

# Nurturing the Academic Intelligence of Children

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# The Minority-White Gap

## **Prison:**

**Blacks and Latinos vastly overrepresented**

## **College**

**Blacks 1/2 as likely to go; 2x as likely to drop out**

## **High School:**

**50% drop out rate; 2-4 year reading gap**

## **K-12**

**Lower standardized test scores and grades**

## **Birth-Preschool**

**Nearly equal ability test scores**

# Under-Performance of Women In Math & Science

**While outperforming men in all other areas of academia, women earn less than 25% of the degrees in Computer Science, Physics, and Engineering**

**College: women perform worse on standardized tests of mathematics but do well in their courses; far fewer choose math/ hard science majors**

**Middle School: Girls earn equally high grades but begin to lose confidence in math abilities; test score gap on standardized tests emerges**

**K-12: Girls Perform at or above the same level as boys on tests and in school; show less intrinsic interest in spatial tasks**

# Common Explanations for Group Differences

1. Lower innate intelligence

--*The Bell Curve*

--*Biological differences in math ability*

2. Poverty (lower skills and preparation)

3. Subculture that discourages academic success

“Acting White”

Larger Culture of Anti-intellectualism

# Larger Culture of Anti-Intellectualism



# Larger Culture of Anti-Intellectualism

**Recent polls indicate among Americans:**

- 20% Believe that the Sun revolves around Earth
- 20 % Cannot locate the U.S. on a World Map
- 80% believe the Government is hiding evidence of space Aliens

All of the traditional explanations fall short of explaining the gap, even when combined; something else must be involved...

# Part One: Intelligence is Fragile

Operational Definition: Intelligence = IQ  
Scores, Performance in School, Verbal  
Fluency, etc.



“Human intelligence is among the most fragile things in nature. It doesn’t take much to distract it, suppress it, or even annihilate it.”

--Neil Postman

# The Fragility of Intelligence

## Some social factors:

- Interpersonal Intimidation (being smarter, funnier, etc with some people)
- Threatened Belongingness (Baumeister, 2002)
- Stereotype Threat/ Identity threat (Steele & Aronson, 1995)

# Identity Threat

Apprehension arising from the awareness of a negative stereotype or personal reputation in a situation where the stereotype or identity is relevant, and thus confirmable

– everyone experiences this in some form

# Examples of Identity Threat

- Jewish person in the Bible Belt
- African American Taking an IQ test
- Woman called upon in math class

# Stereotype Threat: No Explicit Bigotry Required



# Stereotype Threat

## Anecdotal Evidence

“When I talk in class, I feel as though I’m totally on stage, like everyone’s thinking, ‘oh what’s the Black girl going to say?’ But I don’t speak up in class much anymore, so I guess it’s not a big deal.”

—Stanford Undergraduate

# Stereotype Threat

## Anecdotal Evidence

“Group work was a nightmare. I could tell that no one thought my ideas were any good because I’m Latina.”

—NYU Undergraduate

# Stereotype Threat

## Anecdotal Evidence

“Everyone expects me to be good at math because I’m Asian, so I feel extra stupid because I’m not so good at math.”

—NYU Undergrad



# Stereotype Threat

## Anecdotal Evidence

“I knew I was just as intelligent as everyone else... but 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.”

—State Senator, Rodney Ellis (TX)

