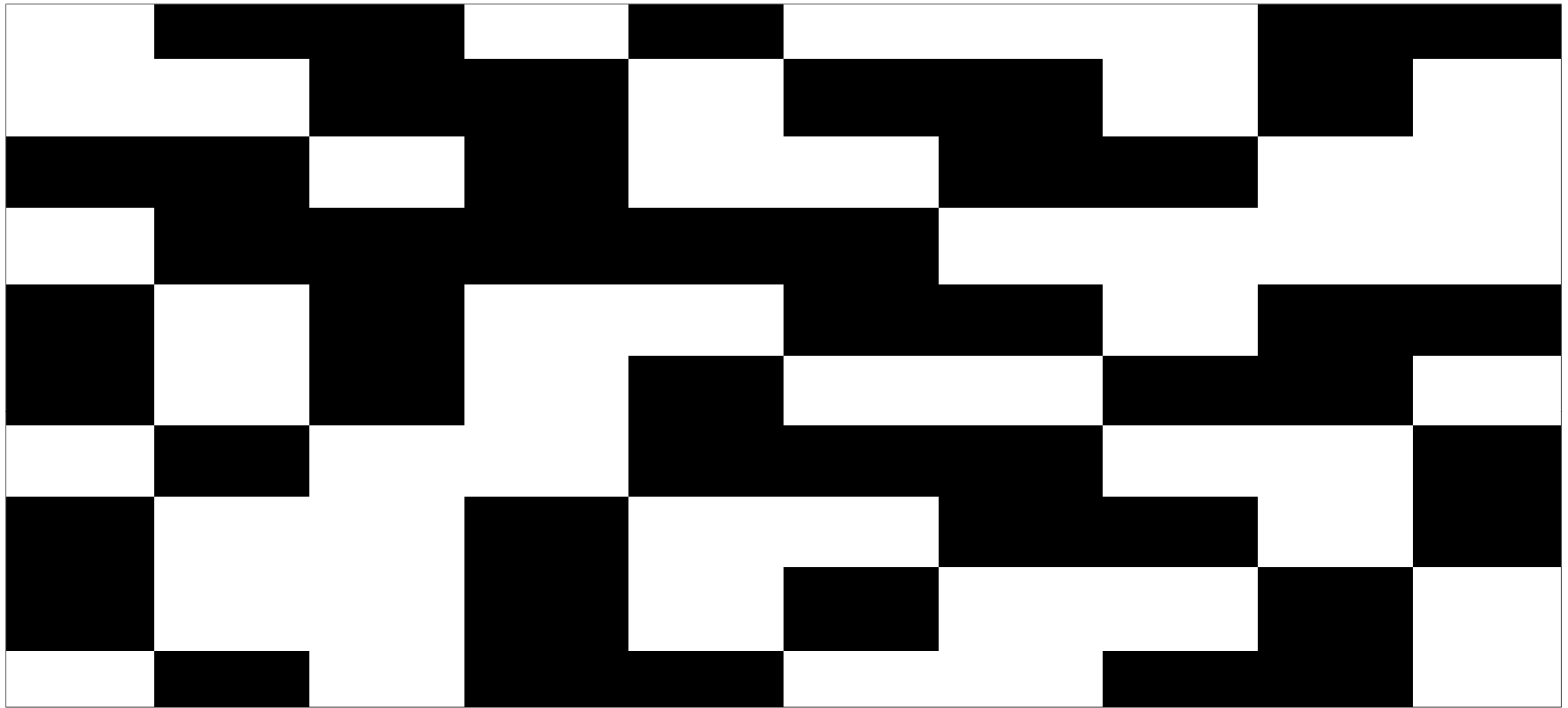
Source: Spencer, S. J., Steele, C. M., & Quinn, D. M., 1999, "Stereotype threat and women's math performance," *Journal of Experimental Social Psychology*, 35(1), p. 13.

## Finding 3 **Self-Assessment**

Girls are “harder on themselves”  
and hold themselves to a higher standard  
when assessing their abilities  
in “male” fields like science and math.



