

Actions to Support Women in Physics

Laura McCullough, PhD
University of Wisconsin-Stout
Menomonie, Wisconsin
(Almost Canada...)

Diversity

Inclusion

Equality

Equity



Women in Physics in Finland

- Very little data!*
- Boost then drop again for women in HS physics
 - Women had *external* motivations to study physics[☆]
- ~20% of physics degrees to women[◇]
- ~18/122 physics faculty are women[†]

*Paljon kiitoksia to Kukka Miikkulainen and Antti Lehtinen!

[☆]Heinonen, Lehtinen & Kankainen, 2022

[◇]Miikkulainen; Miinalainen; Ott, 2023

[†]<https://blogs.helsinki.fi/diversityinphysics/national-network/>

Why care about women and physics?

- Wasted potential
 - Ideas lost
 - Slower progression
 - Diversion of resources
- Advantages
 - More innovation
 - Higher earnings
 - Better science
- Moral issue
 - Data shows inequity
 - Social inequities need to be addressed
- Side benefits
 - Helping women helps all
 - Inspire others
 - Great publicity

What do you think helps
women in physics succeed?

What do we know?—What helps

- Science Identity
 - “I am a physicist.”
 - “I am a physics person.”

What do we know?—What helps

- Sense of Belonging
 - People know your name
 - People look like you
 - Comfortable in physical spaces
 - Sense of safety

What are some of the barriers
women experience in physics?

What do we know?—What hurts

- Sexual harassment
- Gender harassment
- Microaggressions
- Tokenism
- Benevolent sexism
- Stereotype threat
- Unconscious bias
- Brilliance stereotype

Gender Harassment



- “Girls can’t do physics.”
- “You should start out in the lower-level physics class.”
- “Are you sure you’re up for this? It’s pretty hard.”
- “Do you know how to use a wrench/spanner?”

Microaggressions



- Intentional/unintentional
- Verbal/behavioral
- Effect of “othering” someone
- “Do you know how to use a wrench/spanner?”
- “I’ve never seen anyone do that in this building.”

Tokenism



- “We don’t have a problem with women here; we have a woman on the faculty.”
- “We need ‘diversity’ on that committee; put Laura on that one.”
(And that one, and that other one, and this one too...)
- “Laura, why don’t we have more women physics majors?”

Benevolent sexism



- Often disguised as chivalry
- Often patronizing or paternalistic
- Reinforces gender roles

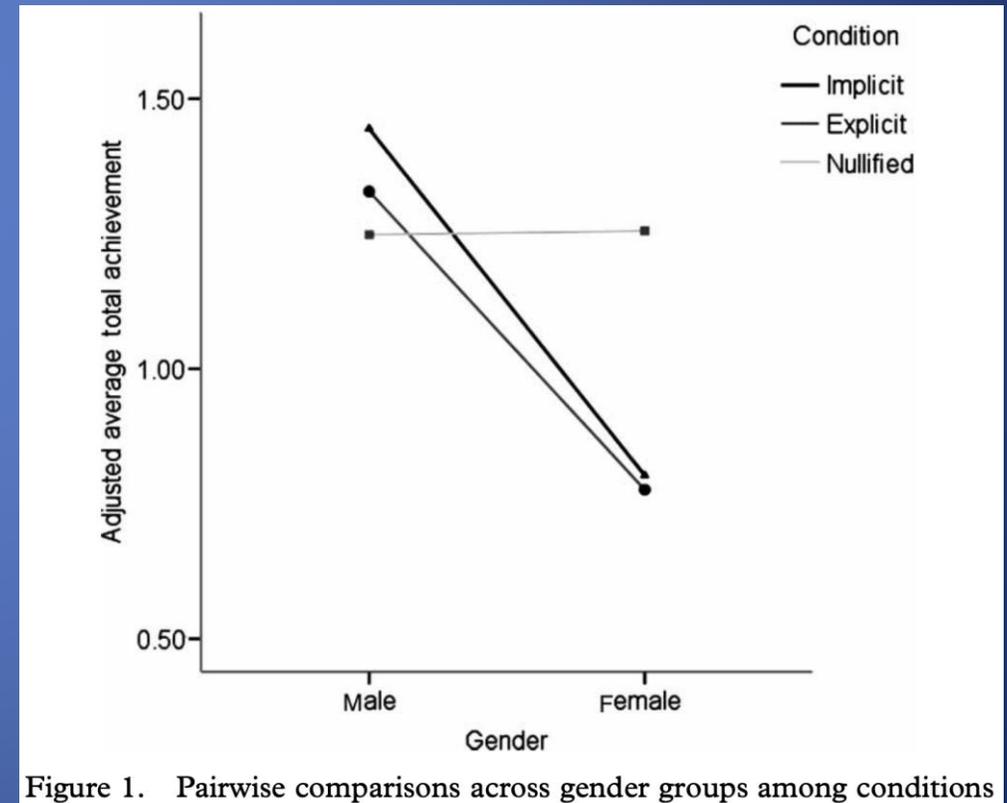
- “That committee meets at 5 pm, and I know you pick up your kids at 4, so I didn’t assign you to that committee.”
- “Can you take notes for this meeting? You have much neater handwriting than I do.”
- “Let me help you with that heavy piece of equipment.”

