



Creating a more inclusive environment  
for underrepresented groups through  
allyship

# A Model of the Impact of Social Identity Threat



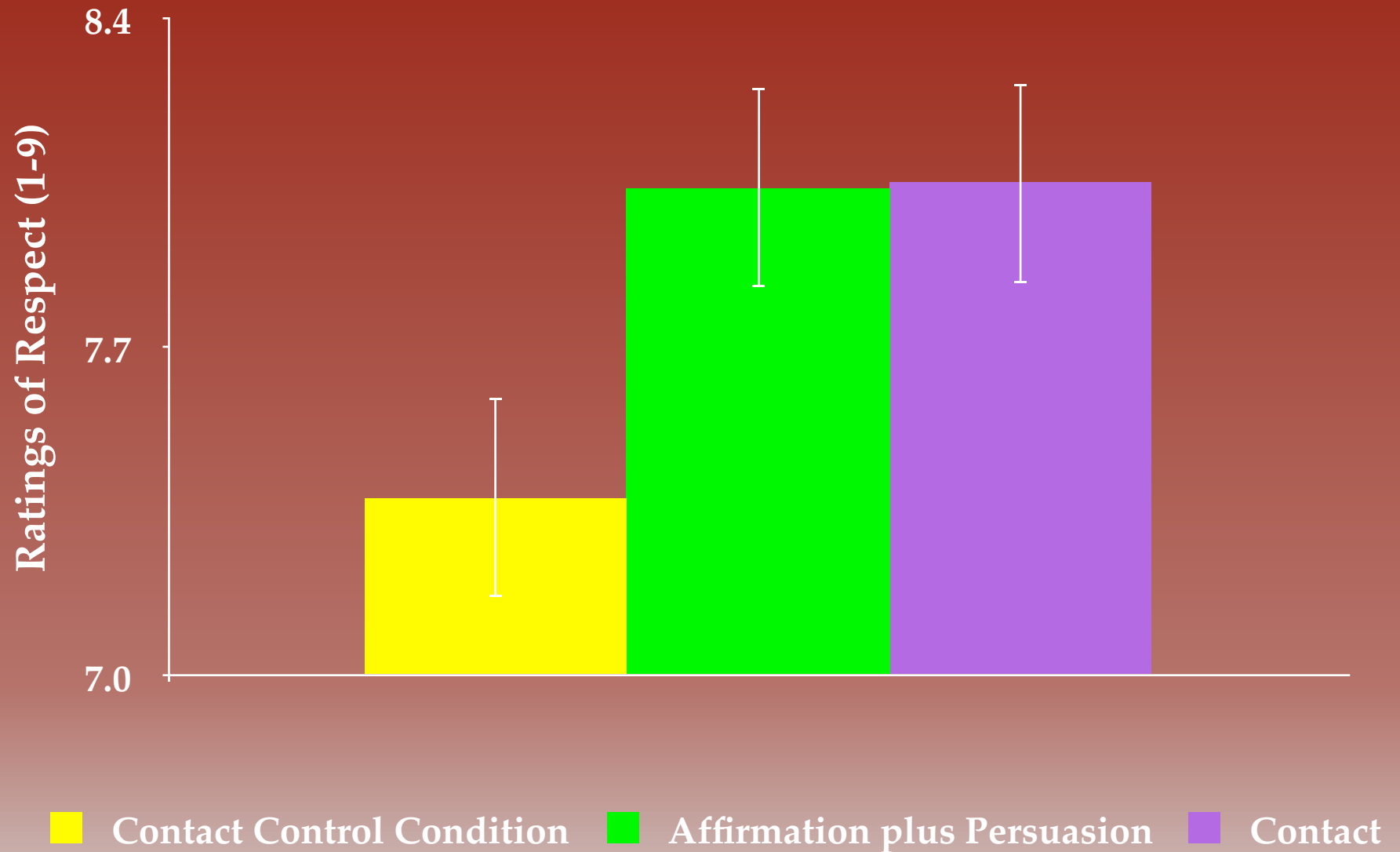
# Intervention Designed to Increase Male Engineers Respect for Their Female Peers

- **Participants - 151 male first year engineering students at the University of Waterloo**
- **Four Conditions:**
  - **An intervention that includes self-affirmation and a persuasive appeal for latent ability, plus three sessions in the term that modelled respect toward female colleagues**
  - **A control condition that just had the persuasive appeal**
  - **A contact condition that enhanced belonging between men and women and that had three jigsaw exercises**

# Time Line

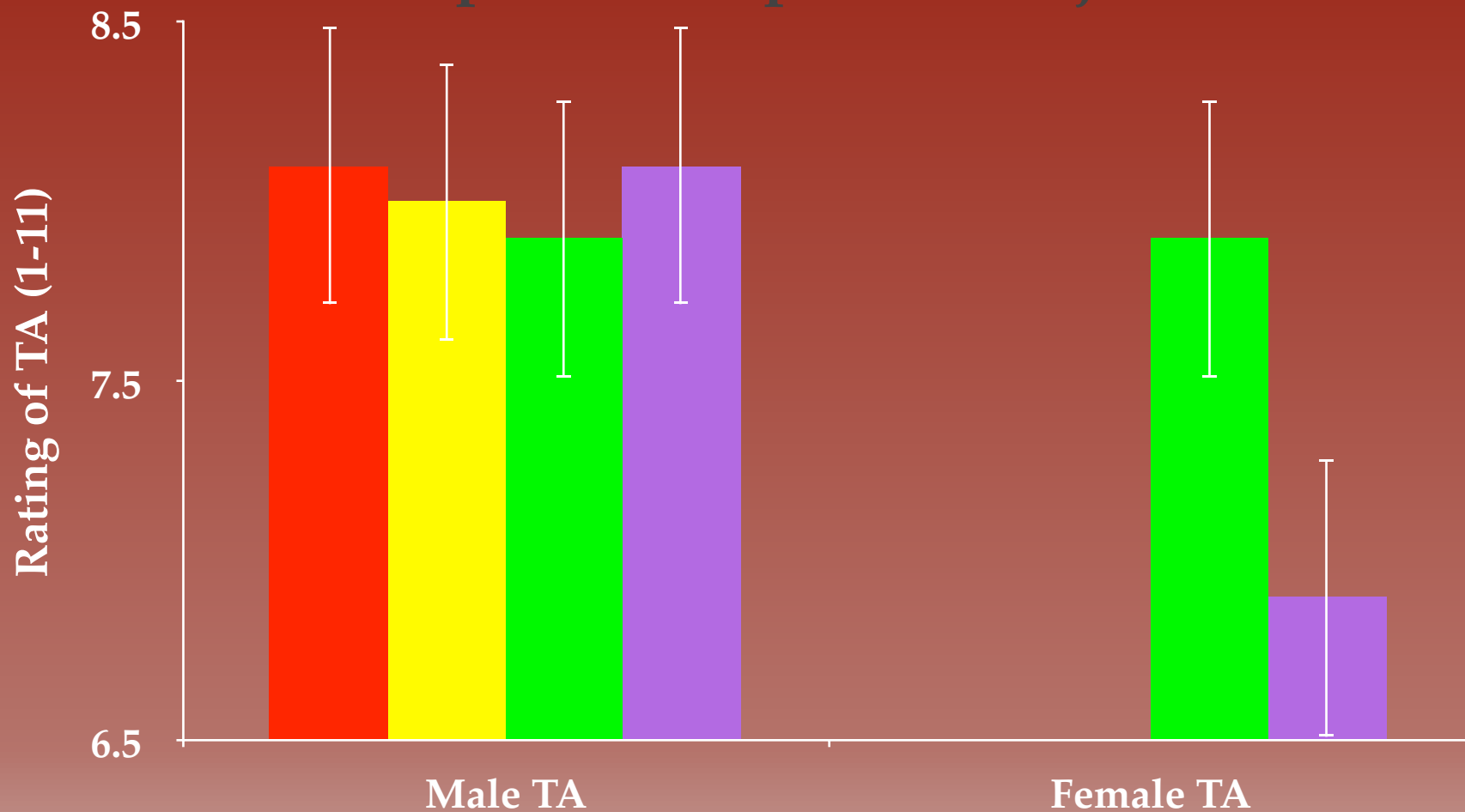
	Session 1	Session 2	Session 3	Session 4
Affirmation + Persuasion	Affirmation Persuasion ♀ & ♂ TAs	Build Bridge ♀ & ♂ TA Model Respect	Build Tower ♀ & ♂ TA Model Respect	RAs collect DVs
Persuasion Control	Persuasion Only ♂ TAs	nothing	nothing	RAs collect DVs
Contact	Collect Back- ground Info ♀ & ♂ TA	Belonging Jigsaw Task ♀ & ♂ TA Model Respect	Jigsaw Task ♀ & ♂ TA Model Respect	RAs collect DVs
Contact Control	Collect Back- ground Info ♂ TAs	Belonging Control Task ♂ TAs	Control Task ♂ TAs	RAs collect DVs

# Results - Men's Respect for Women in Their Group



# Results

## How Much Did Men Want Their TA to Supervise Capstone Project

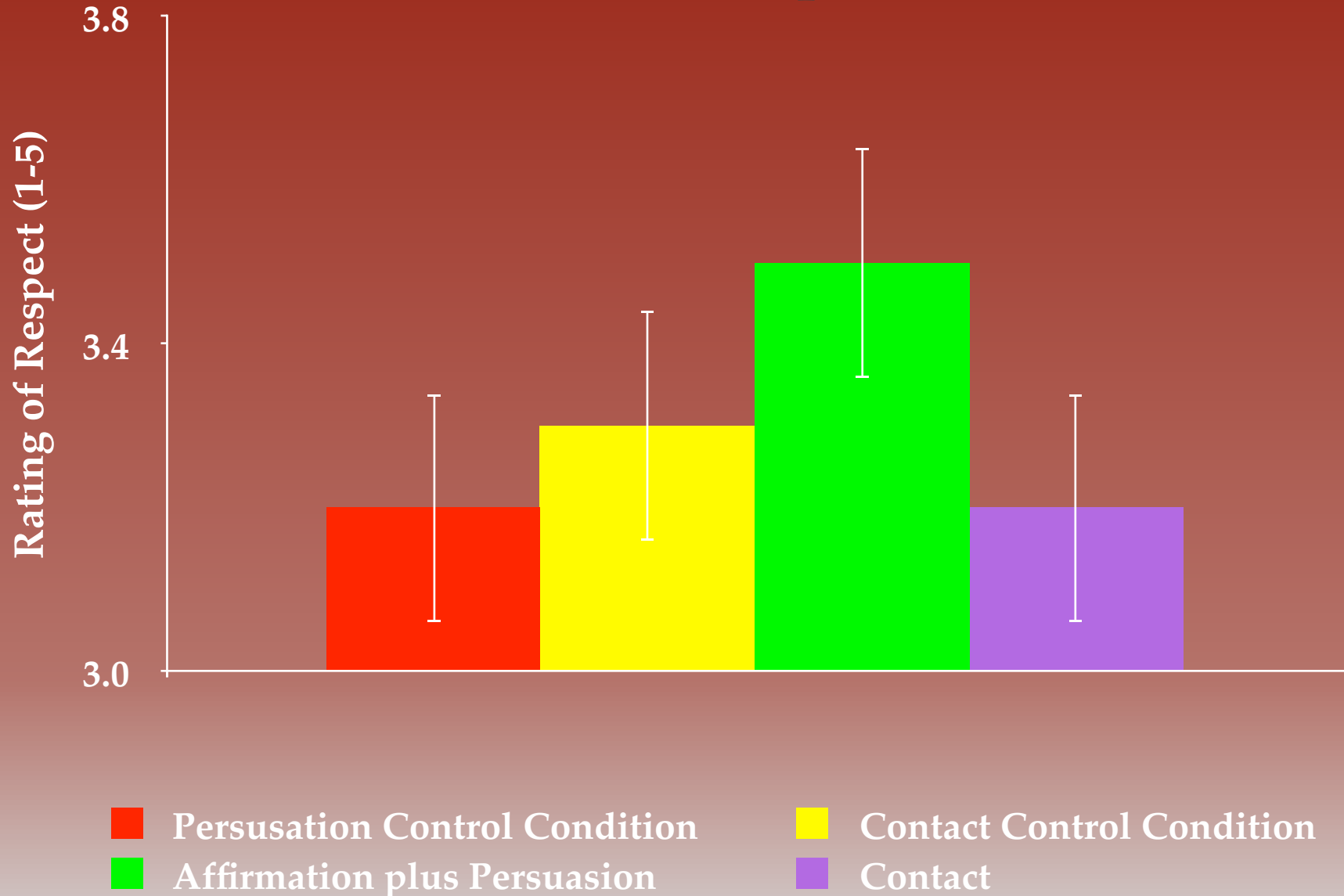


**Persuasion Control Condition**  
**Affirmation plus Persuasion**

**Contact Control Condition**  
**Contact**

# Results

## Female RA's Report of How Much Men Treated Her with Respect



# Initial research exploring ally interventions

- Ally interventions
- Who acts as an ally?
- Why do we need ally interventions?
- Focused initially on Black women
  - Multiple stigmatized identities