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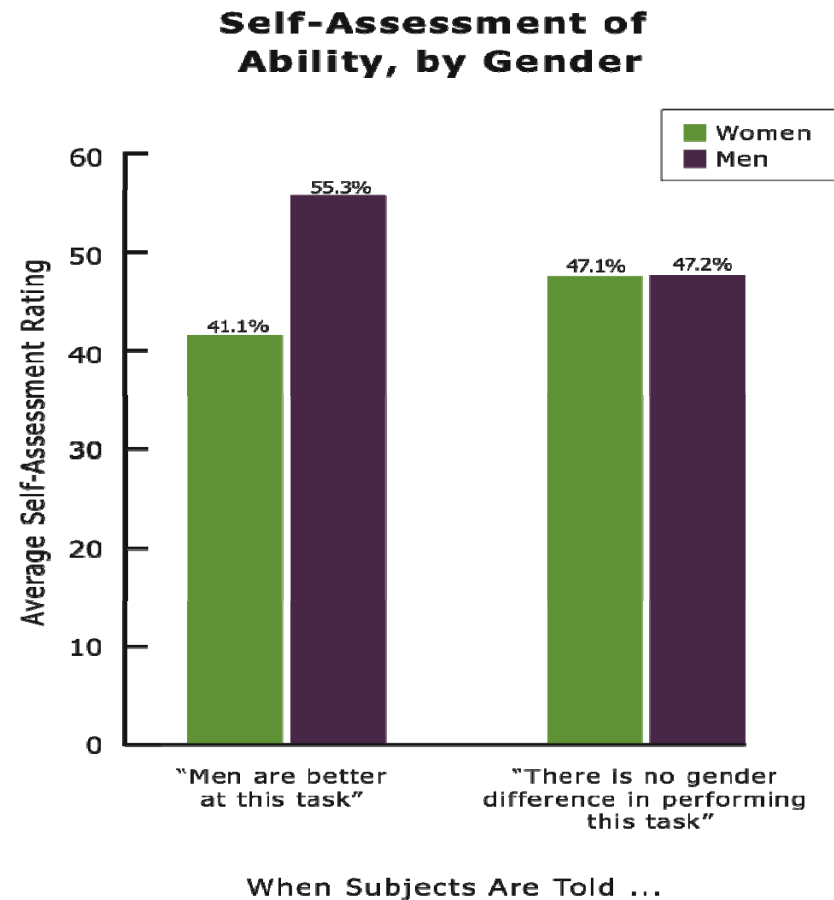


Does this rectangle have more black or more white?



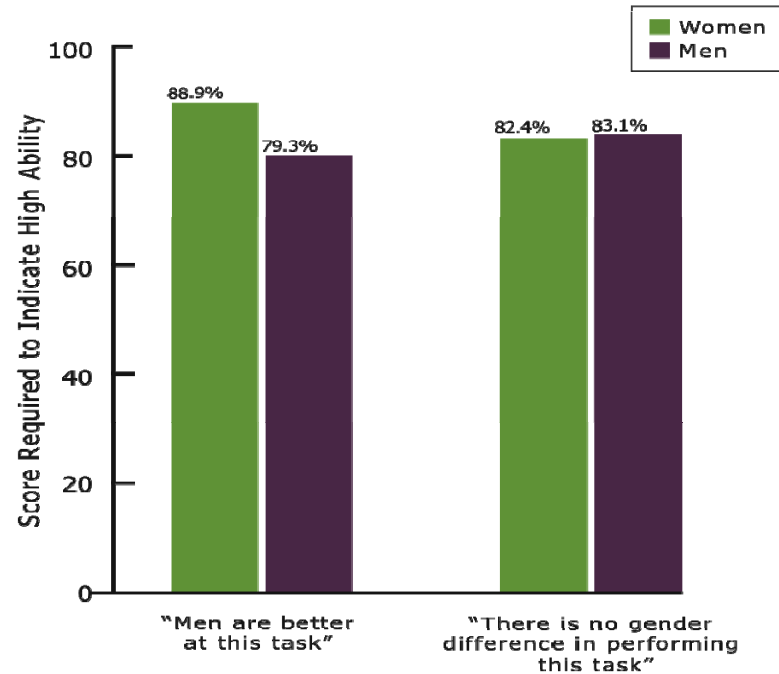
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# Gender differences in self-assessment



Source: Correll, S. J., 2004, "Constraints into preferences: Gender, status, and emerging career aspirations," *American Sociological Review*, 69, p. 106, Table 2.

