

Women in
Grad School...



WOMEN of VALOR
SUPPORT your local female GEEK

Women in Physics: A Case Study of Equity Issues in Physics

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Disclaimer

Three things before we start:

- 1) We have our own limitations and perspectives. We can not represent every one. We may mess up!
- 2) Please speak up if you have another perspective to share.
- 3) This might be uncomfortable for any number of reasons. Please take care of yourself! But please also take this seriously and don't check out just because it isn't fun.
- 4) Our aim is to present valuable perspectives which may be different from yours. We will draw on multiple studies, but also on the *real lived experiences of your colleagues*. We ask that you keep this in mind and be respectful :)

There might be candy.....

Outline

- 1) General info
- 2) Specific studies of interest - we have numbers!
- 3) Solutions/Ideas
- 4) Scenarios - let's practice!

Note: we will focus on women in physics but most of these ideas apply more broadly.

General Info



Why should I care?

By filtering out people based on gender, race, ethnicity, etc. we are losing brilliant minds who could be contributing to the field.

Stagnating statistics reporting the number of women in physics are the canary in the coal mine of equity issues in physics.

- E.g. Women are ~50% of the population but <20% of physics graduates.
- Most of these 20% within the U.S. are white women.
- Few remain in the field for long

Impact on mental health

What qualifies as “Underrepresented?”

What qualifies as underrepresented is situational to the population.

In physics (according to APS), underrepresented groups in physics are:

- Gender minorities (women, trans, and nonbinary)
- Domestic minorities such as
 - African Americans
 - Latinx and/or Hispanic peoples
 - Native Americans
- LGBTQ+ peoples

It is worth noting that **other minorities may not qualify as underrepresented**, but **may still face discrimination or harassment** in physics.

We all have privilege

And that's not a bad thing!

Privilege describes a set of attributes which are **beyond your control** that society chooses to categorize by. These attributes can help and/or hurt you.

Some of these attributes are:

Race, ethnicity, sexuality, religion, gender, disability, citizenship, and age.

One way to think of this is that these attributes can either increase or decrease your baseline HP.

Privilege is like a super-power, and can be used for good.

Quick numbers

- 1) In 2017 (APS):
 - a) 21% of Bachelor's in Physics went to women
 - b) 18% of Doctoral degrees in Physics went to women (2% drop...)
- 2) Rutgers is below the national average for 2015-2017 (APS):
 - a) National: 19.3% of physics doctorate degrees granted to women
 - b) Rutgers: 10.4% of physics doctorate degrees granted to women

Quick numbers

- 1) Female astronomers leave the academic labor market 3-4 times faster than male astronomers during the postdoc stage (Flaherty 2018)
- 2) Donna Strickland is only the third woman to ever win the Nobel Prize
 - a) Candy if you can name the other two!

What factors cause people to leave the field?

- 1) Unconscious bias
- 2) Stereotype threat
- 3) Imposter syndrome
- 4) Direct or indirect harassment

These can be experienced by anyone, but are experienced with greater frequency by underrepresented groups.

All of these impact performance and mental health and can be influenced by the behavior of peers, advisors, professors etc



