Advancing NIH Research on the Health of Women:
A 2021 Conference

How Stereotypes Underpin Inequities for Women in Academic STEMM *and* Advancements in Women's Health

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#HealthOfWomen2021

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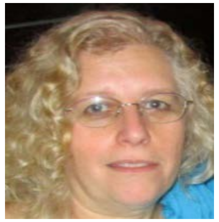

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Points to cover

1. Our knowledge of gender stereotypes (even if we don't believe them) gives rise to overt and unintentional ("implicit") gender bias
2. The conflation of gender and status predicts that health conditions unique to or more common in women would be seen as less important
3. Women in STEMM are more likely to study issues that affect the health of women, but gender bias may impede publication, research funding, willingness to resubmit, and attainment of leadership
4. Individuals at all levels of STEMM must work hard to break their own bias habits because policy is not sufficient to overcome gender bias

We know common stereotypes even if we don't believe them

[1]Carli et al. 2016, Haines et al. 2016, Eagly & Sczesny 2009, Bem 1974; [2]Ghavami & Peplau 2013.

We know common stereotypes even if we don't believe them

Men[1]

- Strong
- Decisive
- Stubborn
- Competitive
- Ambitious
- Risk-taking
- Assertive
- Logical
- Authoritative
- Independent

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Women[1]

- Caring
- Nurturing
- Family-oriented
- Emotional
- Supportive
- Sympathetic
- Nice
- Helpful
- Dependent

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- Dependent

COMMUNAL

White[2]

- High status
- Rich
- Intelligent
- Arrogant
- Privileged
- Blonde
- Racist
- All-American
- Ignorant

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We know common stereotypes even if we don’t believe them

Men[1]	Women[1]	White[2]	Asian[2]
Strong	Caring	High status	Intelligent
Decisive	Nurturing	Rich	Bad drivers
Stubborn	Family-oriented	Intelligent	Good at math
Competitive	Emotional	Arrogant	Nerdy
Ambitious	Supportive	Privileged	Shy
Risk-taking	Sympathetic	Blonde	Skinny
Assertive	Nice	Racist	Educated
Logical	Helpful	All-American	Quiet
Authoritative	Dependent	Ignorant	Passive
Independent			
AGENTIC	COMMUNAL		

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White[2]

- High status
- Rich
- Intelligent
- Arrogant
- Privileged
- Blonde
- Racist
- All-American
- Ignorant

Asian[2]

- Intelligent
- Bad drivers
- Good at math
- Nerdy
- Shy
- Skinny
- Educated
- Quiet
- Passive

Black[2]

- Ghetto or unrefined
- Criminal
- Athletic
- Loud
- Gangsters
- Poor
- Unintelligent
- Uneducated
- Lazy

Latino[2]

- Poor
- Illegal immigrant
- Uneducated
- Family-oriented
- Lazy
- Unintelligent
- Loud
- Gangsters

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Cultural stereotypes are responsible for overt discrimination and implicit bias against minoritized groups

- Institutional
  - Women paid less than men
  - Men penalized for taking family leave
  - Funds allocated for research to improve the health of women vs. men
- Interpersonal
  - Sexual harassment
  - Microaggressions
  - Decisions about who to hire, mentor, sponsor, reward, publish, and fund
- Internalized
  - Imposter syndrome
  - Stereotype threat
  - Decision about “fit” in career decisions
  - Resubmission of grants after rejection

Stereotypes of leaders

Competitive

Self-confident

Aggressive

Ambitious

Powerful

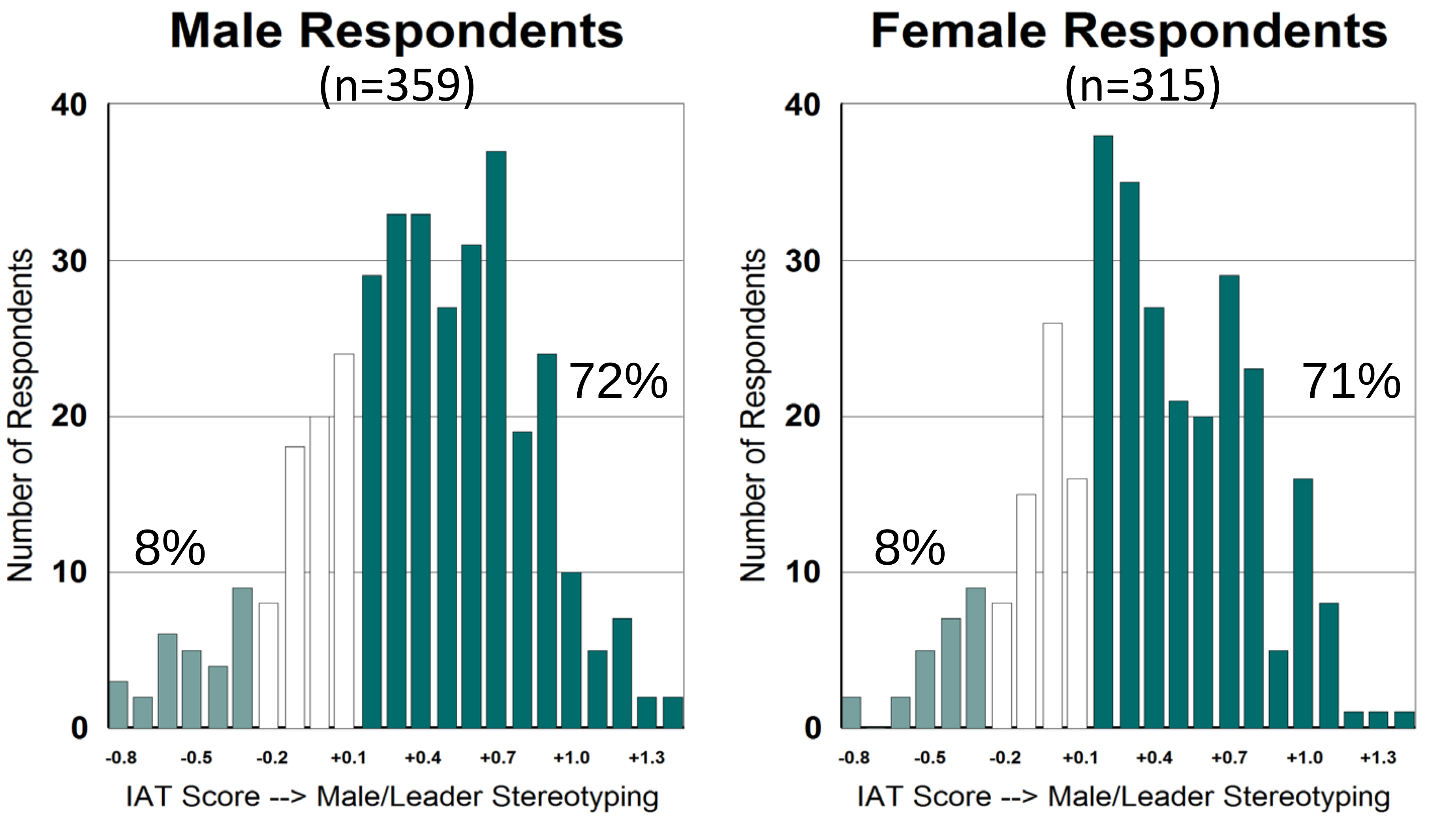
Decisive

Eagly & Carli 2007; Schein 1973

Who "fits"

Men = Agentic		**Women = Communal**
Strong		Caring
Authoritative		Nurturing
Risk-Taking		Supportive
Logical	**LEADER?**	Nice
Assertive		Helpful
Decisive		Dependent
Independent		Emotional

Eagly & Karau 2002; Eagly & Koenig 2008; Eagly & Sczesny 2009; Carli et al. 2016; Schein 2001; Heilman et al. 2004; Heilman & Okimoto 2007



Gender and Leadership IAT Scores

Filut et al, 2017

There are penalties for breaking gender “rules”

Men = Agentic

Caring
Nurturing
Supportive
Nice
Helpful
Dependent
Emotional

SOCIAL PENALTIES

Women = Communal

Strong
Authoritative
Risk-Taking
Logical
Assertive
Decisive
Independent

Eagly & Karau 2002; Eagly & Koenig 2008; Eagly & Sczesny 2009; Carli et al. 2016; Schein 2001; Heilman et al. 2004; Heilman & Okimoto 2007; Correll et al. 2020

Lack of fit could lead to bias in grant peer review

- Participants' selection of traits for "average man" but not "average woman" strongly overlapped with traits for a successful scientist *Carli et al. 2016*

- Creativity and innovation were more strongly associated with male than female-gendered stereotypes *Proudfoot et al. 2015; Elmore & Luna-Lucero 2017*

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- When grant awards were made on basis of *research*, no gender difference in award rate; when made on basis of *scientist* applying for the grant, women were less likely to be funded *Witteman et al., 2019*

- New NIH R01 (Type 1) award rate same for male and female applicants, but for renewals (Type 2) when applicants are both *scientists* and *leaders* female success rates consistently lower for women *Kaatz et al. 2016; Kolehmainen et al. 2018; Erosheva et al. 2020; Chaudhary et al 2021*