### Students' Standards for Their Own Performance, by Gender



When Subjects Are Told ...

*Note:* Respondents were asked, "How high would you have to score to be convinced that you have high ability at this task?"  
*Source:* Correll, S. J., 2004, "Constraints Into preferences: Gender, status, and emerging career aspirations," *American Sociological Review*, 69, p. 106, Table 2.

- Set clear performance standards
- Help girls recognize their career-relevant skills



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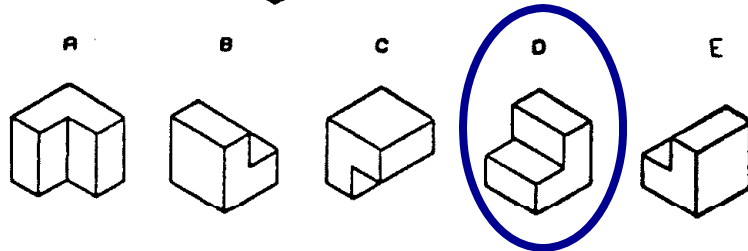
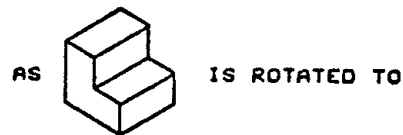
## Finding 4 **Spatial Skills**

Spatial skills are not innate  
and can be improved with training.



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Spatial skills are not innate and can be improved with training.



This is a sample question on mental rotation.

Do you know the right answer?

Encourage girls to play with building toys and to draw to develop their spatial skills.