# Diversity Initiatives in STEM

- Often have the goals:
  - *Increase underrepresented minorities in STEM* **Men**
  - *Increase women in STEM* **White Women**
- Examine the effectiveness of role model interventions for Black women

# Role models

- Female scientist role models increase women's identification with and sense belonging in STEM (Stout, Dasgupta, Hunsinger, & McManus, 2011)
- Women must feel similar to and relate to the role model (Asgari, Dasgupta, & Stout, 2014)
- Role model in STEM research has often focused on women generally (Stout et al., 2011; Asgari et al., 2014)
  - Black women may not easily relate to or identify with a White woman role model

# Intersectional identities

- Ethnic-prominence perspective
  - Black women are more likely to anticipate and attribute experiences of discrimination to their ethnic group than their gender  
(Levin, Sinclair, Veniegas & Taylor, 2002)
  - *Black female and Black male scientists > White female scientist*

# Intersectional identities

- Double Jeopardy perspective
  - Women of color face compounding challenges as a result of their dual stigmatized identities (Beale, 1970; King, 1975; Klonoff, Landrine, & Scott, 1995)
  - *Black female scientist* > *Black male and White female scientist*

# Study 1

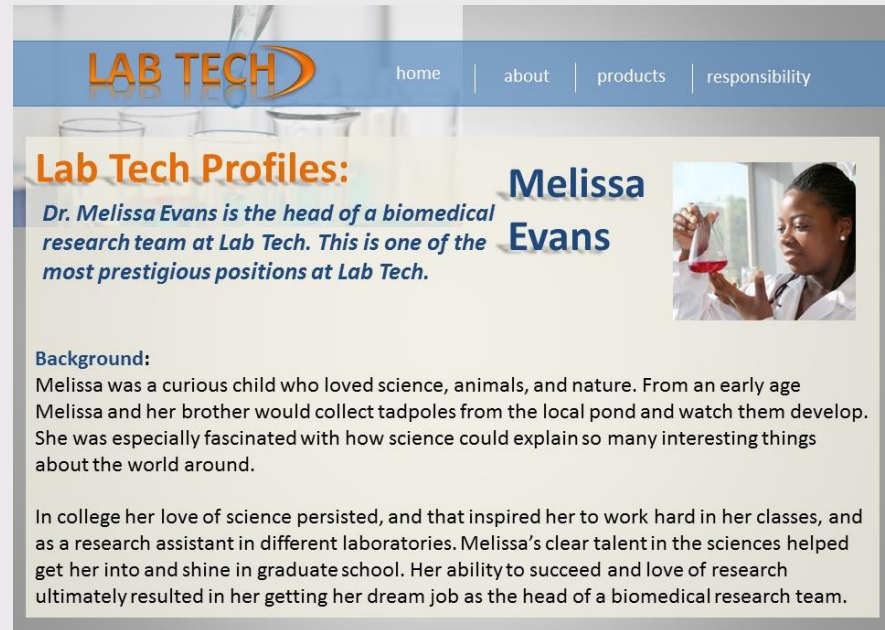
- 393 Black women from the general population using Amazon's Mechanical Turk Website

*Imagine how you would feel working at this company*



# Study 1

- 4 conditions
  - No profile
  - Black woman profile
  - Black man profile
  - White woman profile
- Profiles were identical
- Only things that differed:
  - The name - Melissa or Mark Evans
  - The picture



The screenshot shows a website header for "LAB TECH" with navigation links for "home", "about", "products", and "responsibility". Below the header is a profile for Dr. Melissa Evans. The profile includes a title, a short bio, a background section, and a paragraph about her education and career.

**LAB TECH** | home | about | products | responsibility

**Lab Tech Profiles:**

**Dr. Melissa Evans** is the head of a biomedical research team at Lab Tech. This is one of the most prestigious positions at Lab Tech.

**Background:**  
Melissa was a curious child who loved science, animals, and nature. From an early age Melissa and her brother would collect tadpoles from the local pond and watch them develop. She was especially fascinated with how science could explain so many interesting things about the world around.

In college her love of science persisted, and that inspired her to work hard in her classes, and as a research assistant in different laboratories. Melissa's clear talent in the sciences helped get her into and shine in graduate school. Her ability to succeed and love of research ultimately resulted in her getting her dream job as the head of a biomedical research team.

# Study 1: Measures

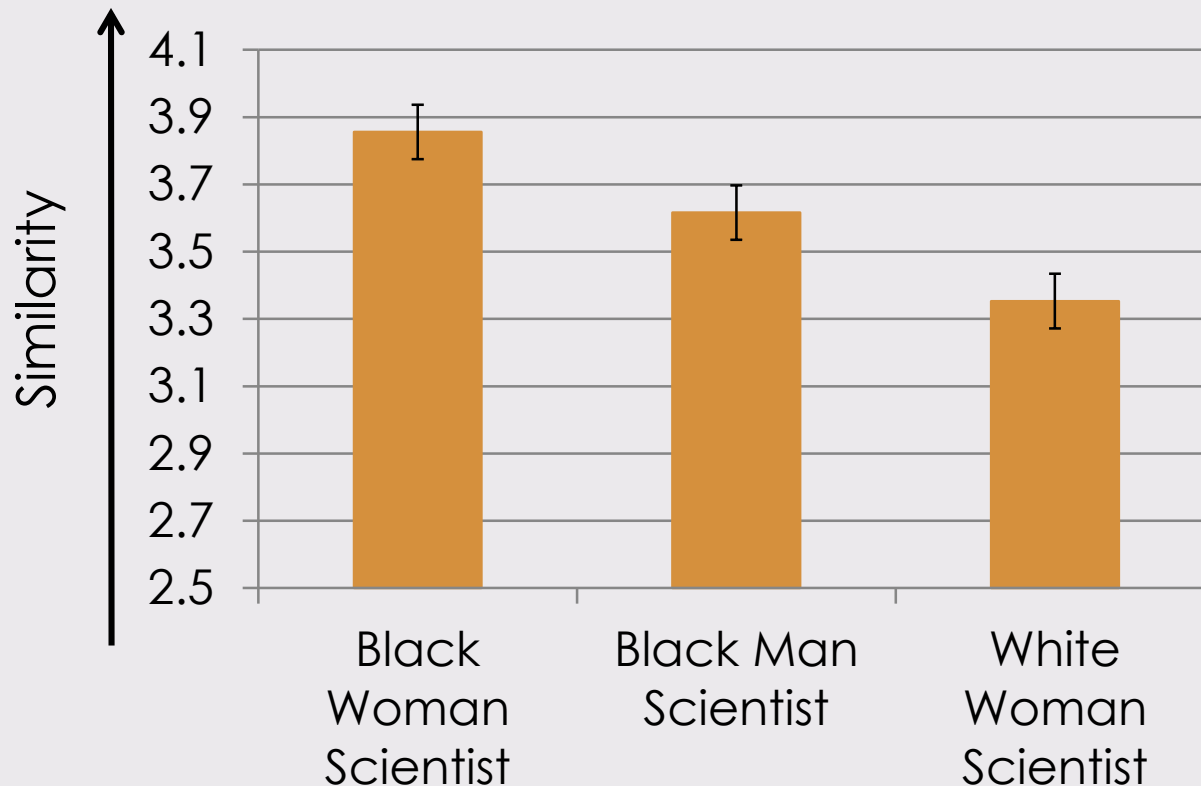
- Perceived similarity to scientist
  - E.g., “This person is similar to me” (1-*strong disagree* to 5-*strongly agree*)
  - 4 items,  $\alpha = .87$
- Predicted Trust and Comfort (Purdie-Vaughn et al., 2008)
  - E.g., “I think would be treated fairly by colleagues” (1-*strong disagree* to 5-*strongly agree*)
  - 4 items,  $\alpha = .86$

# Study 1: Measures

- Stigma Consciousness (Pinel, 1999)
  - E.g., “When interacting with people, I feel like they interpret all of my behaviors in terms of my race and gender” (1-*strong disagree* to 5-*strongly agree*)
  - 5 items,  $\alpha = .78$