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- New NIH R01 (Type 1) award rate same for male and female applicants, but for renewals (Type 2) when applicants are both *scientists* and *leaders* female success rates consistently lower for women - until 2020! *Kaatz et al. 2016; Kolehmainen et al. 2018; Erosheva et al. 2020; Chaudhary et al 2021*

Dozens of experimental studies document that women and non-White individuals are rated lower on performance and employment related variables (vs. men and White individuals) even when the work or application is identical

Race and gender influence rating of identical postdoctoral candidates

Eaton et al., 2020

Race and gender influence rating of identical postdoctoral candidates

- 94 physics and 157 biological sciences faculty
- 8 U.S. public research universities
- Cover story:
  - Hypothetical CV from real postdocs
  - Studying CV formatting
- Evaluate:
  - Hireability
  - Competence

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Gender/race signaled with pre-tested names:

- White
  Bradley Miller
  Claire Miller
- Asian
  Zhang Wei [David]
  Wang Li [Lily]
- Black
  Jamal Banks
  Shanice Banks
- Latinx
  José Rodriguez
  Maria Rodriguez

Eaton et al., 2020

Race and gender influence rating of identical postdoctoral candidates

- Male more competent and hireable than female*

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Race and gender influence rating of identical postdoctoral candidates

- Male more competent and hireable than female*
- White, Asian more competent and hireable than Black, Latinx*

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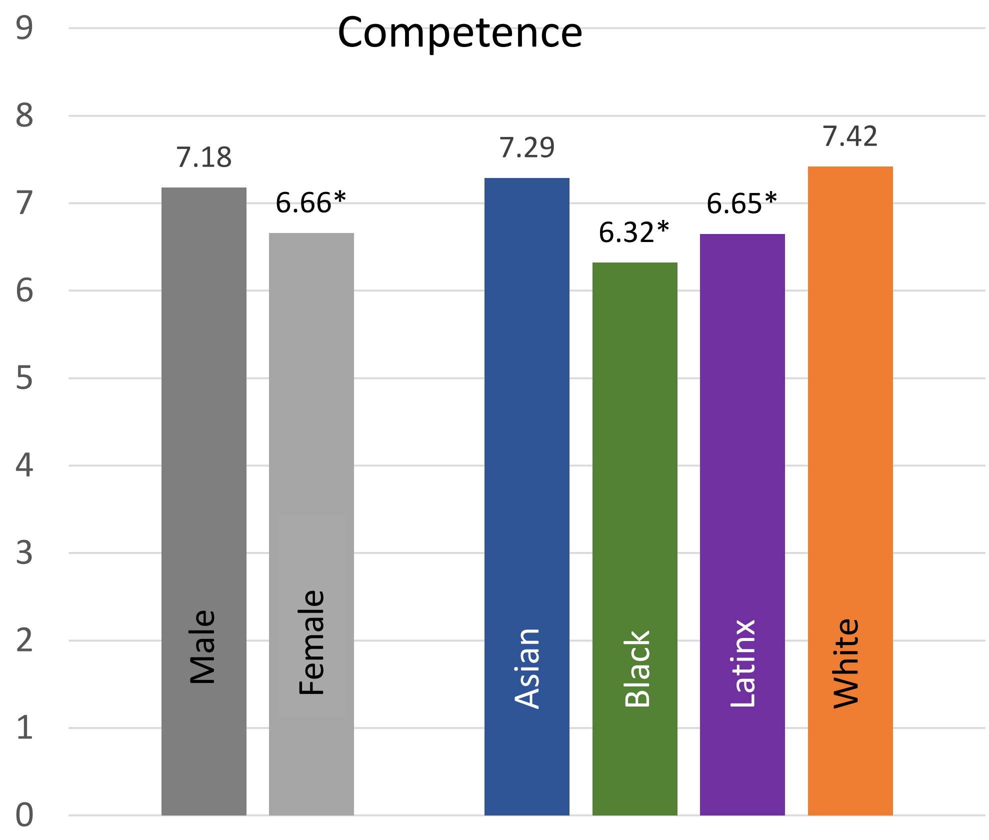


* *p*<.05

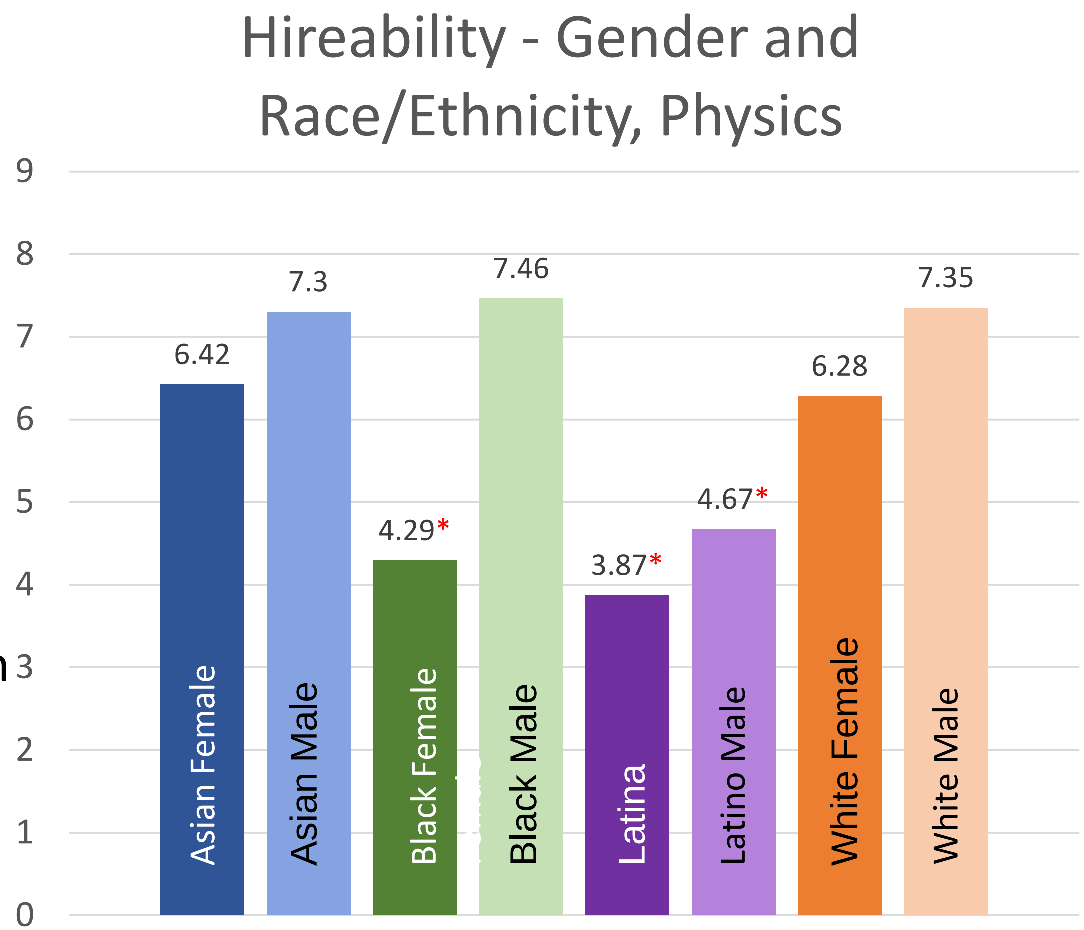
Eaton et al., 2020

Race and gender influence rating of identical postdoctoral candidates

Interaction of Race & Gender

- **Competence:** no significant differences

- **Hireability:** Black and Latina females and Latino males less hireable than all others (in physics, only)*



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Abundant evidence affirms a lower societal value placed on women, roles predominantly occupied by women, and work performed by women than men, roles predominantly occupied by men, and work performed by men

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- A man was worth 50 shekels of silver and a woman was worth 30; and a boy was worth 5 shekels and a girl was worth 3 shekels *Leviticus 24:3-7*

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- Reimbursement for 42/50 surgical procedures performed in men (usually by male urologists) higher than pair matched procedures performed in women (usually by female gynecologists) *Benoit et al. 2017*