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# Finding 5

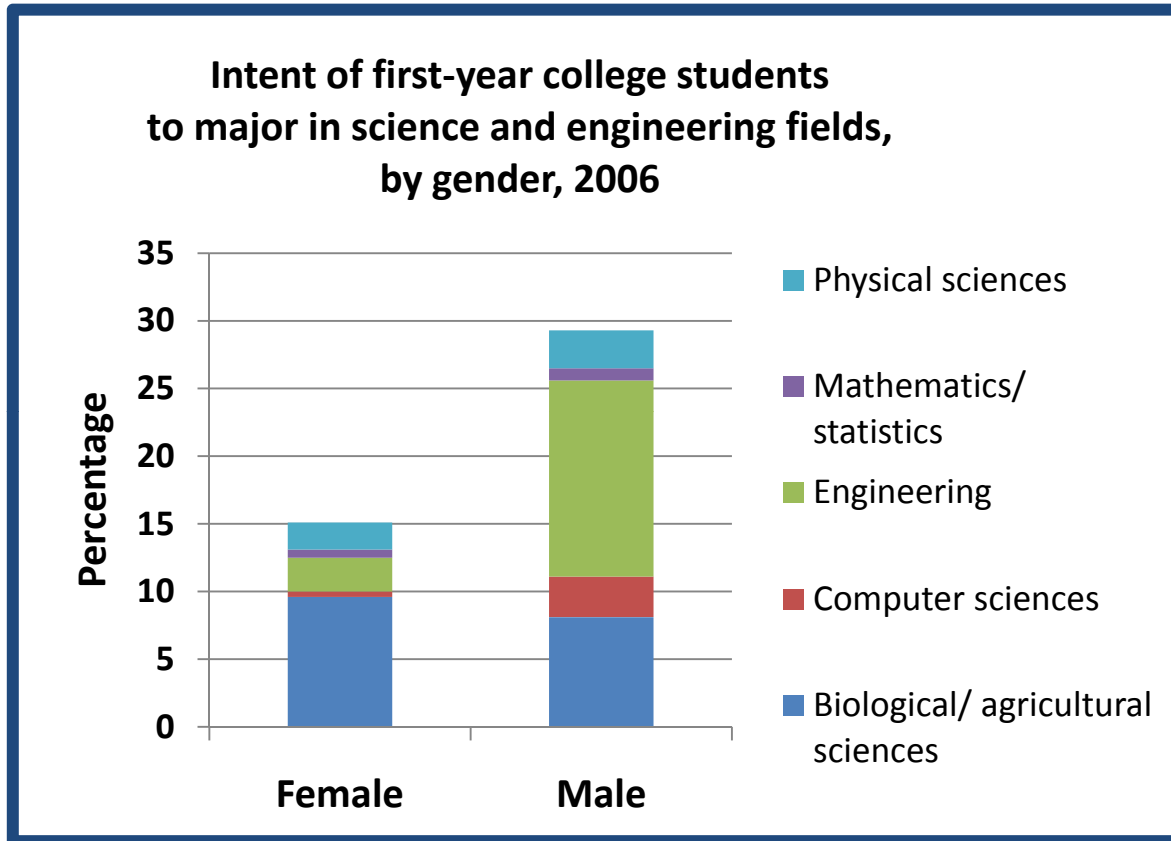
## The College Student Experience

At colleges and universities,  
little things can make a big difference  
for female students in science and engineering.



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# Small changes in college and university STEM departments can make a big difference



- Actively recruit female students
- Emphasize broad applications of science and engineering in introductory courses.
- Consider pre-requisites carefully.

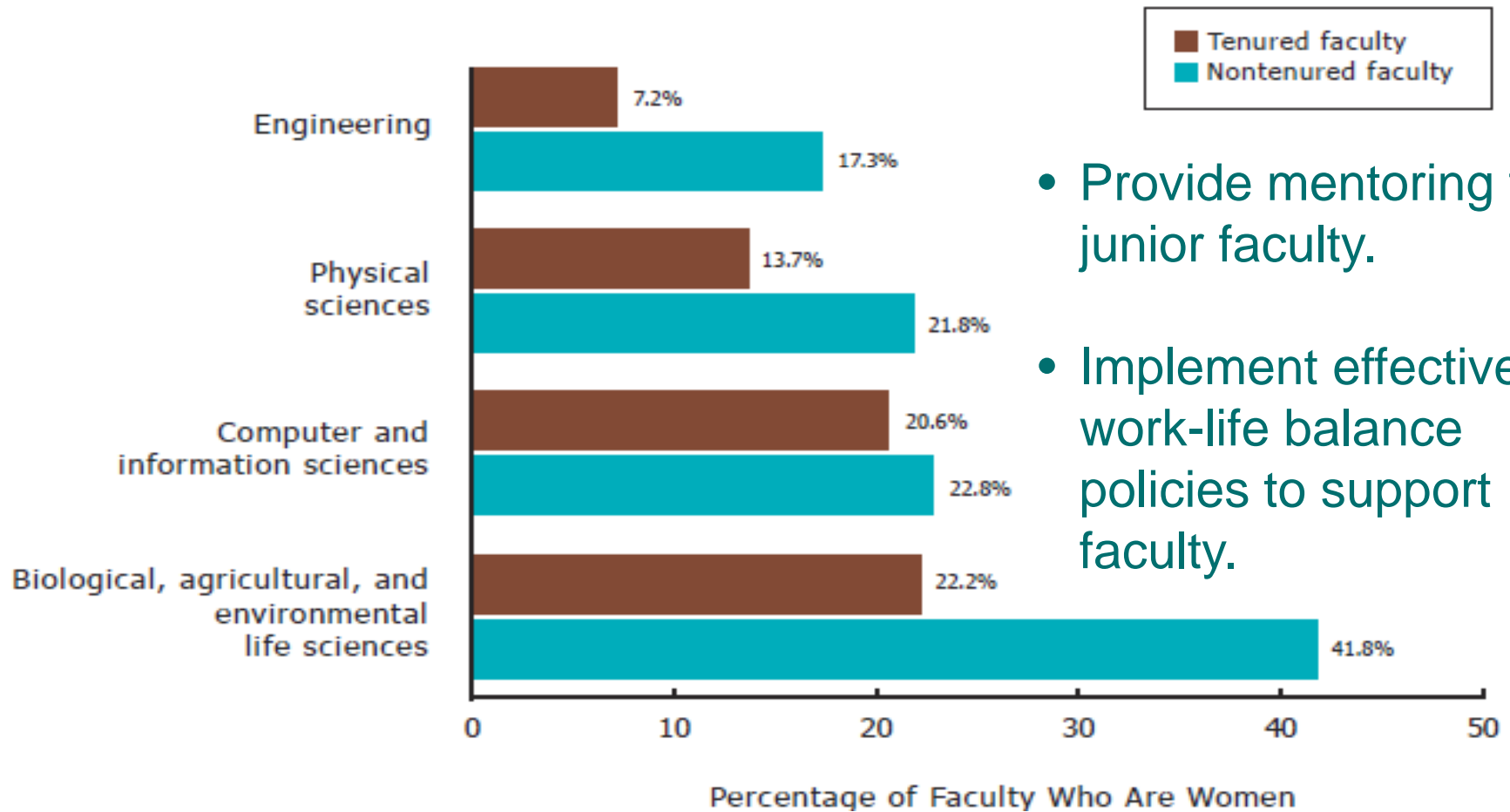
## Finding 6 University and College Faculty