# Study 1 Results: Perceived similarity

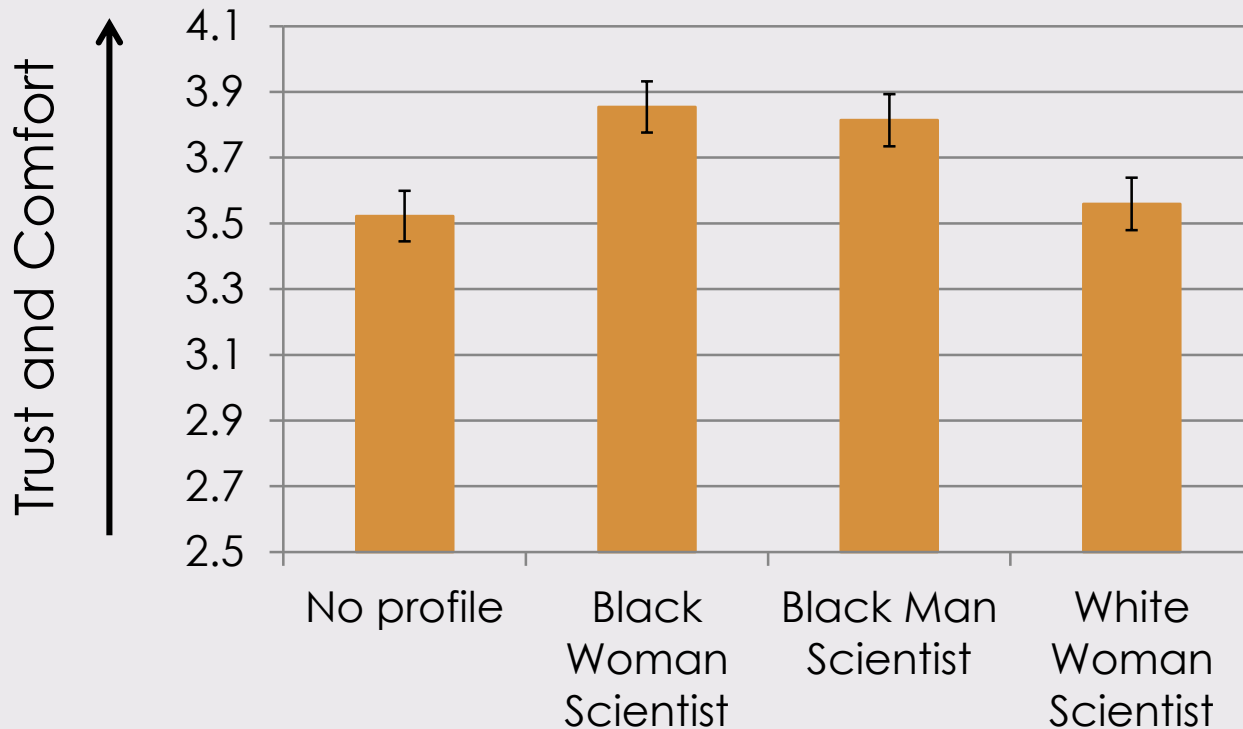


Black woman vs. white woman :  $d=.32, p<.001$

Black man vs. white woman:  $d=.31, p=.063$

$F(2,288)=9.61, p<.001, \eta_p^2=.063$

# Study 1 Results: Trust and comfort



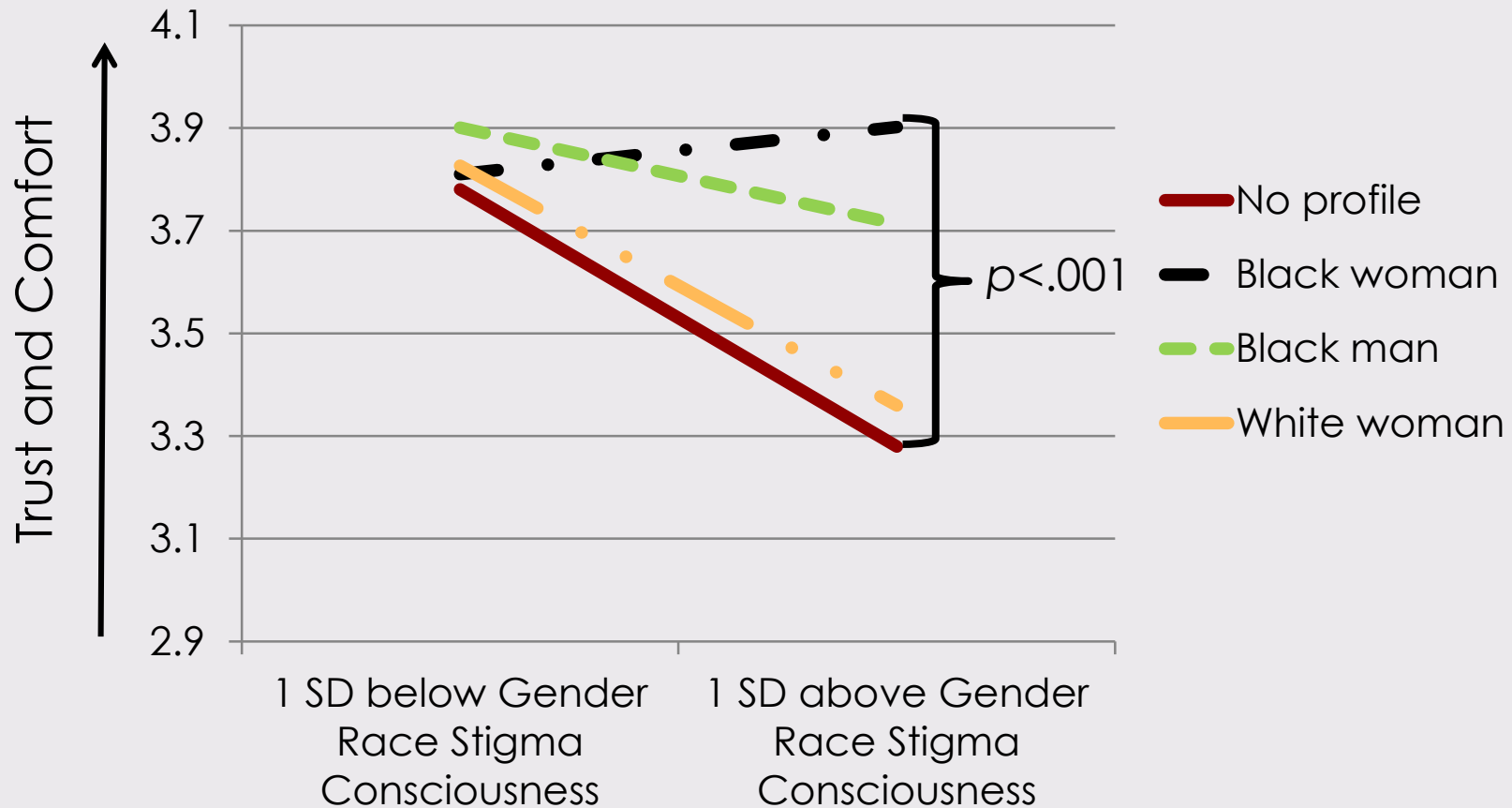
Black women vs. no profile :  $d=.41$ ,  $p=.014$

Black man vs. no profile:  $d=.39$ ,  $p=.045$

White women vs. no profile:  $d=.05$ ,  $p=.985$

$F(2,389)=4.75$ ,  $p=.003$ ,  $\eta_p^2=.035$

# Study 1 Results: Moderation by stigma consciousness



# Study 2

- Replication of Study 1 with 362 Black female students

*Imagine how you would feel at this school*

**#1 IN THE WORLD FOR UNDERGRADUATE RESEARCH STEM OUTCOMES**  
*As ranked by U.S. News & World Report*

**School of Science & Engineering**

About the college | Degree Programs | Faculty | Undergraduate Research

The School of Science and Engineering at University of Chaney is consistently ranked among the upper echelon of science and engineering schools in the world. We provide students with the direct academic mentorship they need to build a successful career and to complete degree programs on time. Our seven departments provide students with experiences and skills needed to find competitive jobs in the world of science, technology, engineering, and math (STEM). We are an interdisciplinary culture of innovation, committed to developing new technology and adding value to the economy in our region, state, and the world.

Civil & Industrial Engineering

Computing Sciences

Biological Sciences

Mathematics & Physics

Chemistry & Chemical Engineering

Systems & Mechanical Engineering

School of Science and Engineering

# Study 2

- 4 conditions
  - White man profile
  - Black woman profile
  - Black man profile
  - White woman profile
- Profiles were identical



The screenshot shows a faculty profile page for Dr. Melissa Evans. At the top left is a photograph of a large, modern brick building with a glass facade, identified as the School of Science & Engineering. To the right of the building photo is a blue navigation bar with the text "School of Science & Engineering" in yellow, and four menu items: "About the college", "Degree Programs", "Faculty", and "Undergraduate Research". Below the navigation bar is a portrait of Dr. Evans, a Black woman with short dark hair and glasses, wearing a red button-down shirt. To the right of the portrait is a text block containing a biographical paragraph and a paragraph about her career.

*Dr. Melissa Evans is a professor in the School of Science & Engineering, and chair of the department of Biological Sciences.*

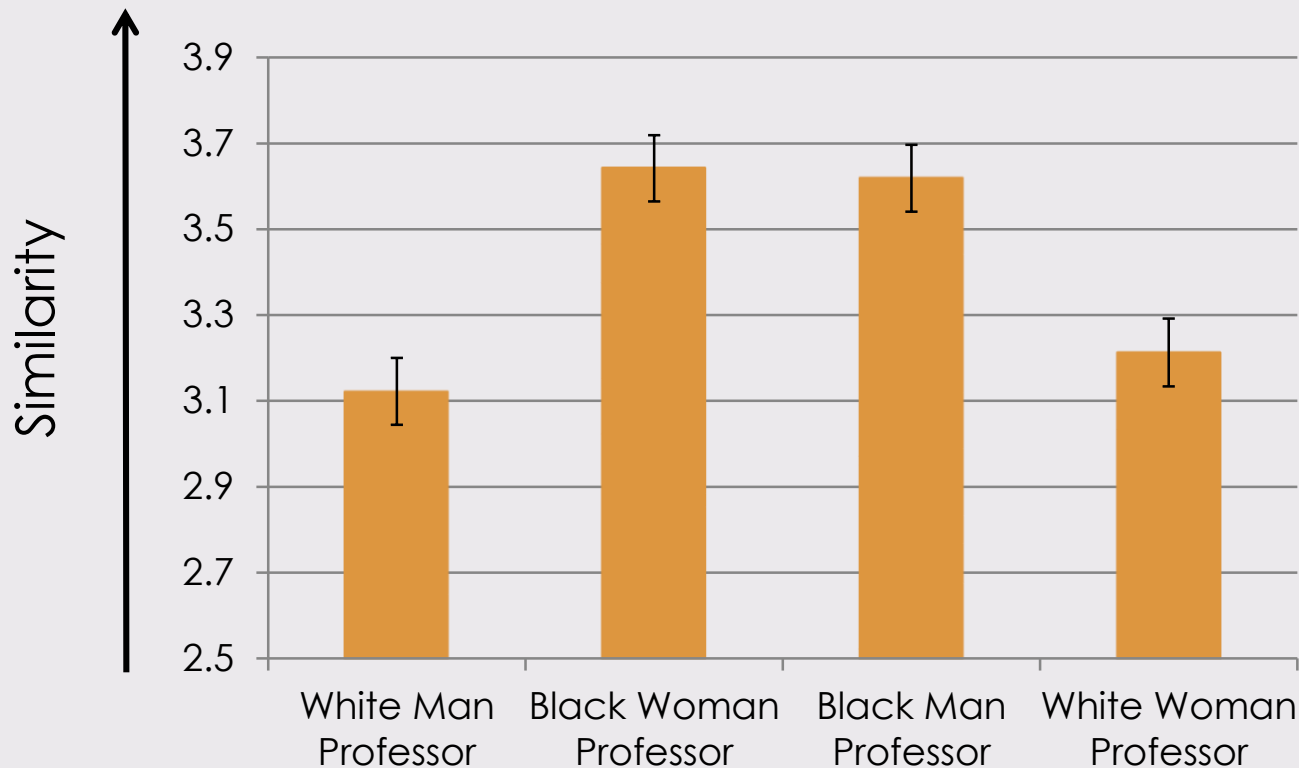
Dr. Evans was a curious child who loved science, animals, and nature. From an early age Dr. Evans would collect tadpoles from the local pond and watch them develop. She was especially fascinated with how science could explain so many interesting things about the world around.

In college her love of science persisted, and that inspired her to work hard in her classes, and as a research assistant in different laboratories. Dr. Evan's clear talent in the sciences helped get her into and shine in graduate school. In graduate school, Dr. Evans learned she also loved mentoring students and including them in her research. Her ability to succeed and love of research ultimately resulted in her landing her dream job as a professor and research mentor to aspiring scientists pursuing STEM degrees.

# Study 2: Measures

- Perceived similarity to scientist
- Predicted Trust and Comfort
- Gender-Race Stigma Consciousness

# Study 2 Results: Perceived Similarity



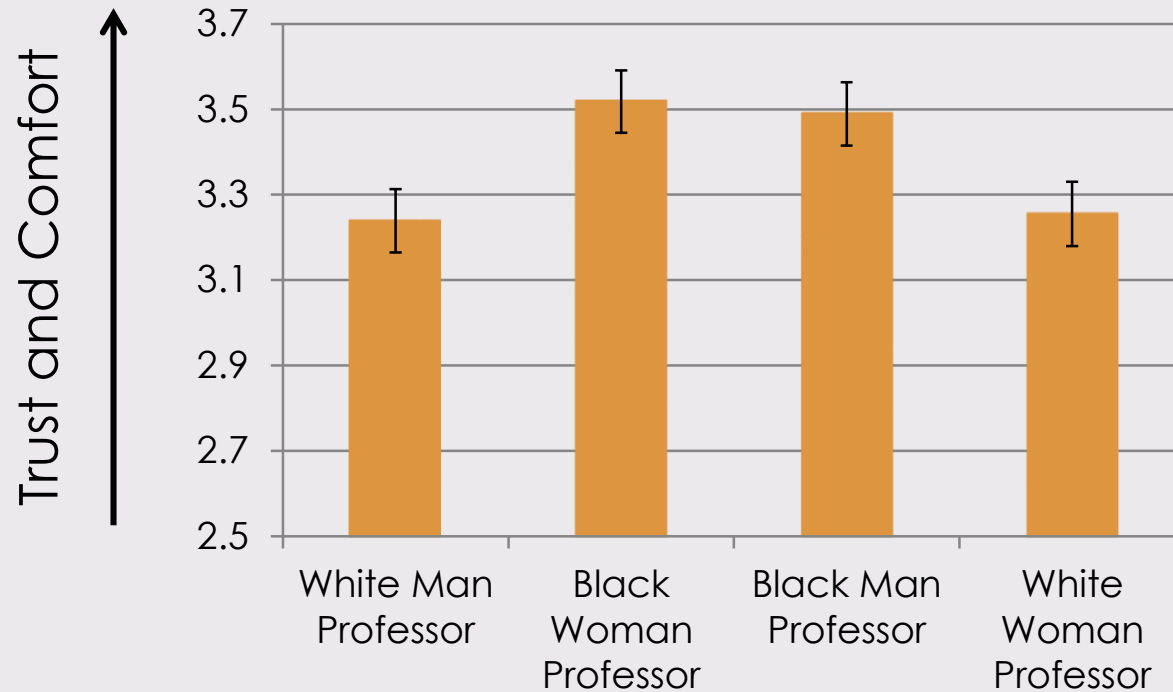
Black woman vs. White man:  $d=.70, p<.001$

Black man vs. White man:  $d=.73, p<.001$

White woman vs. White man:  $d=.12, p=.846$

$F(3,359)=12.02, p<.001, \eta_p^2=.091$

# Study 2 Results: Trust and Comfort



Black woman vs. White man:  $d=.42$ ,  $p=.038$

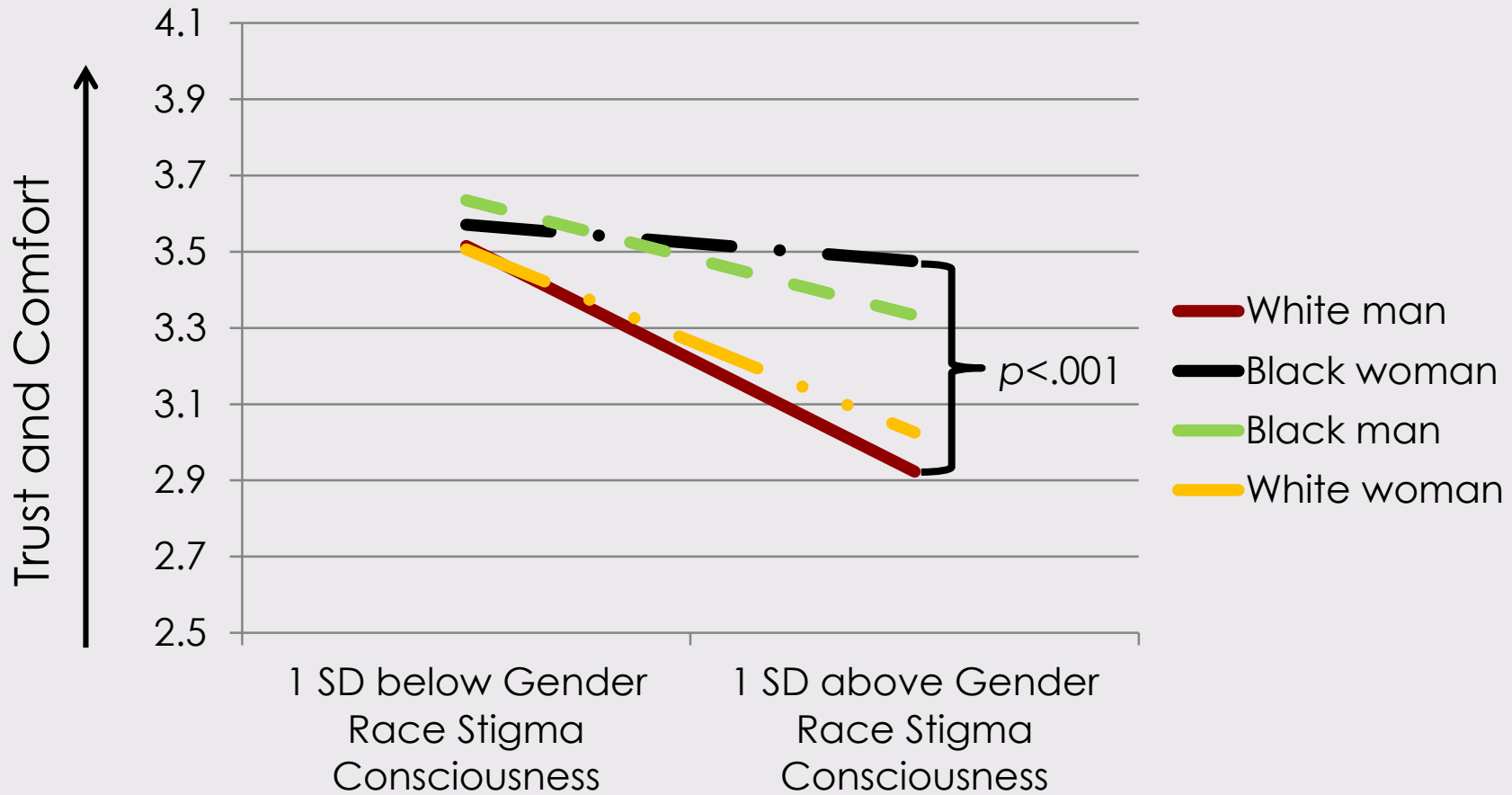
Black man vs. White man:  $d=.37$ ,  $p=.083$

