Diversity, Equity, and Inclusion in Civil and Environmental Engineering

Kara Nelson
Professor, Civil and Environmental Engineering

CEE Seminar
March 7, 2022

Land Acknowledgement

UC Berkeley sits on the territory of xučyun (Huichin), the ancestral and unceded land of the Chochenyo speaking Ohlone people, the successors of the sovereign Verona Band of Alameda County. This land was and continues to be of great importance to the Muwekma Ohlone Tribe and other familial descendants of the Verona Band.

We recognize that every member of the Berkeley community has, and continues to benefit from, the use and occupation of this land, since the institution's founding in 1868. Consistent with our values of community, inclusion, and diversity, we have a responsibility to acknowledge and make visible the university's relationship to Native peoples. As members of the Berkeley community, it is vitally important that we not only recognize the history of the land on which we stand but also, we recognize that the Muwekma Ohlone people are alive and flourishing members of the Berkeley and broader Bay Area communities today.

This acknowledgment was co-created with the Muwekma Ohlone Tribe and Native American Student Development and is a living document.

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Other resources/activities:

* Learn more about the Muwekma Ohlone Tribe.
* Talk on status of UCB's repatriation of Native American ancestral remains and belongings
* Cluster hire of five faculty in Native American and Indigenous Peoples (in progress)
* Songorea Te' Land Trust, Shumi (Land Tax)

Topics for Today

* Why are diversity, equity, inclusion, belonging, justice CEE priorities?

* Inclusion and belonging in at UCB

* Research on implicit bias

* The dimensions of Racism

* How to get involved*

* COE aims for all of our graduates to become inclusive leaders with multicultural awareness in academia, public service, and professional practice
- 2020 COE Equity and Inclusion [Strategic Plan](#)

Setting an Inclusive Climate

* If this was easy, we wouldn't be here.
* It's ok to not be an "expert" on diversity, equity, inclusion, belonging, justice (DEIBJ).
* We are all DEIBJ students and teachers.
* We aim for inclusive and respectful dialog. Practice generosity and compassion.
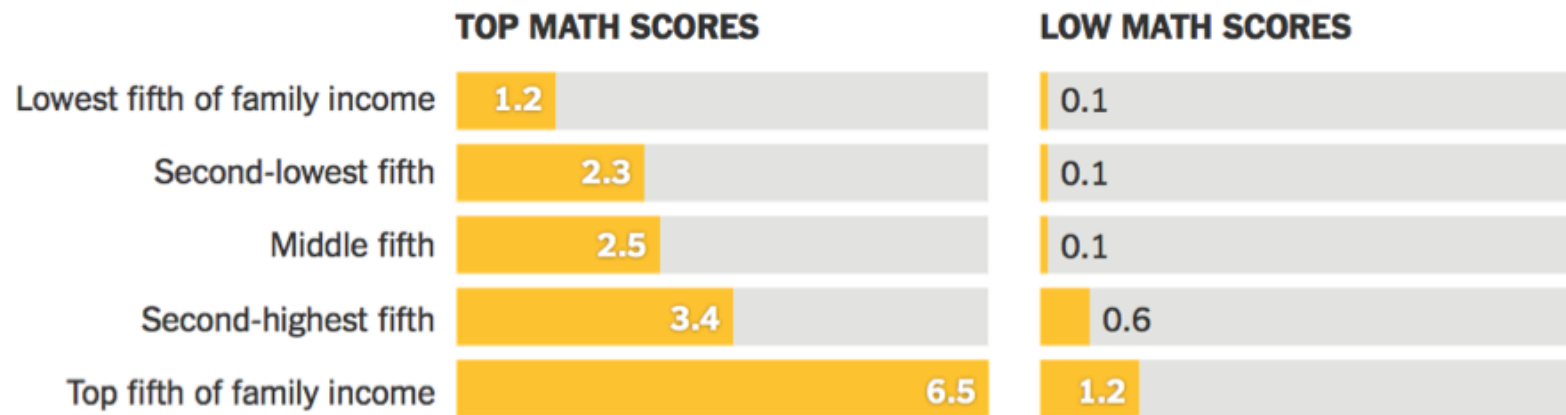* We need to become comfortable with being uncomfortable.

Lost Einsteins: The Innovations We're Missing
David Leonhardt, NYT, Dec 3, 2017

Lost Einsteins

Low-income children who excel at math rarely become patent holders. They are less likely to hold patents than high-income students who do substantially worse in school.

Patents per 1,000 children, by family income and 3rd-grade math performance

	TOP MATH SCORES	LOW MATH SCORES
Lowest fifth of family income	1.2	0.1
Second-lowest fifth	2.3	0.1
Middle fifth	2.5	0.1
Second-highest fifth	3.4	0.6
Top fifth of family income	6.5	1.2

Top math scores are those in the highest 5 percent of all students; low math scores are in the bottom 25 percent. Study analyzed children born from 1980 to 1984.

By The New York Times | Source: Equality of Opportunity Project

Lost Einsteins: Race

Patents per 1,000 children, by race and 3rd-grade math performance

	TOP MATH SCORES	LOW MATH SCORES
Asian	8.2	0.3
Black	1.0	0.4
Hispanic	0.6	0.2
White	3.6	0.7

Top math scores are those in the highest 10 percent of all students; low math scores are in the bottom 50 percent. Study analyzed children born from 1980 to 1984.

By The New York Times | Source: Equality of Opportunity Project

Lost Einsteins: Gender

Patents per 1,000 children, by sex and 3rd-grade math performance

	TOP MATH SCORES	LOW MATH SCORES
Women	2.4	0.1
Men	6.0	0.5

Top math scores are those in the highest 5 percent of all students; low math scores are in the bottom 25 percent. Study analyzed children born from 1980 to 1984.

By The New York Times | Source: Equality of Opportunity Project

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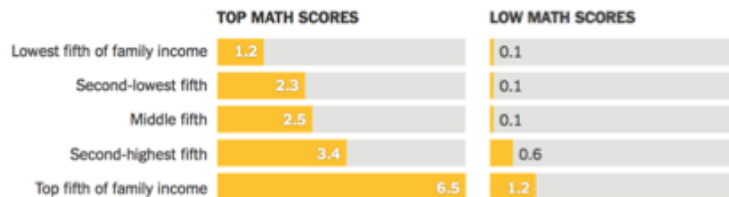|	TOP MATH SCORES	LOW MATH SCORES
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If all these groups had the same level of invention as white men from high-income families, we could quadruple the rate of innovation in the US

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8

When it comes to science collaborations, there's ample data to suggest that gender diversity pays a substantial research and productivity dividend.

Mathias Wullum Nielsen et al. PNAS 2017;114:1740-1742

PNAS

This depiction of the mechanisms of innovation at scientific organizations emphasizes that "diversity in" does not automatically lead to "creativity out." Maximizing gender diversity's benefits requires careful management.

