# Supporting Women in STEM: Looking Towards the Future

OIST C-Hub Workshop
03.26.24

**Tari Tan, PhD | she/her**
**Assistant Dean for Educational Innovation and Scholarship | Office for Graduate Education**
Lecturer on Neurobiology, Harvard Medical School
OIST C-Hub Visiting Fellow

**Kathy Takayama, PhD | she/her**
**Executive Director | C-Hub**
OIST

# Workshop Outline

- **Part I:** Introduction to the current landscape of women in STEM

- **Part II:** Using a systems thinking approach to identify pathways towards change

# Workshop Objectives

**At the end of this workshop you should be able to:**

- **Summarize** some of the barriers to gender equity/equality in STEM

- **Describe** the role of research in describing and addressing gender inequity/inequality in STEM

- **Provide examples** of successful approaches to support women in STEM

- **Apply** a systems thinking approach to identify concrete pathways towards change within and beyond the OIST system

- **Continue to strengthen** your own network with the connections made today

OIST | C-HUB Center for Professional Development & Inclusive Excellence

HARVARD MEDICAL SCHOOL

# Introductions

Please introduce yourself and include your office/lab affiliation so that we can use this opportunity to build community!

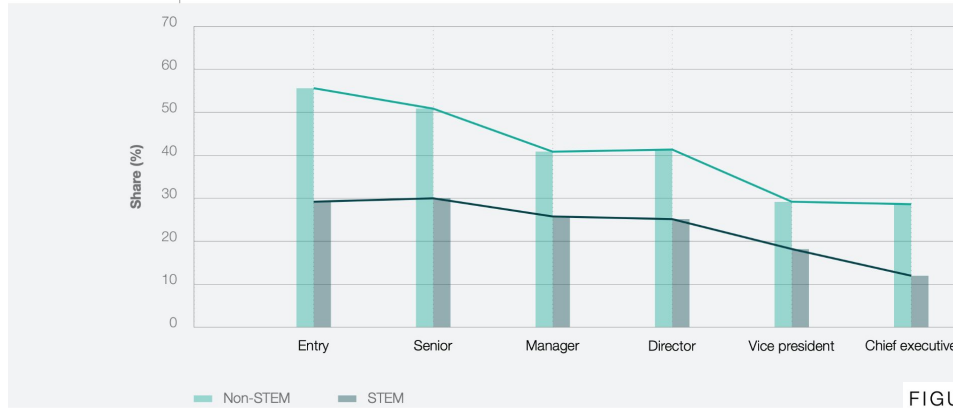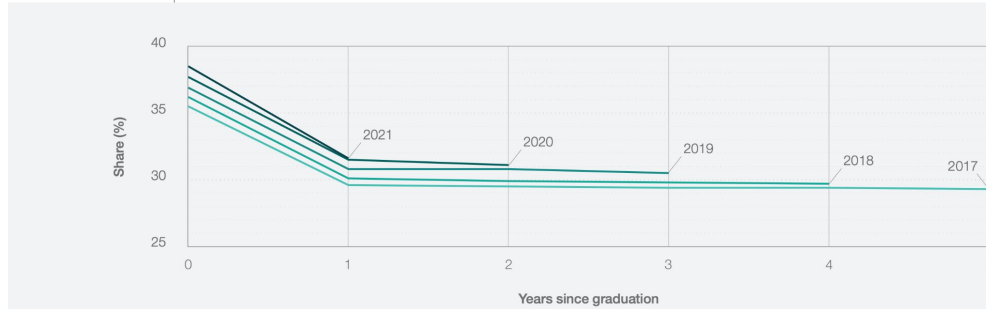# Women in STEM: The Current Landscape

**Share of women in the workforce, by seniority level and STEM occupation status**



- Women make up 49.3% of total employment across non-STEM occupations, but just 29.2% of all STEM workers.

- Women account for 29.4% of entry-level workers; yet for high-level leadership roles such as VP and C-suite, representation drops to 17.8% and 12.4%, respectively.

**Share of women STEM graduates (Bachelor's degree or higher), by years since graduation**

# Women in STEM: The Current Landscape

- Women make up 49.3% of total employment across non-STEM occupations, but just 29.2% of all STEM workers.