Women STEM faculty are less likely than their male peers to feel that they fit or belong in their departments.



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# Female STEM Faculty in Four-Year Educational Institutions, by Discipline and Tenure Status, 2006



- Provide mentoring for junior faculty.
- Implement effective work-life balance policies to support faculty.

Source: National Science Foundation, Division of Science Resources Statistics, 2009, Characteristics of doctoral scientists and engineers in the United States: 2006 (Detailed Statistical Tables) (NSF 09-317) (Arlington, VA), Author's analysis of Table 20.



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## Finding 7 **Implicit Bias**

In a test of implicit bias, most people  
associate science and math fields  
with “male”  
and humanities and arts fields  
with “female”.



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Our unconscious beliefs may be more powerful than our explicitly held beliefs simply because we are not aware of them.

- Take a test to learn about your unconscious bias at <https://implicit.harvard.edu>.
- Take steps to address your biases.



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## Finding 8

### **Bias against Women in Non-traditional Fields**

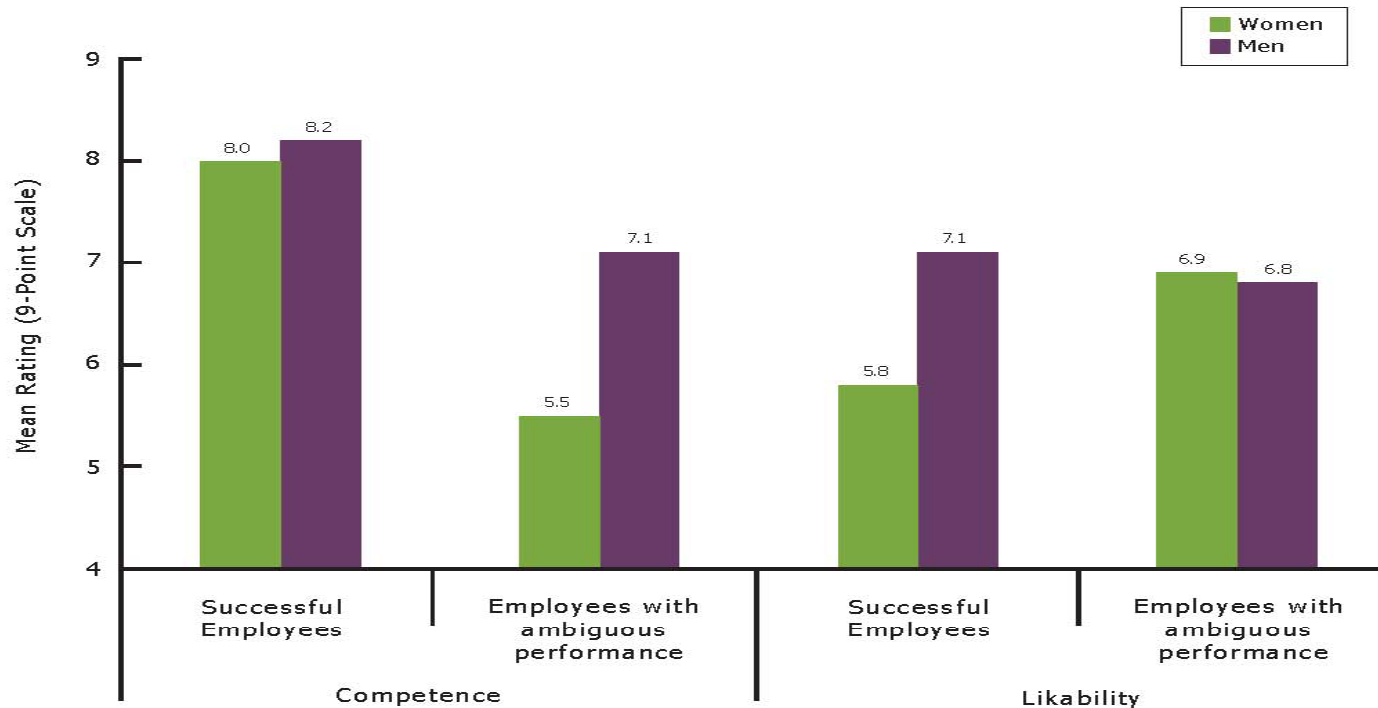
Women in “male” jobs are viewed as less competent than their male peers.

