

# Female STEM Leaders: How Many? What Helps? What Hurts?

Laura McCullough, PhD  
University of Wisconsin-Stout  
Professor of Physics  
lauramccphd@gmail.com

# Welcome!

Let's find out who's here!

- Who has a STEM background?  
(Science, Technology, Engineering, Mathematics)
- Who is in leadership right now?
- Who is in a STEM leadership position?

# Women in STEM leadership

- How many of you can think of a female in a STEM leadership role?

# Women in STEM leadership?

- What counts as STEM leadership in academia?
- Department chair
- Dean
- Other types of leadership?

# “Census” of women

- Biology, Chemistry, Math, Physics
- 30 random departments in US
- Top 20 ranked departments in US
- Department chair
  
- Other leadership positions

# Women as Department Chairs

	Biology	Chemistry	Physics	Math
Random 30 depts in US	8 of 30 (27%)	8 of 28 (29%)	3 of 29 (10%)	7 of 28 (25%)
Top 20 depts in world*	No ranking	3 of 18 (17%)	2 of 19 (11%)	2 of 20 (10%)
Top programs (AIP 2005)			2 of 18 (11%)	
Women's Colleges			13 of 24 (54%)	
Women PhD % (2014)	53%	39%	19%	29%

# STEM Deans

- Top 21 STEM schools (Forbes 2016)
- Deans of STEM colleges:
  - 49 men
  - 18 women (27%)

# National Laboratories

- Director/CEO/President
  - 15 men, 3 women (17%)
- Chief Research Officer
  - 14 men, 3 women (18%)
- Division Heads
  - 69 men, 16 women (19%)



# Women as Directors of National Societies/Foundations/Institutes

	National Science Foundation	National Institutes of Health	National Academy of Science	Amer. Assn. for the Advancement of Science
# of women	3 of 17 Directors (historical)	1 of 16 Directors (historical)	3 of 5 Officers	3 of 5 Officers
			8 of 12 Councilors	6 of 9 Board Members

# Journal Editors

Journal	Men	Women	Total	% women
Science Magazine	5	2	7	29
Scientific American	5	3	8	38
Nature	2	3	5	60
Science News	0	3	3	100
New Scientist	3	0	3	0
Cell	12	7	19	37
PLOSone	2	4	6	67



- Where are our role models, mentors, advocates, sponsors?
- Why are there so few?

# What are the barriers?

What can you imagine are the challenges for women in STEM leadership positions?

# We don't know!

- No research on the intersection of women, STEM, leadership
- Let's find out!

# Data from female leaders

- 134 survey responses
- 110 in US/Canada
- 124 STEM
- 68 in leadership position
  
- 68 female leaders in STEM in US/Canada

# Data from female STEM leaders

Have you experienced any of these barriers to leadership?

	%	N
Balancing work and home life	79	54
Devaluing of your achievements	66	45
Feeling of inadequacy/not being good enough/imposter syndrome	66	45
Microaggressions	63	43
Discouragement from peers or superiors	57	39
Blatant gender bias	56	38
Disparaging comments about your gender	49	33
Dual-career couple issues	41	28
Blatant sexual harassment	16	11

# Data from female STEM leaders

Have you experienced any of these barriers to STEM?

	%	N
Balancing work and home life	81	55
Feeling of inadequacy/not being good enough/imposter syndrome	71	48
Devaluing of your achievements	65	44
Blatant gender bias	54	37
Dual-career couple issues	54	37
Microaggressions	53	36
Discouragement from peers or superiors	50	34
Disparaging comments about your gender	50	34
Blatant sexual harassment	7	5



# Other barriers—leadership

- goalpost-moving: what is the metric for promotion? "I know it when I see it."
- I consciously chose a position and organization that was less intrusive on my time to allow me the time and energy to raise my children
- those with positional power (men) are not fans of participatory leadership
- targeted negative pushback to my leadership from my own department chair
- those who should be advocating for me say I'm "too young", or "not ready"
- impostor syndrome was a big factor in the past, but now is essentially gone
- normal gender and minority challenges, nothing unexpected
- salary discrimination
- I did not feel encouraged to assume leadership by my superiors
- “he-peated”
- academic sabotage and undermining, toxic work culture
- age

# Other barriers—STEM

- same barriers as leadership
- first generation, no prior experience with academia
- job is undefined but big and difficult; sink-or-swim environment

# What is the biggest challenge for leadership?

- Gender bias 20/67
  - Being taken seriously despite my gender and appearance.
  - Expectation that my leadership cannot be effective because I am a woman.
  - I've been flat out told by people "I wouldn't have consulted you on this project if I knew you were a woman. But you seem okay, so we can work together."
- Recognition/being taken seriously 17/67
  - Superiors minimizing my contributions or taking credit for them.
  - Being taken seriously as someone who has accomplished a lot, can contribute a lot, and still has room to grow
  - Always having to prove your worth. Not to be assumed to have valuable knowledge and not to be assumed to be a leader.