# Laboratory Experiment on Stereotype Threat

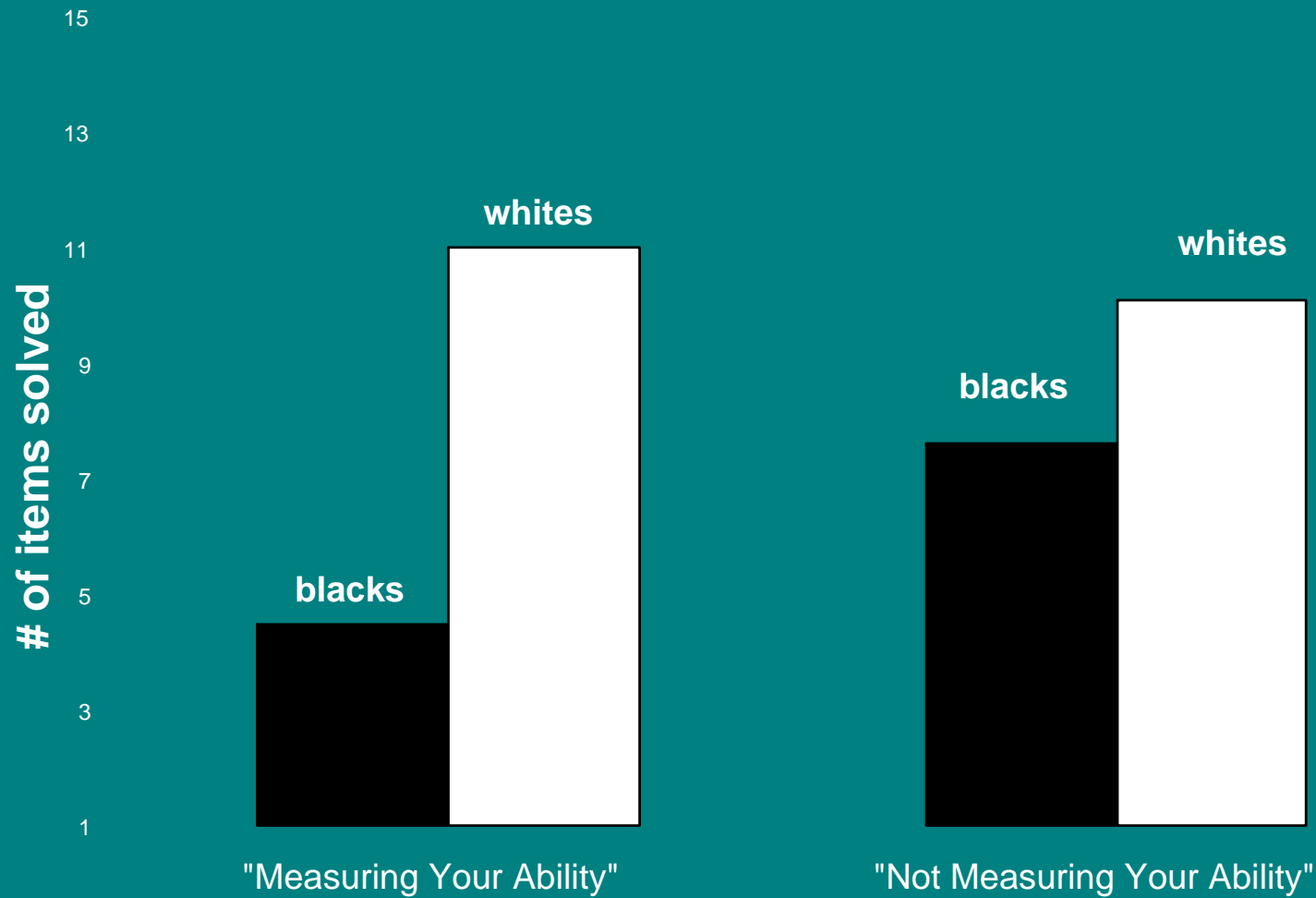
Steele & Aronson (1995). *Journal of Personality and Social Psychology*.

