

## Using Social Psychology to Lift Achievement and Reduce Inequality in the Classroom

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Columbia University

## Broadening participation?



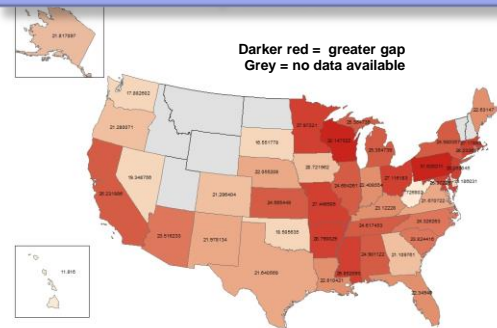
More effective tools for assessing  
change....

Smart people in key places....

## Take Home Message

- For people who are members of diverse groups, hidden and overt bias can cause added stress (stress not faced by others) that can undermine performance, motivation, and health.
- Broadening participation in STEM and beyond requires altering the psychological climate to reduce this stress.

## Racial Achievement Gap (Reading, 8<sup>th</sup> Grade) by State, 2011



(National Assessment of Educational Progress, 2012)

## Project ACHIEVE

Field-based research interventions designed by social psychologists to reduce racial and gender opportunity gaps in academic performance.

- Partnering with educators to apply social psychology theories of identity to education.
- Longitudinal-experimental interventions in middle schools, high schools and colleges.

NSF ADVANCE #0723909, 154685 (Closing achievement gap: A social psychological intervention)

NSF RAPID# 0918075 Testing the effects of the inauguration of the first African American President on the affirmation process

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## STEREOTYPE THREAT

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Are there two people in the room who share the same birthday?

## Stereotype Threat



**The threat of being viewed through the lens of a negative stereotype or the fear of doing something that would inadvertently confirm that stereotype.**

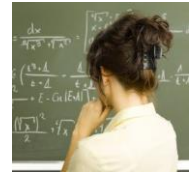
Members of diverse groups can be wary of situations in which their behavior can confirm that their GROUP lacks a valued ability. This extra pressure caused by the concern of reinforcing stereotypes can interfere with performance.

(C.M. Steele & Aronson, 1995)

## Women in the Math and Sciences

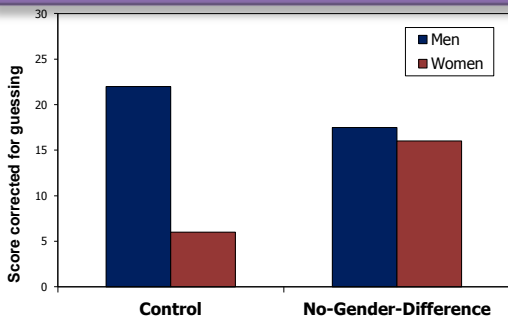
Female and male college students who care about math take a difficult math test (Sample Math GRE).

Test instructions say "no- gender-differences" OR standard test instructions.



(Steele, Quinn, & Spencer, 1997)

## Women in the Math and Sciences



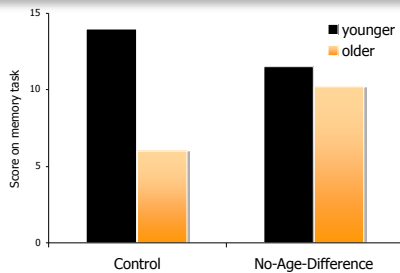
(Spencer, Steele, & Quinn, 1999)

## Stereotype Threat

Other research on stereotype threat (2,500+ studies):

- African Americans, Latinos, Native Americans
- Women and math, science, logic tests
- Older women and driving performance
- White males and math performance
- White males and athletic performance
- Older individuals and memory performance
- Economically disadvantaged and intelligence tests (France)
- Gay males and play behaviors with young children
- First generation college students

## Older adults and memory



(Levy, Slade, Kunkel & Kasl, 2002)

## Stereotype threat in the real world

**Performance:** (Dananhar & Crandall; Massey & Fischer, 2005; Reardon, Atteberry, Arshan, & Kurlander, 2009; Walton & Spencer, 2009)

**Leadership:** (Schmader et al., under review)

**Health:** (Cook, Purdie-Vaughns, et al., under review; Logel & Cohen, 2012)

## Stereotype Threat

"I am a woman in STEM. I don't feel like my performance is any lower through the stereotype of being female. I DO sometimes feel out of place in other courses like poetry, or history...with everyone in the class having a similar major and no one in the class besides me in math, bio, physics. Realizing that kinda' freaked me out and thinking about now I do avoid talking to those professors like I would talk to my physics professor."