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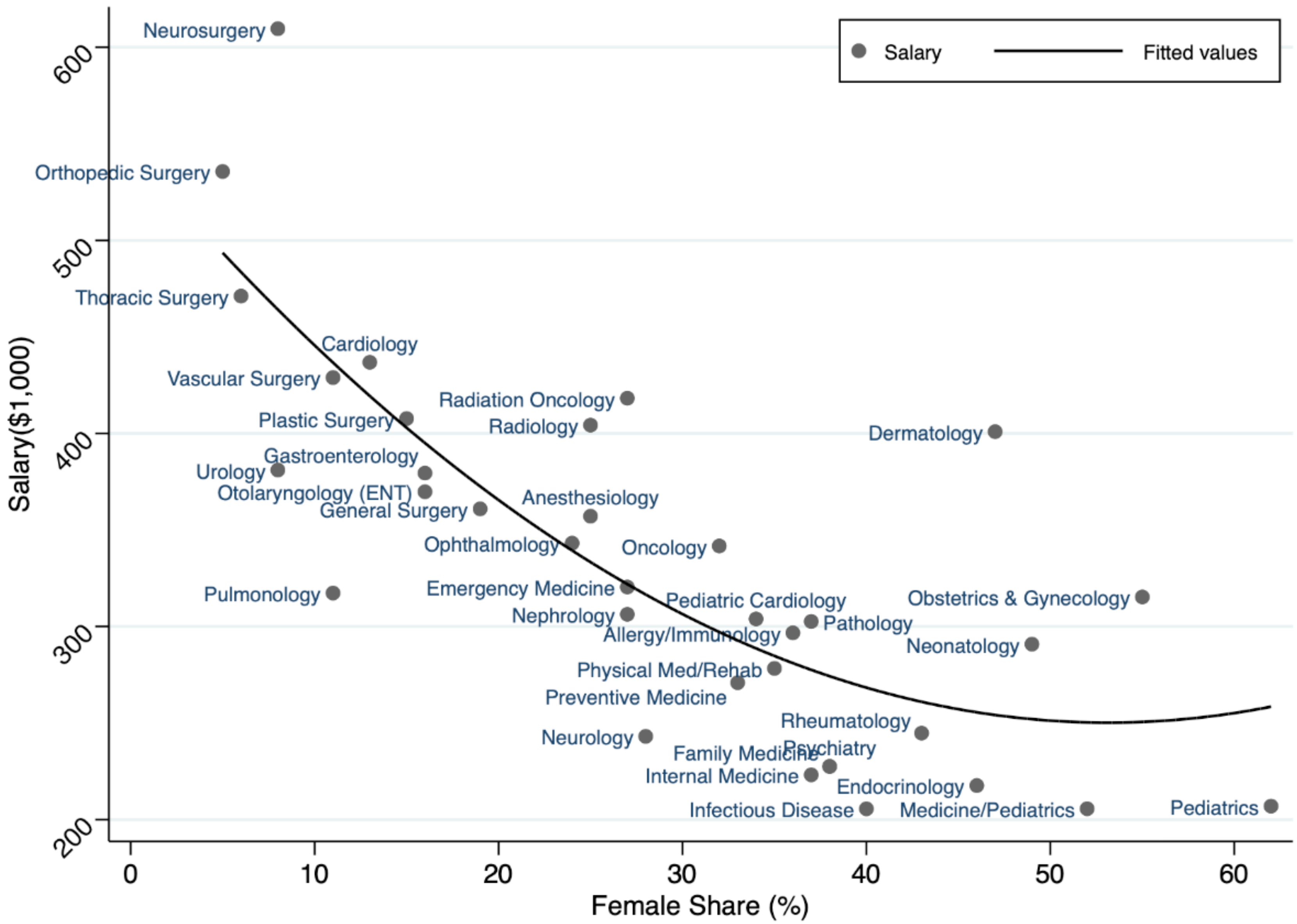
- Women work at the lower echelons of all organizations and there is a strong correlation between percentage of women in a medical field and salary *Pelley and Carnes, 2020*



Pelley and Carnes, Acad Med 2020

Gender bias can reduce investment in research to improve the health of women directly and also by impeding women's career advancement in STEMM

Women physicians, scientists, and engineers more likely than men to:

- Study or invent things to improve the health of women
  Koning et al., 2019
- Report sex-differences in their research
  Nielsen et al., 2017; Sugimoto et al., 2019
- Provide and lead women's health care
  Carnes et al., 2008, 2017
- Have better patient outcomes
  Tsugawa et al., 2017; Wallis et al., 2017; Greenwood et al., 2018

Factors affecting sex-related reporting in medical research: a cross-disciplinary bibliometric analysis

Cassidy R Sugimoto, Yong-Yeol Ahn, Elise Smith, Benoit Macaluso, Vincent Larivière

Lancet 2019; 393: 550–59

See Comment page 497

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For more on the #LancetWomen initiative see https://www.thelancet.com/lancet-women

Summary

Background Clinical and preclinical studies have shown that there are sex-based differences at the genetic, cellular, biochemical, and physiological levels. Despite this, numerous studies have shown poor levels of inclusion of female populations into medical research. These disparities in sex inclusion in research are further complicated by the absence of sufficient reporting and analysis by sex of study populations. Disparities in the inclusion of the sexes in medical research substantially reduce the utility of the results of such research for the entire population. The absence of sex-related reporting are problematical for the translation of research from the preclinical to clinical and applied health settings. Large-scale studies are needed to identify the extent of sex-related reporting and where disparities are more prevalent. In addition, while several studies have shown the dearth of female researchers in science, few have evaluated whether a scarcity of women in science might be related to disparities in sex inclusion and reporting. We aimed to do a cross-disciplinary analysis of the degree of sex-related reporting across the health sciences—from biomedical, to clinical, and public health research—and the role of author gender in sex-related reporting.

Methods This bibliometric analysis analysed sex-related reporting in medical research examining more than 11·5 million papers indexed in Web of Science and PubMed between 1980 and 2016 and using sex-related Medical Subject Headings as a proxy for sex reporting. For papers that were published between 2008 and 2016 and could be matched with PubMed, we assigned a gender to first and last authors on the basis of their names, according to our gender assignment algorithm. We removed papers for which we could not determine the gender of either the first or last author. We grouped papers into three disciplinary categories (biomedical research, clinical medicine, and public health). We used descriptive statistics and regression analyses (controlling for the number of authors and representation of women in specific diseases, countries, continents, year, and specialty areas) to study associations between the gender of the authors and sex-related reporting.

Findings Between Jan 1, 1980, and Dec 31, 2016, sex-related reporting increased from 59% to 67% in clinical medicine and from 36% to 69% in public health research. But for biomedical research, sex remains largely under-reported (31% in 2016). Papers with female first and last authors had an increased probability of reporting sex, with an odds ratio of 1·26 (95% CI 1·24 to 1·27), and sex-related reporting was associated with publications in journals with low journal impact factors. For publications in 2016, sex-related reporting of both male and female is associated with a reduction of –0·51 (95% CI –0·54 to –0·47) in journal impact factors.

Interpretation Gender disparities in the scientific workforce and scarcity of policies on sex-related reporting at the journal and institutional level could inhibit effective research translation from bench to clinical studies. Diversification in the scientific workforce and in the research populations—from cell lines, to rodents, to humans—is essential to produce the most rigorous and effective medical research.

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Methods This bibliometric analysis analysed sex-related reporting in medical research examining more than 11·5 million papers indexed in Web of Science and PubMed between 1980 and 2016 and using sex-related Medical Subject Headings as a proxy for sex reporting. For papers that were published between 2008 and 2016 and could be matched with PubMed, we assigned a gender to first and last authors on the basis of their names, according to our gender assignment algorithm. We removed papers for which we could not determine the gender of either the first or last author. We grouped papers into three disciplinary categories (biomedical research, clinical medicine, and public health). We used descriptive statistics and regression analyses (controlling for the number of authors and representation of women in specific diseases, countries, continents, year, and specialty areas) to study associations between the gender of the authors and sex-related reporting.

Findings Between Jan 1, 1980, and Dec 31, 2016, sex-related reporting increased from 59% to 67% in clinical medicine and from 36% to 69% in public health research. But for biomedical research, sex remains largely under-reported (31% in 2016). Papers with female first and last authors had an increased probability of reporting sex, with an odds ratio of 1·26 (95% CI 1·24 to 1·27), and sex-related reporting was associated with publications in journals with low journal impact factors. For publications in 2016, sex-related reporting of both male and female is associated with a reduction of –0·51 (95% CI –0·54 to –0·47) in journal impact factors.

Interpretation Gender disparities in the scientific workforce and scarcity of policies on sex-related reporting at the journal and institutional level could inhibit effective research translation from bench to clinical studies. Diversification in the scientific workforce and in the research populations—from cell lines, to rodents, to humans—is essential to produce the most rigorous and effective medical research.

Factors affecting sex-related reporting in medical research: a cross-disciplinary bibliometric analysis

Cassidy R Sugimoto, Yong-Yeol Ahn, Elise Smith, Benoit Macaluso, Vincent Larivière

Lancet 2019; 393: 550–59

See Comment page 497

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For more on the #LancetWomen initiative see https://www.thelancet.com/lancet-women

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Lancet 2019; 393: 550–59

Publication bias against research conducted in women?