JORGE CHAM ©THE STANFORD DAILY

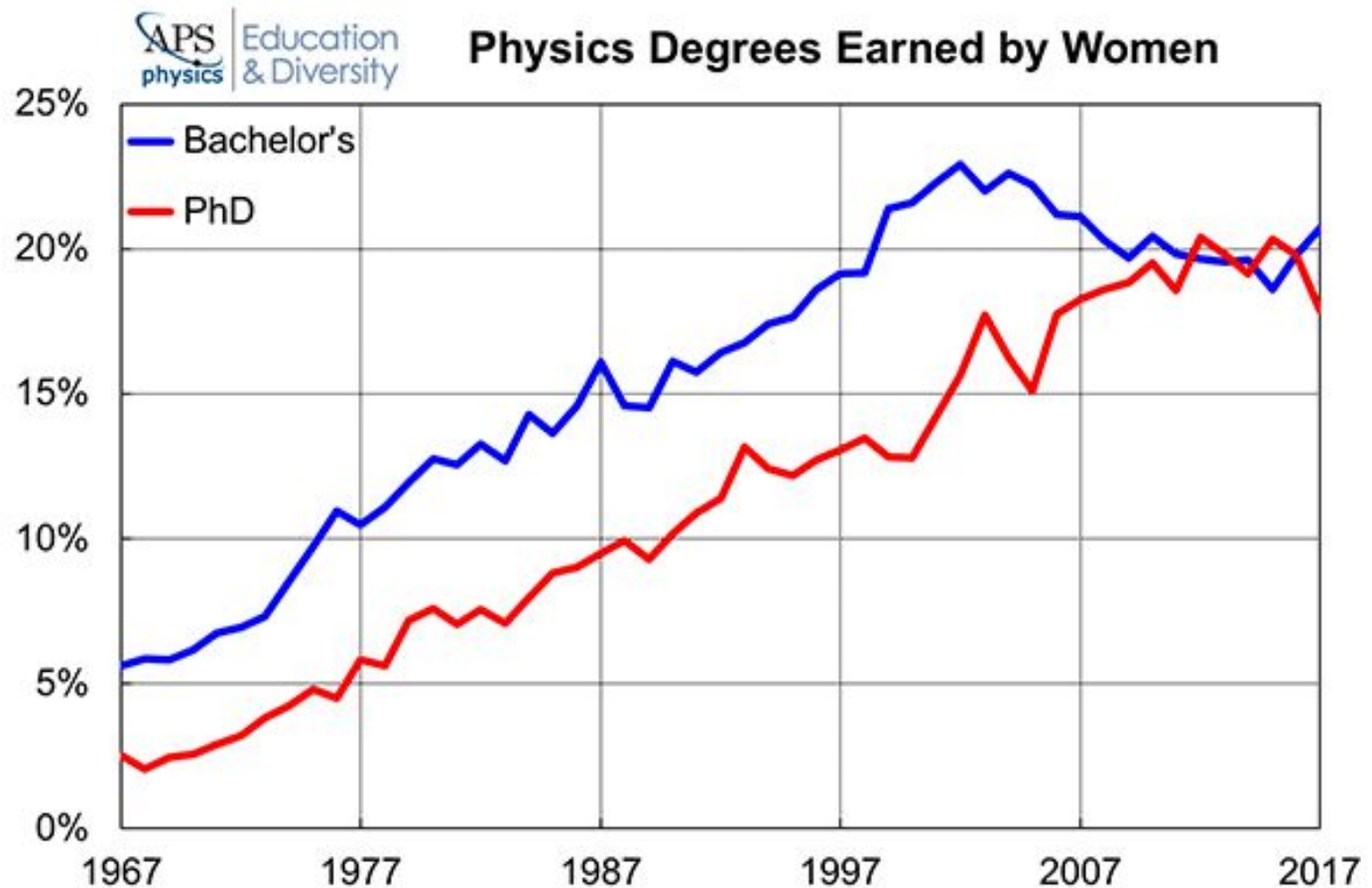
title: "Engineering ratio" - originally published 4/10/1998

Classic stereotype threat....