(college student)

II. Hidden Stress

## Stereotype Threat

*"I knew I was just as intelligent as everyone else . . . . For some reason I didn't score well on tests. Maybe I was just nervous. There's a lot of pressure on you, knowing that if you fail, you fail your race."*

Rodney Ellis, State Senator (Texas)



**Stereotype threat stems from historic and contemporary threat systemic in school structures.**



"...Innate differences between men and women might be one reason fewer women succeed in science and math careers."



## Classroom Environments

Stereotypical room



Cheryan, Plaut, Davies & Steele, 2009

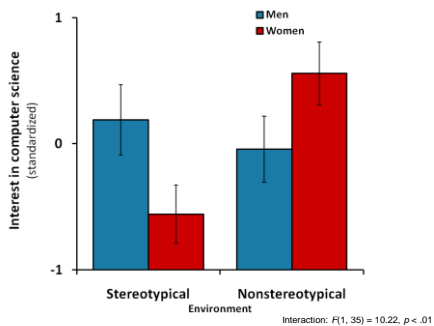
## Classroom Environments

Non-stereotypical room



Cheryan, Plaut, Davies & Steele, 2009

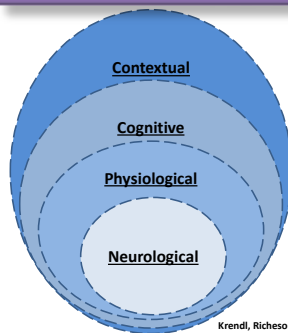
## Environment influences women's interest in CS



Cheryan, Plaut, Davies & Steele, 2009

**Stereotype threat applies is a multi-level phenomenon.**

## Beyond Performance: A Multilevel Phenomenon



- Low recruitment of areas associated with learning (inf. PFC, left inf. parietal cort., bilateral angular gyrus), over recruitment of areas associated with self-regulation of emotions (ventral anterior cingulate cort)
- Increased arousal (cortisol), higher cardiovascular reactivity, heightened immune system response (TNF $\alpha$ )
- Impaired executive functioning, working memory
- Decreased trust/belonging, perceived threat

Krendl, Richeson, Kelley, & Heatherton, 2008; Schmader & Johns, 2003; Schmader, Johns, & Forbes, 2008; Blascovich, Spencer, Quinn, & Steele, 2001;

## First Steps to Reduce Stereotype Threat

- Mindfulness related to the student's subject position.
- Direct engagement with instructors, mentors, administrators to minimize negative stereotypes.
- Credible messages and subtle signals that reassure under-represented students that they belong improve performance.
  - Messages of high standards and assurances they can meet those standards
  - Opportunities to shore up sense of belonging
  - Opportunities to affirm sense of self
  - Personalization of information
  - Early and immediate feedback in courses

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## THE SCIENCE OF BROADENING PARTICIPATION

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## MINDSET INTERVENTIONS

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### You Can Grow Your Brain

*New Research Shows the Brain Can Be Developed Like a Muscle*  
By: Lisa S. Blackwell and David S. Yeager

Many people think of the brain as a mystery. We don't often think about what intelligence is or how it works. And when you do think about what intelligence is, you might think that a person is born either smart, average, or dumb—either a "math person" or not—and stays that way for life.

But new research shows that the brain is more like a muscle—it changes and gets stronger when you use it. Scientists have been able to show just how the brain grows and gets stronger when you learn.

Everyone knows that when you lift weights, your muscles get bigger and you get stronger. A person who can't lift 20 pounds when they start exercising can get strong enough to lift 100 pounds after working out for a long time. That's because muscles become larger and stronger with exercise. And when you stop exercising, the muscles shrink and you get weaker. That's why people say "Use it or lose it!"