- Cover story about developing a new journal and testing whether a review could be done from an abstract alone and with blinding to authors identity
- Sent to R01 grantees from 2010-2014 retrieved from RePORTER
- Randomly assigned one of 3 versions of the abstract: conducted in women, men, or individuals
- Reviewers evaluated scientific rigor, contribution to medical science, recommendation to publish
- Debriefed at end of survey

Murrar et al. 2021

Research conducted in women was deemed more impactful but less publishable than the same research conducted in men

- Research in women greater contribution to science (p=0.030)
- No difference in perceived rigor
- Almost twice as likely to recommend publishing research when conducted in men than women (p<0.001)

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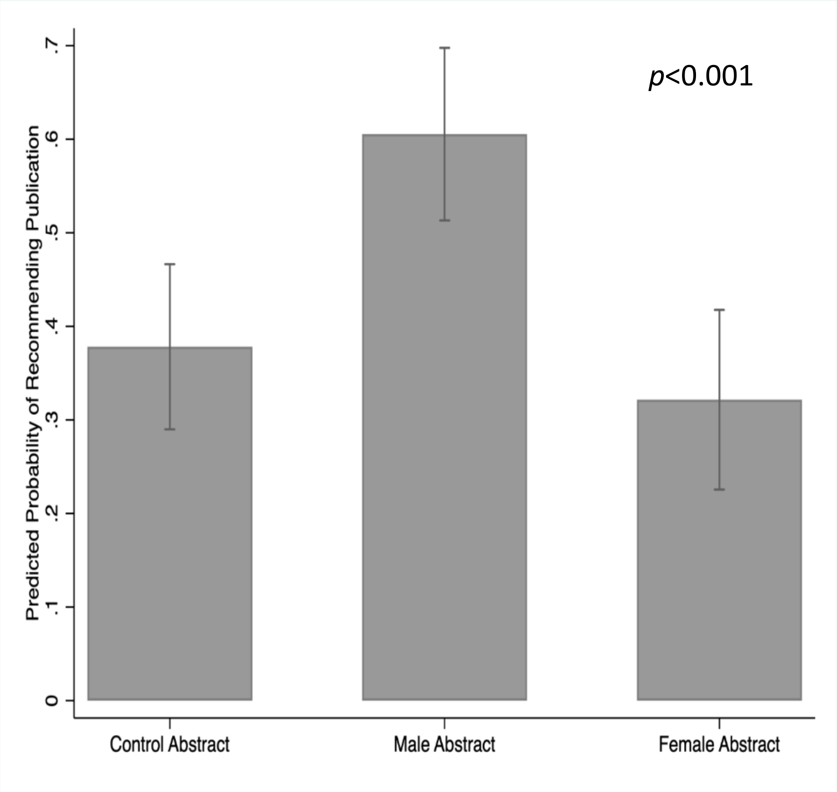

Murrar et al. 2021

To be clear: Negative performance expectations are not born out by actual performance

- Patient satisfaction scores in a large HMO were significantly more negative for female and non-White physicians than male and White physicians with the same objective quality metrics *Hekman et al., 2010*

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- Women received lower scores than men on a research proposal but out-performed men in securing NIH grants and publishing in top journals after receiving the grant *Kolev et al. 2019*

How the lower value of women vs. men and work performed by women vs. men simultaneously impede advancement of women in academic STEMM and women's health *Murrar et al., 2021*

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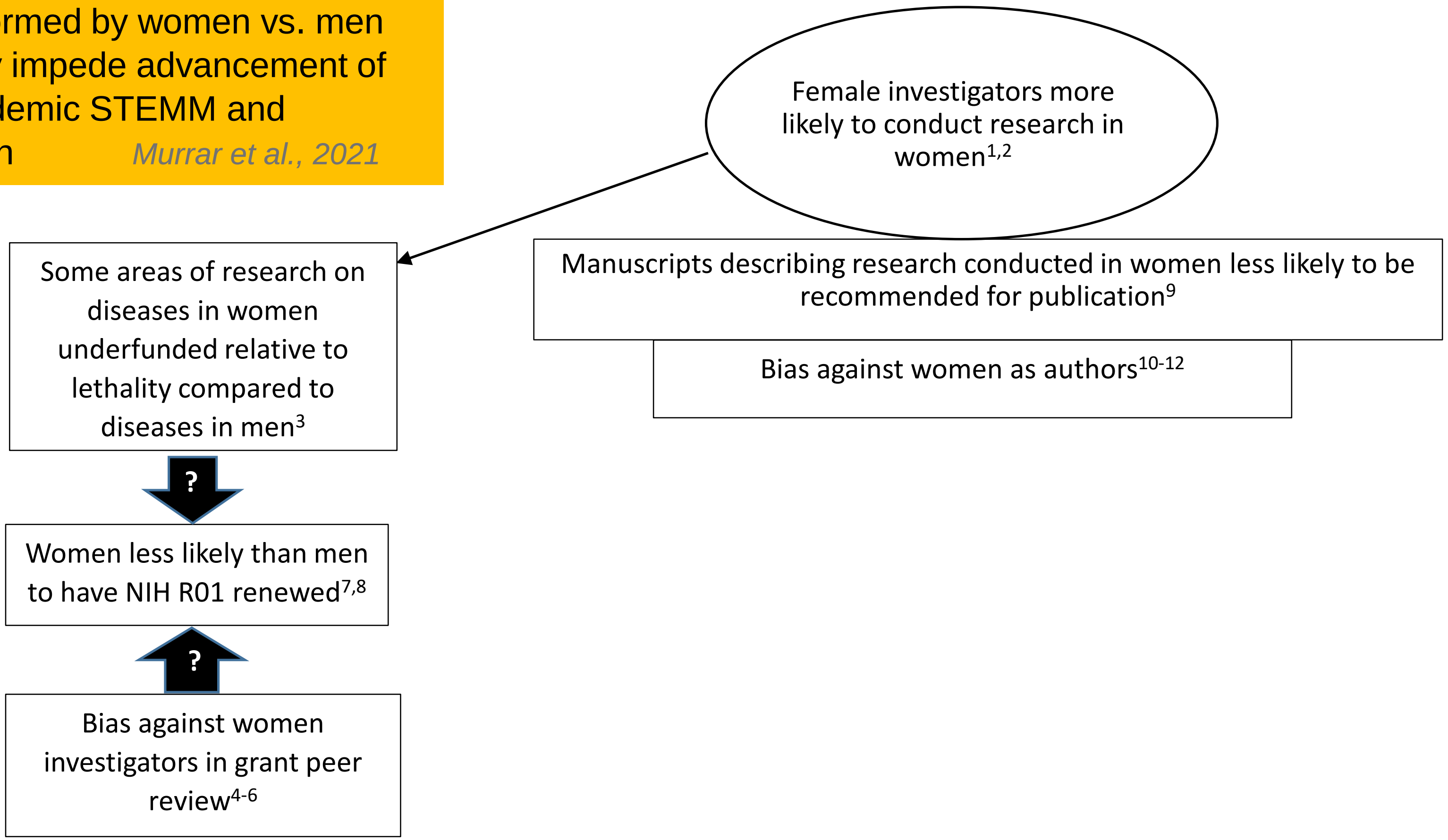

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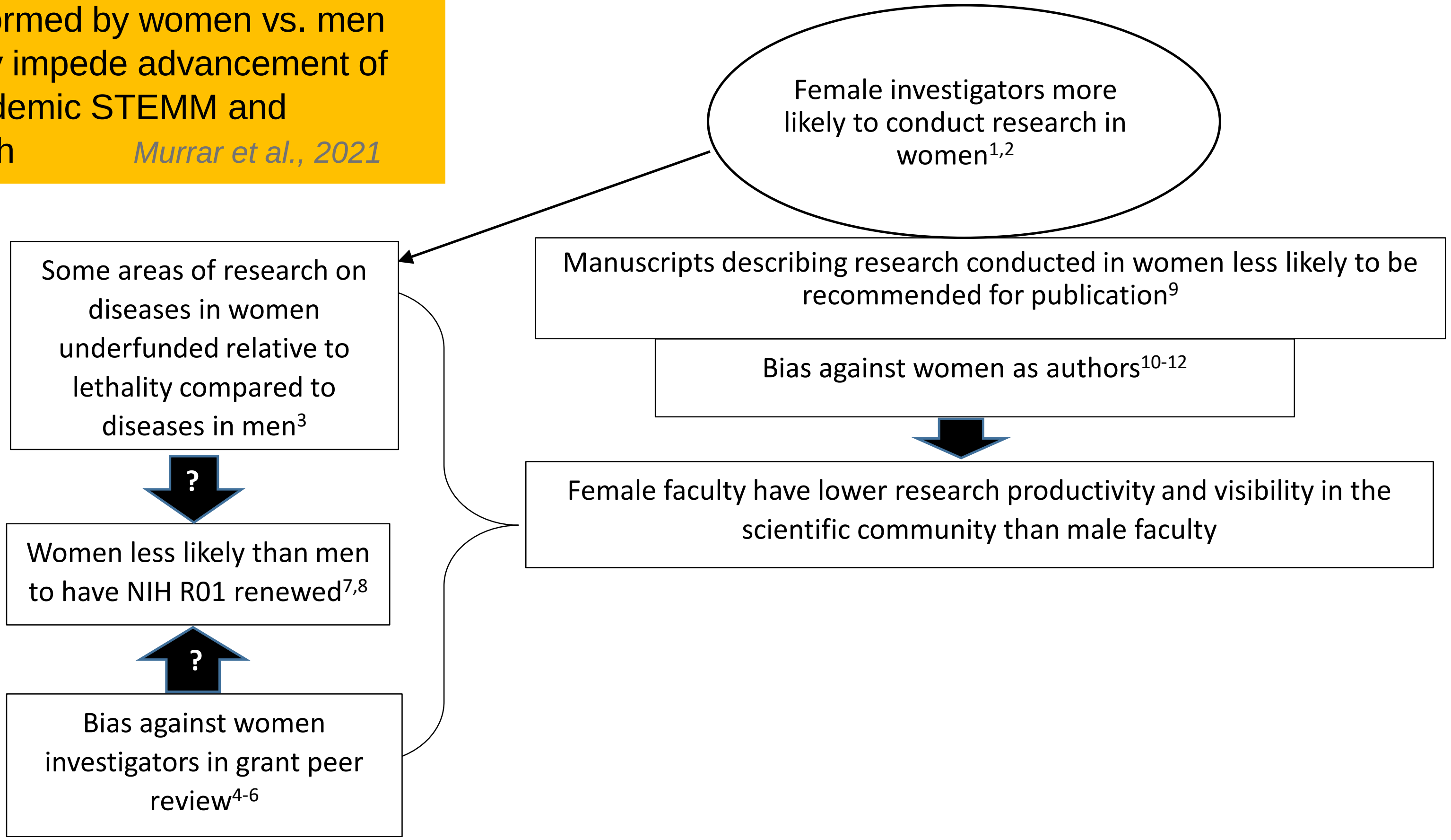