White woman vs. White man:  $d=.02$ ,  $p=.999$

$$F(2,389)=4.05, p=.008, \eta_p^2=.033$$



# Study 2 Results: Moderation by stigma consciousness



# Study 1 and 2: Summary

- Website featuring a Black female scientist or a Black male scientist
  - ↑ trust and comfort in the STEM environment
  - **In line with the ethnic prominence perspective**
- High stigma consciousness:
  - ↓ trust and comfort *unless* the website featured a Black woman role model
  - **In line with double jeopardy perspective**
- **Problem:** *The White female scientist was never effective*

# Study 3

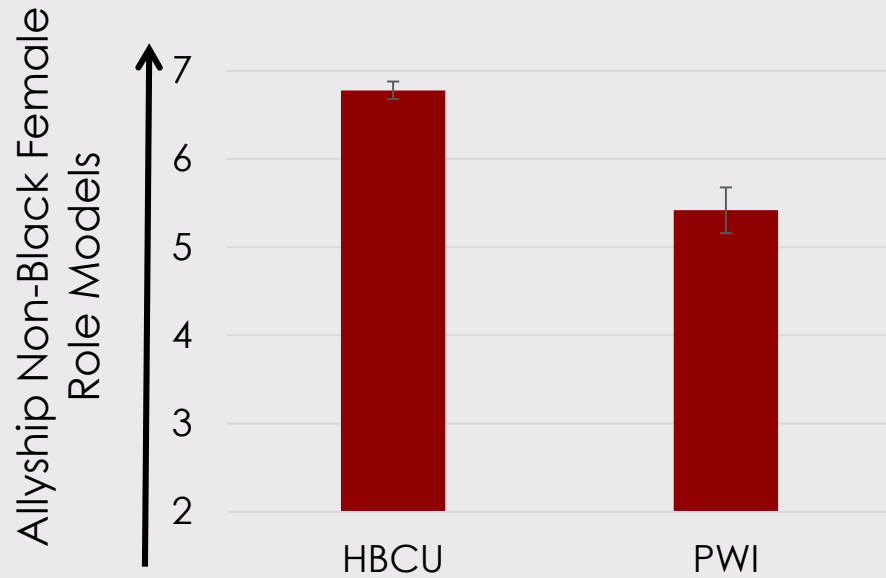
- How do role models influence Black female STEM majors experiences in an institution?
- Recruited Black female STEM majors from:
  - Predominately White University (PWI) (89)
  - Historically Black female college (HBCU) (116)
    - 54 full-time faculty in STEM- 18 Black women (33%)

# Study 3: Measures

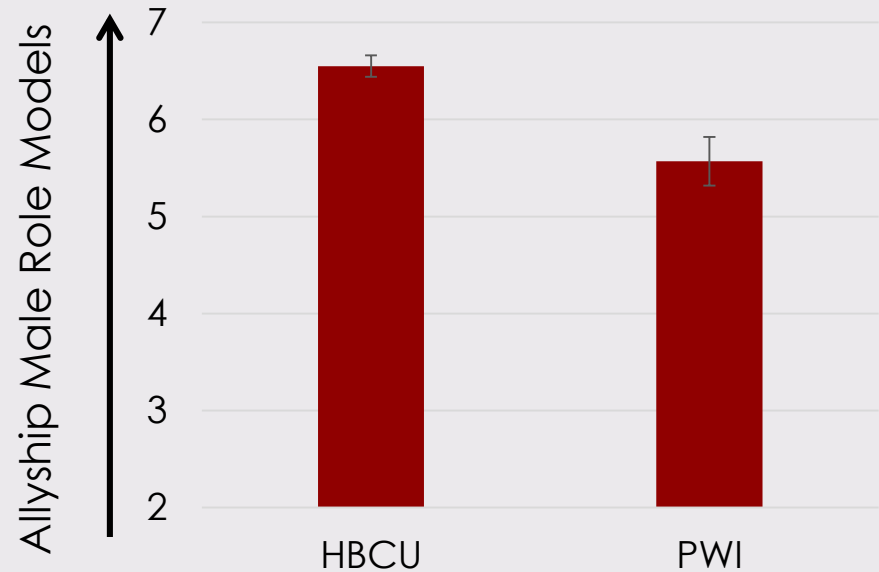
- Role models at institution
  - Indicated the race and gender of the role model
  - Perceived allyship of the role model
    - “How much do you think this role model cares about helping Black women?” (1- *does not care at all* to 7- *cares very much*)
- Belonging at their institution
- Belonging in STEM
  - “I belong in the sciences” (1-*strong disagree* to 5-*strongly agree*)
    - 8 items,  $\alpha=.85$

# Study 3: Results

- Significantly more Black female role models at HBCU (~2-3) than PWI (~0-1),  $t(203)=8.53$ ,  $p<.001$ ,  $d=1.12$

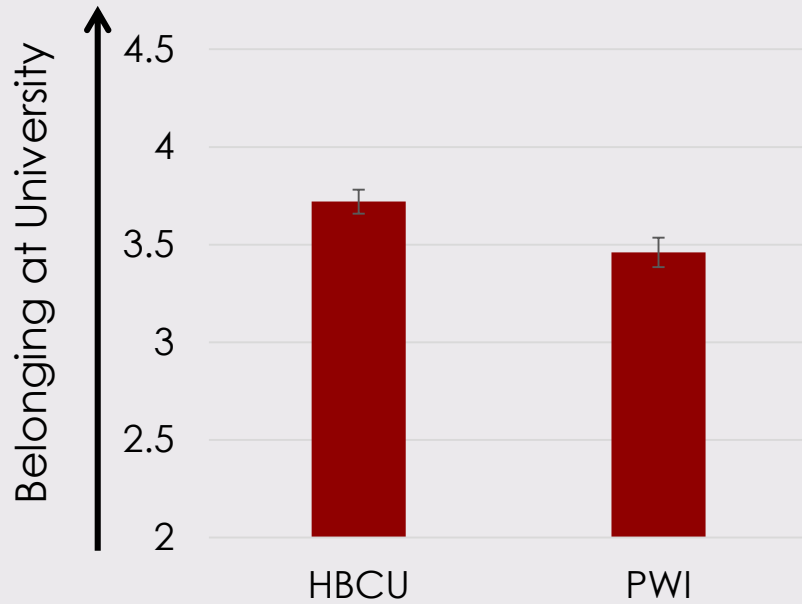


$t(73)=4.70$ ,  $p<.001$ ,  $d=1.10$

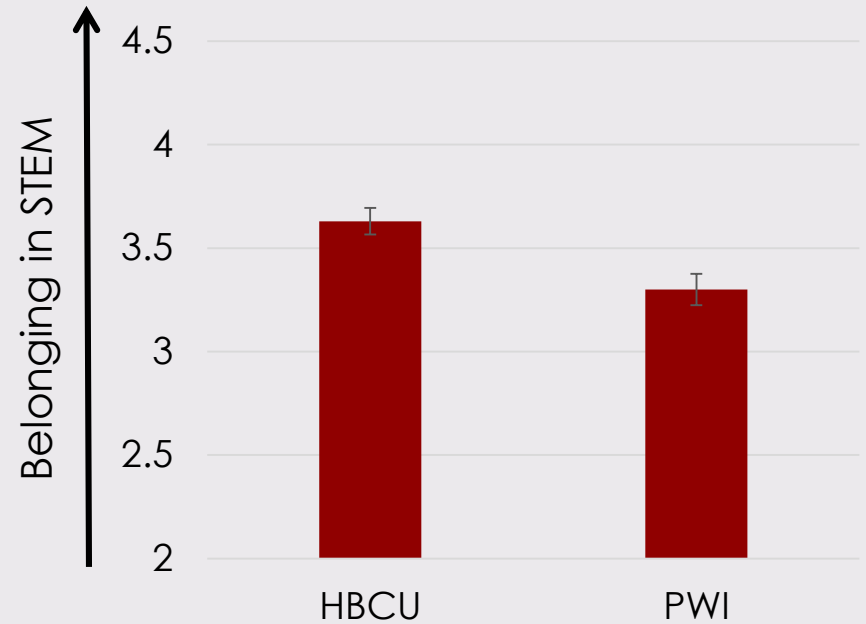


$t(82)=4.17$ ,  $p<.001$ ,  $d=.92$

# Study 3: Results



$t(203)=2.64, p=.009, d=.37$



$t(203)=3.50, p=.001, d=.49$

# Study 3: Results

	<b>Belonging university</b>	<b>Belonging STEM</b>
Black female role models	$r(203)=.31, p<.001$	$r(203)=.14, p=.046$
Allyship non-Black female role models	$r(72)=.21, p=.080$	$r(72)=.42, p<.001$
Allyship male role models	$r(81)=.14, p=.134$	$r(81)=.20, p=.068$

# Study 3: Summary

- Compared to PWI, Black female STEM majors at HBCU
  - ↑ Black female role models
  - ↑ belonging at their institution and in STEM
  - ↑ Perceived allyship from role models with different gender and racial identities



# Study 3: Summary

- Believing their non-Black female role models were allies
  - ↑ belonging at their institution and in STEM
- How do we make White women more effective role models?
  - Have them signal allyship

# Study 4

- Ethnic minorities feel more welcomed in companies that acknowledge the value of diverse perspectives (e.g. a multicultural ideology) (Plaut, Thomas, & Goren, 2009; Stevens, Plaut, & Sanchez-Burks, 2008)
- *A White woman who endorses multiculturalism*

# Study 4

- Black women have more positive experiences when they perceive more allyship from their White counterparts  
(Dominigue, 2015)
- White women can demonstrate allyship acknowledging and combating prejudice  
(Brown & Ostrove , 2013; Droogendyk et al., 2016)
- *A White woman ally who acknowledges the unique experiences of Black women*

# Study 4

- 426 Black women from the general population using Amazon's Mechanical Turk Website

*Imagine how you would feel working at this company*



# Study 4

- 5 conditions

- No profile

- Black woman profile

- White woman profile

- White woman endorsing multiculturalism

- *Having diverse research teams has been key in the success of this research. Diverse groups really do bring more creative and innovative ideas for new experiments and avenues to take this research.*

