

# Dismantling inequity in physics: The essential role of overrepresented groups.

Melissa H. Dancy

*Western Michigan University*



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# About Me

## PhD in Physics

Housed in physics departments for most of my career (teaching and research focused positions).

## Research fields

- Discipline Based Education Research (DBER)
- Physics Education Research (PER)

## Research Interests

- Why do people do things badly when they know they are doing them badly but want to do good?
  - Teaching
  - Equity
- How can people be supported to do well as they want to do?

# Inequity in STEM is not explained by

Lack of

- Knowledge that inequity exists.
- Desire for change by individuals, departments, institutes, etc.
- Willingness to exert effort toward change.
- Professional development opportunities to support change.
- Funding to address the problem.

**The vast majority of those who work in STEM believe inequity is a problem, want it to change, are willing to personally work for that change, and have many resources to support them in that work.**



# Our model of change must be flawed.

Current change paradigm: Focus on changing people historically intentionally excluded from STEM.

- Mentoring, Scholarships, Bridge Programs, Professional Development Workshops, Affinity Spaces, Inclusive Pedagogy.
- Be better prepared, more confident, feel belongingness, negotiate better, learn to think, act, look, talk like the privileged group.

**Power structures, and people who have been historically over included, generally remained unexamined and unchanged.**



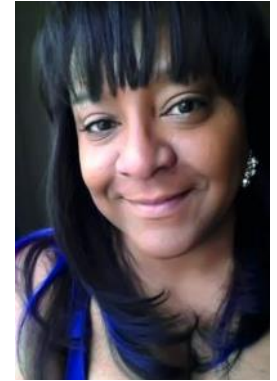
# How do people historically over included in STEM talk about equity?

Interviews with 27 self-identified white-male physicists from 13 USA institutions.

- 13 Faculty (10 full, including 4 current dept chairs)
- 14 Graduate Students

Knowledge, experiences and beliefs about gender and race.

Not a Representative Sample - These are progressive men



Dr. Apriel Hodari  
Eureka Scientific

# Privilege & Intersectionality



Elsherif, M. M., Middleton, S. L., Phan, J. M., Azevedo, F., Iley, B. J., Grose-Hodge, M., Tyler, S., Kapp, S. K., Gourdon-Kanhukamwe, A., Grafton-Clarke, D., Yeung, S. K., Shaw, J. J., Hartmann, H., & Dokovova, M. (2022).

**Bridging Neurodiversity and Open Scholarship: How Shared Values Can Guide Best Practices for Research Integrity, Social Justice, and Principled Education.**

MetaArXiv

<https://doi.org/10.31222/osf.io/k7a9p>

Discourses of  
Distancing:

Inequity is outside  
my sphere of  
influence



*Not me, my students my research group,  
my department, or my field.*

“I mean that view is out there in our society. I guess you'd be crazy to think there isn't some of it inside STEM fields. ...Attitudes among engineers are a lot different than attitudes among physicists, is my experience.

Discourses of  
Distancing:

Inequity is outside  
my sphere of  
influence



*The causes of inequity IN PHYSICS lie in grand social structures.*

The **K12 system** discourages women and provides inadequate education to students of color.

People of color experience **poverty** that limits their opportunities.

Sexism and racism are **historical legacies** of the past. It will be better when the old white guys retire.

Differential expectations of **parenting** for mothers and fathers and the choices men and women make impact women's participation.



# Discourses of Inaction:

## Not my job



*I'm not responsible for learning about or addressing inequity around me.*

“I'm not great about stepping into that conversation and being productive about this. My sense is oh, that's awful, but then I don't do much with it...I don't feel like I have the tools to handle this productively.” - Full Faculty

Discourses of  
Minimizing: There  
is inequity but it  
isn't that bad.



“I think everybody has had at least one negative story. Whether it affected them negatively or not is less clear because these are all people that have been successful.”

When women and people of color report experiencing discrimination in STEM what experiences are they thinking about?

Most common answer ...

Things INDIVIDUAL people say/do that create DISCOMFORT

- “People making snide, insensitive comments.”
- “Locker room talk”
- “The types of stories that you tend to hear, being confused for the janitor.”

# Harassment vs. Discrimination

	Harassment	Discrimination
Source	Bad intentioned individuals	Systems/Culture
Impact	Discomfort	Lost opportunity
Examples	Microaggressions, unwanted sexual advances, sexist/racist comments, etc.	Unequal pay, bias in hiring and promotion, ignoring contributions, unequal access to mentoring and resources, etc.