# What is the biggest challenge for STEM?

- Gender bias 20/63
  - Being taken seriously by people older, more experienced, or male. I'm a small blonde girl who doesn't exactly give off "smart" appearance vibes.
  - Being the only woman in a room full of guys.
  - Different standards for how men and women are judged
  - Many sexist comments and behaviors. Even comments that seem nice, like "You really held your own in that room of senior xxx" (Well....why wouldn't I?)
  - Systematic devaluing of women faculty in department
  - Always being viewed as a woman first and a scientist a distant second

# It's a tough job!

- Lots of challenges and barriers

# Barriers to what?

- Barriers to being a woman in STEM
  - Barriers to being a female leader
- 
- Do women have to hurdle these twice to become a female STEM leader?

# Barriers: overlap or add?

“Research suggests that the barriers for women in leadership and the barriers for women in STEM are very similar.

Considering your experiences in STEM and in leadership, which best describes your experience?”

	%	N
Dealing with gender bias in STEM has helped me deal with gender bias as a leader	59	40
I have not experienced gender bias in STEM, but I have as a leader	1.5	1
I have not experienced gender bias as a leader, but I have as a woman in STEM	7	5
Dealing with gender bias in STEM did not prepare me for gender bias as a leader	12	8
I have not experienced gender bias either as a leader or as a woman in STEM	1.5	1



Yikes! Does anything help?!

# More data!

What helps women in STEM in their path to leadership?

	%	N
Encouragement from peers	79	54
Support from spouse/partner	75	51
Mentorship	66	45
Encouragement from superiors	66	45
Informal peer networking	65	44
Leadership training (workshop, short course, etc)	54	37
Encouragement from family	48	33
Sponsorship/Advocacy	40	27
Formal networking	22	15

# More data!

What helps women in STEM in their path in STEM?

	%	N
Support from spouse/partner	78	53
Encouragement from peers	74	50
Informal peer networking	74	50
Encouragement from family	71	48
Encouragement from teachers	63	43
Mentorship	62	42
Encouragement from superiors	60	41
Sponsorship/Advocacy	43	29
Formal networking	22	15

# Other assistance—leadership

Training courses in project management and people management but not leadership as such

Prior election to [organization's] council; appointment to relevant committees where I could gather experience

I have a strong self awareness!

I find mentoring others, including much more junior people, very helpful. I have also greatly benefited from working with an executive coach.

Work in leadership at my church, as Chair of Education.

# Other assistance--STEM

- proactive learning and coaching all self paid for
- opportunities
- therapy

# What helps the most—leadership?

- People! 43/65
  - "support" 30/65
  - "mentor" 10/65
  - "encouragement" "advocacy" "coaching"
- Not training, opportunity, success
- 1 woman said no help

# What helps the most—STEM?

- People! 47/62
  - Mentor 18/62
  - Support 31/62
  
- 5 women said no help

# It's a tough job!

- Work-life balance, gender bias and recognition are the biggest challenges
- People are the biggest help: support, mentorship
  
- Where do these challenges come from?



# What underlies many barriers?

- Three ideas that create/promote barriers for women in leadership and women in STEM

# Cultural factors

- Societal belief that women don't belong in science
- Implicit bias
- Stereotype threat
- Mindset
- Discrimination
- Sexual harassment

# Implicit (Unconscious) Bias

- Growing up → culturally instilled values
- Pervasive: everyone has them
- Different from explicit biases (can be same or different)
- May differ from our declared beliefs
- Tend to favor our own in-group
- Malleable—thank goodness!