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Manuscripts describing research conducted in women less likely to be recommended for publication[9]

Bias against women as authors[10-12]

Female faculty have lower research productivity and visibility in the scientific community than male faculty

Female faculty less likely to be promoted to leadership in academic medicine where they can advance women's health research, education, and clinical care[13-17]

Less research conducted to improve the health of women

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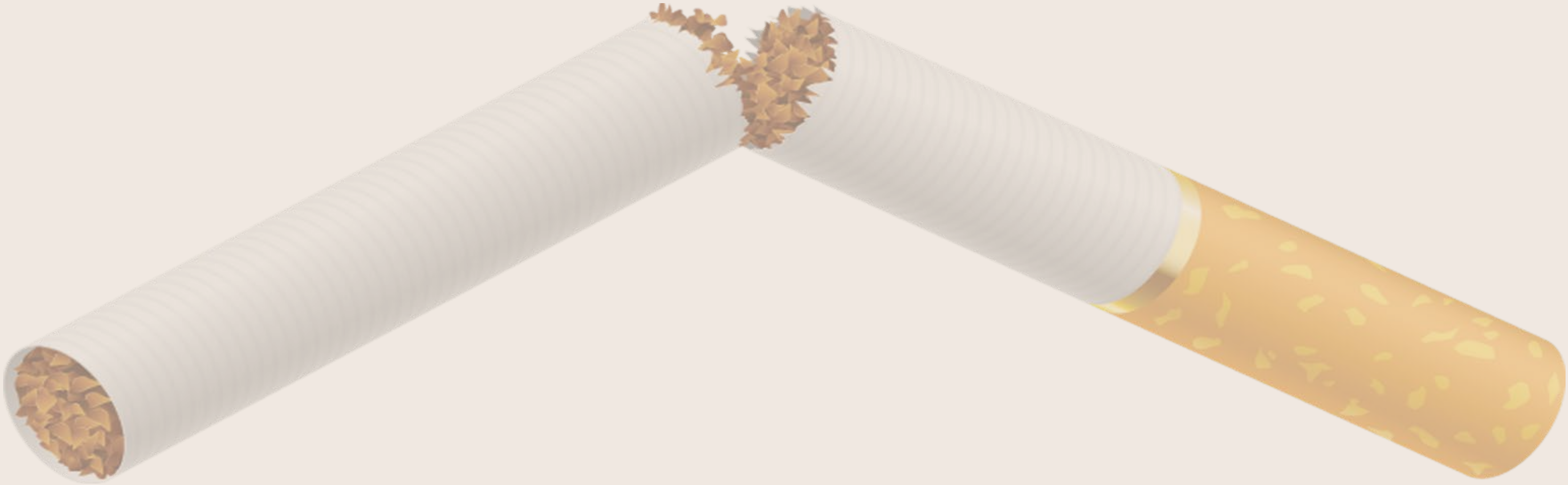


Bias is a habit that can be broken

We are focusing on helping STEMM faculty break the bias habit because policy alone does not change behavioral norms

- Equal pay for equal work has been law for almost 50 years *Equal Pay Act, 1963; Title VII of the Civil Rights Act, 1964*
- Multiple studies affirm gender pay inequity in academic science and medicine including chairs *Butkus et al. American College of Physicians position statement 2018; Mensah et al.2020*
- For organizational culture to change, the individuals who create the culture must intentionally change their behavior *Rogers 1962; Nonaka 1994; Simpson 2002*

One of few strategies proven effective in helping change *behavior* in response to stereotype-based bias

- “Motivated self-regulation” – social psychology
- “Intuitive override” – judicial reasoning
- “Forward-looking tuneability by reasons” - philosophy
- “Breaking the bias habit” – our research team

Monteith et al., 2016; Guthrie et al., 2009; Toribio, 2021; Carnes et al., 2015; Devine et al., 2017

Breaking the bias habit takes *more than good intentions*

Changing any habit is a multistep process:

- Awareness
- Motivation
- Self-efficacy
- Positive outcome expectations
- Deliberate practice

e.g. Bandura, 1977, 1991; Devine, et al., 2000, 2005; Plant & Devine, 2009; Ericsson, et al., 1993; Prochaska & DiClemente, 1983, 1994

Cluster randomized trial of gender bias habit-reducing intervention (R01 GM088477)

92 STEMM depts.
2,290 faculty

46 experimental
1,137 faculty
Attendance/dept 31% ± 21
Overall 310 = 26%

46 control
1,153 faculty

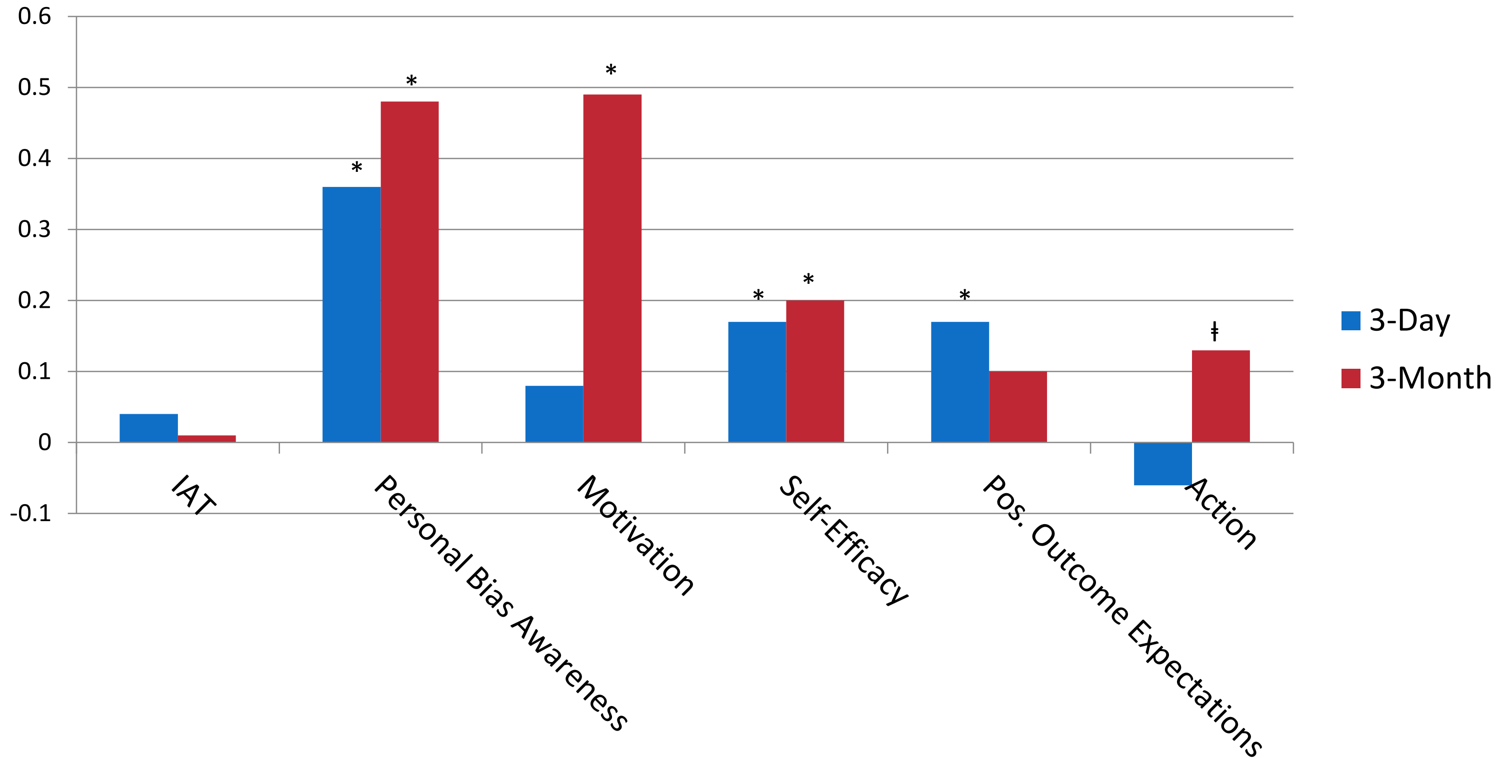
Baseline, 3 d & 3 months
Survey response: 587 (52%)