- Women account for 29.4% of entry-level workers; yet for high-level leadership roles such as VP and C-suite, representation drops to 17.8% and 12.4%, respectively.

# Women in STEM: The Current Landscape

| | Total | International | Women |
|---|---|---|---|
| **Faculty** | 91 | 58 (64%) | 17 (19%) |
| **Research Unit Staff** | 484 | 326 (67%) | 186 (38%) |
| **Research Support Staff** | 85 | 38 (45%) | 33 (39%) |
| **Administrative Staff** | 432 | 84 (19%) | 311 (72%) |
| **Total** | 1,092 | 506 (46%) | 547 (50%) |

OIST, Jan. 2024 (https://www.oist.jp/about/facts-and-figures)



hhmi

Total employees: 267

● Male 200 (74.9%)
● Female 67 (25.1%)

**Investigators**
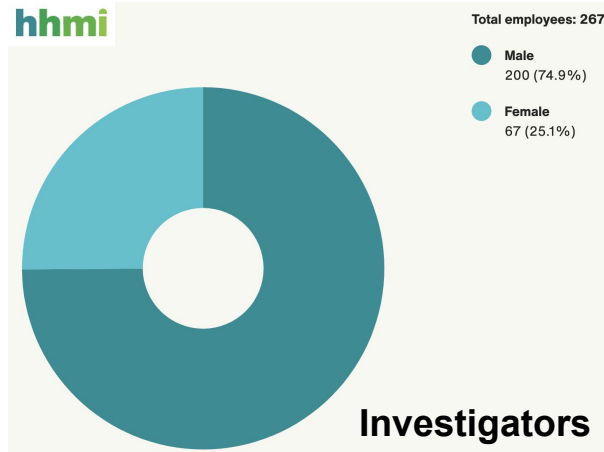
https://diversity.hhmi.org/ (Accessed March 2024)



In 2023, 46% of faculty were women

Instructor/Lecturer — Assistant Professor — Associate Professor — Professor

2.6 x
4.7 x
3.9 x
8.1 x

54%
50%
38%
24%

21%
11%
10%
3%
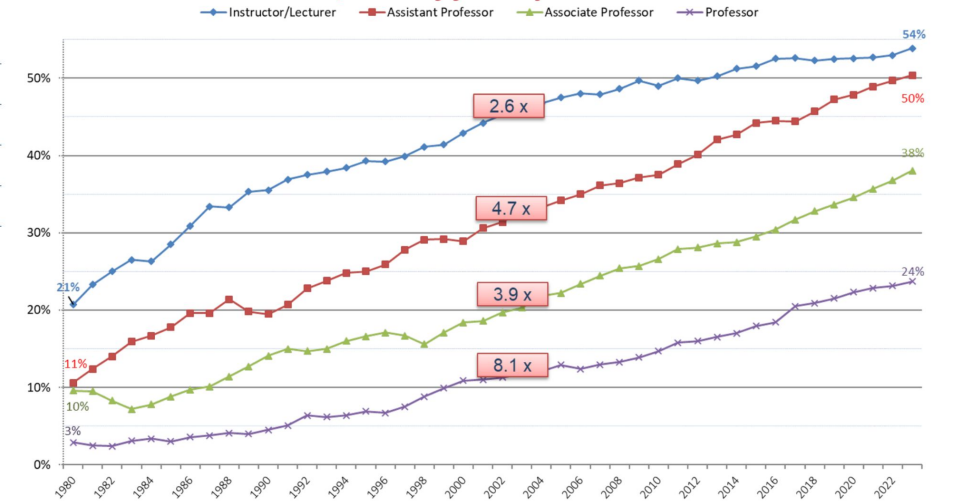
Data points shown are for faculty active on July 1st. each year, updated 11/28/23

© 2023
BY THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE

HARVARD MEDICAL SCHOOL — OFFICE FOR Faculty Affairs

7

Harvard Medical School, Nov. 2023 (https://fa.hms.harvard.edu/faculty-demographics)

OIST | C-HUB Center for Professional Development & Inclusive Excellence

HARVARD MEDICAL SCHOOL

# Building Upon Recent Conversations

**With respect to gender, what does "catalyzing diversity in science" mean?**

- Maintain diversity through career advancement including achieving diversity in leadership!