**Discourse of Minimizing: Half of interviewees described only harassment when asked for examples of discrimination.**

Discourses of  
Evasiveness:

Refusing to See



*It isn't about race or gender.*

“Probably one of the advantages of physics is you get to work for smart people, so normally {gender and race are} not an issue....Physics is probably one of the better fields to go into....it's a field where it really doesn't care about {your gender or race} so much. It's more of, especially at the professional level, what have you done in the past five years.”

Discourses of  
Gaslighting:

Blaming the victim.



*Focus on fixing the oppressed without acknowledging racism/sexism or taking steps to stop it.*

“{If I had a student experiencing racial hostility in my class} I would try and get {them} in touch with whatever organization on campus specializes in working with these kinds of students to help connect them with resources and whatnot.”

Deficit Model Solutions (i.e training for women to better negotiate, rather than training for chairs to eliminate hiring bias)

*Causes the victim to doubt their own experiences and feel responsible for their situation.*

# How privilege is maintained by the privileged.

**Distancing:** It is a problem but it occurs where I have no power.

**Inaction:** It is a problem but I don't have to act if I'm uncomfortable or have not been told how to act.

**Minimizing:** It is a problem but it isn't that bad.

**Evasiveness:** There is a problem but it isn't about race or gender.

**Gaslighting:** The oppressed are the problem.

# Interview Prompt

From Johnson,  
Unintended  
consequences: How  
science professors  
discourage women  
of color. Science  
Education (2007)

*One day, I walked into a huge lecture hall and saw, down at the front, one of my informants, Zina, a tall, dark-skinned African American woman. She was sitting in an aisle seat; the rest of the row she sat in was empty. I sat through class with her, and at the end of class she told me that whatever row she sits in, she clears it out—no one will sit within five or six seats of her. She explained that she used to sit in the sixth row, all by herself. Recently she had moved up to the fourth row, which had previously had habitual occupants. Now, as I saw for myself when I looked around, the sixth row held a number of students and the fourth row was empty.*

**Interviewee was then asked follow-up questions including what they would do if this were happening in their own classroom.**



What is the  
cause of the  
problem?

### **Zina (n=9)**

“{Zina should} form study groups, and then if you have a study group maybe you can have that group sit together.”

### **Majority students are “uncomfortable” (n=11)**

“I suspect at least a piece of it is that we tend to take the easy path, and the easy path is sitting next to your friends.”

### **Bias/Racism/Sexism (n=17)**

“People are just revealing their biases.”

What should  
an instructor  
do in this  
situation?

Half of participants were unable to provide any reasonable instructor response.

- It's Zina's responsibility to solve.
- Do nothing.
- Talk about diversity.

Half of participants suggested group work or assigned seating.

One interviewee suggested addressing physical isolation AND the bias.

## Role of Empathy?

Empathy primarily went to hostile students.

“It's really tricky, because obviously the thing you want to do is call it out and be like what the hell is going on here? Why is no one sitting in this row? But obviously you can't do that because that would be an excruciating experience for the person who's clearing out the row.”

# How does emotion connect to action?

No Emotion Expressed



Passive Emotions  
(Disappointment, Frustration,  
Sadness)



Active Emotions  
(Disgust, Anger)



Little Action (Do nothing, encourage Zina to solve problem herself, ask for advice, etc.)



Weak Action (Solution addresses physical isolation only, i.e. assigned seats, group work)



Strong Action (Solution addresses isolation and bias, i.e. monitored and structured group work)

# Survey of Physics, Math and Chemistry Faculty\*

- Survey of instructional practices and individual, department, and institutional factors that might influence instruction. 3769 responses.
- Subset of these agreed to take a survey about DEI issues. Administered in Fall 2020 and received 1,023 responses.