- Method: Reducing Evaluative Scrutiny
- Measure: Blacks' and Whites' Verbal GRE Performance

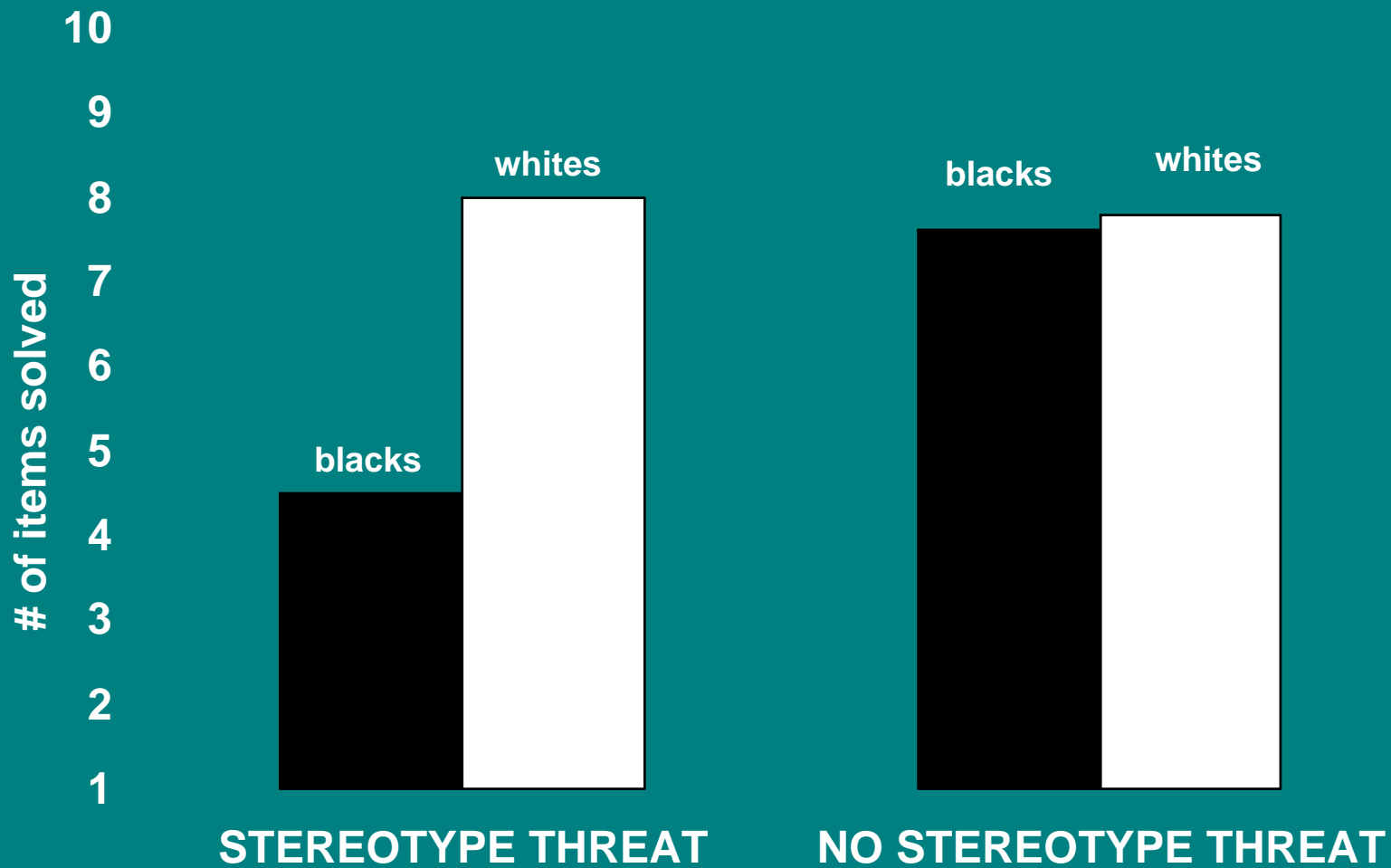
# Verbal Test Performance



# Verbal Test