- Promotion of science at all ages, improving early science education

- Enable participation in science without compromising other parts of life (family)

- Emphasize the value of a diverse team and enable people to act on their potential
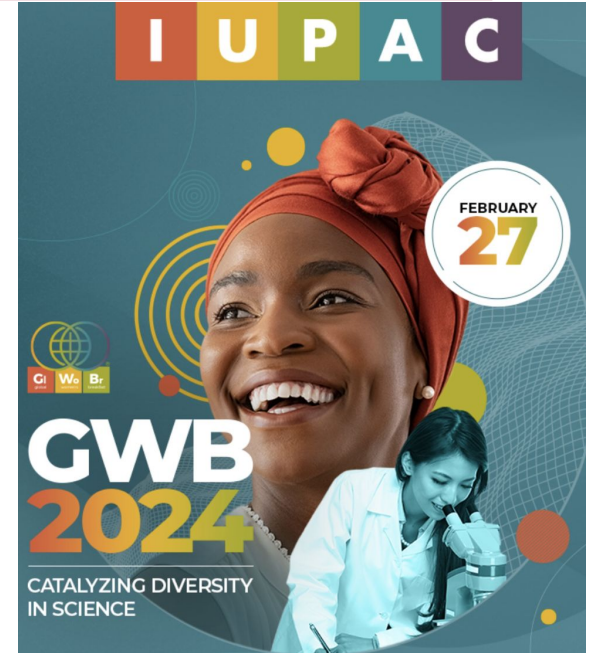


OIST GWB organizers: Samantha Phan, Saffira Yan Tjon, Jamila Rodrigues, Tom Tassilo Wilfling, Nadege Bonne, Jonathan Josh Ramtaha, Yuan-Qiu-Qiang Yi
Faculty sponsor: Christine Luscombe
Keynote speaker: Gail Tripp

Thanks to Samantha Phan for providing summary notes from the event!
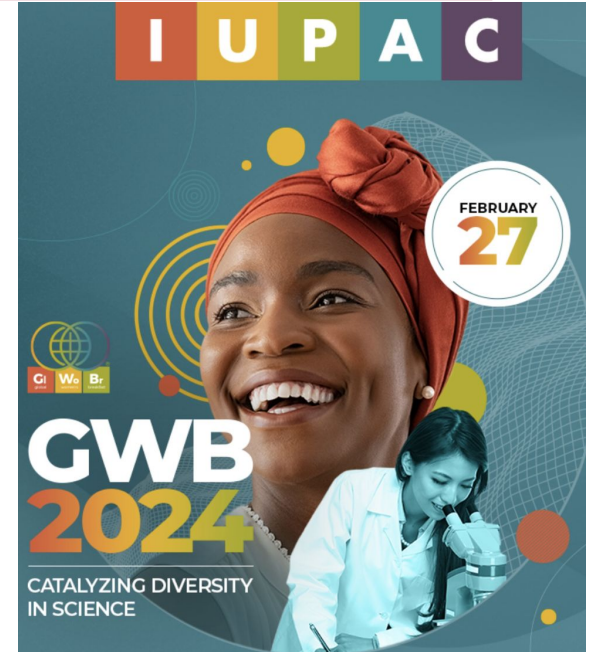
# Building Upon Recent Conversations

**With respect to gender, who or what are the barriers (inhibitors) of catalyzing diversity in science?**

- Stereotypes (even from our community/supporters)

- Ignorance of problems

- Being overwhelmed from trying to meet expectations (society and ourselves)

- Lack of retention (and lack of understanding why women leave)

- Bias in promotion and hiring

- Hostile work environments: harassment and discrimination

Thanks to Samantha Phan for providing summary notes from the event!



OIST GWB organizers: Samantha Phan, Saffira Yan Tjon, Jamila Rodrigues, Tom Tassilo Wilfling, Nadege Bonne, Jonathan Josh Ramtaha, Yuan-Qiu-Qiang Yi
Faculty sponsor: Christine Luscombe
Keynote speaker: Gail Tripp

# Building Upon Recent Conversations

**Following the day's discussion, what action will you take to catalyze diversity with respect to gender?**

- Hold people accountable for their actions and comments (requires knowing where/who to go to)

- Educate educators at all levels to improve science education

- Improve diversity education

  - Instill values at all levels

  - Management training

- Outreach to bring in people at all levels

- Concrete policy

- Respect others and ask for respect in return

Thanks to Samantha Phan for providing summary notes from the event!