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Growing up → culturally instilled values

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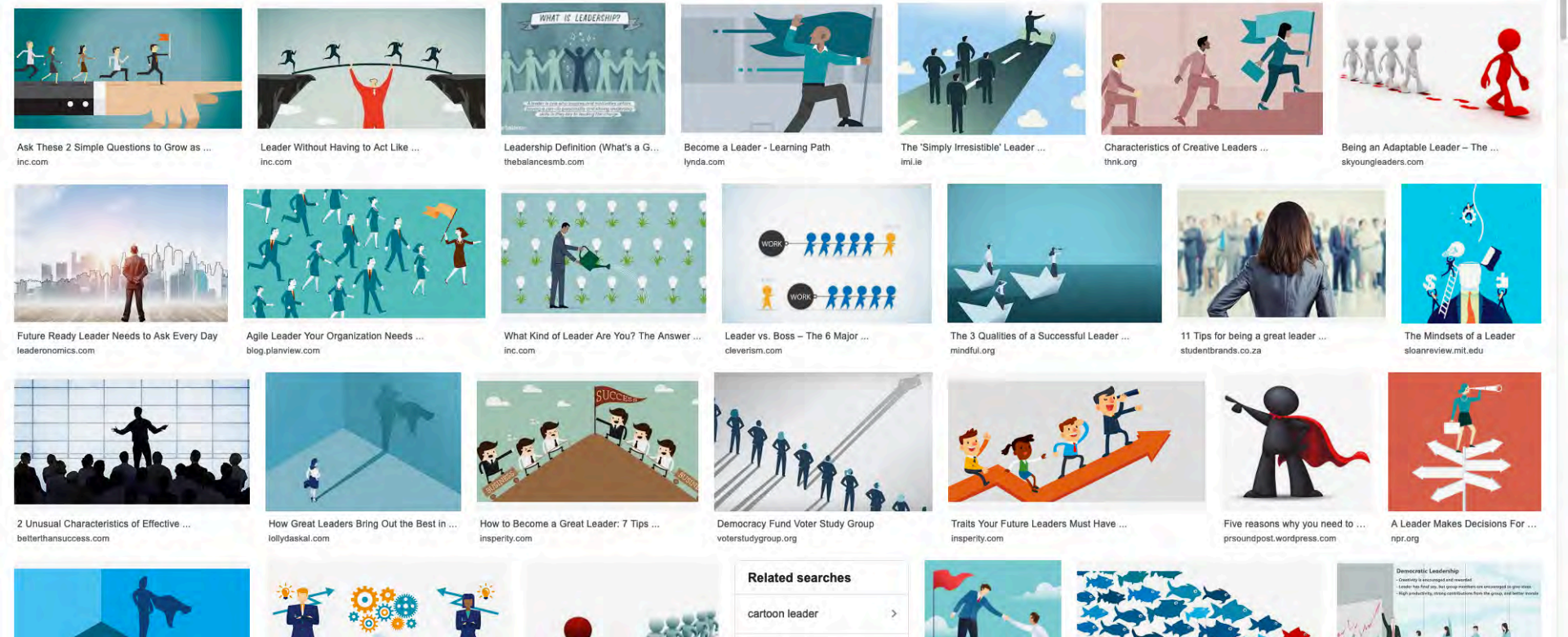
May differ from our declared beliefs

Tend to favor our own in-group

Malleable—thank goodness!







“leader” image search



High-Performing Leaders from Average Ones  
hbr.org



Essential Qualities of a Good Leader in ...  
isha.sadhguru.org



Political Leadership Profiles ...  
leadershipgeeks.com



Most Disappointing Leaders ...  
fortune.com



Game-Changing Marketing Leaders  
forbes.com



Most Effective Sales Leaders  
hbr.org



Where the party leaders are on Day 17 ...  
cbc.ca



How Trump talks to world leaders in ...  
washingtonpost.com



2019 Class of Young Global Leader...  
weforum.org



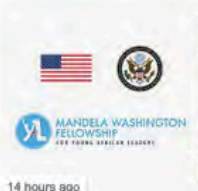
Trump, Imran most googled UNGA leader...  
tribune.com.pk