Baseline, 3 d & 3 months
Survey response: 567(49%)

Carnes et al. Acad Med 90 (2): 221-230, 2015

Differences Between Experimental and Control Departments Compared With Difference at Baseline

(IAT in D-scores; others on 7-point Likert scales)



N = 92 departments; 1154 faculty (50.4% response rate)

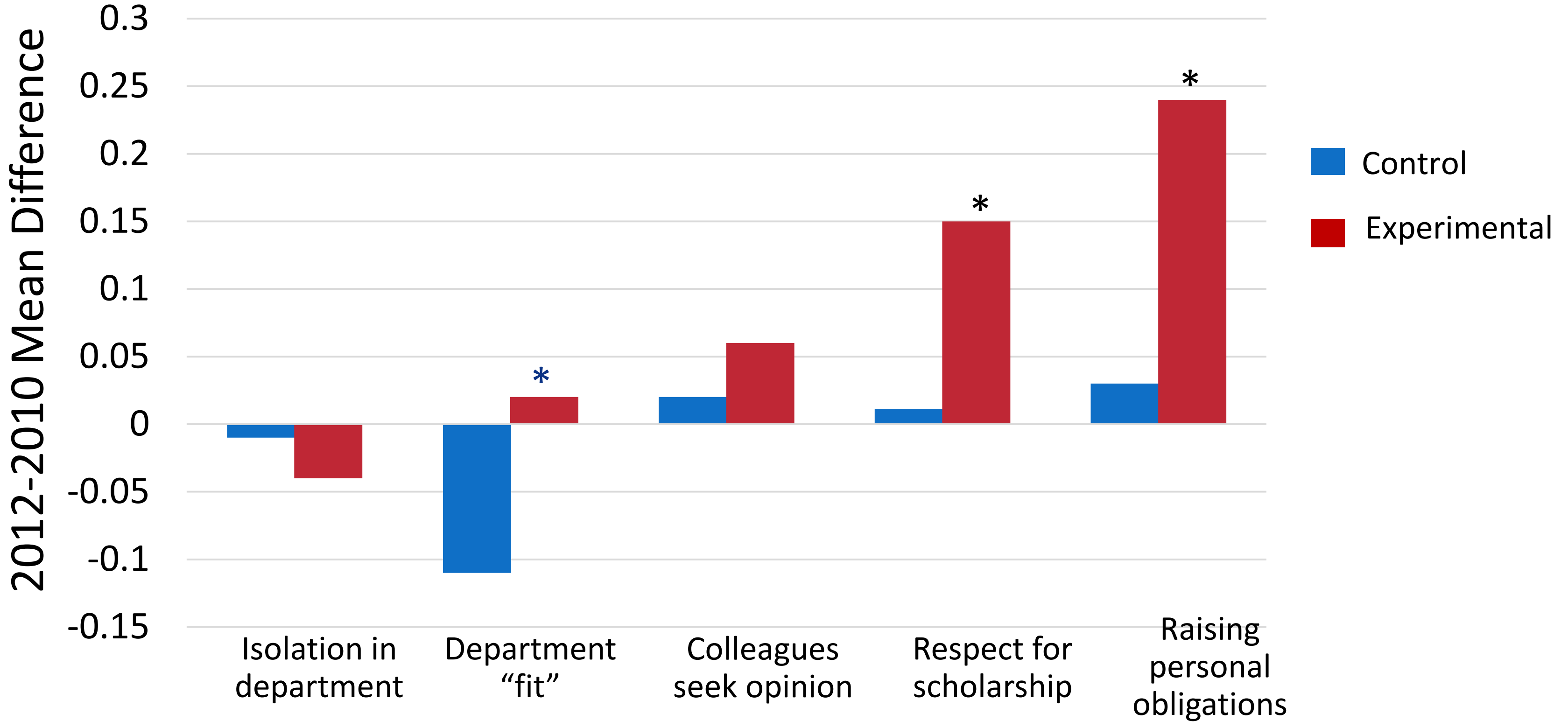
IAT= Implicit Association Test (standardized D-score)

*P < 0.05; models adjusted for faculty gender and rank

ǂ P < 0.05 for action at 3 months when comparing only experimental depts with ≥25% attendance

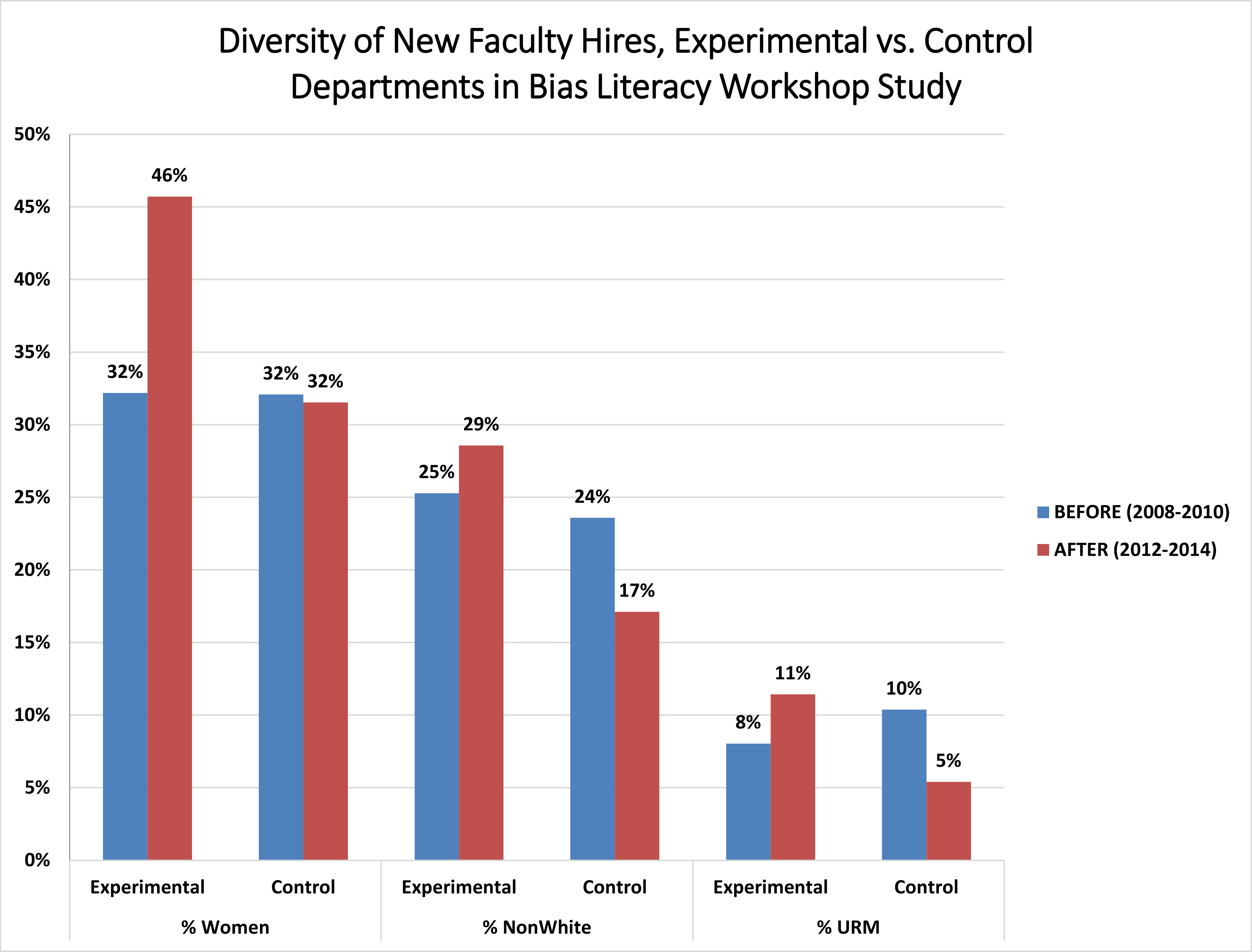
Carnes et al. Acad Med 90 (2): 221-230, 2015

Differences Between Experimental & Control Departments
Study of Faculty Worklife 2010 and 2012



N = 92 departments; 671 faculty for response rate 48% (2010) and 43% (2012).
* Indicates significant difference between experimental and control depts. compared with differences at baseline at $p<.05$.