Mathias Wullum Nielsen et al. PNAS 2017;114:1740-1742

PNAS

The Diversity–Innovation Paradox in Science

Bas Hofstra[a,1], Vivek V. Kulkarni[b], Sebastian Munoz-Najar Galvez[a], Bryan He[b], Dan Jurafsky[b,c], and Daniel A. McFarland[a,1]

[a]Graduate School of Education, Stanford University, Stanford, CA 94305; [b]Department of Computer Science, Stanford University, Stanford, CA 94305; and [c]Department of Linguistics, Stanford University, Stanford, CA 94305

Prior work finds a diversity paradox: Diversity breeds innovation, yet underrepresented groups that diversify organizations have less successful careers within them. Does the diversity paradox hold for scientists as well? We study this by utilizing a near-complete population of ~1.2 million US doctoral recipients from 1977 to 2015 and following their careers into publishing and faculty positions. We use text analysis and machine learning to answer a series of questions: How do we detect scientific innovations? Are underrepresented groups more likely to generate scientific innovations? And are the innovations of underrepresented groups adopted and rewarded? Our analyses show that underrepresented groups produce higher rates of scientific novelty. However, their novel contri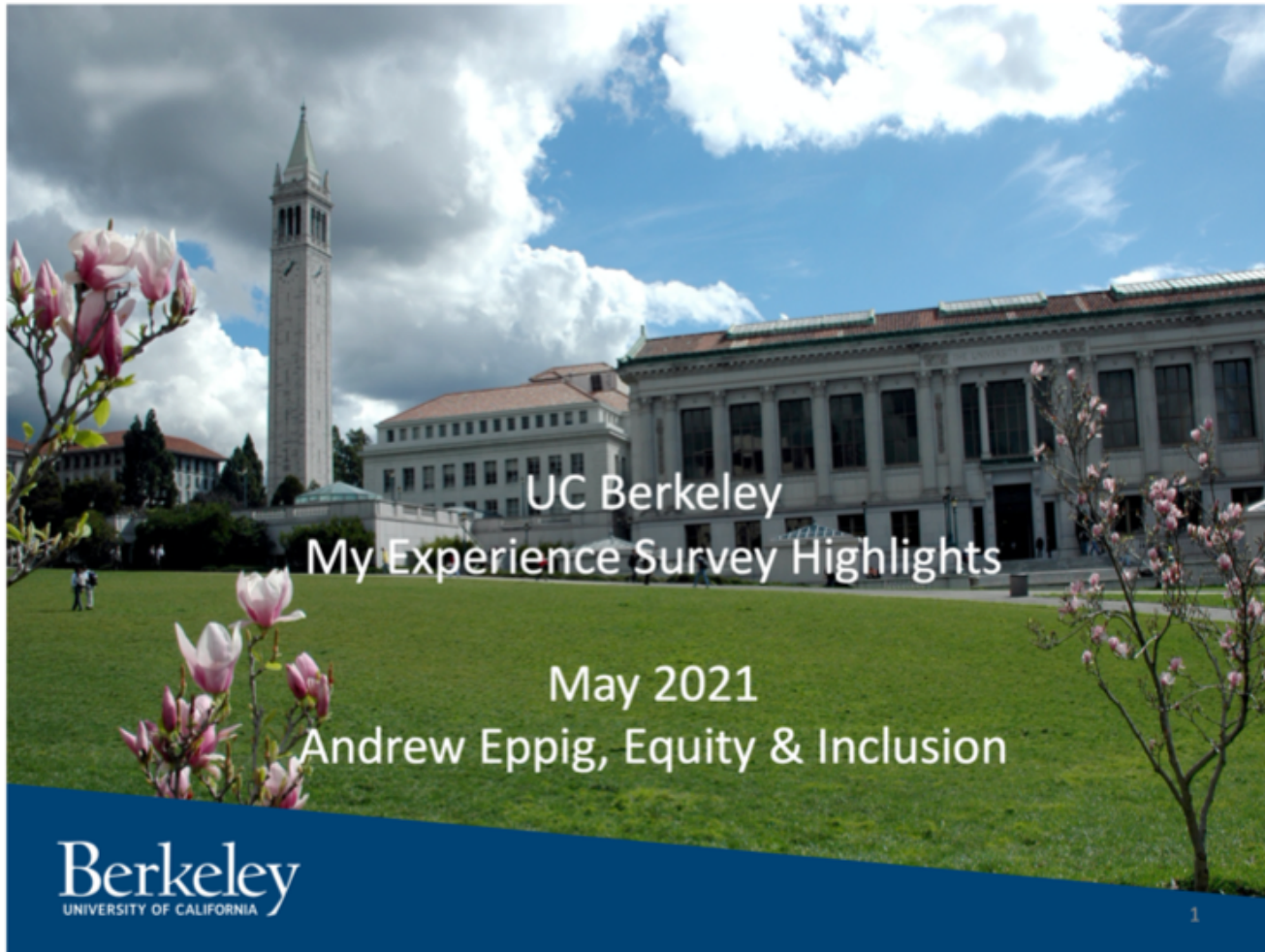butions are devalued and discounted: For example, novel contributions by gender and racial minorities are taken up by other scholars at lower rates than novel contributions by gender and racial majorities, and equally impactful contributions of gender and racial minorities are less likely to result in successful scientific careers than for majority groups. These results suggest there may be unwarranted reproduction of stratification in academic careers that discounts diversity's role in innovation and partly explains the underrepresentation of some groups in academia.

other scholars, how "distal" those linkages are (14), and the subsequent returns they have to scientific careers. Our analyses use observations spanning three decades, all scientific disciplines, and all US doctorate-awarding institutions. Through them we are able 1) to compare minority scholars' rates of scientific novelty vis-à-vis majority scholars and then ascertain whether and why their novel conceptualizations 2) are taken up by others and, in turn, 3) facilitate a successful research career.

Innovation as Novelty and Impactful Novelty in Text

Our dataset stems from ProQuest dissertations (20), which includes records of nearly all US PhD theses and their metadata from 1977 to 2015: student names, advisors, institutions, thesis titles, abstracts, disciplines, etc. These structural and semantic footprints enable us to consider students' rates of innovation at the very onset of their scholarly careers and their academic trajectory afterward, i.e., their earliest conceptual innovations and how they correspond to successful academic careers (21). We link these data with several data sources to arrive at a near-complete ecology of US PhD students and their career trajectories. Specifically, we link ProQuest dissertations to the US

11

PNAS (2020)

So how is our climate at UC Berkeley?

UC Berkeley
My Experience Survey Highlights

May 2021
Andrew Eppig, Equity & Inclusion

Berkeley
UNIVERSITY OF CALIFORNIA

A Few Strengths

- Almost all respondents (97%) agreed that diversity, equity, and inclusion were important values to uphold.
- A substantial majority (87%) reported that diversity, equity, and inclusion are values promoted at Berkeley.
- More than four out of five (82%) of respondents were comfortable with the climate.