IUPAC

FEBRUARY 27

GWB 2024

CATALYZING DIVERSITY IN SCIENCE

OIST GWB organizers: Samantha Phan, Saffira Yan Tjon, Jamila Rodrigues, Tom Tassilo Wilfling, Nadege Bonne, Jonathan Josh Ramtaha, Yuan-Qiu-Qiang Yi
Faculty sponsor: Christine Luscombe
Keynote speaker: Gail Tripp

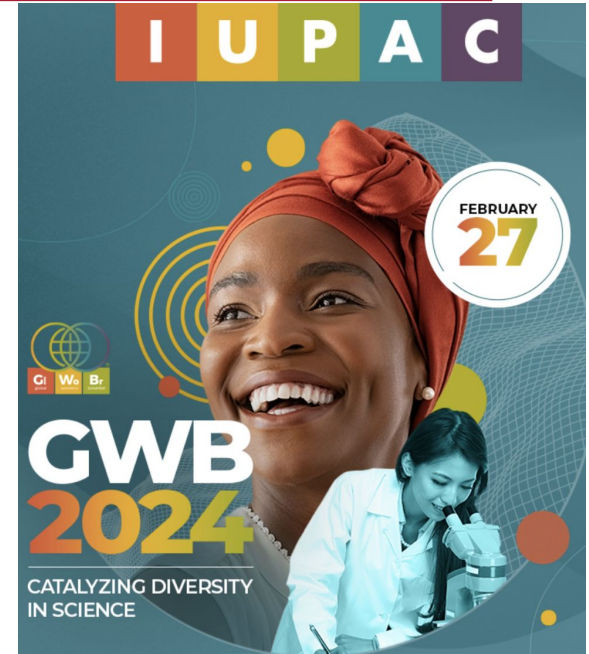OIST | C-HUB Center for Professional Development & Inclusive Excellence

HARVARD MEDICAL SCHOOL

# Building Upon Recent Conversations

**Following the day's discussion, what action will you take to catalyze diversity with respect to gender?**
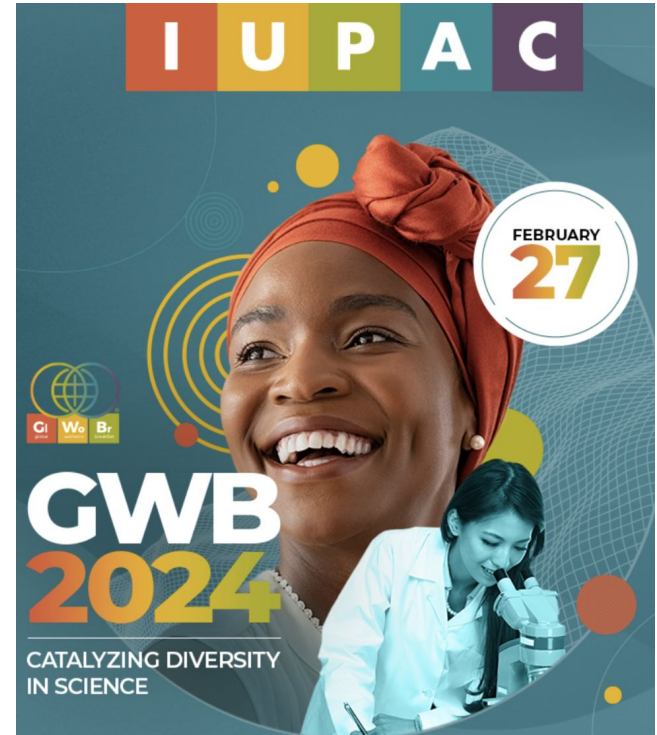
Individual actions

⬇

Systems thinking, institutional change

Individual experiences

⬇

Research & program evaluation

# Evidence from the Research: Bias is Real!

- Gender bias in hiring

    - Male and female faculty at major research institutions rated the exact same application materials for a laboratory manager position more favorably when the application was labeled with a male name instead of a female name (Moss-Rascusin *et al*. 2012)