Specific Studies

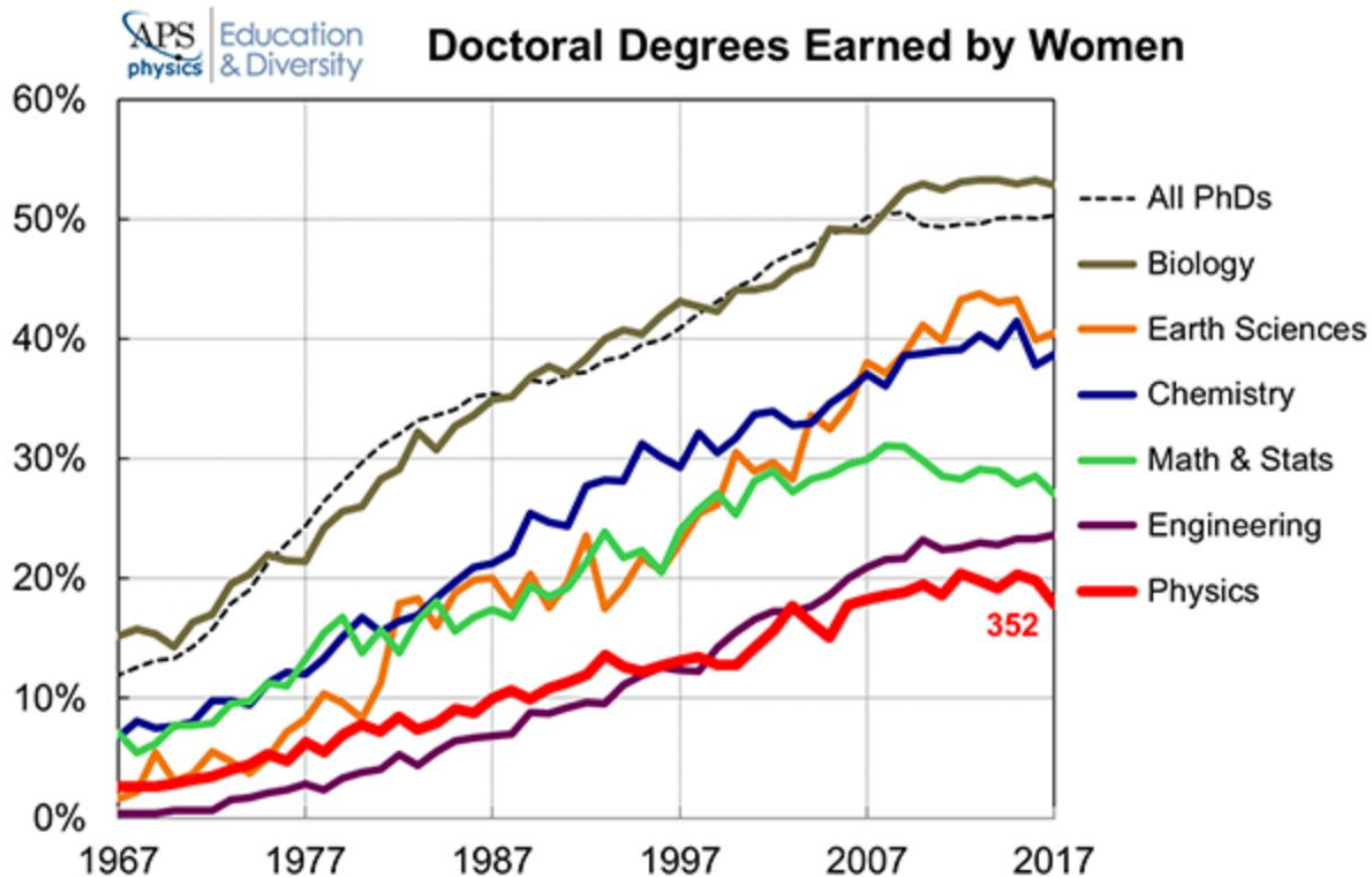


The Numbers



Source: IPEDS and APS

The Numbers



More Numbers:

Nature (vol. 557, May 31, 2018)

- Women accounted for only 13% of prestigious last author spots
- Percentage has increased by only 0.1% per year since 2002
- Authorship will reach equity in 260 years!

New York Times (March 5, 2019)

- Men get more federal grant money
- Male PIs received \$41000 more than female PIs from NIH

AAUW 2013 Study on pay gap

- Pay for women in CS, Mathematics, Engineering and Physics jobs 82-87%

Unconscious bias

Definition:

Unconscious biases are social stereotypes about certain groups of people that individuals form outside their own conscious awareness. Everyone holds unconscious beliefs about various social and identity groups, and these biases stem from one's tendency to organize social worlds by categorizing.