- Most students rate their academic experiences positively
    - Roughly nine in ten (92%) undergraduates felt they were treated with respect in their department
    - Roughly nine in ten (91%) graduate students felt valued by other students in the classroom
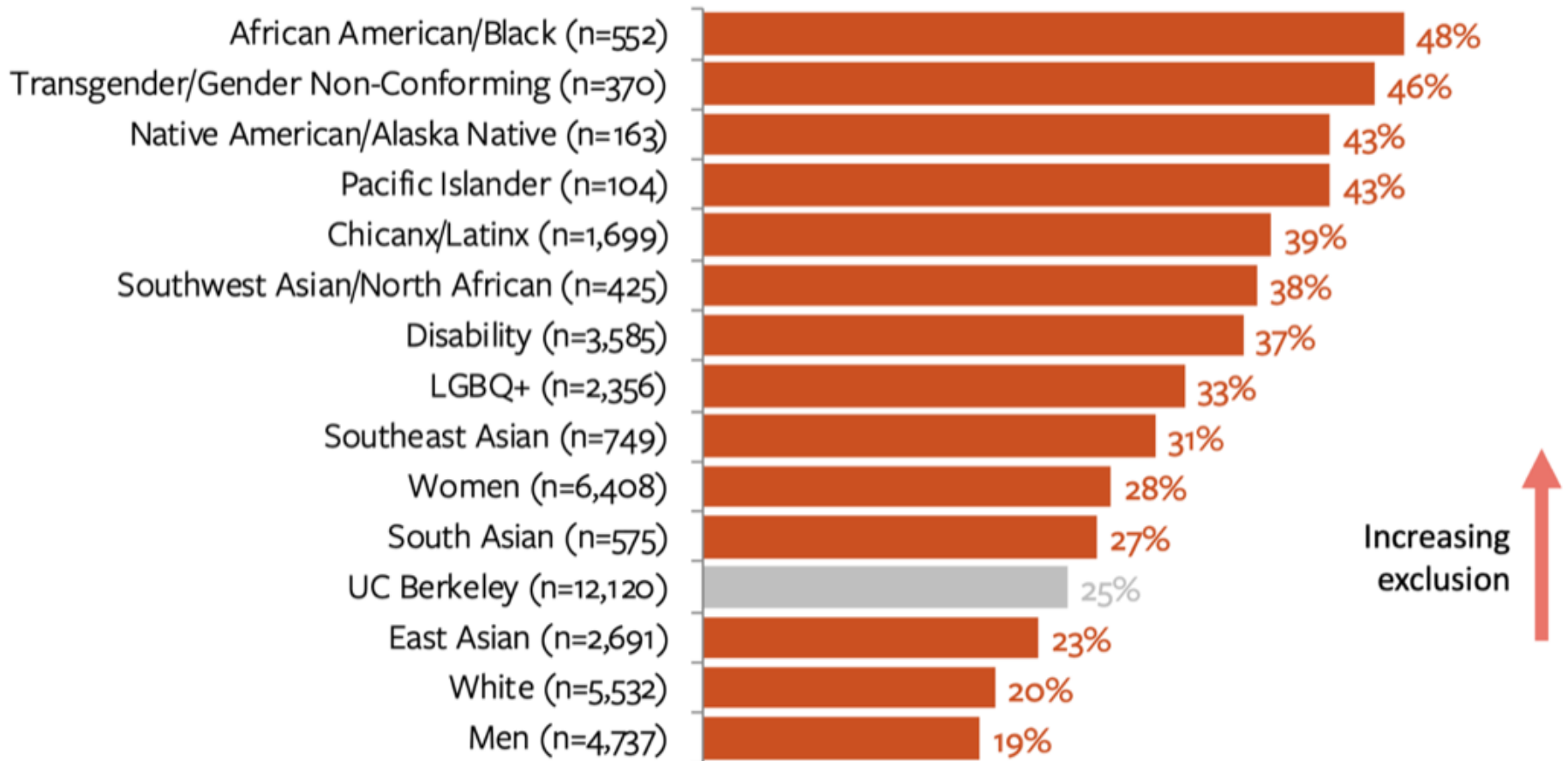
A Consistent and Persistent Story

Groups that are **marginalized** and underrepresented in the broader society **experience worse campus climate** than dominant or majority groups at UC Berkeley. Climate **worsens at the intersections** of these most impacted groups.

- African American
- Transgender/GNC
- Native Am./ Alaska Native
- Pacific Islander
- Chicanx/Latinx
- Disability
- LGBQ+

- Southwest Asian/ North African (SWANA)
- Muslim
- Low SES Growing Up
- Neither Parent has 4-Year Degree
- Southeast Asian
- Women

Patterns of negative climate are **cross-cutting across populations** -- affecting students, faculty and staff alike -- and **across climate areas** -- including lack of belonging, basic needs insecurities, worse mental health, lack of opportunities, and less trust of campus leadership, police, and faculty.

Experiences with Exclusionary Behavior

Percent experiencing at least one exclusionary behavior within the past year regularly (Very Often, Often, or Somewhat Often)

Group	Percent
African American/Black (n=552)	48%
Transgender/Gender Non-Conforming (n=370)	46%
Native American/Alaska Native (n=163)	43%
Pacific Islander (n=104)	43%
Chicanx/Latinx (n=1,699)	39%
Southwest Asian/North African (n=425)	38%
Disability (n=3,585)	37%
LGBQ+ (n=2,356)	33%
Southeast Asian (n=749)	31%
Women (n=6,408)	28%
South Asian (n=575)	27%
UC Berkeley (n=12,120)	25%
East Asian (n=2,691)	23%
White (n=5,532)	20%
Men (n=4,737)	19%

Increasing exclusion
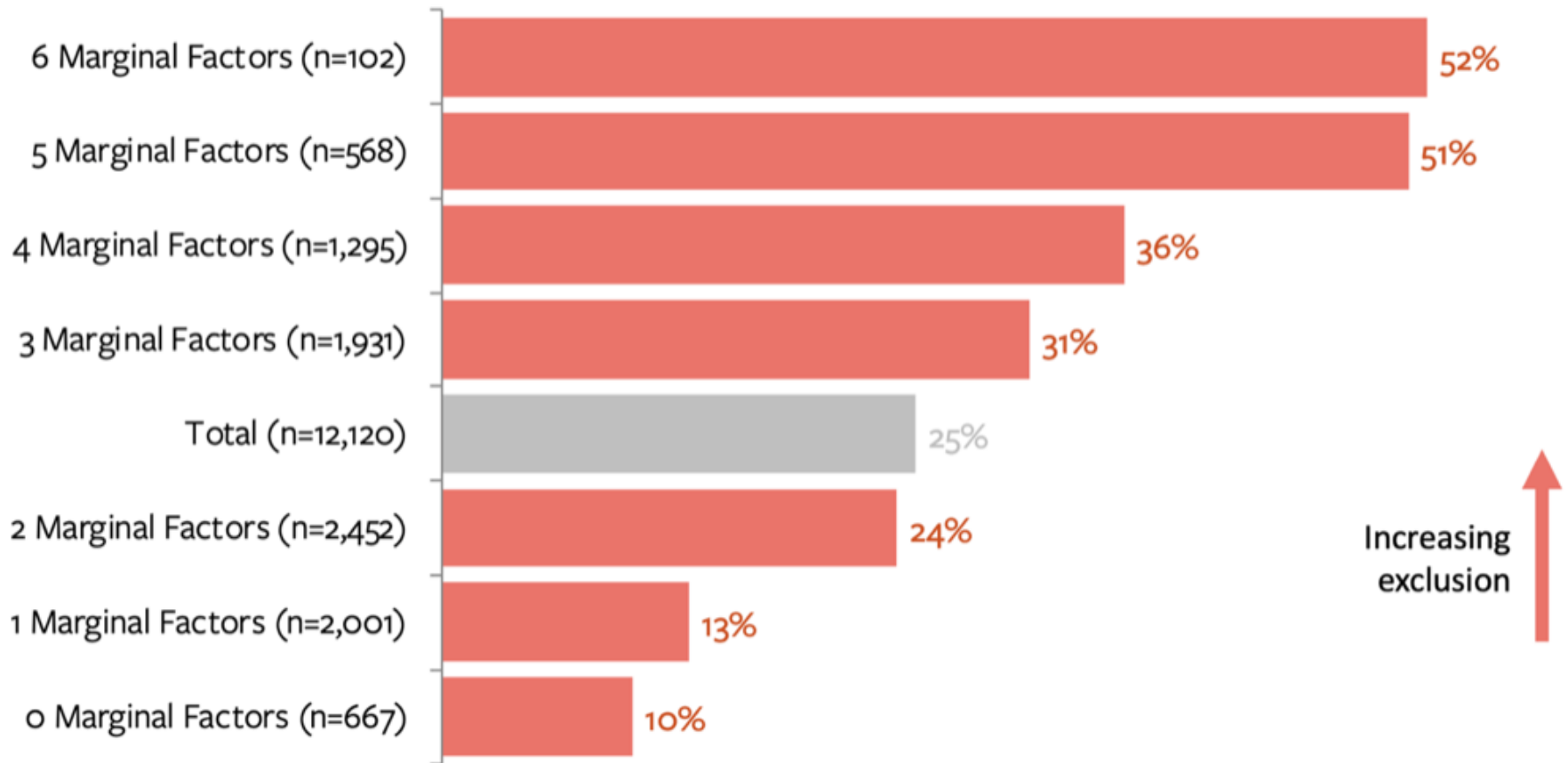
Experiences with Exclusionary Behavior