But most people don't know that when they practice and learn new things, parts of their brain change and get larger, a lot like the muscles do. This is true even for adults. So it's not true that some people are stuck being "not smart" or "not math people." You can improve your abilities a lot, as long as you practice and use good strategies.



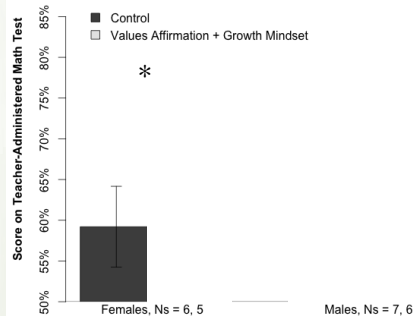
Inside the outside layer of the brain—called the cortex—are billions of tiny nerve cells, called neurons. The nerve cells have branches

Student mindsets undermine motivation

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### Valencia College, Beginning Algebra

Score on Teacher-Administered Math Test



Student mindsets undermine motivation

### Interviews With Treatment Group: "What did you learn from the exercise?"

- "As soon as I leave class, I go to the lab. When I leave the lab I go home and do more work. Even in the car, I am studying. Just doing work, doing work, doing work. All day long I am studying ... and that was helping me fail my tests.

After I read that article it clicked for me. I changed my study habits. Instead of just doing work throughout all my other activities, I started studying for shorter periods of time. And actually studying, not just working the same problems over again. I tried that for the test and I did so much better!"

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## WISE-FEEDBACK INTERVENTIONS

(Yeager, Purdie-Vaughns, Cohen, & Garcia, 2013)

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## “Wise” Interventions

**How can you be critical of a student's behavior without undermining the motivation and self-confidence needed to improve?**

**Today's proposal:** Providing unambiguous clear feedback of high expectations and assurance that student can reach those expectations. This reassures them that their identity will not be a barrier to success.

## “Wise” Interventions

- Convey to stereotyped individuals that they are seen in their “full humanity” and not through the lens of a stereotype. (Goffman, 1963; Cohen & Steele, 2002)

(Goffman, 1963; Cohen & Steele, 2002)

## “Wise” Interventions: Laboratory study with college students.

- Unbuffered criticism**
- “Unwise”: Criticism + positive buffer:**
  - Overall, nice job. Your enthusiasm for your teacher really shows through, ... You have some interesting ideas in your letter and make some good points. ... I've provided .... suggested several areas that could be improved.
- “Wise”: Criticism + high standards + Assurance:**
  - Judged by a higher standard, the one that really counts, that is, whether your letter will be publishable in our journal, I have serious reservations. The comments I provide in the following pages are quite critical but I hope helpful. Remember, I wouldn't go to the trouble of giving you this feedback if I didn't think, based on what I've read in your letter, that you are capable of meeting the higher standard I mentioned.

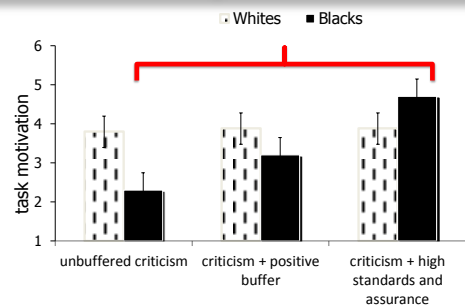
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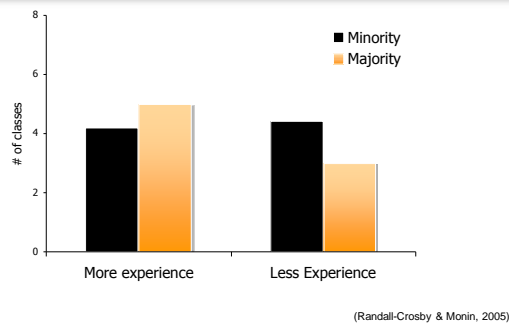
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## “Wise” Interventions: Laboratory study with college students.



(Cohen, Steele, & Ross, 1999)

### Under-represented students and accurate feedback



### First Steps to Reduce Stereotype Threat

- When instituting high standards communicate that student is not seen stereotypically (e.g., "I believe in your ability to succeed and meet a higher standard").
- Encourage personal responsibility for providing accurate feedback to students from under-represented groups.