Unconscious bias is far more prevalent than conscious prejudice and often incompatible with one's conscious values. Certain scenarios can activate unconscious attitudes and beliefs. For example, biases may be more prevalent when multi-tasking or working under time pressure.

Source: <https://diversity.ucsf.edu/resources/unconscious-bias>

Unconscious Bias: The Numbers

Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman (2012)

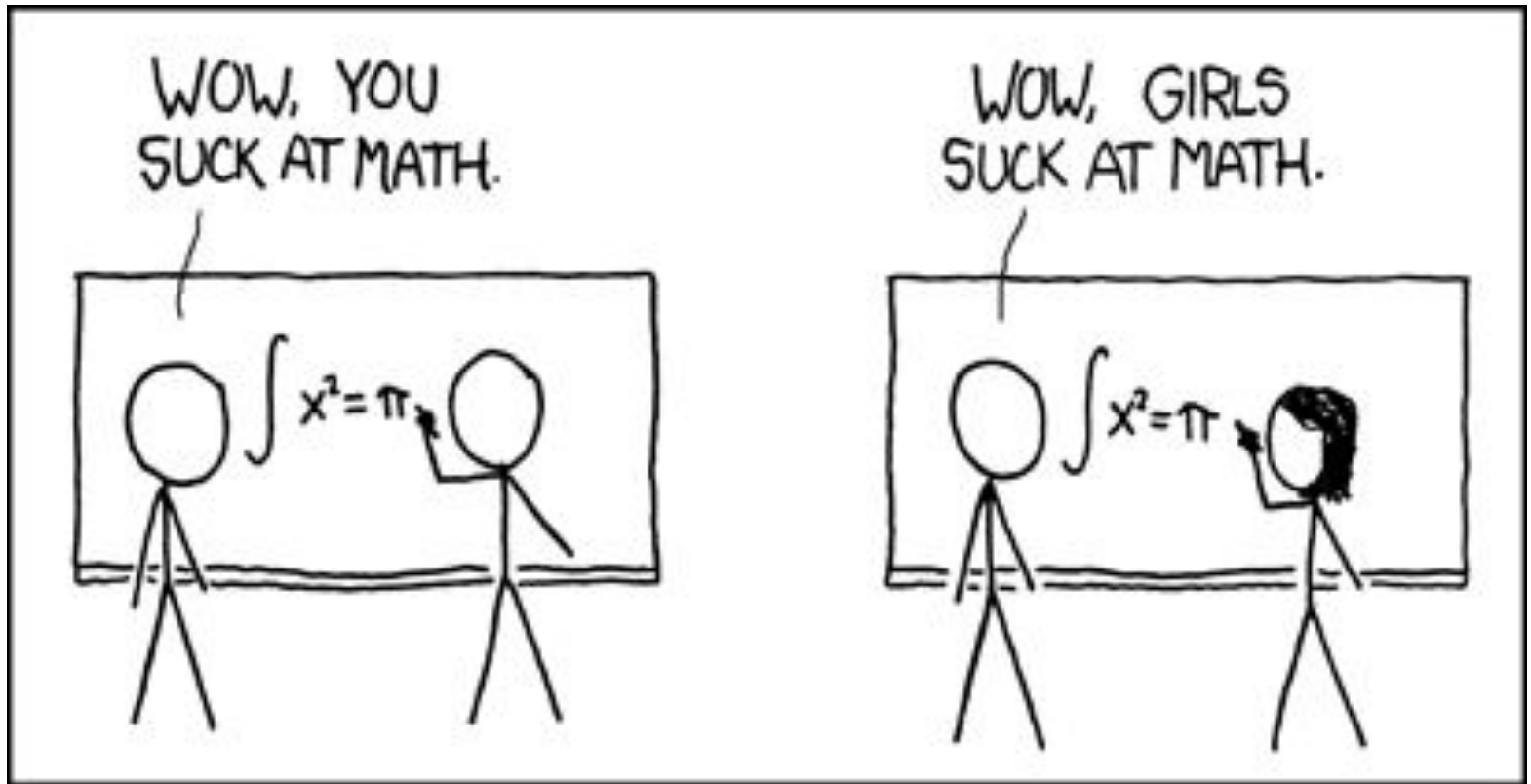
- Randomized double blind study asked faculty to rate a student for a lab manager position
- Students were randomly given male or female names
- Faculty rated male applicants as “significantly more competent and hireable”
- Selected a higher starting salary and offered more career mentoring for male students
- Gender of faculty had no effect