Carnes et al. Acad Med 90 (2): 221-230, 2015

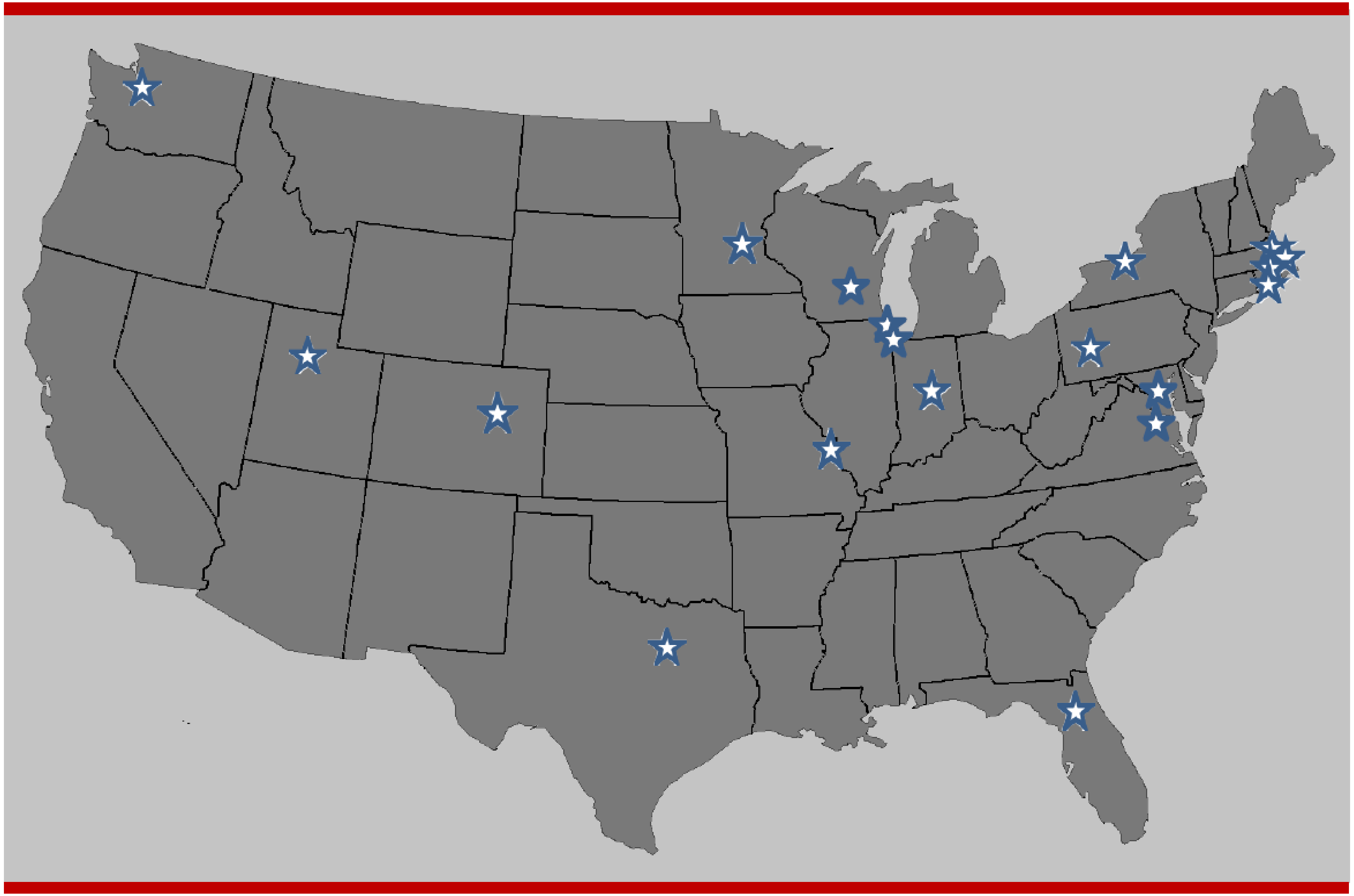


Devine et al., J Exp Soc Psychol 73:211-215, 2017

Does this approach work beyond one institution and beyond gender bias? (R35 GM122557)

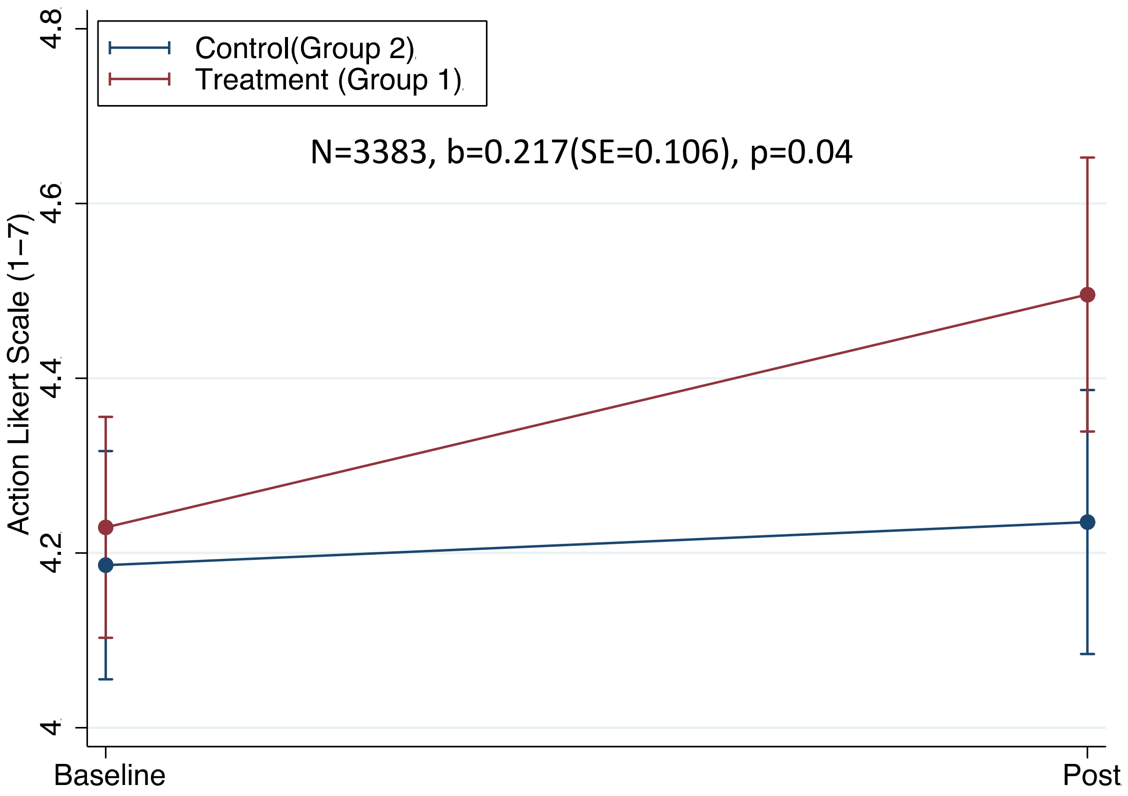
Bias **R**eduction in **I**nternal **M**edicine (BRIM)

- Cluster randomized study of 3-hour bias habit-reducing workshop
- 19 departments of Medicine
- Divisions randomly assigned to receive workshop early (Group 1) or later (Group 2)
- Outcome measures: self-reported equity-promoting behaviors, perceptions of department climate, burnout



Q10-5 Intervene if I witness a student, resident, fellow, or colleague being treated in a biased way…

I engage in this action on a regular basis



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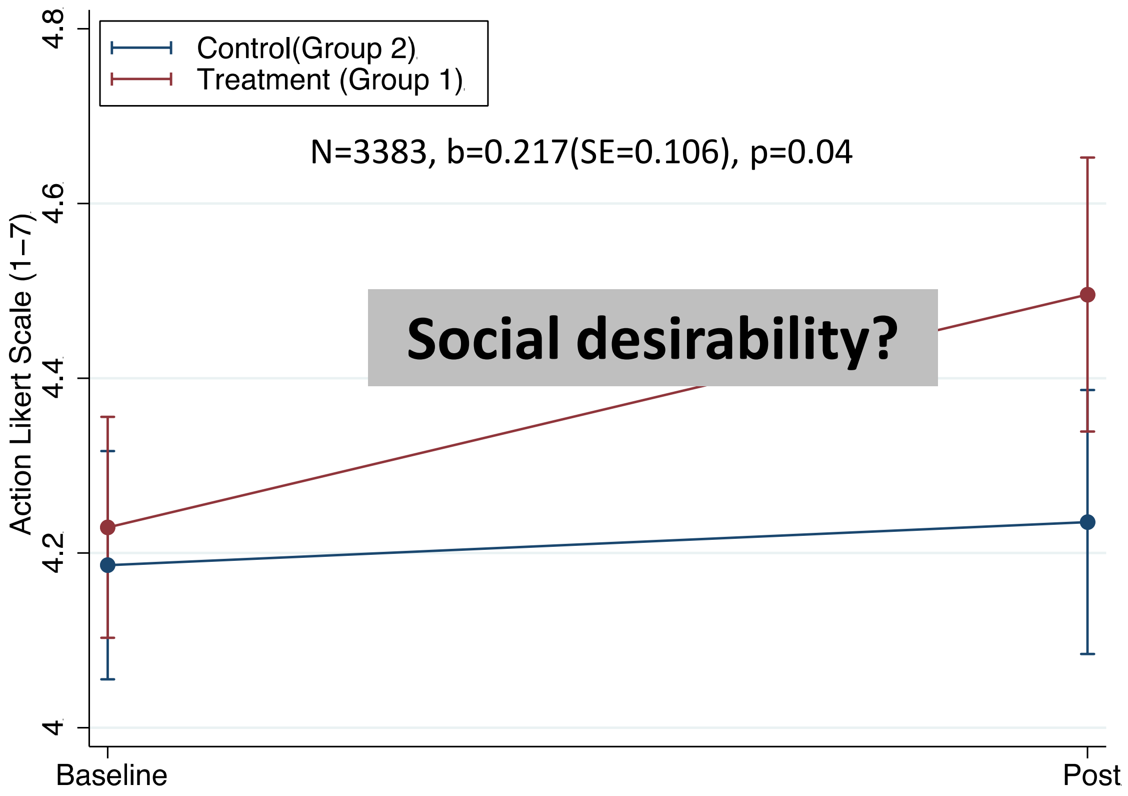