Performance



# Verbal Test Performance Corrected for SAT



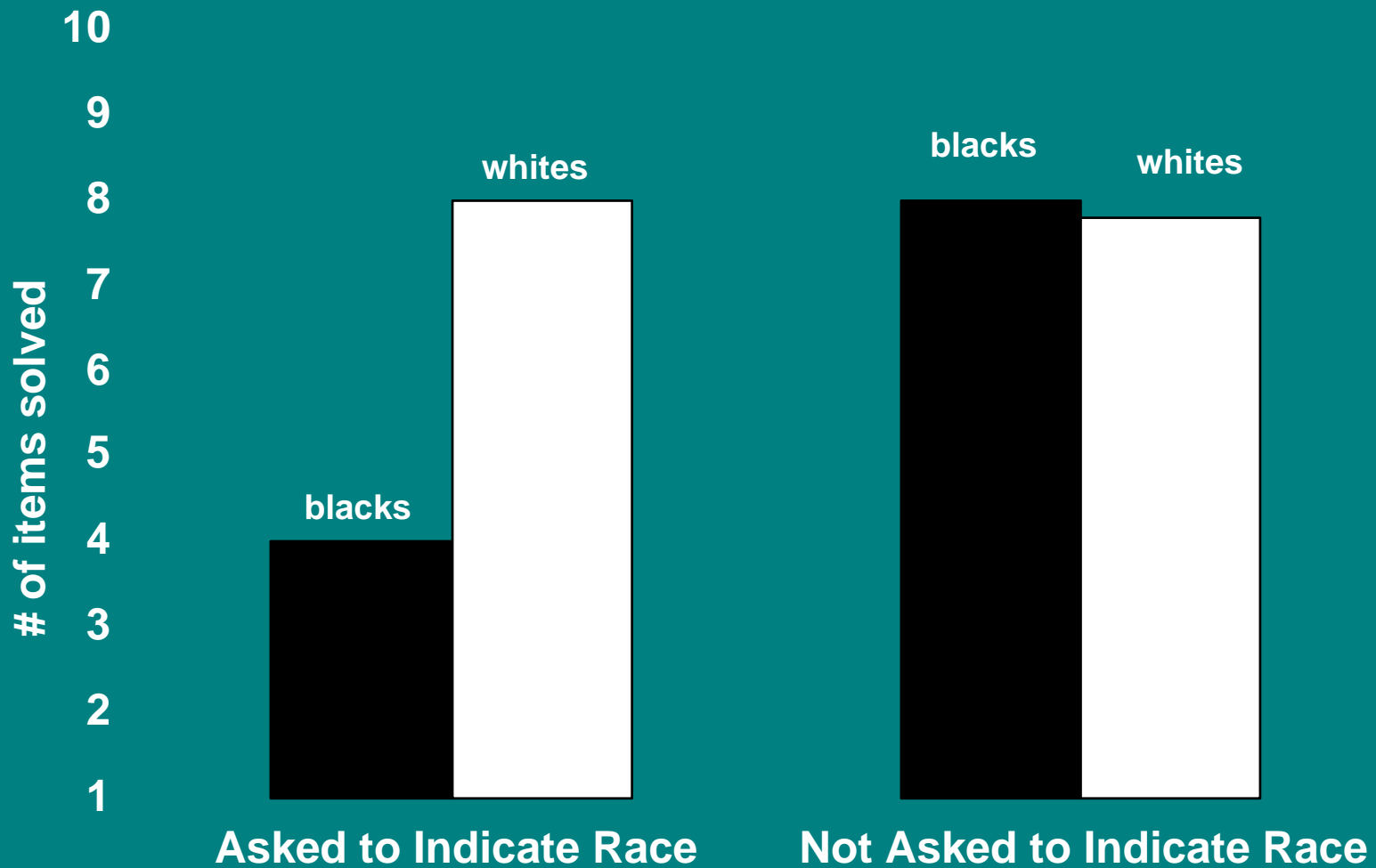
# Laboratory Experiment on Stereotype Threat

Steele & Aronson (1995)