Stereotype threat

Definition:

Stereotype threat refers to being at risk of confirming, as a self-characteristic, a negative stereotype about one's social group (Steele & Aronson, 1995).

In general, the conditions that produce stereotype threat are ones in which a highlighted stereotype implicates the self though association with a relevant social category (Marx & Stapel, 2006; Marx, Stapel, & Muller, 2005).



Xkcd: How It Works

Stereotype Threat: The Numbers

Maries, Karim, & Singh 2018 (Colloquium speaker)

- At the end of a year-long physics course in which women are severely underrepresented, “agreeing with a gender stereotype was correlated negatively with the performance of female students on the conceptual physics surveys”
- May be partially due to students who agree with a gender stereotype having increased stereotype threat.

Imposter syndrome

Definition:

The persistent inability to believe that one's success is deserved or has been legitimately achieved as a result of one's own efforts or skills.

Langford and Clance (1993): “believing that one’s accomplishments came about not through genuine ability, but as a result of having been lucky, having worked harder than others, and having manipulated other people’s impressions.”

(Quotation provided in: Ivie & Ephraim 2011)

Imposter Syndrome: The Numbers

More from Ivie & Ephraim 2011:

- Women are more likely than men to show characteristics associated with imposter syndrome
- Women are more likely to report feeling they have to work harder than others to succeed
- Women are less likely to attribute their success to their high ability
- Women are less likely to report feeling confident in their ability to succeed in the future
- Students who felt mentored were less likely to exhibit imposter syndrome

Imposter Syndrome: The Numbers

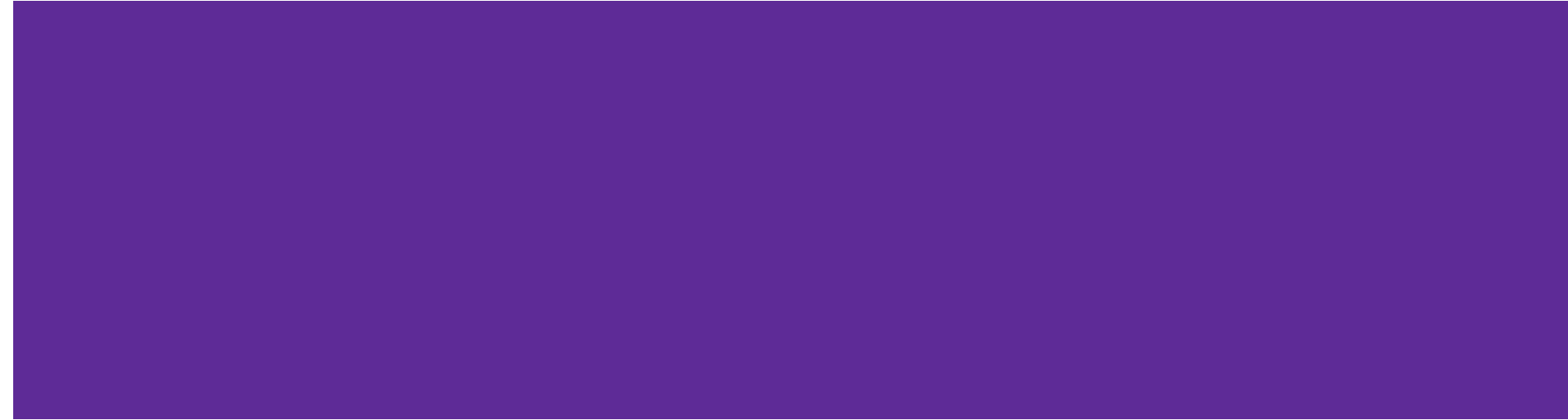
Marshman, Kalendar, Nokes-Malach, Schunn, & Singh 2018:

- Title: “Female students with A’s have similar physics self-efficacy as male students with C’s in introductory courses: A cause for alarm?”
- Self-efficacy gaps grew over physics 1 and 2 courses regardless of course format and instructor
- Female student’s self-efficacy negatively impacted by intro physics

Anecdote:

- Professor reports having women with B’s ask if they should quit, but never men

Solutions/Ideas



Individual Solutions

(if you are a member of an underrepresented group)

Self Care

Sleep! Take an afternoon off. Talk about it

Mental Health Care - See previous health care SSPAR

Finding Mentors and Role Models

Don't discount the little stuff!!! It builds up.

Individual Solutions

(if you want to support a member of an underrepresented group)

Don't discount the little stuff!!! It builds up.

Be a good listener

Ask women (and members of underrepresented groups) about their research! (Not just the challenges they face, and not their personal lives.)

Mentoring matters!

(Citation: <https://www.newscientist.com/article/mg24032031-900-women-in-physics-why-theres-a-problem-and-how-we-can-solve-it/>)

Cohort Solutions

This also works for research groups

Support your peers

Listen if your peer needs to talk - just listening can mean a lot

Speak up if something seems off, even if it doesn't directly affect you. Even speak up if no one from the targeted group is present.

Departmental Solutions

Diversity and Inclusion policies and/or anti-harassment policies

Department wide unconscious bias training.

Discuss problems openly.

Women in Physics groups (Underrepresented minorities groups)

Especially if you have a leadership role, speak up about visible problems within and outside of your department!

Mentoring matters!

Real World Example: Division of Nuclear Physics

Women in Physics Dinner Year 1:





Year 2 and 3

Scenarios



How this works

These scenarios are based on real experiences. We have used fake names and situations to protect the people involved, but the key elements are REAL! Please keep that in mind and be respectful.

We will read the scenario together, please then discuss with your neighbors.

We will then discuss as a group.

Candy for the first group willing to share their thoughts!

Scenario: As an instructor

You are the instructor for a course. Cathy, one of your students, is fairly quiet but consistently scores well on homework and tests. In class one day, Cathy volunteers a correct answer to a question that you asked but most of the other students don't hear. Dave, another student, loudly volunteers an incorrect answer.

What should you do? What issues are relevant here?

Scenario: As a fellow researcher

You're in a research group with Gwen. Lately she hasn't been showing up to the lab and your advisor is angry. When you next see her, she's deeply upset. You find out that the strain of classes and long research hours have put such a strain on her relationship that her husband is leaving her. You decide to go to your advisor and advocate for her. Your advisor says he's aware of the situation, but that it's her fault since she should be able to balance her "familial duties" and grad school or else she shouldn't have applied to the program. He also expresses sympathy for her partner since he thinks it's wrong that she leaves him at home to handle all the chores.

What should you do? What issues are relevant here?

Scenario: As a peer

You are in a meeting (e.g. research meeting, meeting about a class project etc.) and Deepa, one of your peers, makes a suggestion. No one addresses it and the conversation moves on to other things. A few minutes later, Sean, another peer, makes the same suggestion Deepa did. This time, everyone agrees it is a great idea.

Is something wrong? If so, what and what do you do?



Brian,

"That's an excellent suggestion, Miss Triggs. Perhaps one of the men here would like to make it."