    - Similar results have been found for postdoctoral hiring and faculty hiring

- Gender bias in teaching evaluations

    - Students in an online course evaluated two instructors (one male, one female). Gender identities were disguised such that evaluations of perceived vs actual genders could be compared. Students rated the same instructors more highly when they were perceived as male compared to female (MacNell, Driscoll and Hunt 2014)
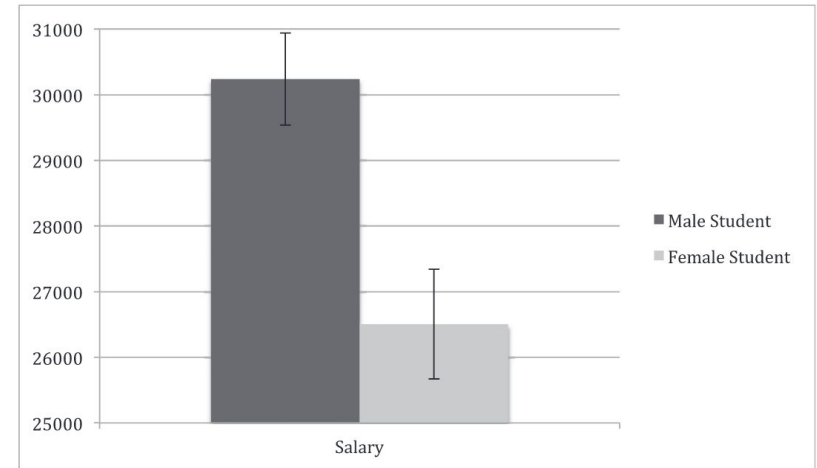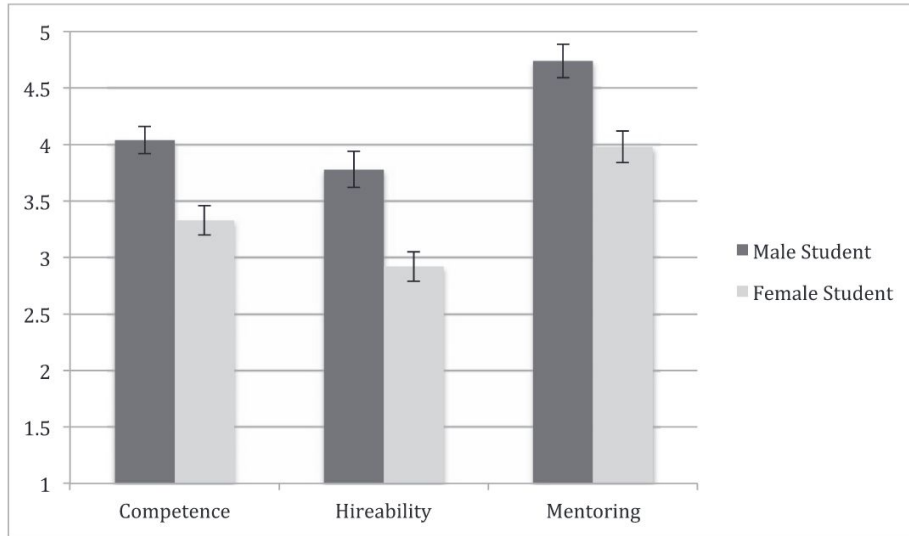
# Evidence from the Research: Bias is Real!