Percent campus reporting experiencing at least one exclusionary behavior within the past year regularly (Very Often, Often, or Somewhat Often)

Category	Percent
6 Marginal Factors (n=102)	52%
5 Marginal Factors (n=568)	51%
4 Marginal Factors (n=1,295)	36%
3 Marginal Factors (n=1,931)	31%
Total (n=12,120)	25%
2 Marginal Factors (n=2,452)	24%
1 Marginal Factors (n=2,001)	13%
0 Marginal Factors (n=667)	10%

Increasing exclusion

''Marginal Factors'' = gender, race/ethnicity, sexual orientation, disability, parental education, socioeconomic status growing up

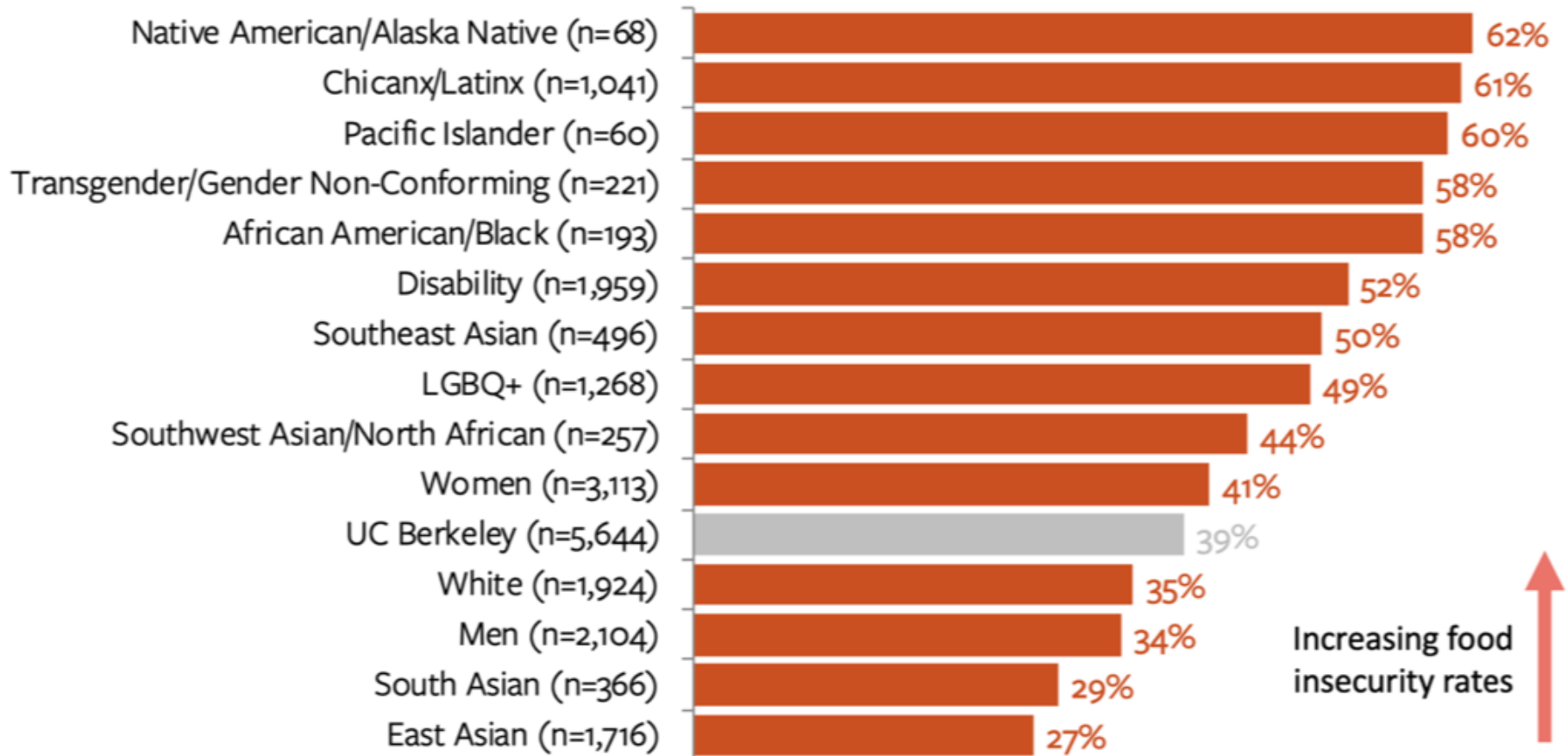# Sources and Locations of Exclusion

Source	Undergrads	Grad Students	Postdocs	Faculty	Academic Employees	Staff
Student	56%	52%	13%	25%	32%	16%
Faculty member	8%	32%	13%	64%	35%	20%
Co-worker	4%	23%	46%	26%	28%	40%
Administrator	8%	11%	0%	32%	35%	26%
Staff member	6%	11%	8%	16%	19%	35%
Faculty advisor	3%	13%	17%	1%	1%	1%

Location	Undergrads	Grad Students	Postdocs	Faculty	Academic Employees	Staff
UC Berkeley worksite	39%	31%	25%	16%	26%	19%
Public space	38%	28%	21%	22%	28%	20%
Group meeting	16%	26%	25%	51%	34%	31%
Class/lab/clinic	21%	39%	46%	12%	22%	4%
UC Berkeley office	4%	13%	8%	36%	24%	45%
Staff office	3%	4%	0%	6%	15%	39%

Food Insecurity – Undergrads

Percent of undergraduates who are food insecure (Low or Very Low food security)

Category	Percent
Native American/Alaska Native (n=68)	62%
Chicanx/Latinx (n=1,041)	61%
Pacific Islander (n=60)	60%
Transgender/Gender Non-Conforming (n=221)	58%
African American/Black (n=193)	58%
Disability (n=1,959)	52%
Southeast Asian (n=496)	50%
LGBQ+ (n=1,268)	49%
Southwest Asian/North African (n=257)	44%
Women (n=3,113)	41%
UC Berkeley (n=5,644)	39%
White (n=1,924)	35%
Men (n=2,104)	34%
South Asian (n=366)	29%
East Asian (n=1,716)	27%

Increasing food insecurity rates

Source: My Experience Survey, 2019

Food Insecurity – Grad Students

Percent of grad students who are food insecure (Low or Very Low food security)