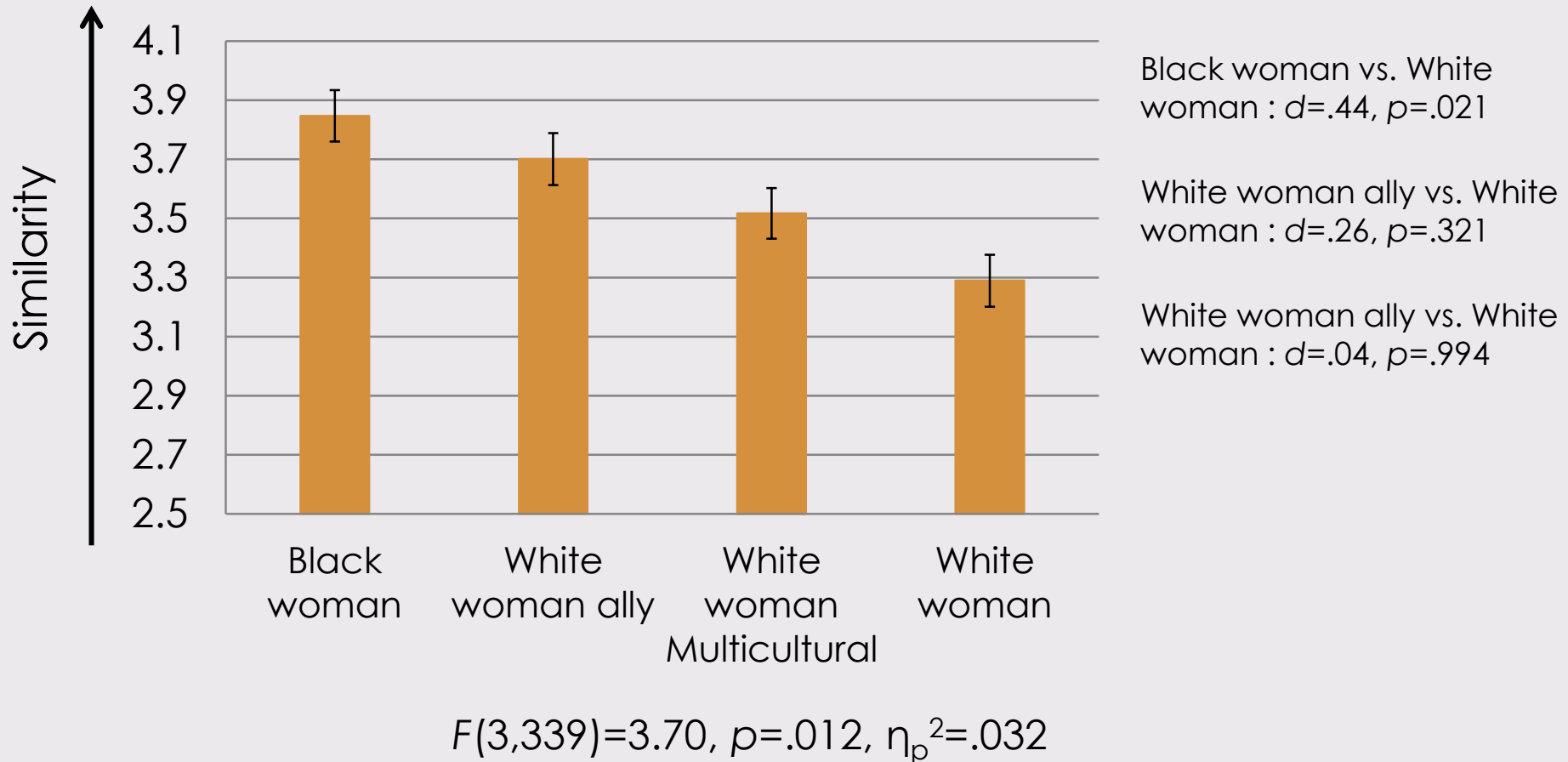
- White woman ally

- *The reality is, right now there are just not as many women as men in science and the group that is really missing is women of color. Even though I'm a woman, I recognize my experience as a White woman is different than that of a Black or Latina woman. I really value their unique perspective and work to actively recruit them as research assistants and research scientists for my group.*

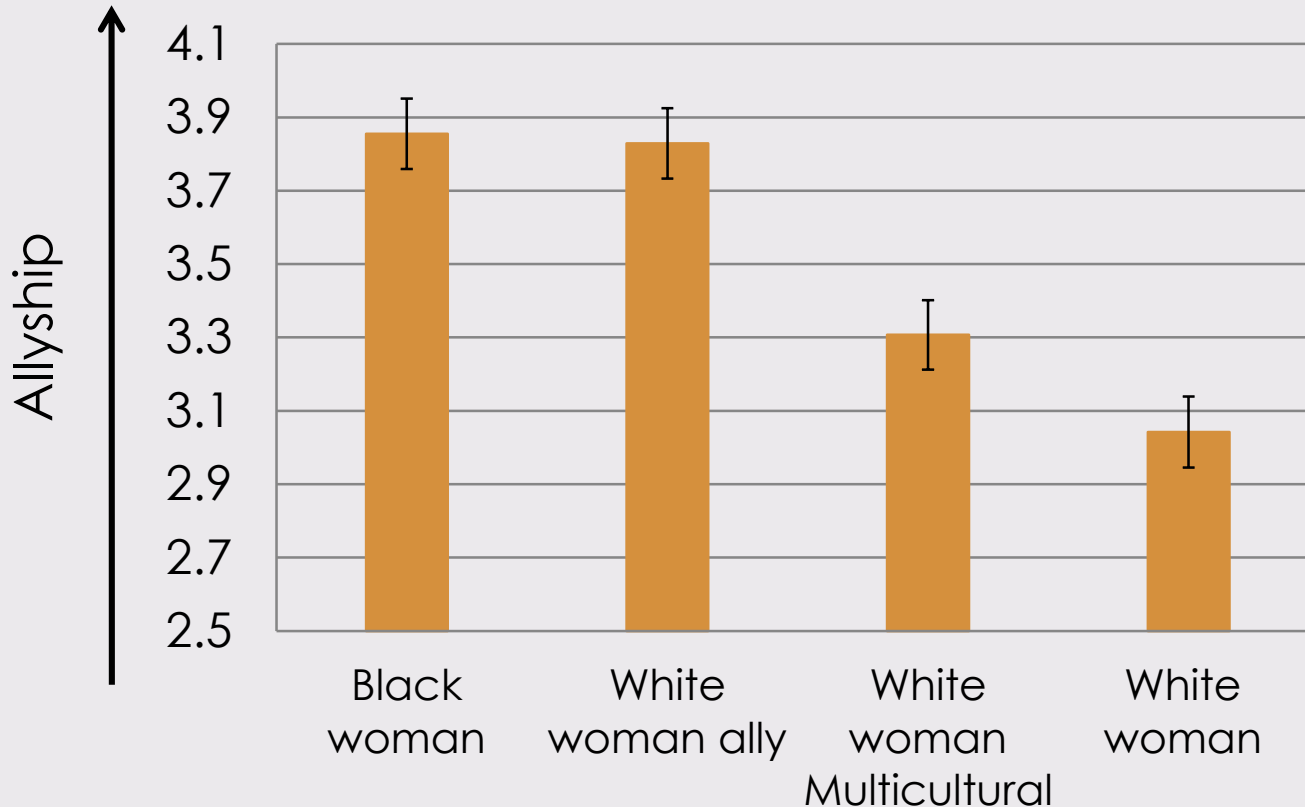
# Study 4: Measures

- Perceived similarity to scientist
- Perceived allyship of the scientist
  - “Most likely this person wants to help Black women succeed in the sciences” (1-*strong disagree* to 5-*strongly agree*)
    - 2 items,  $\alpha=.85$
- Predicted Trust and Comfort
- Gender-Race Stigma Consciousness

# Study 4 Results: Perceived similarity



# Study 4 Result: Perceived allyship



Black woman vs. White woman :  $d=.97, p<.001$

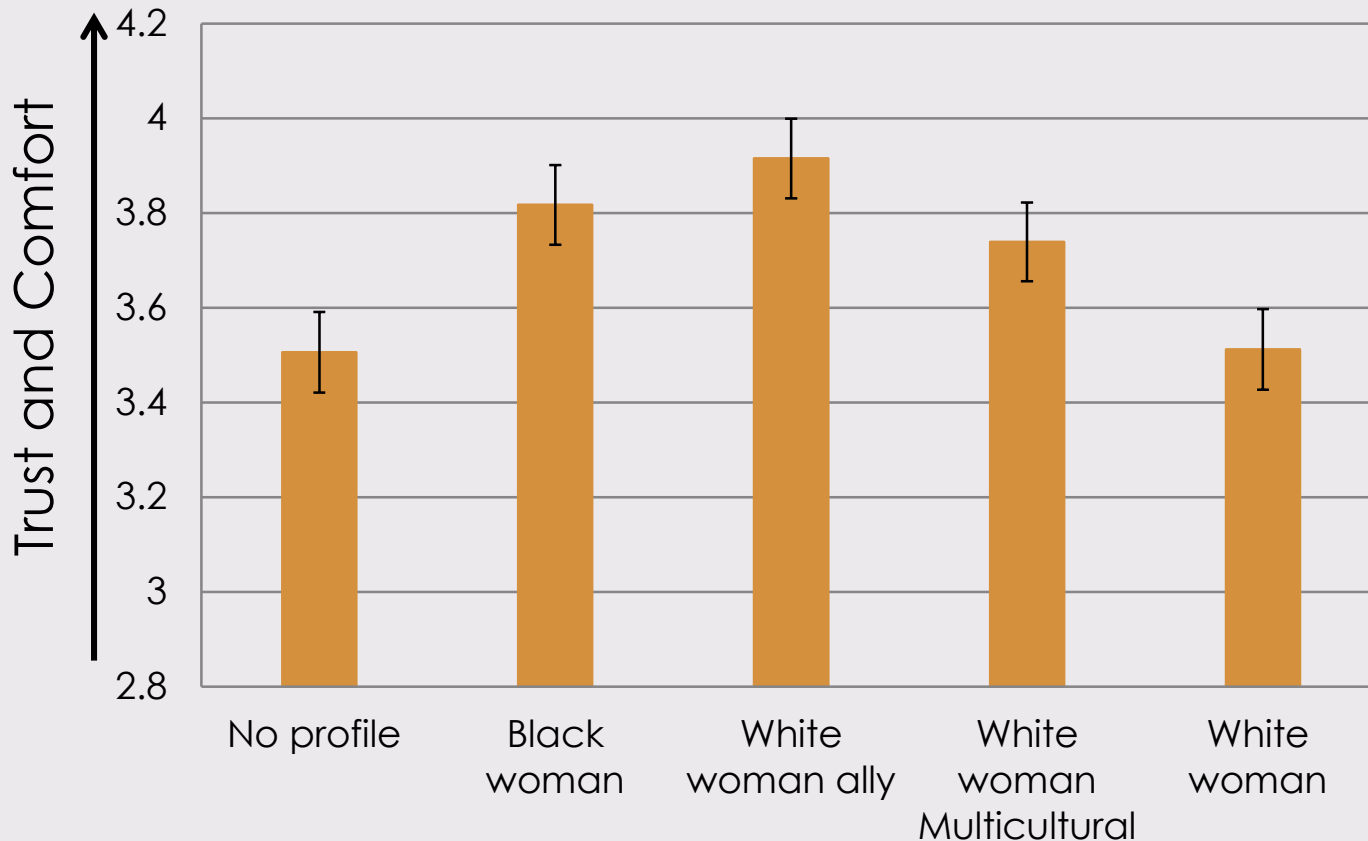
White woman ally vs. White woman :  $d=.98, p<.001$

White woman multicultural vs. White woman :  $d=.34, p=.207$

$F(3,339)=17.29, p<.001, \eta_p^2=.133$



# Study 4 Results: Trust and comfort



Black woman vs. no profile:  $d=.42$ ,  $p=.071$

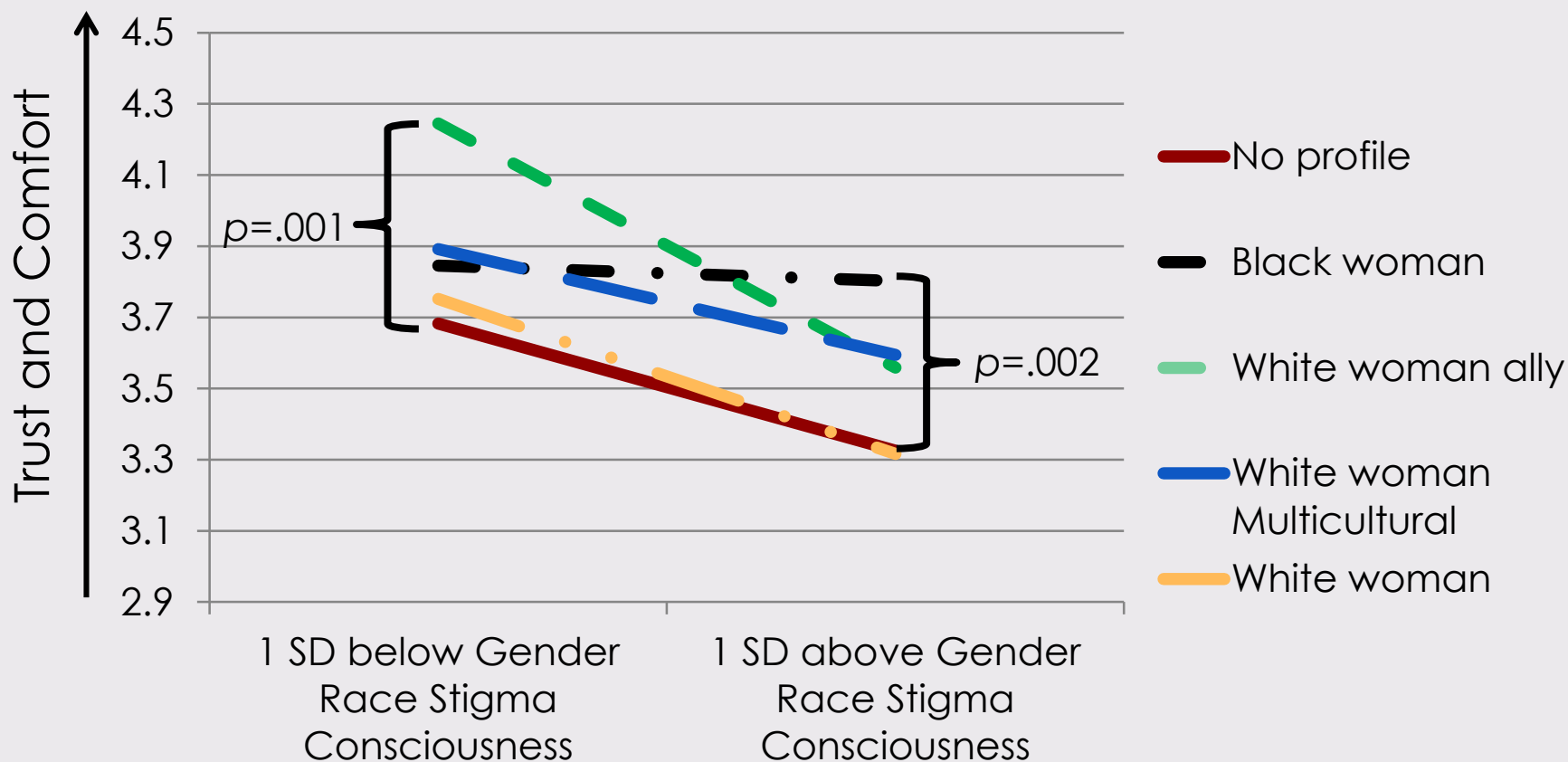
White woman ally vs. no profile:  $d=.50$ ,  $p=.006$