"Science faculty from [US] 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."
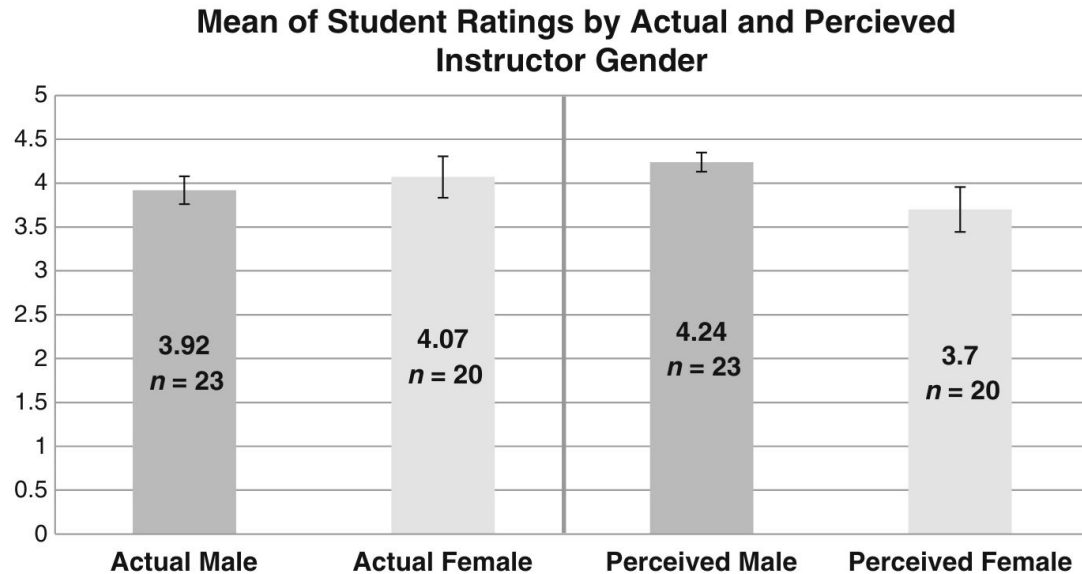


Moss-Rascusin *et al.* 2012

# Evidence from the Research: Bias is Real!

Students in an online course evaluated two instructors (one male, one female). Gender identities were disguised such that evaluations of perceived vs actual genders could be compared.



**Mean of Student Ratings by Actual and Percieved Instructor Gender**

Actual Male: 3.92, *n* = 23
Actual Female: 4.07, *n* = 20
Perceived Male: 4.24, *n* = 23
Perceived Female: 3.7, *n* = 20

# Widespread Bias and Inequity

A number of additional facets of gender bias have been documented in the literature, including in:

- Sexual harassment
- Conference abstract acceptance and speaker invitations
- Family expectations
- Negotiations
- Peer-reviewed publications
- Research grant applications
- Paper citations
- Tenure decisions and promotion

See Llorens *et al.* 2021 for a good review of gender bias in academia

# Towards Solutions: Rigorous Evaluation Needed

Strategies that have been effective to mitigate biases and/or inequities related to hiring, tenure, and promotions include:

- Mandatory bias training for members of hiring committees

- Increasing the diversity of hiring and promotion committees (and compensating participation, e.g., through a reduction of other teaching/administrative duties)

  - *Increasing representation of women is necessary, but not sufficient, to address gender bias*

# Towards Solutions: Rigorous Evaluation Needed

Testing a simple intervention: added language to student evaluations of teaching.

"Student evaluations of teaching play an important role in the review of faculty. Your opinions influence the review of instructors that takes place every year. Iowa State University recognizes that student evaluations of teaching are often influenced by students' **unconscious** and **unintentional** biases about the race and gender of the instructor. Women and instructors of color are systematically rated lower in their teaching evaluations than white men, even when there are no actual differences in the instruction or in what students have learned.

As you fill out the course evaluation please keep this in mind and make an effort to resist stereotypes about professors. Focus on your opinions about the content of the course (the assignments, the textbook, the in-class material) and not unrelated matters (the instructor's appearance)."

**Students who were given the anti-bias language rated female instructors significantly higher than students who received the "standard" course evaluation language**

Peterson, DAM *et al*. 2019
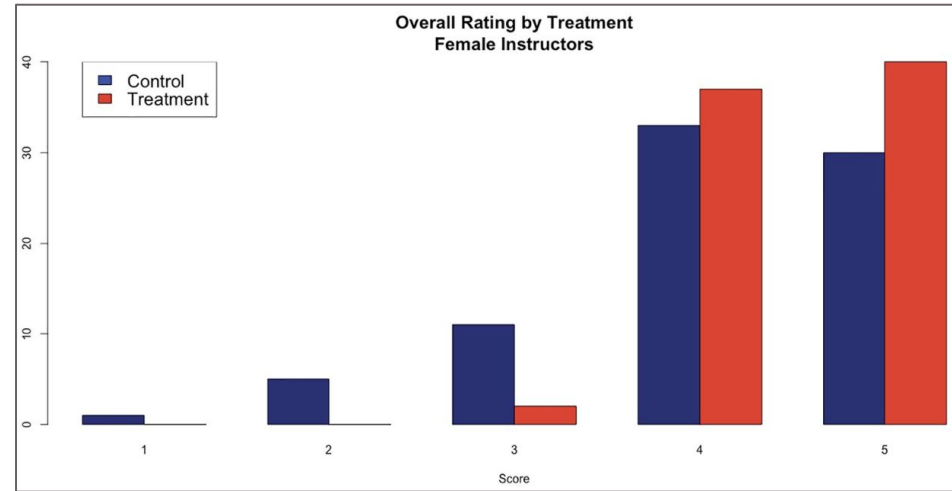
# Towards Solutions: Rigorous Evaluation Needed