Group	Percent
Native American/Alaska Native (n=24)	52%
African American/Black (n=90)	44%
Transgender/Gender Non-Conforming (n=74)	41%
Chicanx/Latinx (n=248)	37%
Disability (n=573)	35%
LGBQ+ (n=465)	32%
South Asian (n=127)	26%
UC Berkeley (n=2,311)	24%
Women (n=1,000)	24%
Men (n=1,061)	23%
Southeast Asian (n=63)	23%
White (n=1,114)	22%
Southwest Asian/North African (n=83)	22%
East Asian (n=516)	19%

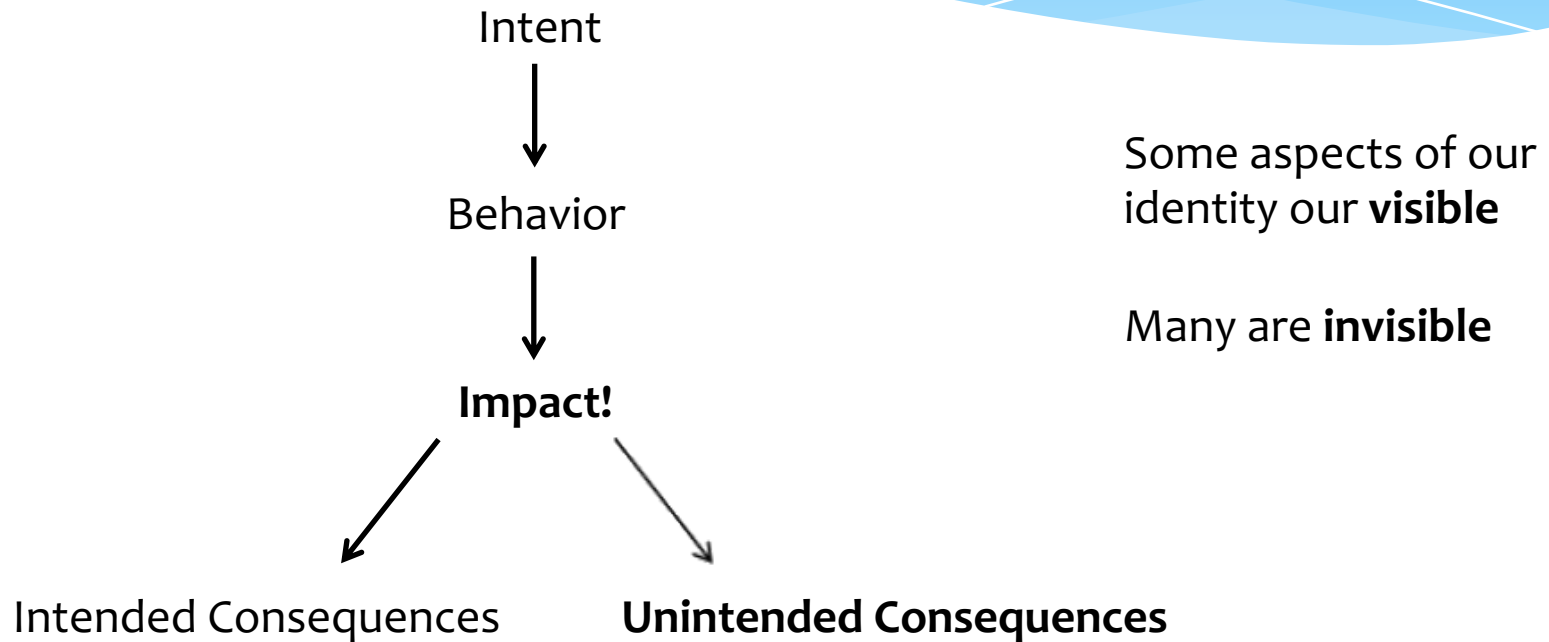Increasing food insecurity rates

Source: My Experience Survey, 2019

What does this mean for CEE?

* My Experience survey results were similar for College of Engineering and CEE
* We still have a lot of work to do
* We can all contribute to increasing belonging

* Resources on Creating Inclusive Learning Environments:
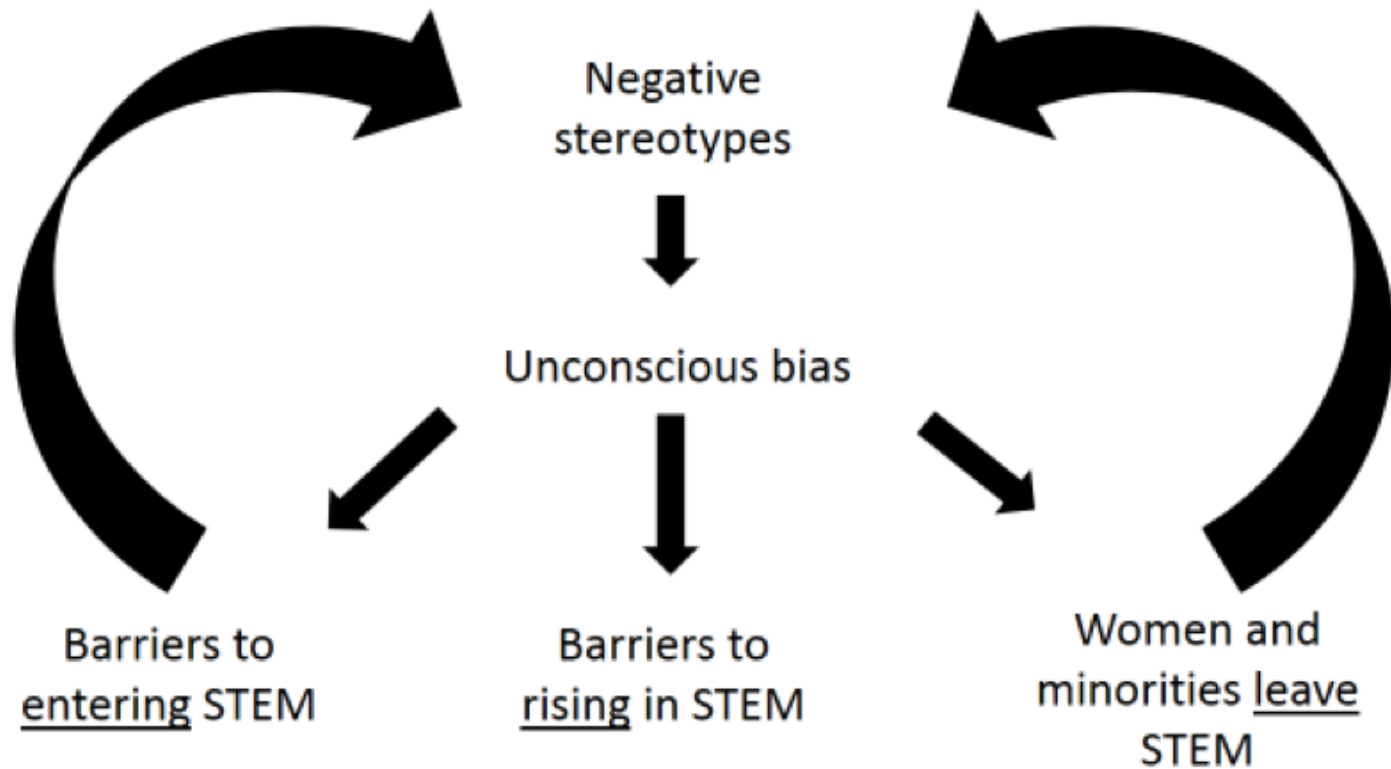   * ReNUWIt Inclusive Excellence Initiative
    * COE EMPOWER workshops

Be aware of intent vs. impact

Intent

↓

Behavior

↓

Impact!