Stereotype Threat



- Behaving to match stereotype when reminded of stereotype
 - Claude Steele, 2011, *Whistling Vivaldi*

Gwen C. Marchand & Gita Taasobshirazi (2012): Stereotype Threat and Women's Performance in Physics, *International Journal of Science Education*, DOI:10.1080/09500693.2012.683461





Unconscious Bias

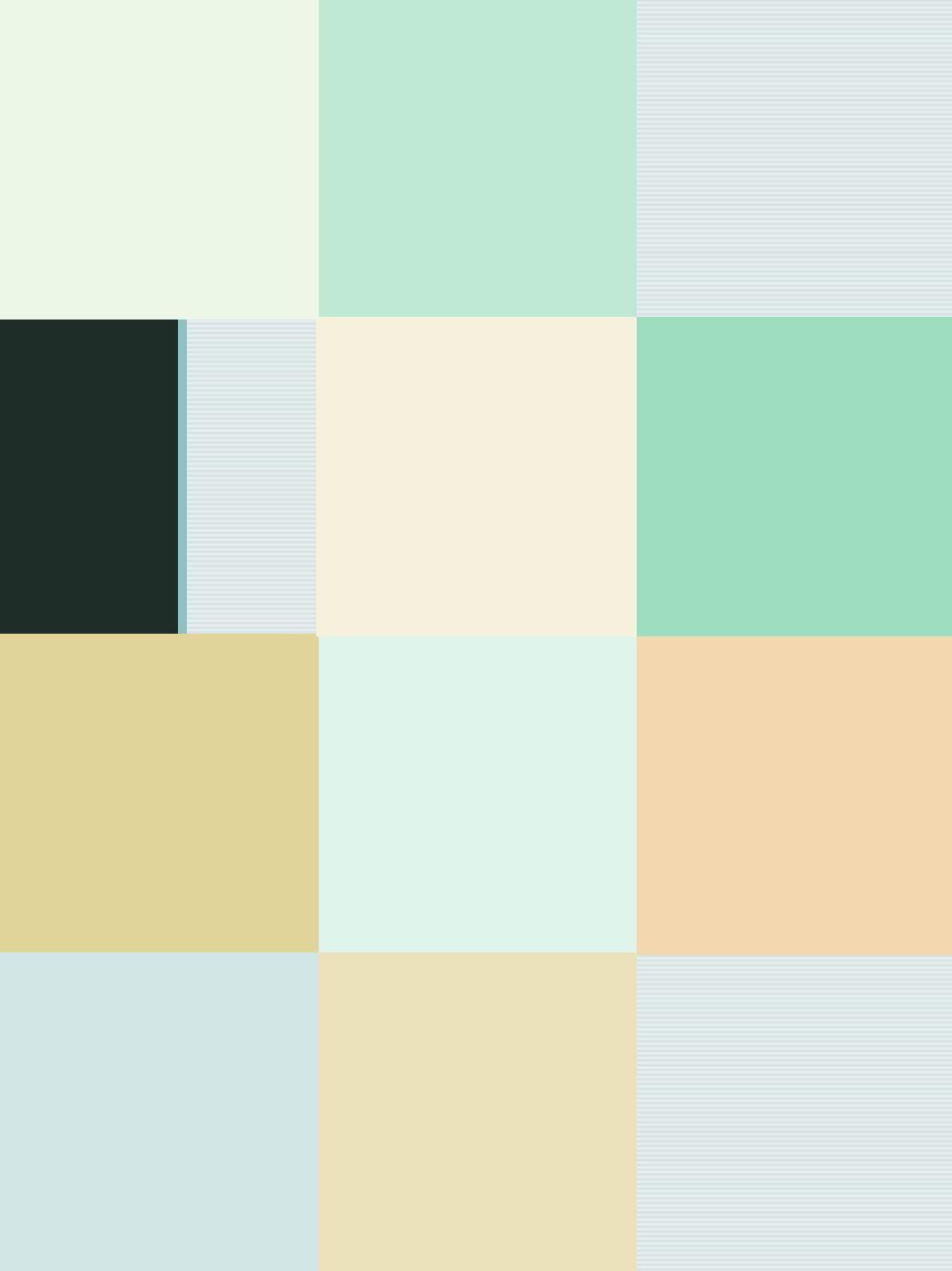
Age

Sex/gender

Race

Class

Other



Brilliance and gender



- Brilliance needed to succeed? Fewer women
- “Brilliance” or “genius” in student evaluations of instructors?
Fewer women and African Americans

Leslie S-J, Cimpian A, Meyer M and Freeland E 2015, Science 347 262–5
Storage D, Horne Z, Cimpian A, Leslie S-J 2016, PLoS ONE 11 e0150194

How can we encourage and support women in physics?

It's not about the women

It's about physics

How to get more women in physics

Get resources

Do research

Collect data

Try things

Assess

Repeat

Actions to support women in physics— Individual

- Sense of belonging
 - Actively encourage young women
 - Share personal stories
 - Normalize making mistakes
 - Explicitly say “You belong here” or “I’m glad you’re in our department”

Actions to support women in physics— Individual

- Science Identity
 - Actively encourage young women
 - Encourage growth mindset in yourself and others
 - #thisiswhataphysicistlookslike
 - Share stories of women physicists
 - Explicitly say “You are a good physicist/physics student.”

Growth Mindset



- Our abilities and characteristics are malleable, not fixed
- We can develop skills
 - Mathematics
 - Sports
 - Empathy
 - Critical thinking
 - Curiosity

Actions to support women in physics— Departmental & Institutional

Retention
before
recruitment