When women are clearly competent, they are often considered less “likable.”



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**Figure 21. Competence and Likability for Women and Men in "Male" Professions**



Source: Heilman et al., 2004, "Penalties for success: Reaction to women who succeed in male gender-typed tasks," *Journal of Applied Psychology*, 89(3), p. 420, Table 2.

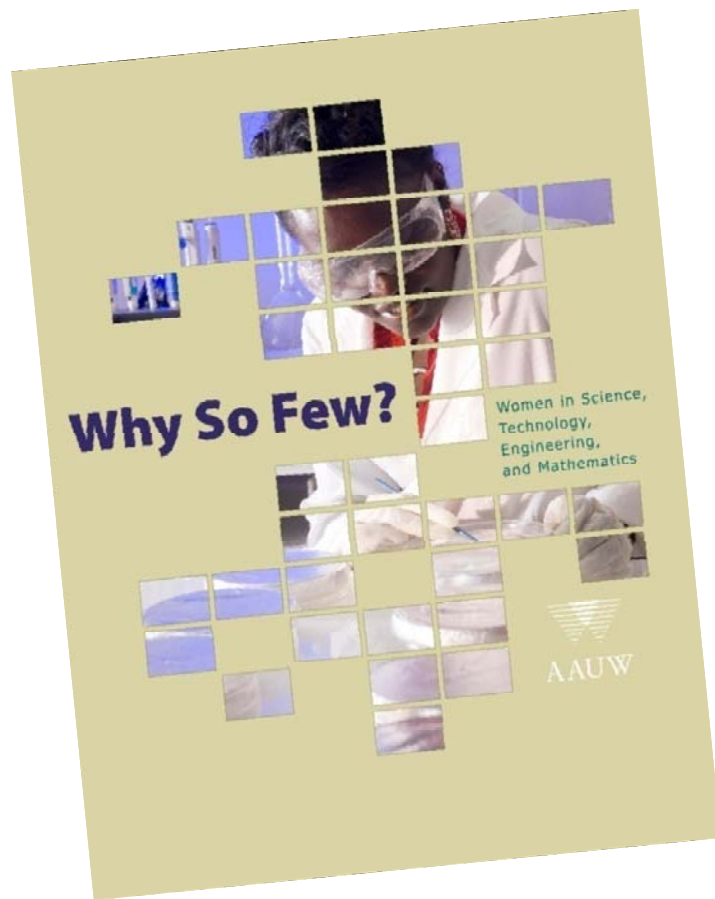
- Raise awareness about bias against women in STEM fields.
- Create clear criteria for success.



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# *Why So Few? Women in Science, Technology, Engineering, and Mathematics*



To download a pdf of the report:  
[www.aauw.org/learn/research/whysofew.cfm](http://www.aauw.org/learn/research/whysofew.cfm)

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<http://aauw.source4.com>



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