Method: Inducing the Relevance of Race

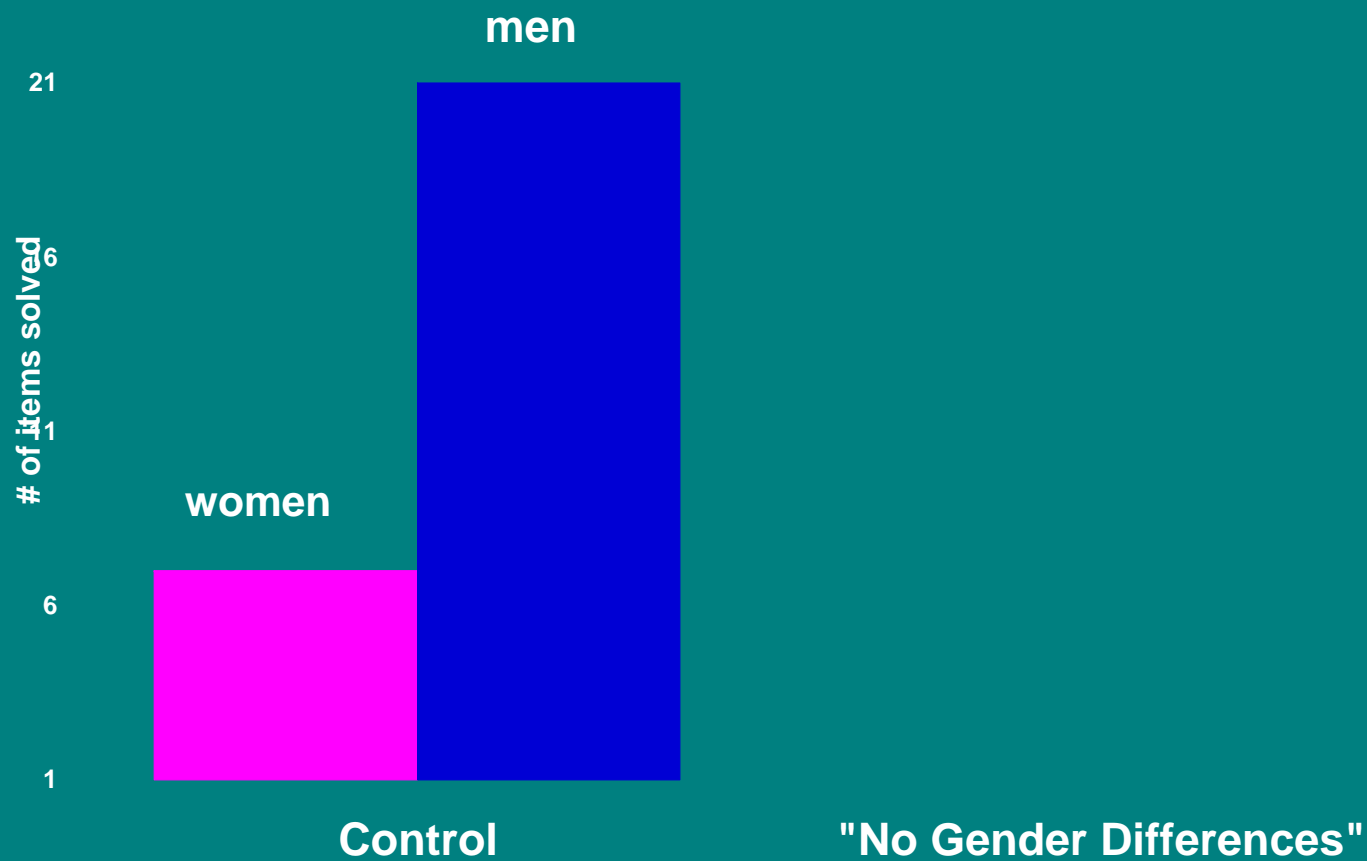
Measure: Blacks' and Whites' Verbal GRE  
Performance