Intended Consequences   **Unintended Consequences**

Some aspects of our identity our **visible**

Many are **invisible**

What is implicit/unconscious bias?

* Implicit biases are prejudices we have, but are unaware of. They are 'Mental shortcuts' or "schemas" based on social norms and stereotypes.

* EVERYONE has them

* It's not your fault

* You CAN do something about it

Implicit/unconscious bias leads to negative stereotypes

Image from Unconscious Bias Project; http://unconsciousbiasproject.org. Also credit to finn schneider, Cat Adams, Shaila Kotadia

Negative stereotype example

THE GENDER GAP IN SELF-PROMOTION[*]

CHRISTINE L. EXLEY AND JUDD B. KESSLER

We run a series of experiments involving over 4,000 online participants and over 10,000 school-aged youth. When individuals are asked to subjectively describe their performance on a male-typed task relating to math and science, we find a large gender gap in self-evaluations. This gap arises when self-evaluations are provided to potential employers, and thus measure self-promotion, and when self-evaluations are not driven by incentives to promote. The gender gap in self-evaluations proves to be persistent and arises as early as the sixth grade. No gender gap arises if individuals are asked about their performance on a more female-typed task. *JEL Codes:* C91, D91.

Given same level of ability in math and science, starting as early as 6th grade, women more likely to assess themselves at lower level.

The Quarterly Journal of Economics (2022)

NYT Series on "Who, Me, Biased?"

- Sent email to 2,500 professors at 260 univ.

- Asked for a meeting to learn more about PhD program

- Varied name to indicate gender and race

- White males far more likely to receive response

https://www.nytimes.com/video/us/100000004818668/check-our-bias-to-wreck-our-bias.html
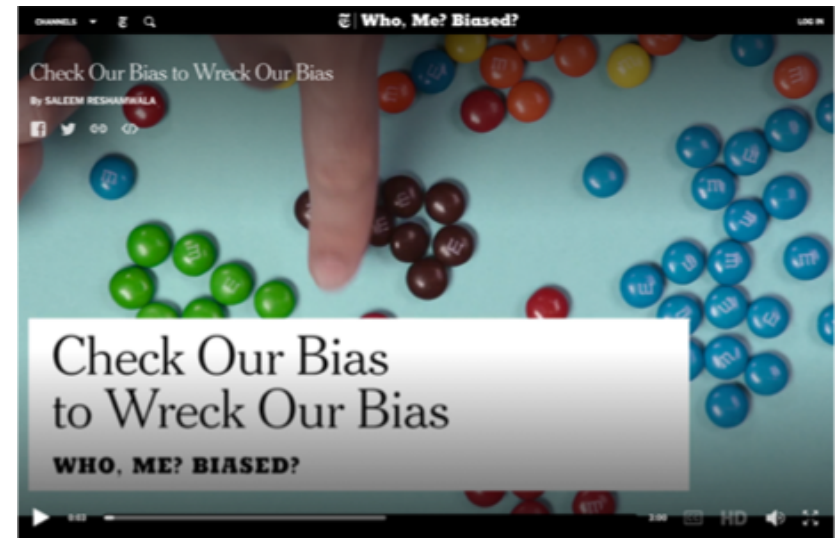
Gender and Race Bias: Evaluation of CVs

- 251 professors (physics and biology) at eight large public US universities

- Each evaluated 8 CVs for postdoctoral positions

- Name changed to convey gender and race

* Indicates statistically different from either male (top) or white (bottom)

Eaton, A.A., J.F. Saunders, R.K. Jacobson, and K. West. "How Gender and Race Stereotypes Impact the Advancement of Scholars in STEM: Professors' Biased Evaluations of Physics and Biology Post-Doctoral Candidates." *Sex Roles*, June 3, 2019. https://doi.org/10.1007/s11199-019-01052-w.
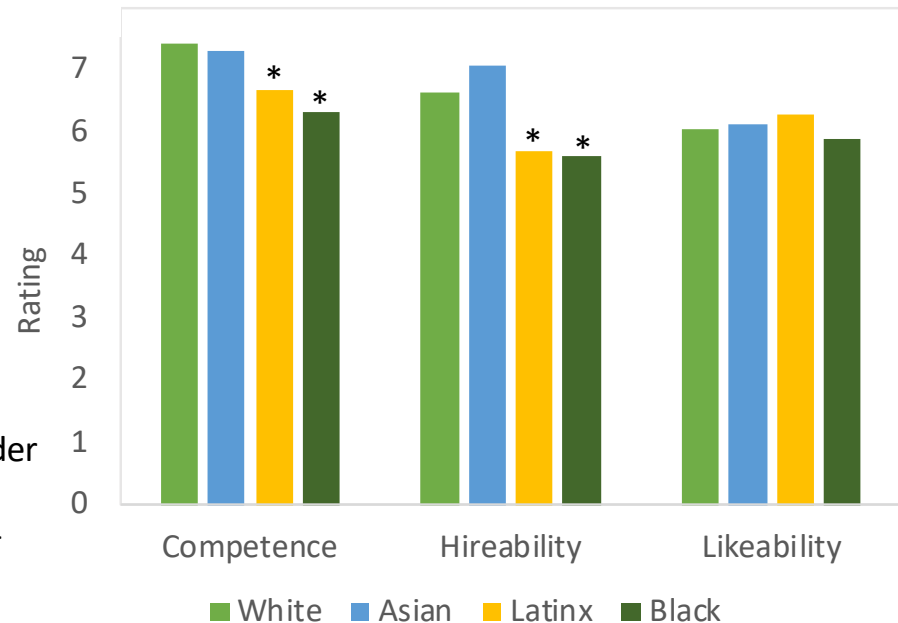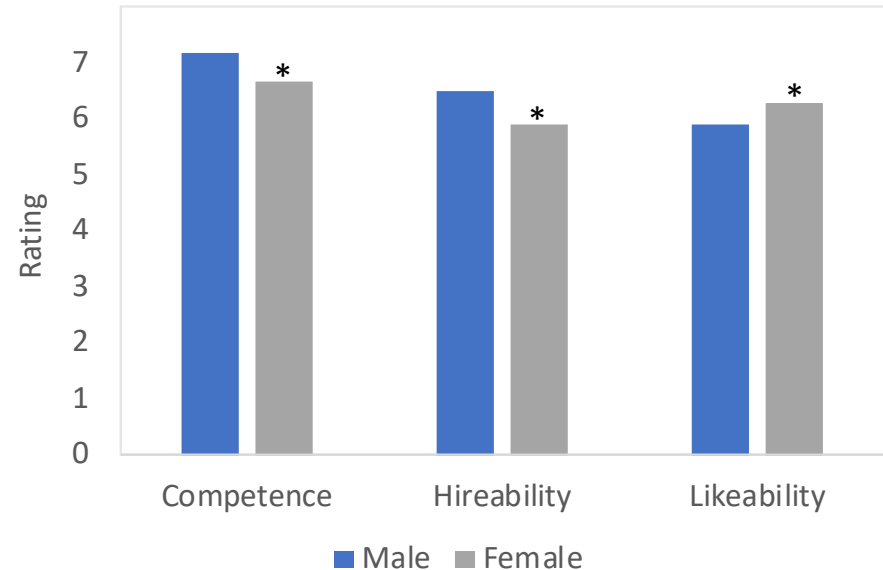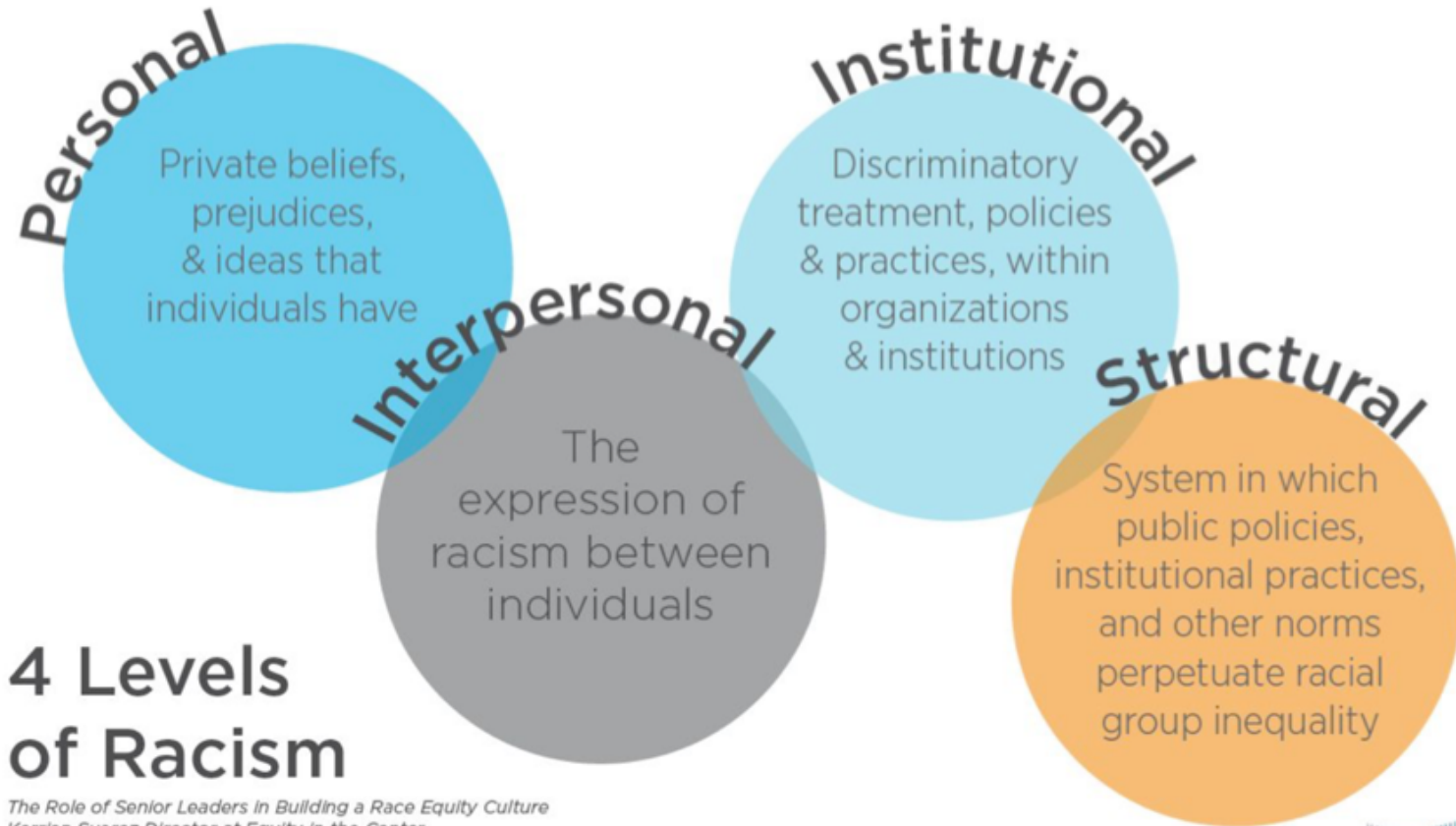
Overcoming Implicit Bias