Testing a simple intervention: added language to student evaluations of teaching.

"Student evaluations of teaching play an important role in the review of faculty. Your opinions influence the review of instructors that takes place every year. Iowa State University recognizes that student evaluations of teaching are often influenced by students' **unconscious** and **unintentional** biases about the race and gender of the instructor. Women and instructors of color are systematically rated lower in their teaching evaluations than white men, even when there are no actual differences in the instruction or in what students have learned.

As you fill out the course evaluation please keep this in mind and make an effort to resist stereotypes about professors. Focus on your opinions about the content of the course (the assignments, the textbook, the in-class material) and not unrelated matters (the instructor's appearance)."



Peterson, DAM *et al*. 2019

# Towards Solutions: The Importance of Diagnosing the Issue

**Why do women faculty leave?**

- Across STEM and non-STEM fields, women who left the field cited workplace climate as the most common primary reason why they left (not work-life balance)
- Among current women STEM faculty, workplace climate is cited more often than work-life balance as having a "major impact" in their potential decision to leave

Spoon *et al.* 2023

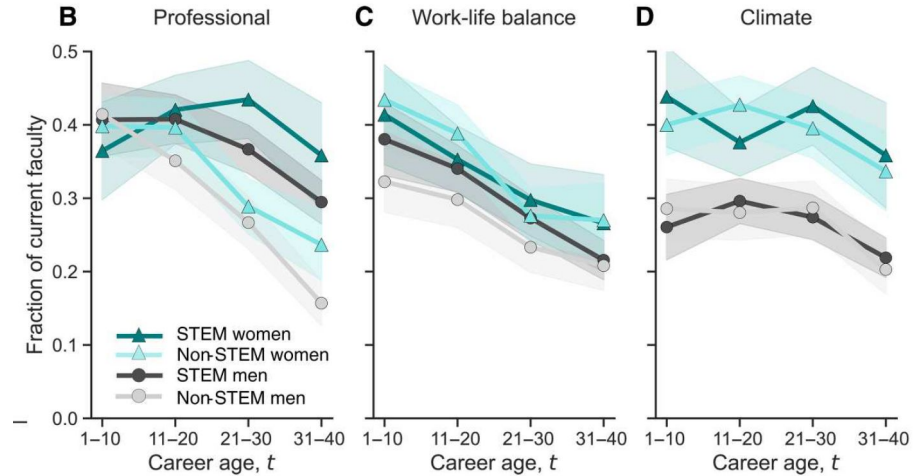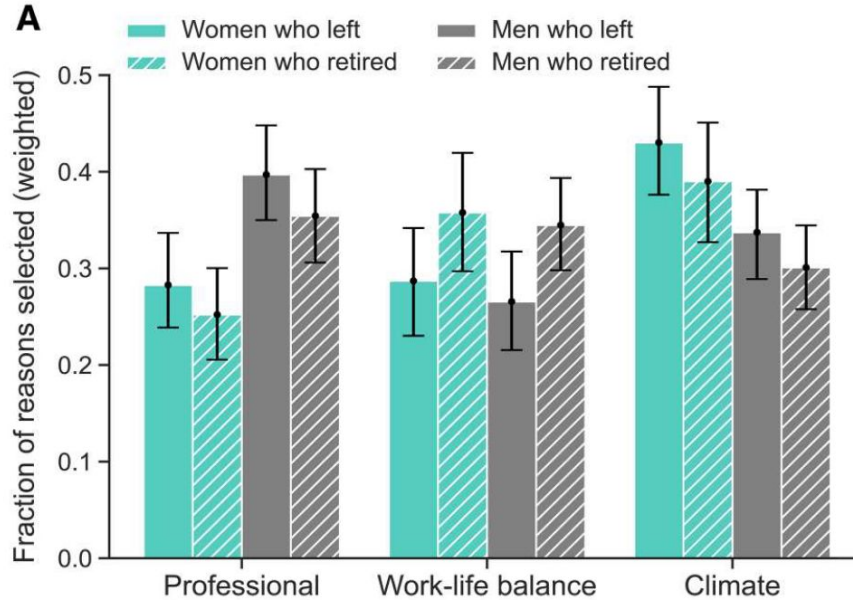# Towards Solutions: The Importance of Diagnosing the Issue