Leadership traits: When leaders lead ...  
changefactory.com.au



Donald Tusk attacks 'fake leaders' who ...  
ft.com



Mandela Washington Fellowship for Young ...  
irex.org



Biggest Challenges Women Leaders Face ...  
forbes.com



Congressional leaders react to Trump's ...  
nypost.com



Leaders spread out across country for ...  
1310news.com

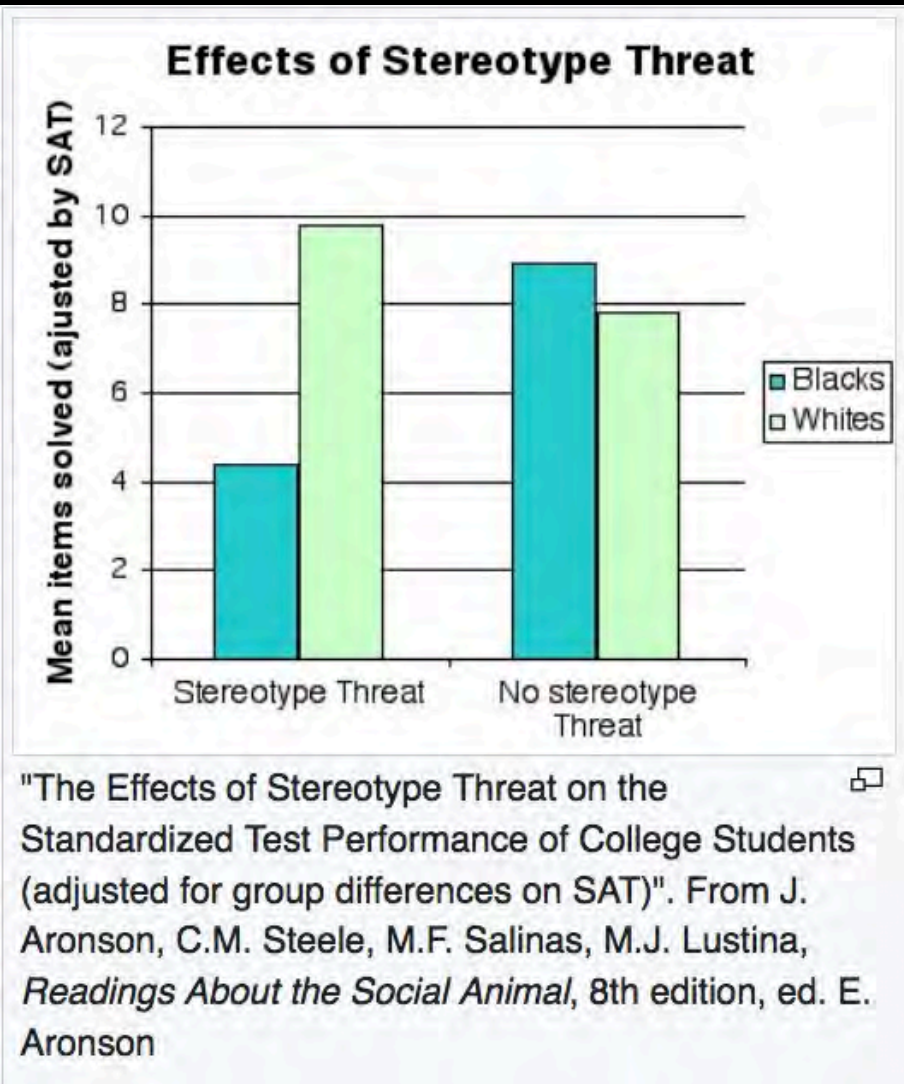


“photos of leaders” image search



# Stereotype Threat

- Risk of confirming a negative stereotype
- Triggered by mentioning stereotype (or even being unconsciously aware of it)
- Lowers performance of stereotyped groups





# Stereotype threat in leadership

- Women in stereotype threat condition had lower aspirations towards leadership
- Creating “identity-safe” environment eliminated vulnerability to stereotype threat

# Mindset

- Fixed mindset: your qualities are set and unchangeable
- Growth mindset: your qualities can be cultivated and developed

# Mindset check

- You can learn new things, but you can't really change your basic intelligence.
- Your intelligence is something about you that you can't change very much.
- You have a certain amount of intelligence and you really can't do much to change it.

# Growth mindset

- Growth mindset: skills can be learned
  - Characteristics can be learned!
- Fixed mindset: you have a certain amount of skill/trait  $X$ , and you can't change it
- We have different starting places, but effort can lead to growth in any area

# Mindset for leadership

- Leadership = skills
- Skills can be grown
  
- Leadership can be *developed*
- Despite starting place, leaders are *grown*
  
- Possible connection between fixed mindset and imposter phenomenon

Why is this important?

# Women leaders have a lot to offer

- “Until women can feel as much at home in [STEM] as men, our nation will be considerably less than the sum of its parts. If we do not draw on the entire talent pool that is capable of making a contribution to science, the enterprise will inevitably be underperforming its potential.”
- “Diversity within and between groups helps a whole population to survive and adapt to the changing demands of the environment.”
- “Diversity in the workplace is known to foster innovation; a diversity of experiences and perspective-taking yields greater opportunity for creativity.”
- “Women leaders on average manifest valued, effective leadership styles, even somewhat more than men do.”

Presidents of Stanford, MIT, Princeton. 2005.

Wittmann WW. 2005. Understanding and Measuring Intelligence.

Stout, Grunberg, Ito. 2016. Sex Roles.

Eagly, A. 2007. Psychology of Women Quarterly.



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