Actions to support women in physics— Departmental & Institutional: For students

- Sense of belonging
 - Lounge areas
 - Study support
 - Women in physics student group
 - Physical & psychological safety
 - Peer mentoring
 - Advisor training

Actions to support women in physics— Departmental & Institutional: For students

- Science Identity
 - Pictures in hallway
 - Student poster displays
 - Photos on website
 - Recognition/awards
 - Undergraduate research
 - Good introductory physics teaching
 - Show the breadth of careers using a physics degree

Actions to support women in physics— Departmental & Institutional: For faculty/employees/workers

- Modernize language?
- Physical & psychological safety
- Good mentoring (within and outside department)
- Transparency in policies and procedures
- Equitable workloads (especially service/admin)

Actions to support women in physics— National/Suomen Fyysikkoseura

- Research Council grant?
- Collect data!
- Strengthen connection to IUPAP WG5: Women in Physics
- Awards for equity work
- FPS Grant specifically for equity work

Supporting Women in Physics

- It's everyone's job
- Need to change the culture
- Change is slow
- Celebrate the small wins
- Recognize the long history and the many improvements
- Don't give up!
- It gets better

Takeaways

- Definite problem with physics in Finland with respect to women
- It's cultural, not individual
- We know the key pieces that help
 - Science Identity
 - Sense of Belonging
- Treat it like any other research question
- Many actions available to help change the culture while helping individual women
- Everyone can and should help

Kiitos!
Thank you!
Takk!

Women and
Physics 2/E



This
presentation