**Charles Henderson**  
Western Michigan  
Physics



**Melissa Dancy**  
Western Michigan  
Physics



**Naneh Apkarian**  
Arizona State  
Mathematics



**Estrella Johnson**  
Virginia Tech  
Mathematics



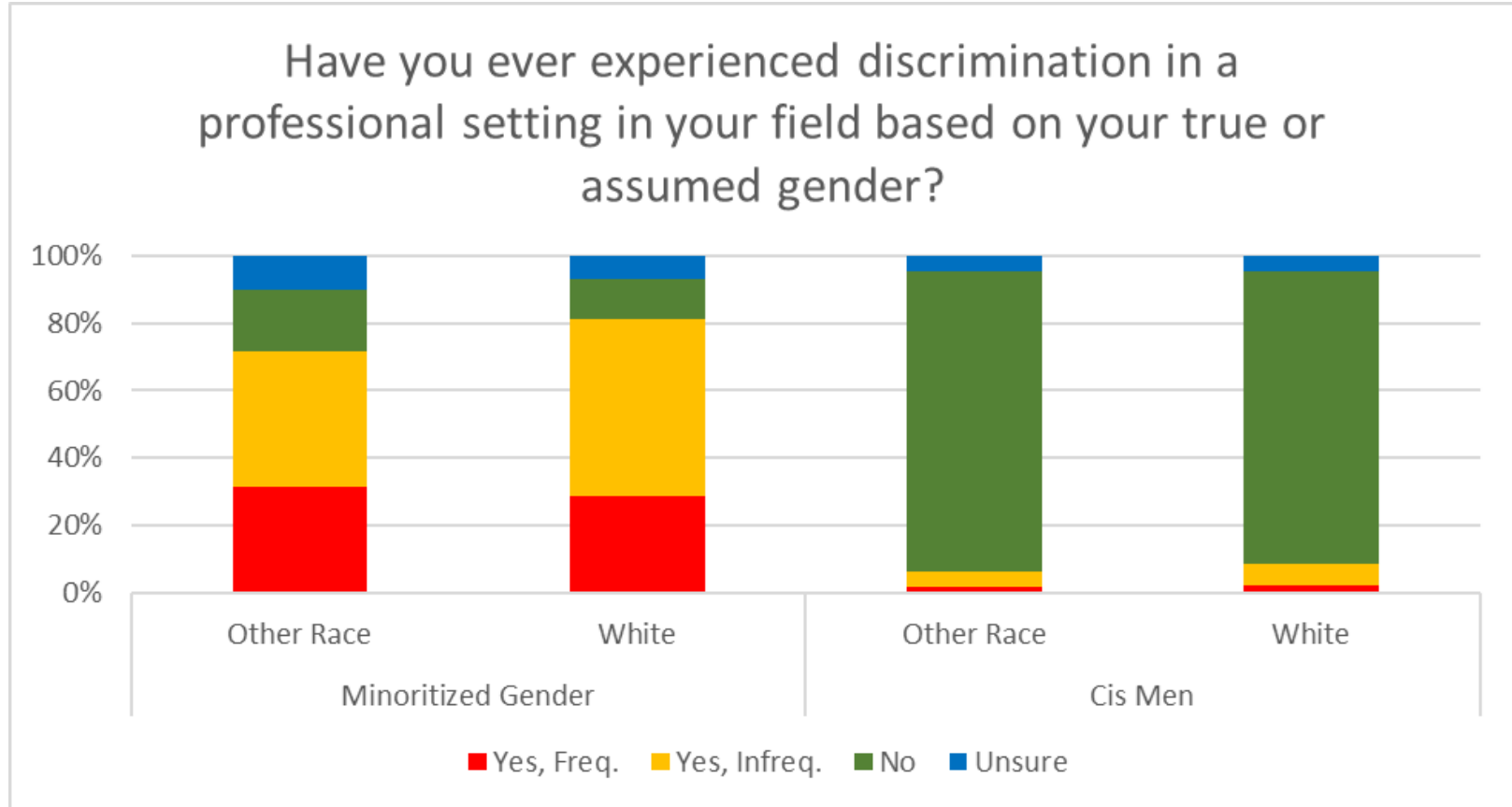
**Marilyne Stains**  
U of Virginia  
Chemistry