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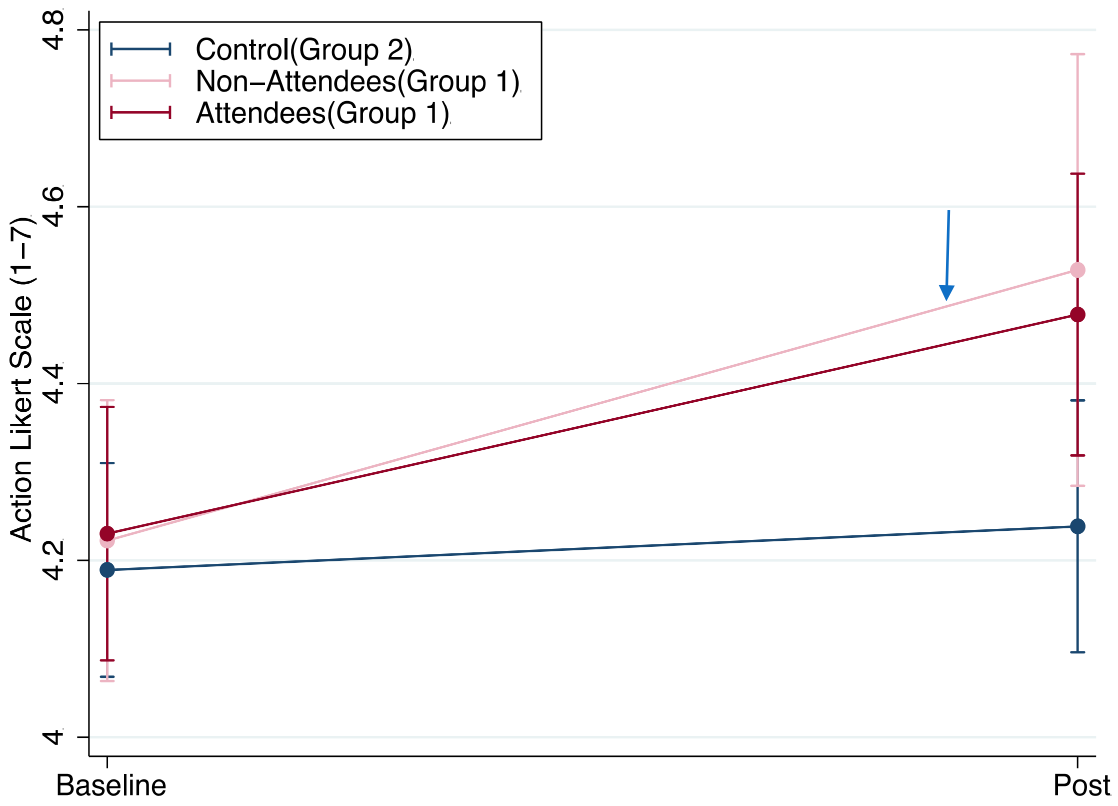
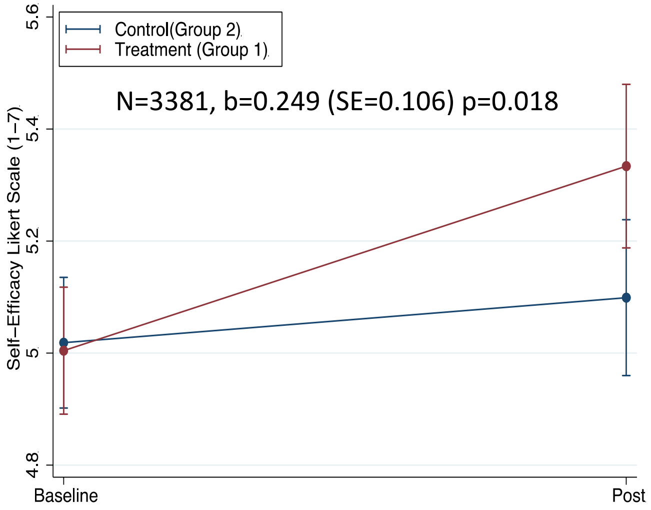
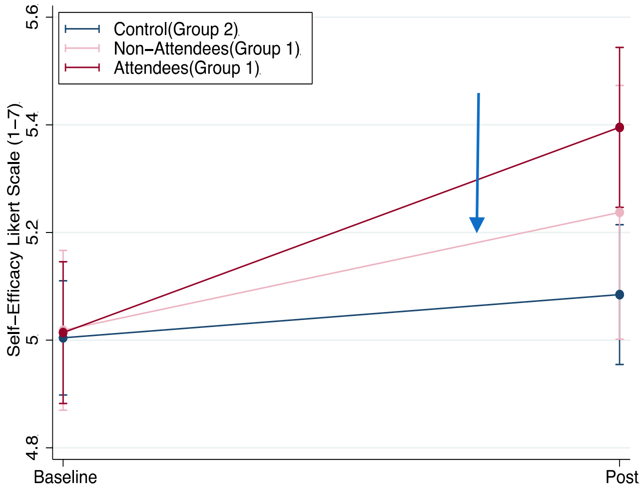


Challenge a personnel decision if I think it has been influenced by stereotypes

Q8-2

I am confident that I can do this





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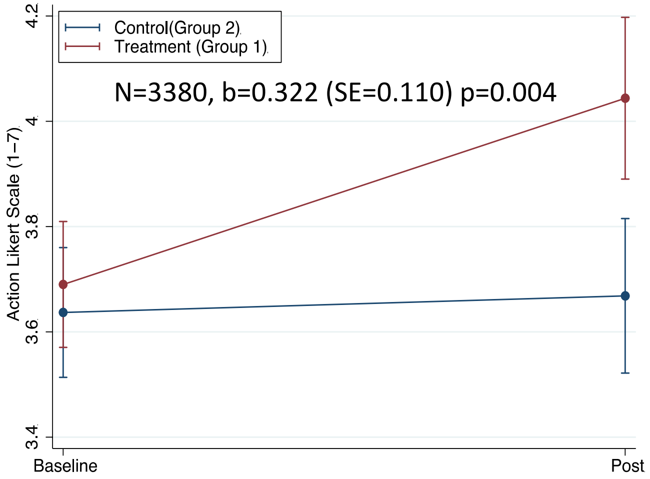

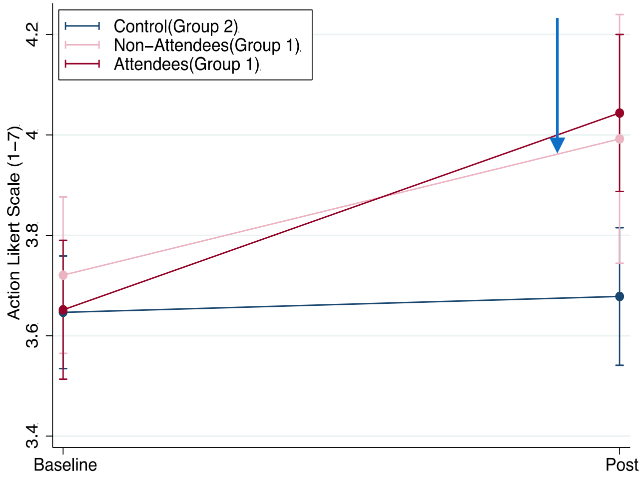

Why do we think this approach worked?

- Engaged those responsible for organizational norms
- Incorporated strategies shown to be effective in fostering sustained intentional behavioral change
- Participation was voluntary
- Enabled social diffusion by targeting the entire dept/division

2 strategies to <u>practice</u> to break your own bias habits

- <u>Growth mindset</u>: e.g., “with *hard work* I can overcome the influence of stereotypes on my judgment and decision-making” *(based on studies in Carr et al., 2012)*

- <u>Perceiving variability:</u> Whenever you hear someone say [members of some group] are…., respond with “some are ___, some are ___, some others are___...”
(based on studies in Er-rafiy & Brauer, 2012)

Summary & Conclusions

- Gender stereotypes are deeply entrenched in habitual patterns of thinking and behaving

- The conflation of gender and status negatively impacts the value placed on studying conditions prevalent in women and advancement of women in STEMM

- Breaking the bias habit should benefit both women in STEMM and women's health but it requires hard work

Questions?

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