White woman multiculturalism vs. no profile:  $d=.31$ ,  $p=.287$

White woman vs. no profile:  $d=.01$ ,  $p=.999$

$F(4,421)=4.71$ ,  $p=.001$ ,  $\eta_p^2=.043$

# Study 4 results: Moderation by stigma consciousness



# Study 4: Summary

- Website featuring a Black woman or White woman ally
  - ↑ trust and comfort at a company
- High stigma consciousness:
  - ↓ trust and comfort *unless* the website featured a Black woman role model
- Low stigma consciousness:
  - The White woman ally resulted in higher trust and comfort

# Study 5

- How can we make the White female scientist more effective for Black woman with high stigma consciousness?
- Extended Contact Theory
  - Knowledge that ingroup members have positive contact experiences with an outgroup → reductions in prejudice towards outgroup members (Turner, Hewstone, Voci, Paolini, & Christ, 2007)
- *Black woman endorsing a White woman scientist as an ally*

# Study 5

- 315 Black women from the general population using Amazon's Mechanical Turk Website

*Imagine how you would feel working at this company*



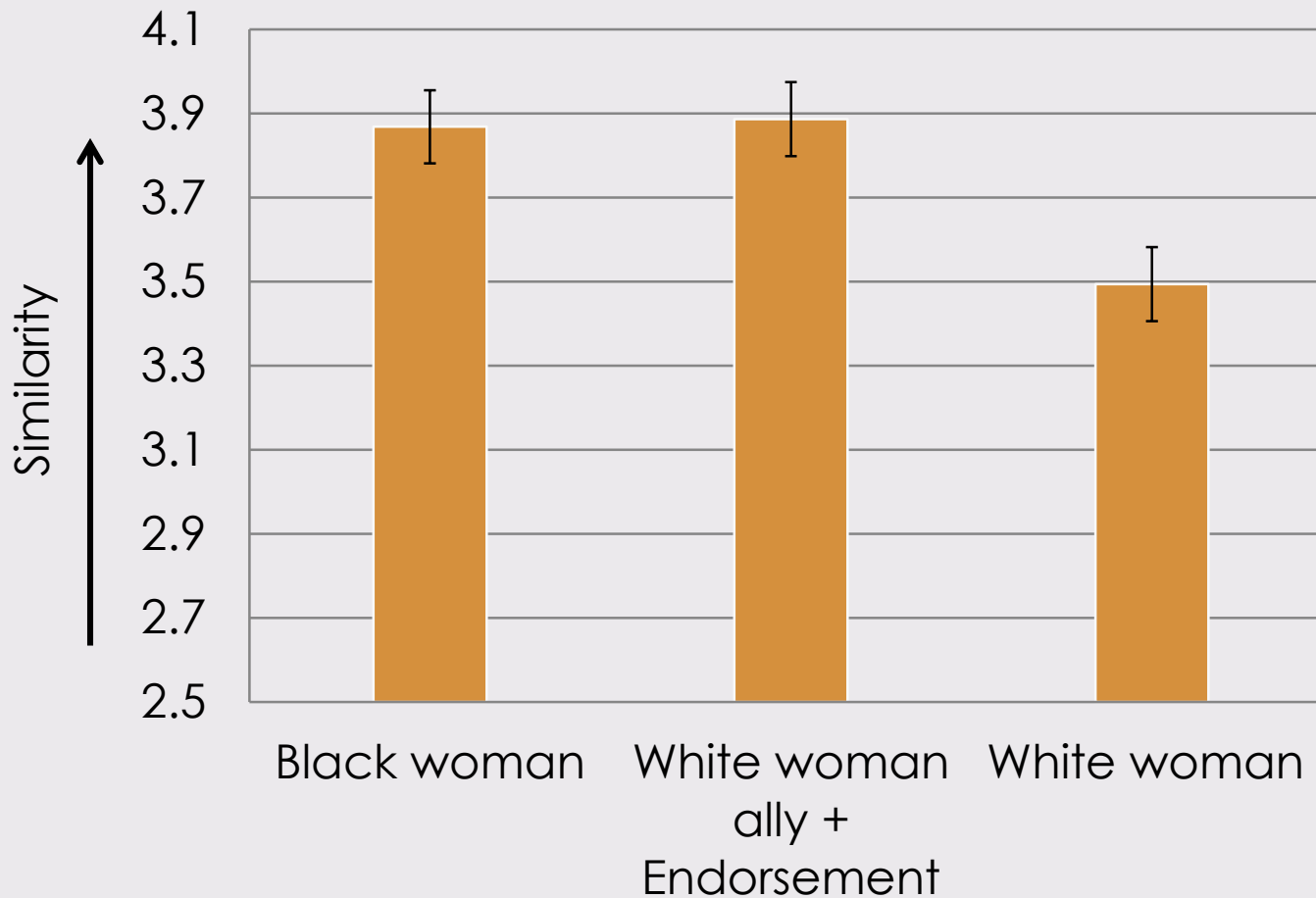
# Study 5

- 3 conditions
  - Black woman profile
  - White woman profile
  - White woman ally + Endorsement
    - *Although she is a woman, Dr. Evans acknowledges that the experiences of Black woman in the sciences are unique and does what she can to support my needs; she is truly an ally and an advocate for challenges Black women in the sciences face. She recognizes that Black women are underrepresented in the sciences, and actively works to support and recruit women of color (like me!) so we too can contribute to the sciences!*



The screenshot shows a website header for 'LAB TECH' with navigation links for 'home', 'about', 'products', and 'responsibility'. Below the header is a profile section for 'Amber Pratcher'. The text reads: 'Lab Tech Profiles: Amber Pratcher is a research assistant working under the supervision of Dr. Melissa Evans.' To the right is a photo of Amber Pratcher, a Black woman in a lab coat holding a test tube. Below the photo is a testimonial: 'Amber's experiences working with Dr. Melissa Evans: I have really enjoyed being apart of Dr. Evan's research team! She is an amazing and talented scientist and has been an excellent supervisor over the past year. I am excited to be involved in her research identifying interventions for neurodegenerative diseases; the experience I have gained is invaluable!' At the bottom is another testimonial: 'Amber also views Dr. Evans as an ally for women of color. "Although she is a woman, Dr. Evans acknowledges that the experiences of Black woman in the sciences are unique and does what she can to support my needs; she is truly an ally and an advocate for challenges Black women in the sciences face. She recognizes that Black women are underrepresented in the sciences, and actively works to support and recruit women of color (like me!) so we too can contribute to the sciences! She encouraged me to apply to the most competitive graduate programs and always challenged me as a research assistant to ensure I was prepared. Her support has meant everything and I am thankful for her and my time at LabTech!"'

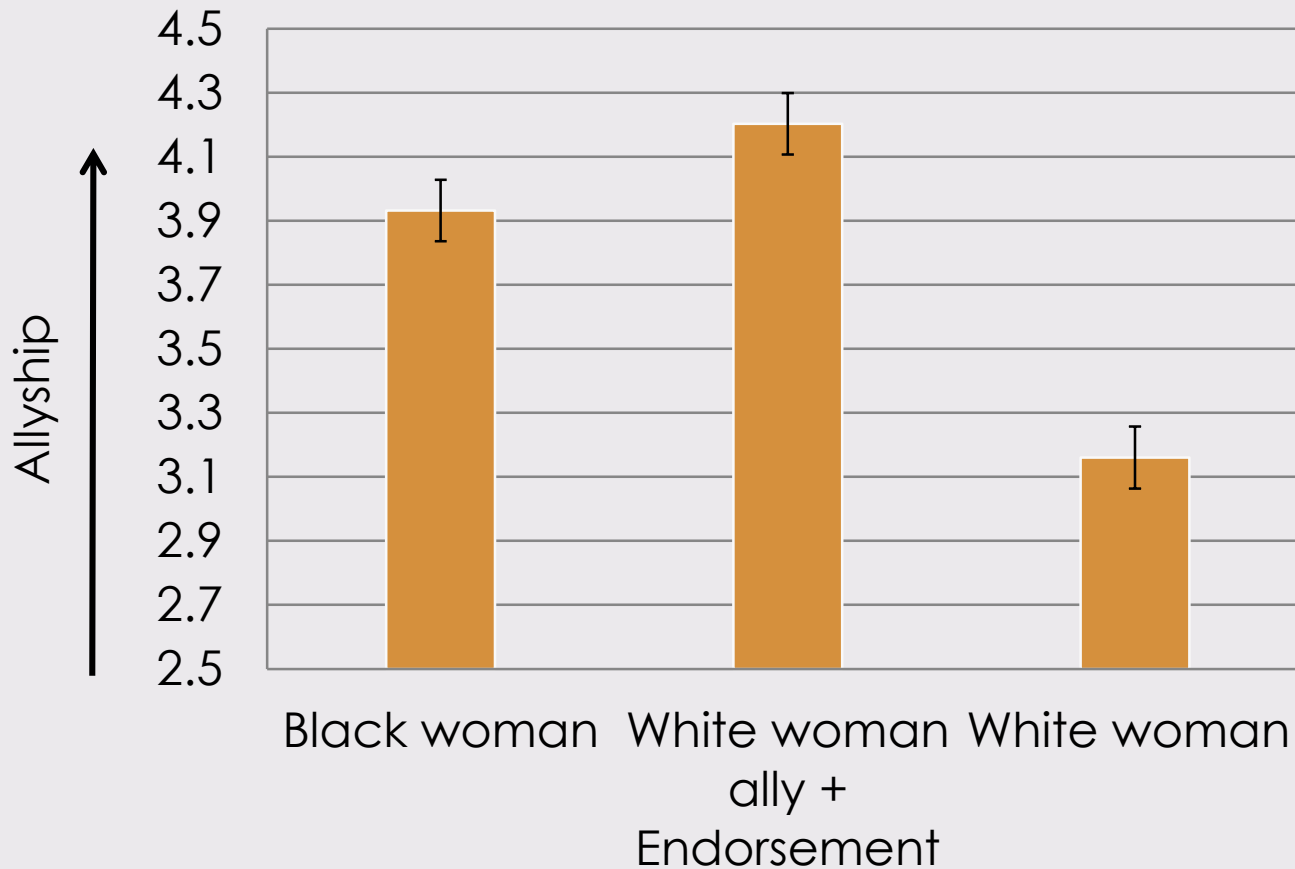
# Study 5 Results: Perceived similarity



Black woman vs.  
white woman:  
 $d=.48, p=.001$   
White woman ally  
+ Endorsement vs.  
white woman:  
 $d=.39, p=.016$