* Raise awareness

* Slow down: Allow time to overcome snap judgments and stereotypes

* For incidents: Use bystander intervention

* In evaluations: Be systematic and consistent when developing and applying criteria
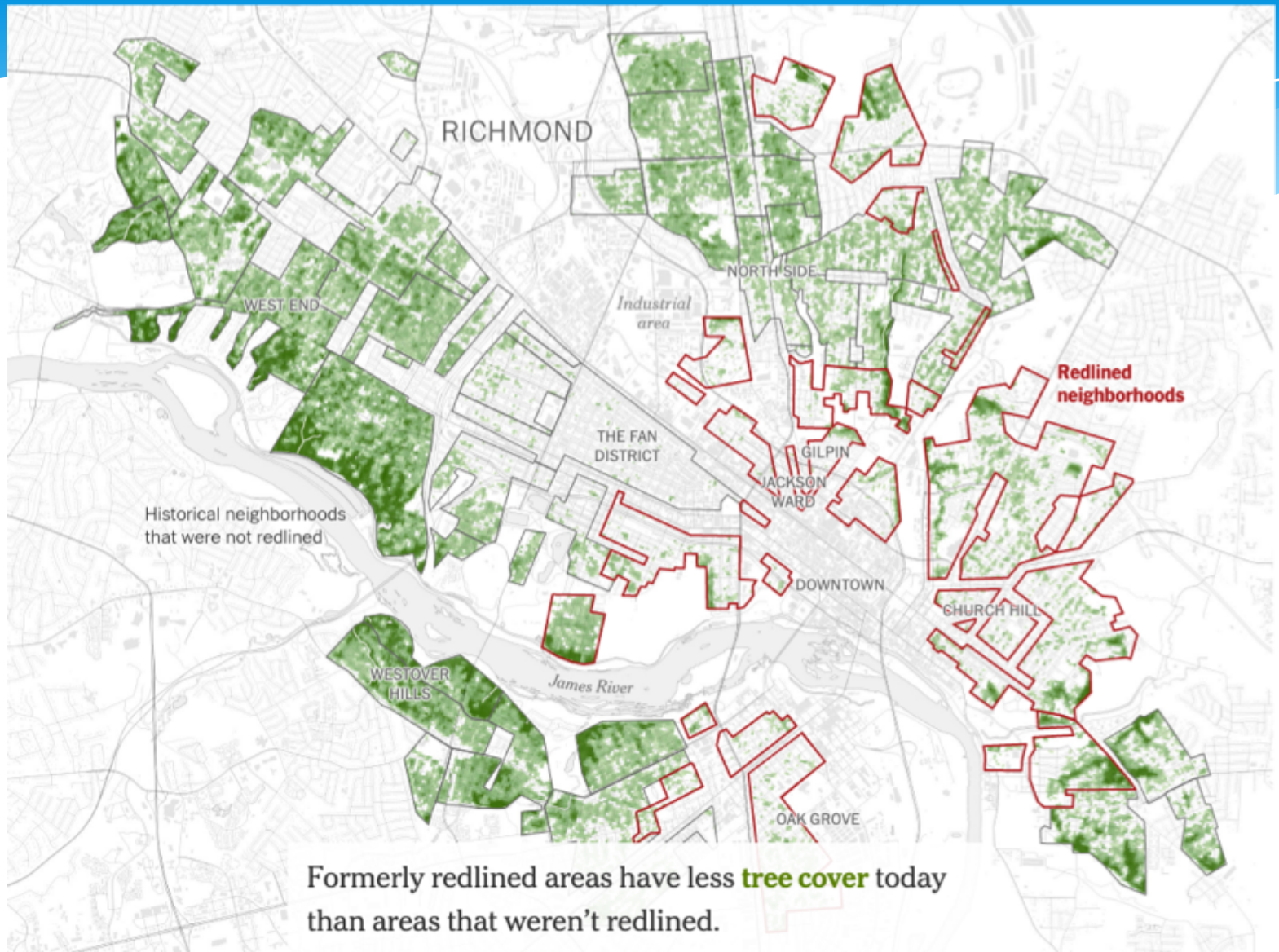
Dimensions of Racism