Not a new problem

Special thanks to Punch Limited

Scenario: As a student

You are taking an introductory grad level course. Your professor has graded your exams, but says he's disappointed in the scores, and wants everyone to speak to him individually during office hours. You make an appointment with him to collect your exam. When you also express that you're disappointed with your score he tells you not to worry and that he's going to curve everyone's exam. When you ask why he wanted to speak to people individually, he says that it's because he's really only disappointed with the Chinese and Indian students since he thinks they should be doing better. He tells you that he wants to add the type of pressure their parents give them to help them succeed.

Scenario: As a peer

Your classmate Aisha is in her fourth year and is married to a male fourth year also in physics. They are expecting a baby. You see her at colloquium and are on your way over to congratulate her, but she is talking to a very senior member of the department. You overhear him tell her that it's inappropriate for her to continue to pursue her PhD since it is sabotaging her husband and that she should master out so that she can focus on the baby and on being a better support to him.

Scenario: As junior faculty

Barbara is tenured faculty in your department. She's had years of experience in industry and is well respected in her field. Your colleague Dan, who is an untenured recent hire like you, has noticed that Barbara is particularly harsh on her female grad students. While her male students are always fully funded, her female students are often asked to apply for fellowships. Barbara's high standards for her female students has caused one to switch advisors, and one has left school. When Dan confronts Barbara about this, she tells him she's hard on the women in her group because it's "a man's world," and they need to toughen up if they want to succeed.

Is Barbara right?

Scenario: As an older student

You are at a conference and attending a poster session where you are learning of work similar to your own done by Ananda, an undergrad at another institution. While you are talking to her about her research and discussing a possible collaboration, a senior and well respected professor from your institution comes over and shows interest in Ananda's work. After he asks a few questions, he tells her that if she wants to be taken seriously in physics she shouldn't wear such tight clothing since it makes her look cheap. Ananda appears to be deeply humiliated, and you are embarrassed as well since you feel his comments were uncalled for.

What do you do?

Scenario: As an older student or instructor (Part a)

You are working in a shared study space. Near you, Alice and Bob are working on the homework for a class you have already taken. You notice that Alice's explanation of the problem is really good, but Bob interrupts her to give his own explanation which is less complete. You think it is odd that he isn't listening to her explanation.

What do you do?

Scenario: As an older student or instructor (Part b)

You are the instructor for a course. Betty, one of your students, attempts to ask a question but Josh, another student, cuts her off to ask his own question. She stops talking and goes back to taking notes while Josh talks. She shows no sign of trying to speak up again.

What can you do?

Scenario: As a fellow student

You are taking a grad course. Sammie, one of your peers, attempts to answer a question in class, but the professor seems to ignore her answer and gives his own answer to the question. She goes back to taking notes while the professor talks. She shows no sign of trying to follow up on the question and seems quiet for the rest of the class. Later in the class, the professor reacts positively to a male student's answer to a question. What should you do?

Hint: We really don't know the answer to this one.

Scenario: As an instructor

You are the instructor for a course. Ty, one of your students is nonbinary and identifies as neither female nor male. On the first day of class when you asked for your students' pronouns, Ty gave you pronouns of they, them, and theirs. After class several weeks into the semester, you are speaking with one of their group members who misgenders Ty. What should you do?

Scenario: As a researcher

You do research for a non-tenured faculty member. She's deeply dedicated to her students, but you notice that she seems to have more obligations than any mentor /advisor you've worked for before, and because of this she rarely has much time for her grad students, and often pulls all nighters to prepare materials for the course she teaches. Because she is a member of multiple underrepresented groups in your field, she has been asked to serve on almost every committee in the department, and because of her non-tenured status, she doesn't feel she has the luxury of turning down these invitations.