**Jeff Raker**  
U of South Florida  
Chemistry

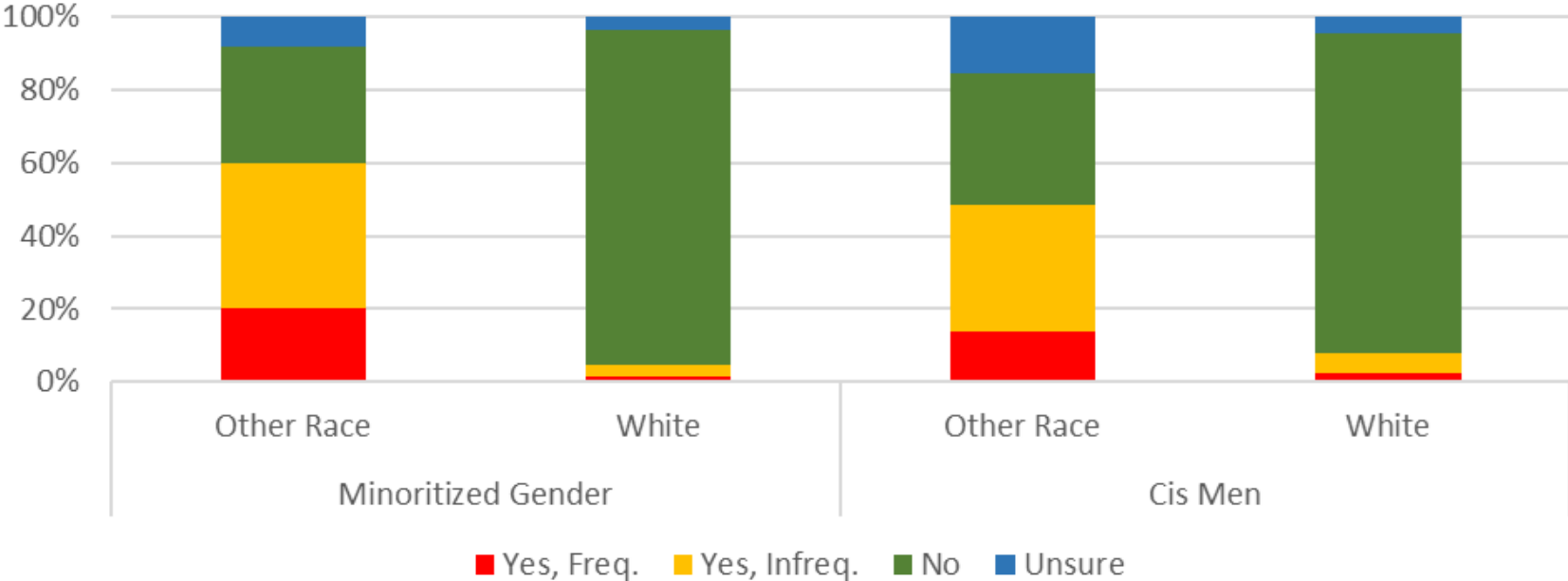
**\*Evaluating the Uptake of Research-Based Instructional Strategies in Undergraduate Chemistry, Mathematics, & Physics** NSF-1726042; PI's Henderson, C., Dancy, M. Johnson, E., Stains, M., Raker, J. (2017-2021)