**Why do women faculty leave?**



Spoon *et al.* 2023

# Main Takeaways

- Experimental studies are important to rigorously describe the existence of bias and other inequities (showing with data what many of us experience anecdotally)

- Research approaches are also important to test and evaluate the effectiveness of interventions and initiatives designed to reduce inequity

- Research studies have further demonstrated the importance of identifying the specific root causes of observed phenomena, as they might be counter-intuitive

# Towards Solutions: Ongoing Challenges

- Many gaps remain in research, e.g., lack of systematic and validated metrics to assess gender bias and evaluate potential interventions/initaitives aimed to reduce it

- More research with international cohorts/global contexts needed

- Many studies/approaches do not adequately address intersectionality or the full spectrum of genders

- Observed inequalities in STEM arise from the complex interplay of biases, inequitable structures/policies/practices, and toxic environmental factors, so specific causative factors to target with interventions are challenging to identify

    - **Systems thinking can help here!**

# Part II (Kathy)

# Thanks for listening!

What questions do you have for me?

**Keep in touch: taralyn_tan@hms.harvard.edu**

# My section…

- Overview of state of women in STEM

- Research on the topic (moving from anecdotes)
  - See Neuron article "Gender bias in academia: A lifetime problem that needs solutions"
  -

- Making progress: examples of institutionally supported structures
  - Representation: decreasing the "dude walls", https://www.npr.org/sections/health-shots/2019/08/25/749886989/academic-science-rethinks-all-too-white-dude-walls-of-honor
    - Also see BiasWatchNeuro
    - Anne'sList (highlighting female women neuroscientists)
  - SfN: Increasing Women in Neuroscience (IWiN) resources and toolkit
  - Blind peer review - pros/cons
    - COSYNE case study (didn't fix gender bias)

# My section…

- Overview of state of women in STEM
  - Stats from UNESCO, OIST, HMS, HHMI, etc.

- Barriers facing women in STEM - Women's breakfast summary
  - Summarize key issues: representation, biases, structural systems that amplify bias/inequity

- Research on the topic (moving from anecdotes)
  - Biases in hiring (Moss-Rascusin 2012, Sheltzer & Smith 2014, Steinpreis 1999)
  - Biases in teaching evaluations (Stark & Freishtat 2014, Peterson et al 2019, Blair et al 2001)
  - Hiring, tenure, promotion - women necessary but not sufficient
    - Mandatory bias training (Carnes et al 2015, Schrouff et al 2019); increase diversity in search committees and compensate women (see Table 2 citations in Neuron article)
    - Does Kathy want to highlight OIST?
  - Representation & engagement at conferences (stats and successes - e.g., BiasNeuroWatch)
    - Women don't ask questions if man goes first
    - Childcare
    - Code of conduct
    - Awards/education: See SfN
  - Treating Sexual harassment as research misconduct (talk about NIH, etc.) - anti-pass the harasser (e.g., https://www-science-org.ezp-prod1.hul.harvard.edu/content/article/nih-strengthens-policies-alert-agency-sexual-harassment-grantees) + legal documents between universities (in US)
    - Note that sexual harassment trainings have mixed reviews (some make it worse!)
  - Work-life balance vs. toxic workplace (recent article highlighting the importance of research)

- Success Stories
  - (highlight some of the findings from above articles)
- Ongoing challenges: Intersectionality, including trans scientists; lack rigorous evaluation of many approaches… Transition to Kathy

# Exit Slips

- What is the most useful thing you are taking away from today's workshop?

Please take **1 minute** to write out your answer on a sticky note that I will collect.

(You do not need to put your name on note.)