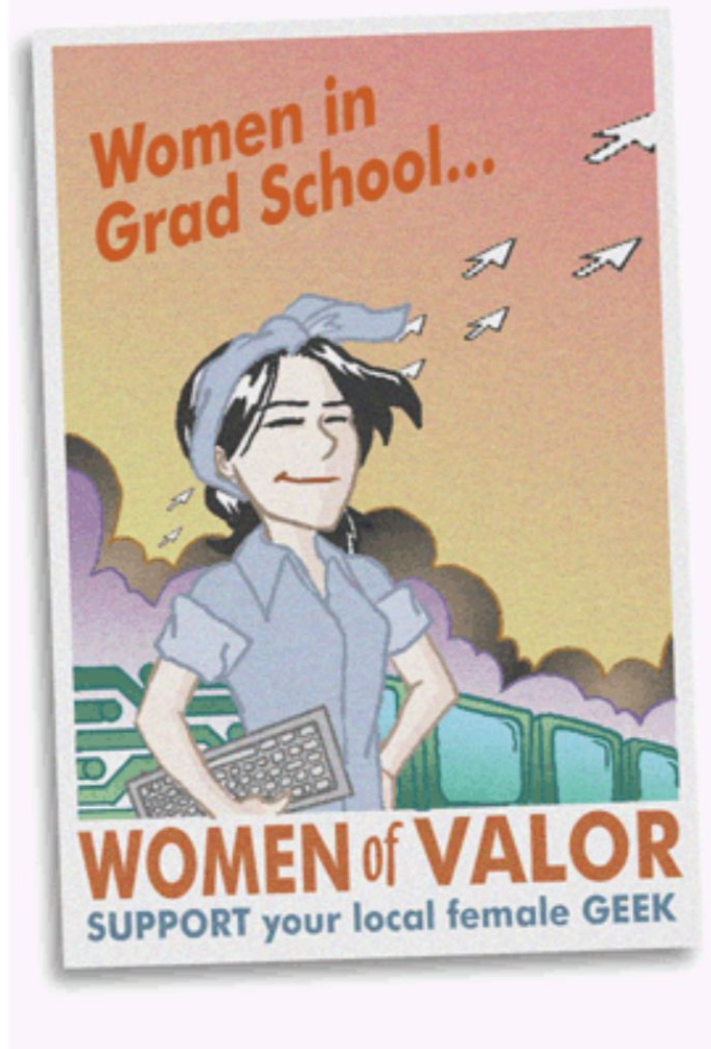
Scenario: As an early career scientist

You are at a major conference in your sub-field. It's been a long day of talks and splinter meetings, and you're heading back to your room in the hotel. As you get in the elevator, you notice the two people already in the elevator seem to be having a conflict. You recognize the man from one of the plenary talks from earlier in the day. The young woman is in the middle of reminding him of the conference's code of conduct, but he is merely chuckling as if she is telling a joke. You realize the situation is serious when she, with a great deal of agitation in her voice, tells him she's gay and not interested and to please stop following her. He laughs again and says, "I don't care what you are, I've reviewed your papers before, and I'll do it again, so you better play nice." When she runs out of the elevator to her room, he follows her.

Scenario: As a test proctor

You are proctoring an exam for a course you do not teach so you don't know the students. But you do notice that there is only one female student. She seems visibly anxious and keeps glancing about the room. You assume that it's just nerves about the test and continue with your proctoring duties. But later, you keep remembering her anxious demeanor.

Is something wrong? If so, what and what can you do?



In conclusion

There are a TON more resources!

See us if you are interested in more info.

Some key resources are:

- APS (<https://www.aps.org/programs/women/resources/statistics.cfm>)
- STEM-wide review article: Blackburn 2017 (Thank you Humna!)
- Unconscious bias compilation
(https://academic.ubc.ca/sites/vpa.ubc.ca/files/documents/Unconscious_Bias_Studies-and-Resources.pdf)
- National Academies Press: 300+ pg report
(<https://drive.google.com/drive/folders/1hAANn9PYpQFxEixoSAEdLU10yCKdosXK>)

There are many many resources we haven't discussed!