$F(2,306)=8.59, p<.001, \eta_p^2=.053$

# Study 5 Results: Perceived Allyship

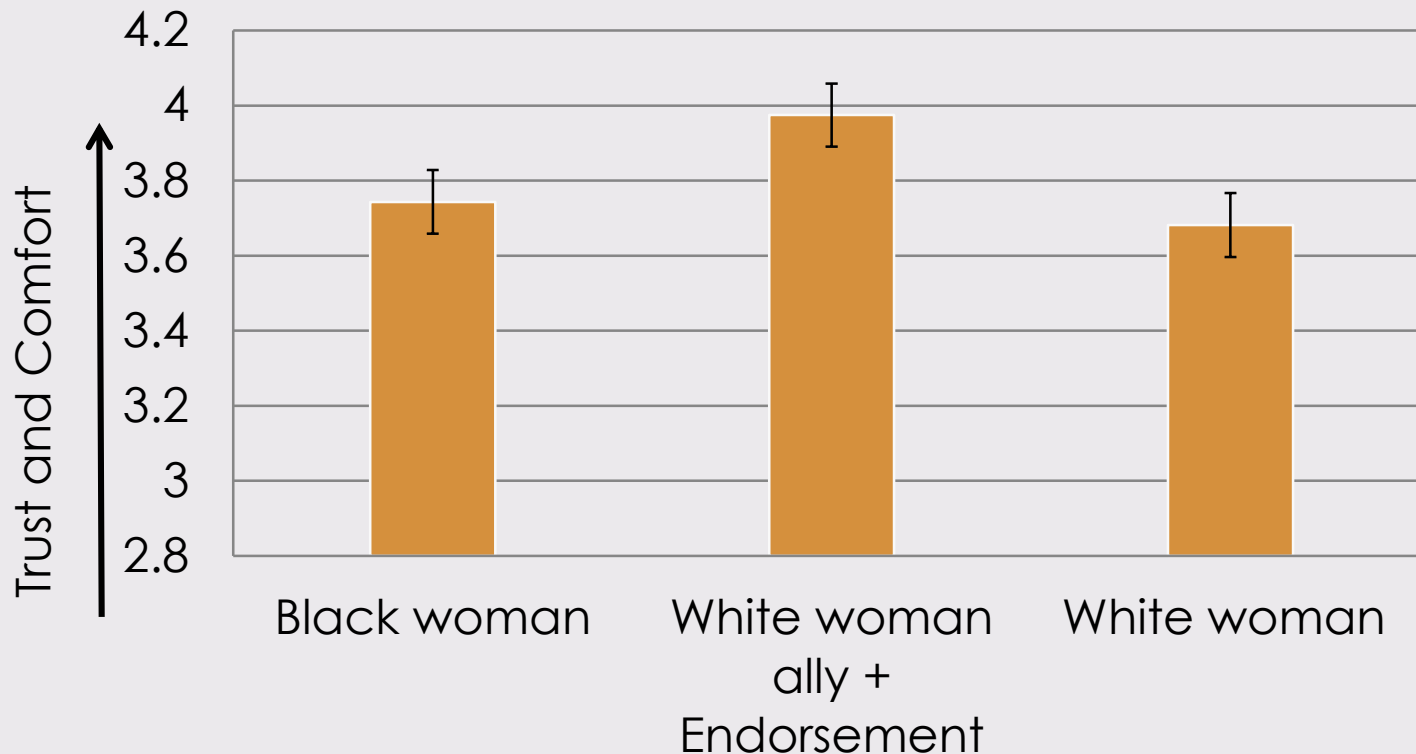


Black woman vs.  
white woman:  
 $d=.87, p<.001$   
White woman ally +  
Endorsement vs.  
white woman:  
 $d=.1.04, p<.001$

$F(2,306)=38.14, p<.001, \eta_p^2=.20$



# Study 5 Results: Trust and comfort

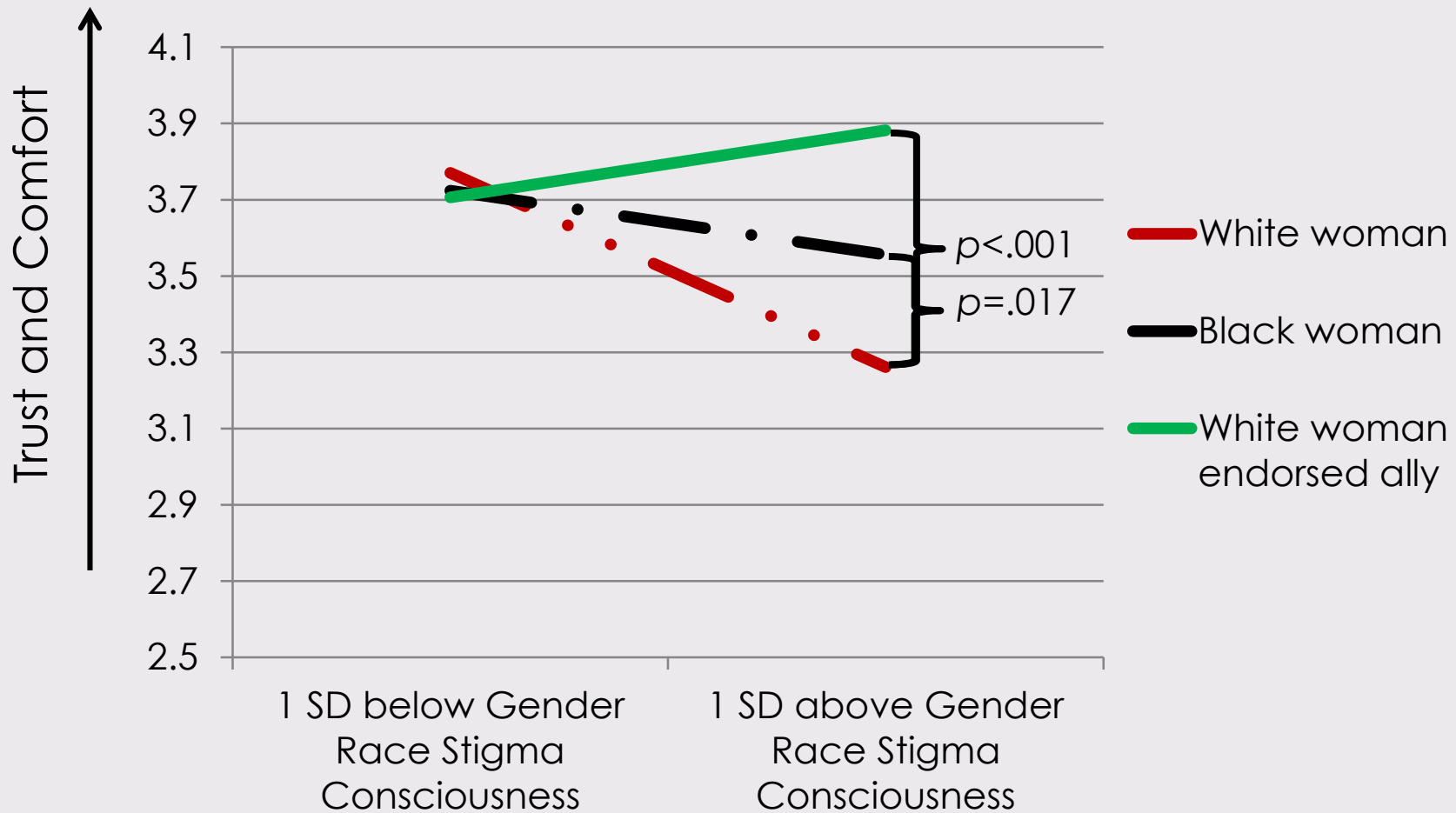


Black woman vs.  
white woman:  
 $d=.08$ ,  $p=.816$

White woman  
ally +  
Endorsement  
vs. white  
woman:  $d=.40$ ,  
 $p=.015$

$F(2,302)=4.46$ ,  $p=.012$ ,  $\eta_p^2=.029$

# Study 5 Results: Moderation by stigma consciousness



# Study 5: Summary

- Website featuring a White woman ally endorsed by a Black woman
  - ↑ trust and comfort at a company
  - Even for participants ***high in stigma consciousness***
- Do these effects generalize to other underrepresented identities?

# Study 6

- 335 White women from the general population using Amazon's Mechanical Turk Website

*Imagine how you would feel working at this company*



# Study 6

- 4 conditions
  - White man profile
  - White woman profile
  - White man ally + Black female Endorsement profile
  - White man ally + White female Endorsement profile



**LAB TECH** home | about | products | responsibility

**Lab Tech Profiles:** Amber Pratcher

Amber Pratcher is a research assistant working under the supervision of Dr. Melissa Evans.



Amber's experiences working with Dr. Melissa Evans:  
*I have really enjoyed being apart of Dr. Evan's research team! She is an amazing and talented scientist and has been an excellent supervisor over the past year. I am excited to be involved in her research identifying interventions for neurodegenerative diseases; the experience I have gained is invaluable!*

Amber also views Dr. Evans as an ally for women of color. "Although she is a woman, Dr. Evans acknowledges that the experiences of Black women in the sciences are unique and does what she can to support my needs; she is truly an ally and an advocate for challenges Black women in the sciences face. She recognizes that Black women are underrepresented in the sciences, and actively works to support and recruit women of color (like me!) so we too can contribute to the sciences! She encouraged me to apply to the most competitive graduate programs and always challenged me as a research assistant to ensure I was prepared. Her support has meant everything and I am thankful for her and my time at LabTech!"



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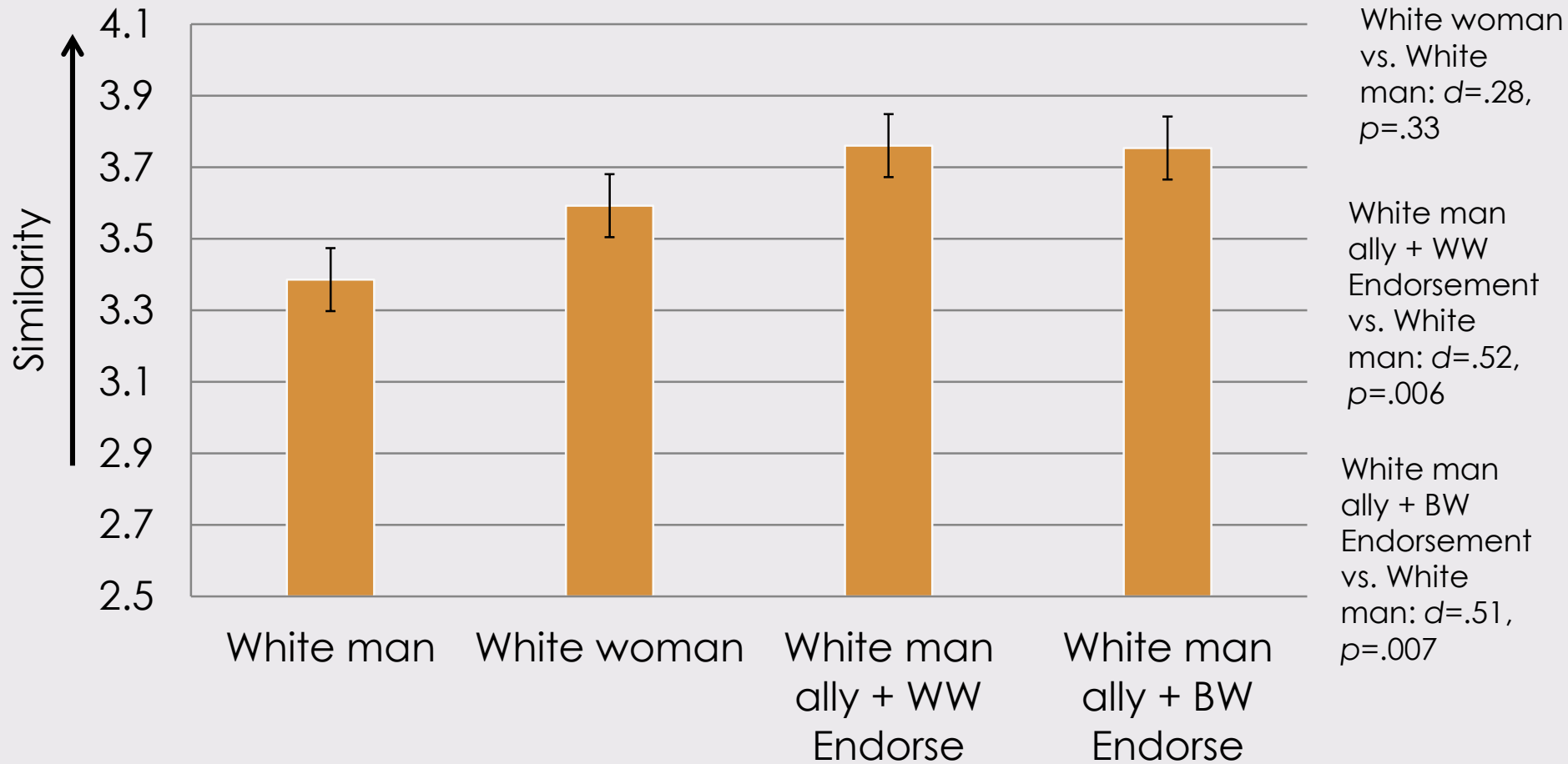
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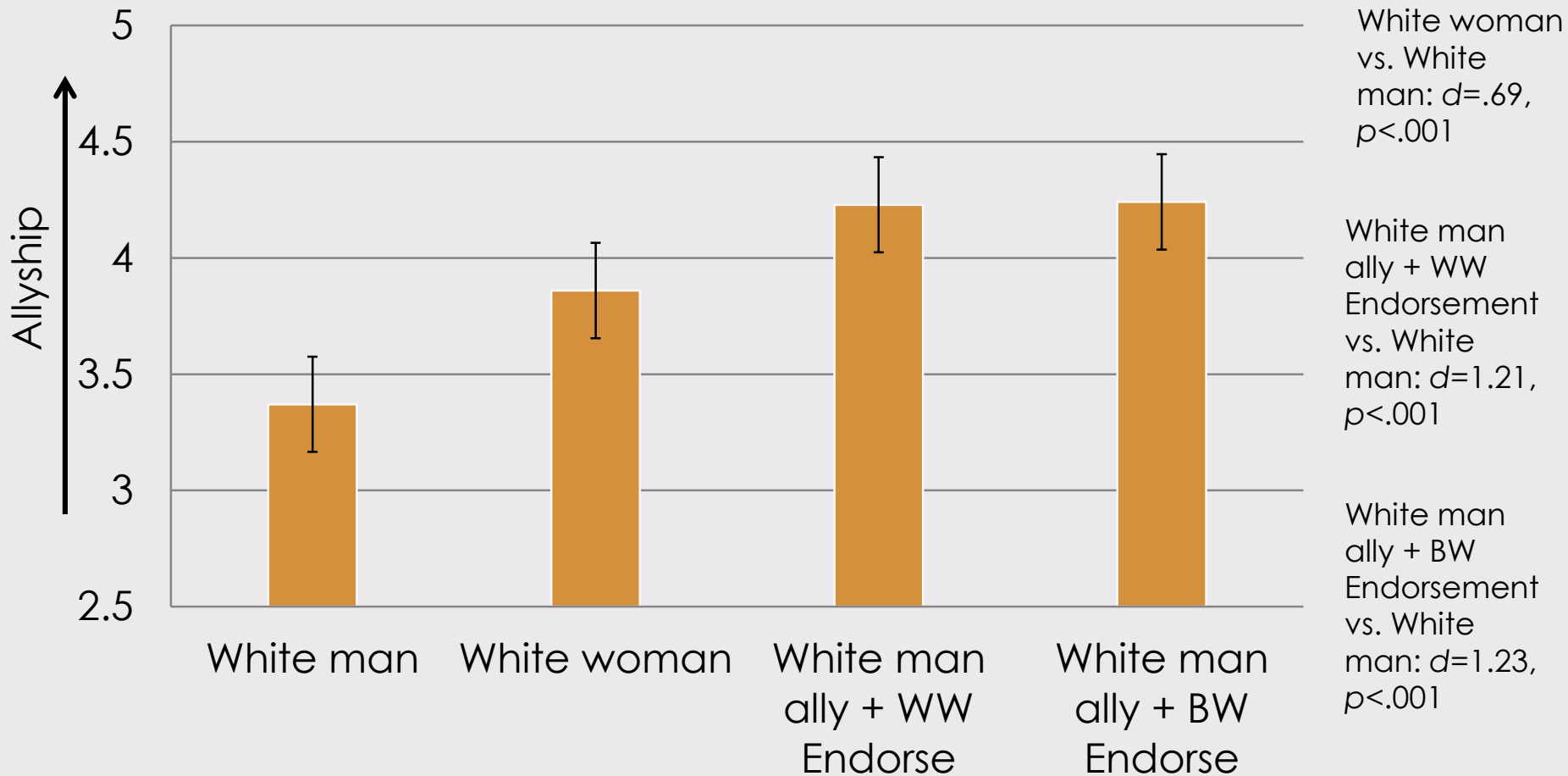
Amber also views Dr. Evans as an advocate for all women. "Although he is a man, Dr. Evans acknowledges that the experiences of women and women of color in the sciences are unique and does what he can to support my needs. He truly is an ally and advocate for challenges women in the sciences face. He recognizes that women are underrepresented in the sciences, and actively works to support and recruit women (like me!) so we too can contribute to the sciences. He encouraged me to apply to the most competitive graduate programs and always challenged me as a research assistant to ensure I was prepared. His support has meant everything and I am thankful for him and my time at LabTech!"