### BELONGING INTERVENTIONS

### Belonging interventions...

**Negative stereotypes and underrepresentation can lead students to be uncertain about whether they belong and fit in, which can affect performance.**

**Today's proposal:** Make the implications of belonging for them (and their group) less identity-based, less personal, and thus less distressing.

### Belonging interventions...

1. Black and white freshmen create ostensible video messages for high school students (watched messages from college seniors too).

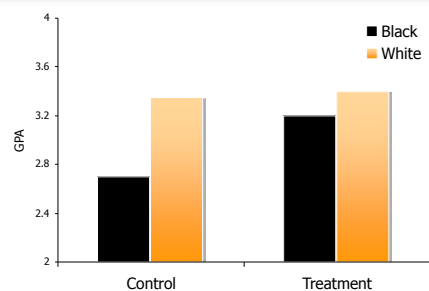
2. Video messages:

"My days in college are as follows.."

"College is difficult. I am struggling right now but all students struggle at first."  
"Over time, this will go away."

3. Measure grades: one week after intervention and end of semester (used SAT as covariate)

### Belonging interventions...



## VALUES-AFFIRMATION INTERVENTIONS

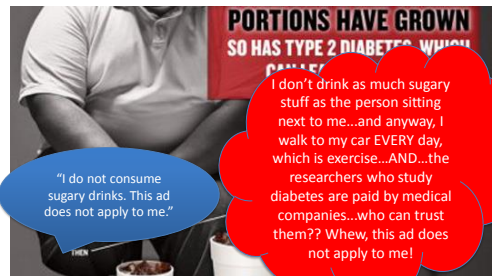
- Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009, *Science*;
- Cook, Purdie-Vaughns, Garcia, & Cohen, 2012, *Journal of Personality and Social Psychology*;
- Shnabel, Purdie-Vaughns, Cook, Garcia & Cohen, under revision, 2012, *Personality and Social Psychology Bulletin*;
- Purdie-Vaughns, Cohen, Garcia, Sumner, Cook, & Apfel, 2009, *Teacher's College Record*
- Cohen, Purdie-Vaughns, & Garcia, 2012, *Stereotype Threat: Theory, Process & Applications*

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## Reducing Stereotype Threat...

Knowing that psychological climates can impair performance, how can we reduce threat so students can achieve in the face of these climates?

**Today's proposal:** Reduce threat by affirming students' core sense of self "I am more valuable than this stressful moment."







For African American students, the academic environment, presents an ongoing cue that "my identity may be a problem" because of negative stereotypes about intellectual ability. This can undermine academic performance (Cohen, Garcia, Purdie-Vaughns, Apfel & Brzustoski, 2009).

## Values-affirmation reminds people of sources of their self-worth.

- Self-affirmation refers to thoughts or behaviors that bolster one's sense of self as competent, effective, and able to control important outcomes (Sherman & Cohen, 2006; Steele, 1988)
- Self-affirmation is not self-esteem!

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### [SELF Affirmation Condition]

WHA

*MUSIC AND ART ARE IMPORTANT TO ME ON A VERY PERSONAL LEVEL BECAUSE THEY ARE THE THINGS I USE TO KEEP MY HEAD ON STRAIGHT, VENT MY EMOTIONS AND FRUSTRATION, AND I AM RARELY WITHOUT THEM... AND I CANNOT IMAGINE WHAT A DIFFERENCE PERSON I WOULD BE w/out A CONSTANT SOUNDTRACK.*

(Black student – Music group value)

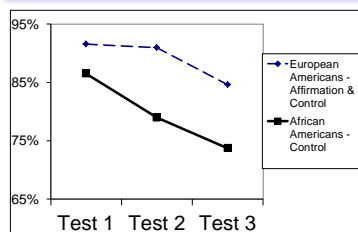
### [GROUP Affirmation Condition]

WHA

*There is ... a hierarchy in America, and-like it or not- my group isn't that high up.... You can say this is the most important group to me because I feel a duty & responsibility to it. I feel obligated to do my best to try to push this group up the ladder. There is no way of removing (even if I wanted to) myself from the group, so I feel commitment to it.*