# Gender Discrimination Is Common in STEM

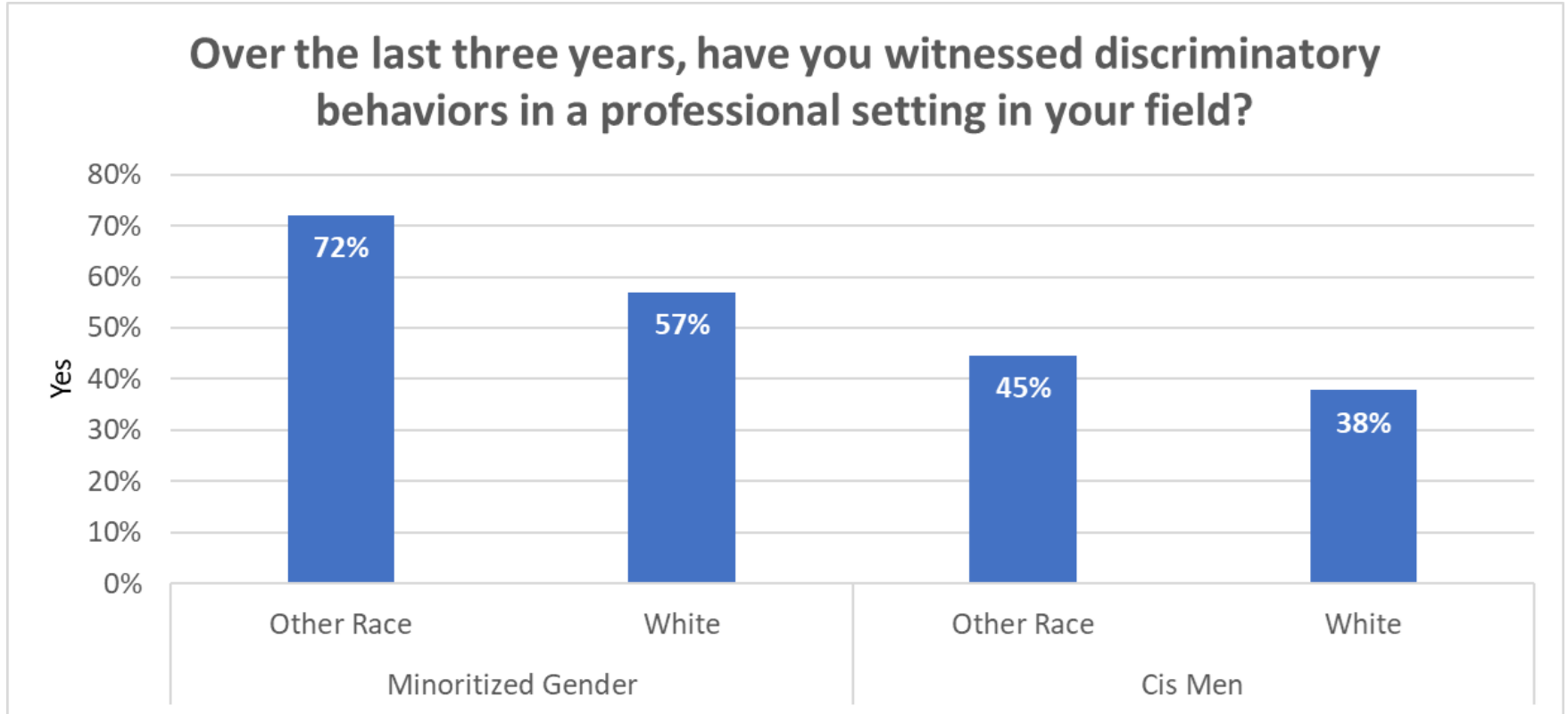


# Race Discrimination Is Common in STEM

Have you ever experienced discrimination in a professional setting in your field based on your true or assumed race and/or ethnicity?