Personal — Private beliefs, prejudices, & ideas that individuals have

Institutional — Discriminatory treatment, policies & practices, within organizations & institutions

Interpersonal — The expression of racism between individuals

Structural — System in which public policies, institutional practices, and other norms perpetuate racial group inequality

4 Levels of Racism

The Role of Senior Leaders in Building a Race Equity Culture
Kerrien Suarez Director at Equity in the Center

The Bridgespan Group

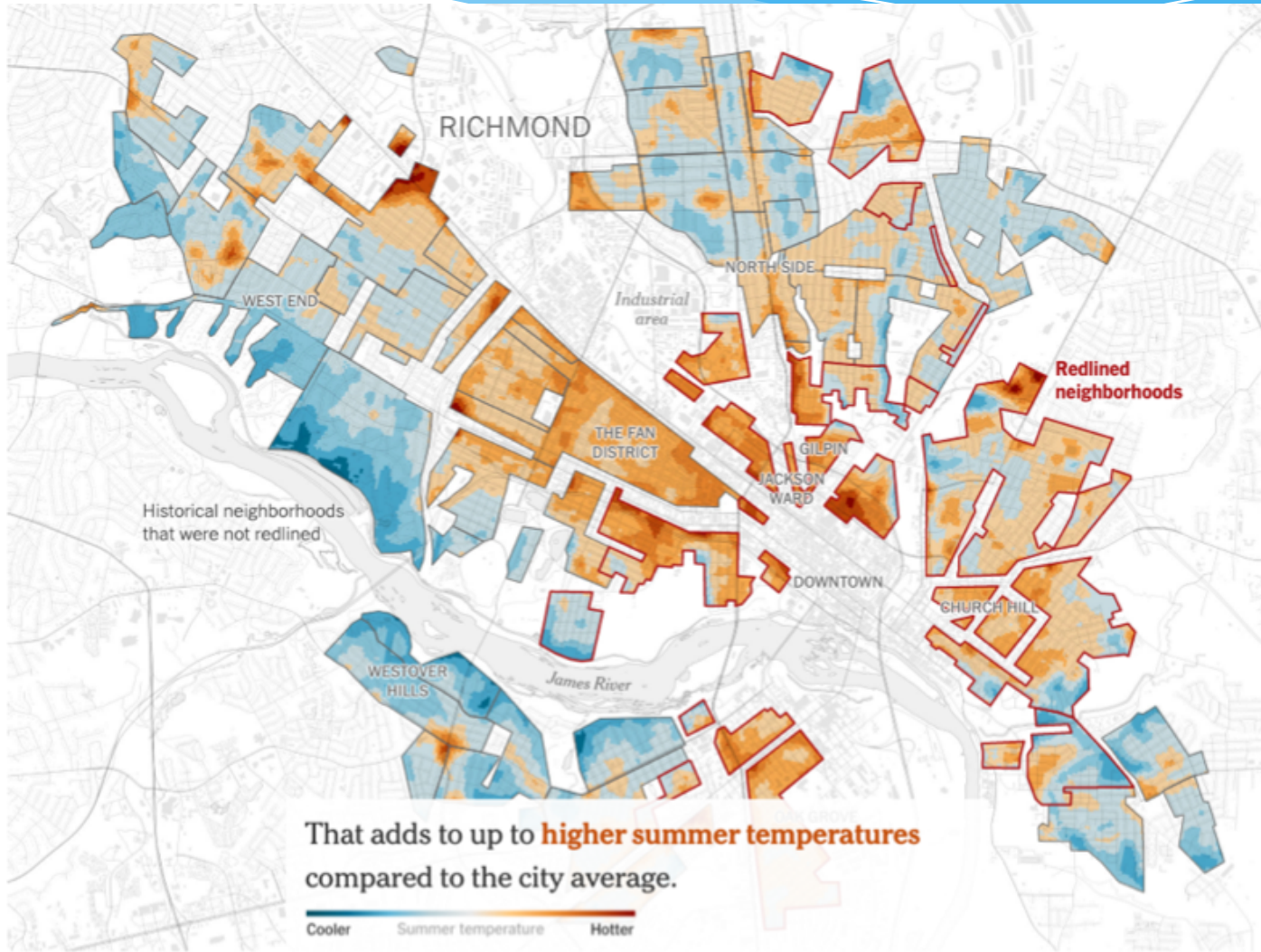Courtesy of UCB Becoming and Anti-Racist Campus Steering Committee

The New York Times

How Decades of Racist Housing Policy Left Neighborhoods Sweltering

By Brad Plumer and Nadja Popovich

Photographs by Brian Palmer   Aug. 24, 2020

RICHMOND

NORTH SIDE

WEST END

Industrial area

Redlined neighborhoods

THE FAN DISTRICT

GILPIN

JACKSON WARD

Historical neighborhoods that were not redlined

DOWNTOWN

CHURCH HILL

WESTOVER HILLS

James River

OAK GROVE

Formerly redlined areas have less **tree cover** today than areas that weren't redlined.

0%   Percentage tree cover   100%

https://nyti.ms/2QiQ8lt

That adds to up to **higher summer temperatures** compared to the city average.

Anti-Racism

Anti-racism: Actively doing something to address racial inequality.

* Personal
* Interpersonal
* Institutional
* Structural

Leading scholar: Prof. Ibrahm X Kendi, https://www.ibramxkendi.com/

Justice

"None of us is free until all of us are free"

DEIB in CEE

* ## CEE DEIB Committee
  * 1 undergraduate
  * 3 graduate students

  * 2 staff/postdoc

  * 4 faculty

    Committee)

    Committee)

Srishti Hazra	Junior
Aqshems Nichols	TE MS/PhD
Daniel Ocasio	ENV MS/PhD
Jinyan Zhao	SEMM MS/PhD
Rose Kantor	Research Staff, former PostDoc
Pam Ong	Academic Staff/Personnel
Tina Chow	ENV (Vice Chair of Grad Studies)
Matt DeJong	SEMM (Grad Studies
Susan Shaheen	TE/ECIC (Undergrad Studies
Joan Walker	TE/SYS/ECIC (Vice Chair of DEIB)

* E&I representative on all faculty search committees
* Student associations: CEEFAR, LAGSES, BGESS, GWE, SWE, HES, BESSA

Getting involved

* Attend CEE DEIB events – check!
  * This year CEE held two movie screenings (Picture a Scientist & Coded Bias), a Mindfulness workshop, and this special seminar. Keep an eye out for more events.
* Fill out the Climate Survey coming mid-April and encourage others to.
* Connect with the members of the CEE DEIB committee with your ideas and/or concerns, including Vice Chair for DEIB Joan Walker (JoanWalker@Berkeley.Edu)
* Engage with student affinity groups, including CEEFAR (Rebecca Sugrue rasugrue@berkeley.edu, Jeannie Wilkening jvwilkening@ berkeley.edu)
* Check out learning and volunteer opportunities at
  * UCB website: diversity.berkeley.edu
  * UCB COE website: https://engineering.berkeley.edu/about/equity-and-inclusion/
  * COE Equity and Inclusion Strategic Plan