(Black student – racial group value)

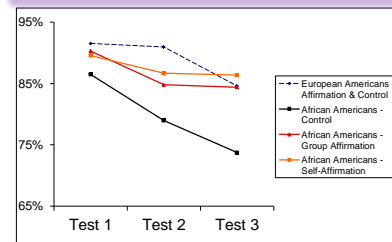
### Math accuracy by test



\*Accuracy = number of questions correct out of number attempted

(Purdie-Vaughns, Reddy, Garcia & Cohen, in p)

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## Operationalizing values-affirmation

- Structured writing exercises, integrated into physics courses. Developed in conjunction with faculty.
- Controlled and scripted procedures developed with help of faculty at each specific site.
- Administered at periods of high stress. Only treatment delivered 1 weeks after start of semester.
- Double-blind randomized field experiments.

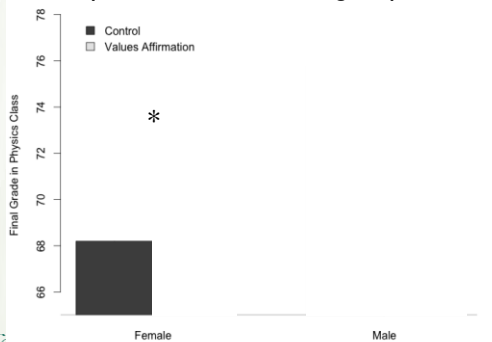
### [Affirmation Condition Worksheet:]

#### WHAT ARE YOUR PERSONAL VALUES?

The **most** important values to me are: (circle two or three)

Athletic Ability  
Being Good at Art  
Creativity  
Independence  
Living in the Moment  
Membership in A Social Group  
(such as your community, racial group, or school club)  
Music  
Politics  
Relationships with Friends or Family  
Religious Values  
Sense of Humor

### Miyake et al., *Science*, College Physics



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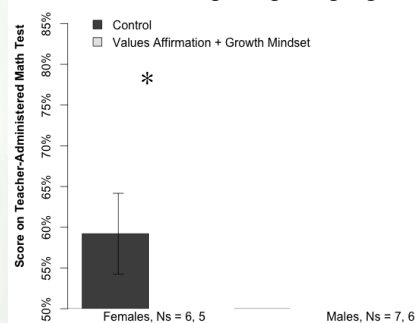


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## Concluding Remarks

- Importance of social psychological approach motivation and achievement
- Three social psychological interventions help lift achievement and promote equality in the classroom
- Combining social-psychological interventions with pedagogical and curricular interventions may yield greater benefits
- Understanding the effects of identity threat help explain when and why people from “all walks of life” perform below their potential

Thank you.

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 Society for the Psychol. Study of Social Issues

## Cognitive and Neural mechanisms

Threat Response	Biological Marker	Behavioral Outcome	References
<b>Physiological Arousal</b>	- <b>Skin conductance response (SCR)</b> - <b>Cardiac reactivity</b>	- Poor performance on hard tests - Better per. easy test	Blascovich, Spencer, Quinn, & Steele, 2001; Cassidy & Johnson, 2001
<b>Neurobiological (HPA-axis)</b>	<b>Cortisol</b> (hormone mobilizes energy in response to stress)	- Impairs working memory - Increased anxiety	[Dickerson, Cabble, et al., 2009; Dickerson, et al. 2004; (Belsky, Rydell), & McConnell, 2007; Schneider & Johns, 2003; Schneider, Johns, & Forbes, 2008]
<b>Neurobiological (immune system)</b>	<b>Proinflammatory cytokines (TNFα)</b> (mobilized to fight against biological threats)	Increased immune response from stress (sickness behavior = more sleep, prevention behaviors)	Schneider, Johns, & Forbes, 2008 (theory)
<b>Brain activation</b>	<i>Failure to increase acti. of inf. prefrontal cort., left inf. parietal cort., and bilateral angular gyrus but increased vent. anterior cingulate cort.</i>	- Low recruitment of areas associated with learning - Over recruit areas associated with self-regulation of emotions	Krendl, Richeson, Kelley, & Heatherton, 2008