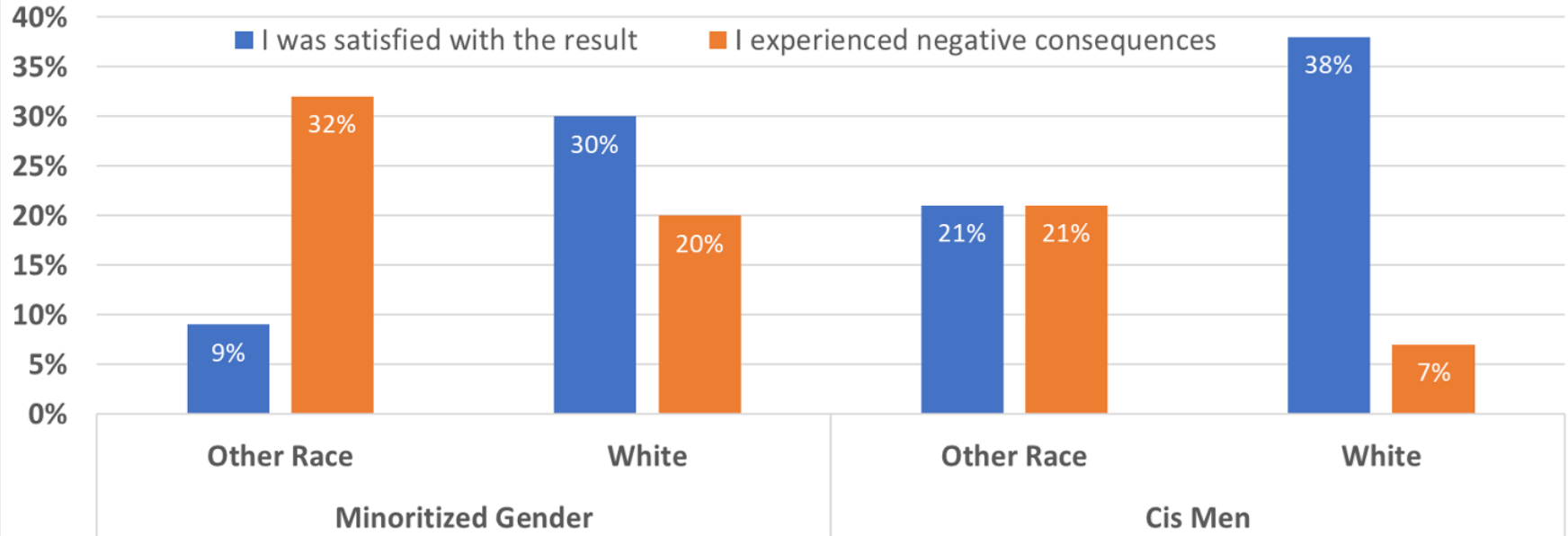
# White Cis Men Have Limited Awareness



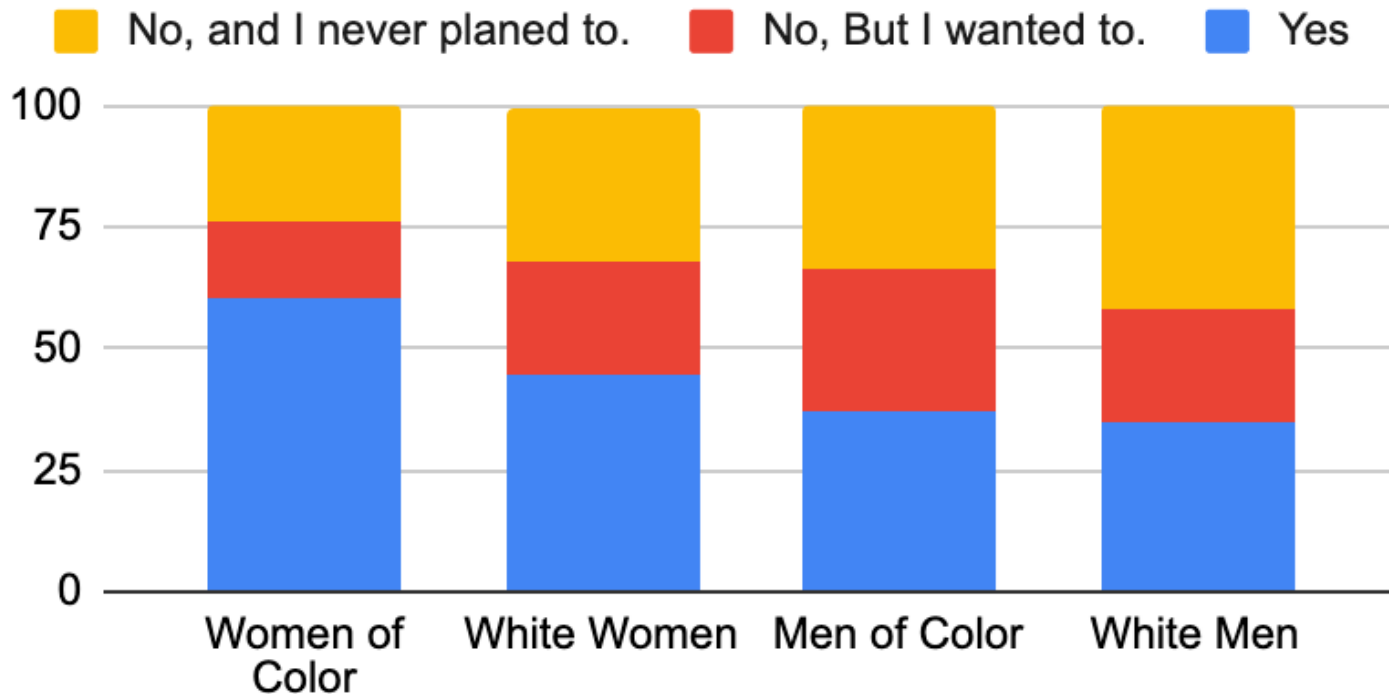


# Systemic Barriers to Speaking Up

Consider the most recent time you brought attention to discrimination in a professional setting in your field. What was the result? (Select all that apply)



## Member of a group or committee (including as an advisor) dedicated to taking equity action in 2019.



**Privileged people are the least likely to engage in learning and action.**

# Summary

Well meaning privileged people are essential for change!

They often maintain inequity by

- Distancing, justifying inaction, gaslighting, minimizing, denying gender is relevant.
- Blaming the oppressed and putting the responsibility for solving the problem on them.
- Empathy/emotion play a critical role.
  - ingroup/outgroup dynamics

# Summary

Privileged people maintain inequity unless they put intentional and sustained effort into

- listening to those who are oppressed
  - and believing them!
- continuous learning
- intentionally acting to undermine inequity.

Workshop Tomorrow!

(16:30-18:15), Beyond Good Intentions:  
Strategies for Effective Equity Work

[bit.ly/3wgA1xx](https://bit.ly/3wgA1xx)