# Study 6 Results: Perceived similarity



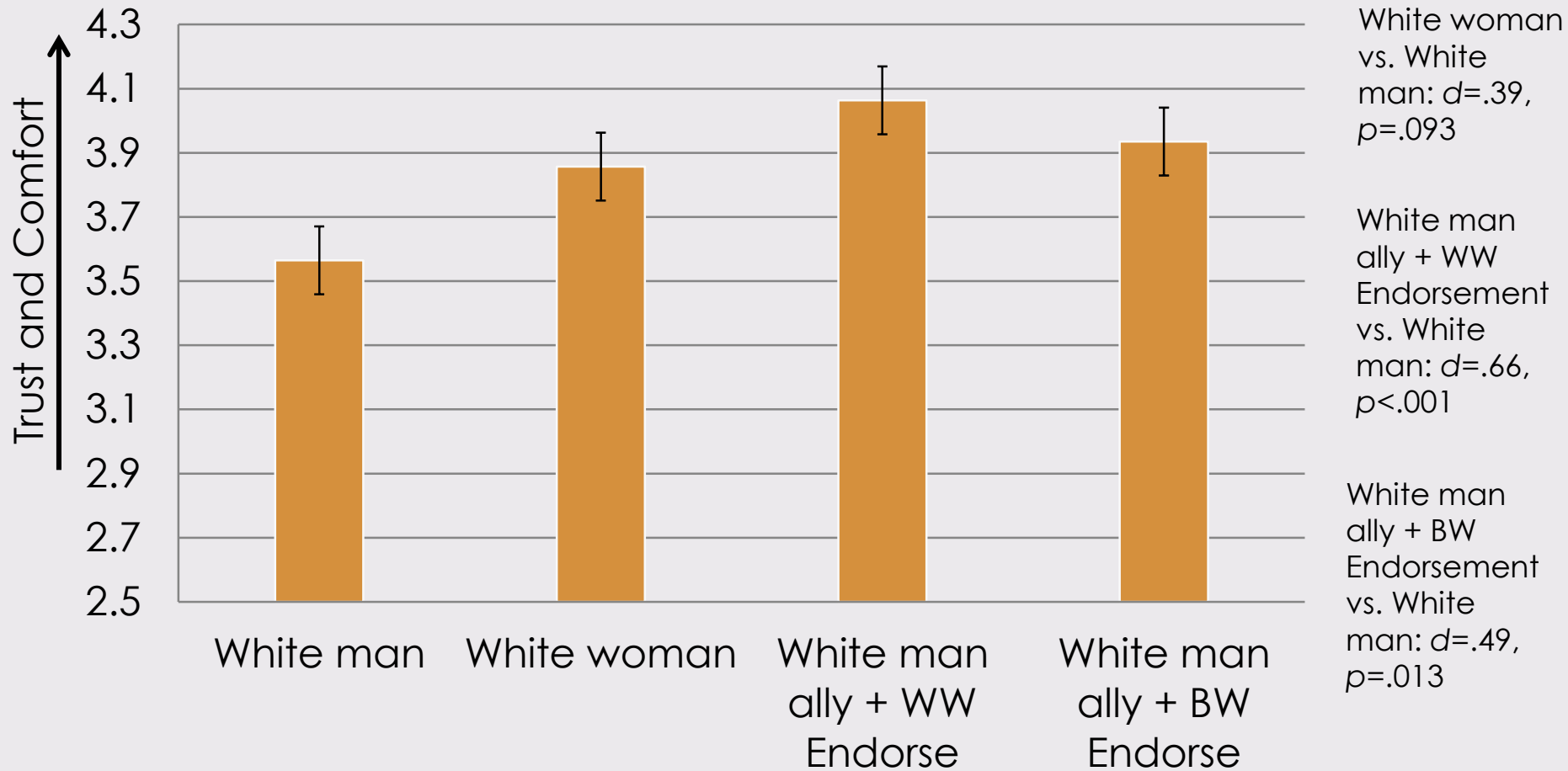
$F(3,331)=5.24$ ,  $p=.002$ ,  $\eta_p^2=.045$

# Study 6 Results: Perceived allyship



$F(3,331)=29.56$ ,  $p<.001$ ,  $\eta_p^2=.211$

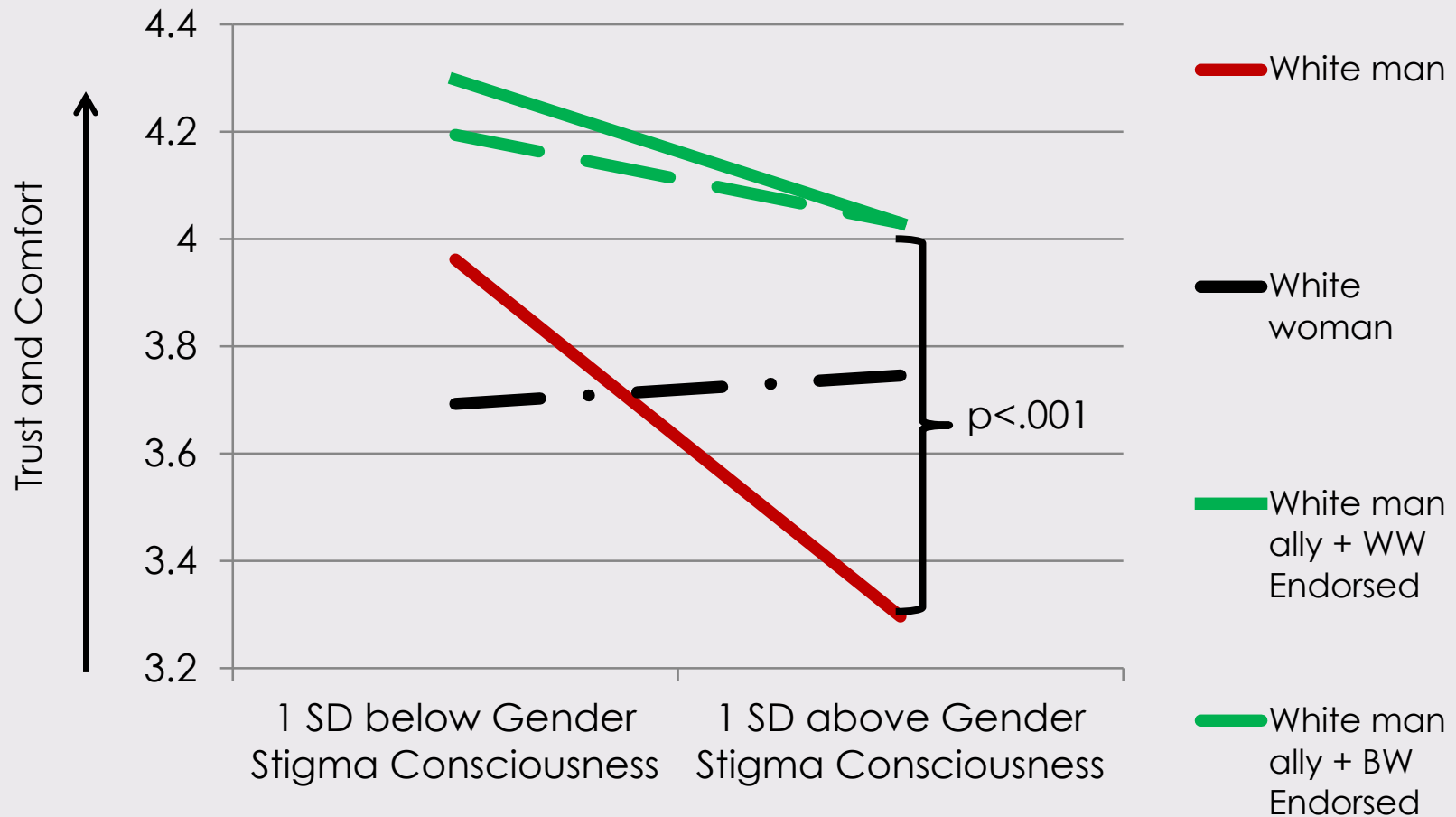
# Study 6 Results: Trust and Comfort



$F(3,331)=6.83$ ,  $p<.001$ ,  $\eta_p^2=.059$



# Study 6 Results: Moderation by stigma consciousness



# Study 6: Summary

- Website featuring a White male ally endorsed by a Black or White woman
  - ↑ trust and comfort at a company
  - Even for participants ***high in stigma consciousness***

# Taken together

- An ally who explicitly expressed allyship
  - Helpful for women with low are average levels of stigma consciousness
- Ally who expresses allyship and was endorsed by a woman (i.e., a member of the stigmatized group)
  - Helpful for all women regardless of stigma consciousness level

# Next Steps

- Allyship Training Intervention
- Study 1
  - Mixed-methods approach to identify how students of underrepresented groups perceive individuals belonging to majority groups can best support and serve as effective allies
- Study 2
  - Experimentally manipulate allyship → Belonging, perceived allyship, & interest in future interactions

# Next Steps: Allyship Training Intervention

- Study 3
  - Allyship Training Intervention
  - Anti-Bias Training
  - Waitlist Control
    - Faculty → Attitudes towards underrepresented students, behavioral intentions & self-efficacy
    - Underrepresented Groups → Belonging

# Thanks!

## Contact info:

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