# Verbal Test Performance



# Math Test Performance Of College Men and Women

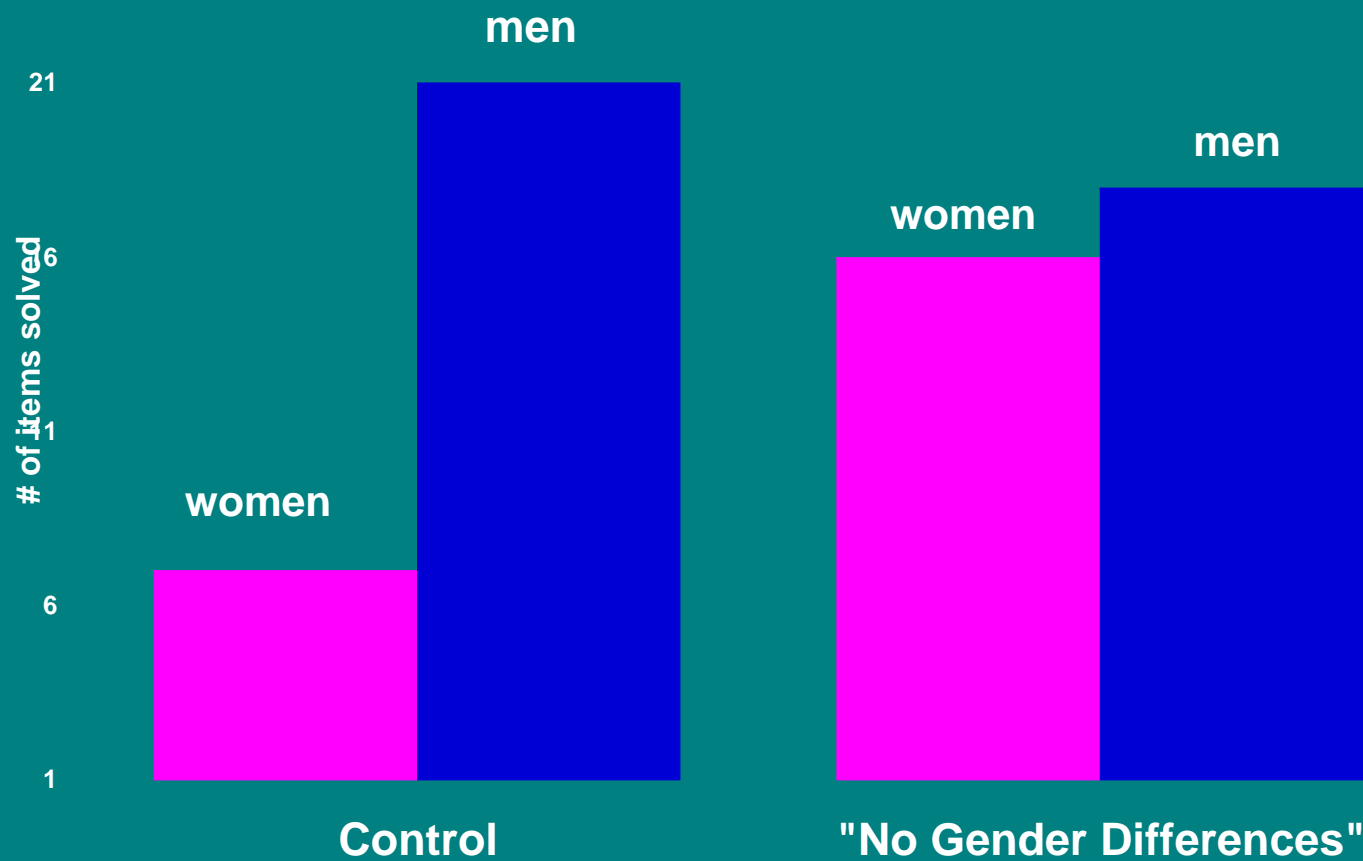
(Spencer, Steele & Quinn, 1999)





# Math Test Performance Of College Men and Women

(Spencer, Steele & Quinn, 1999)

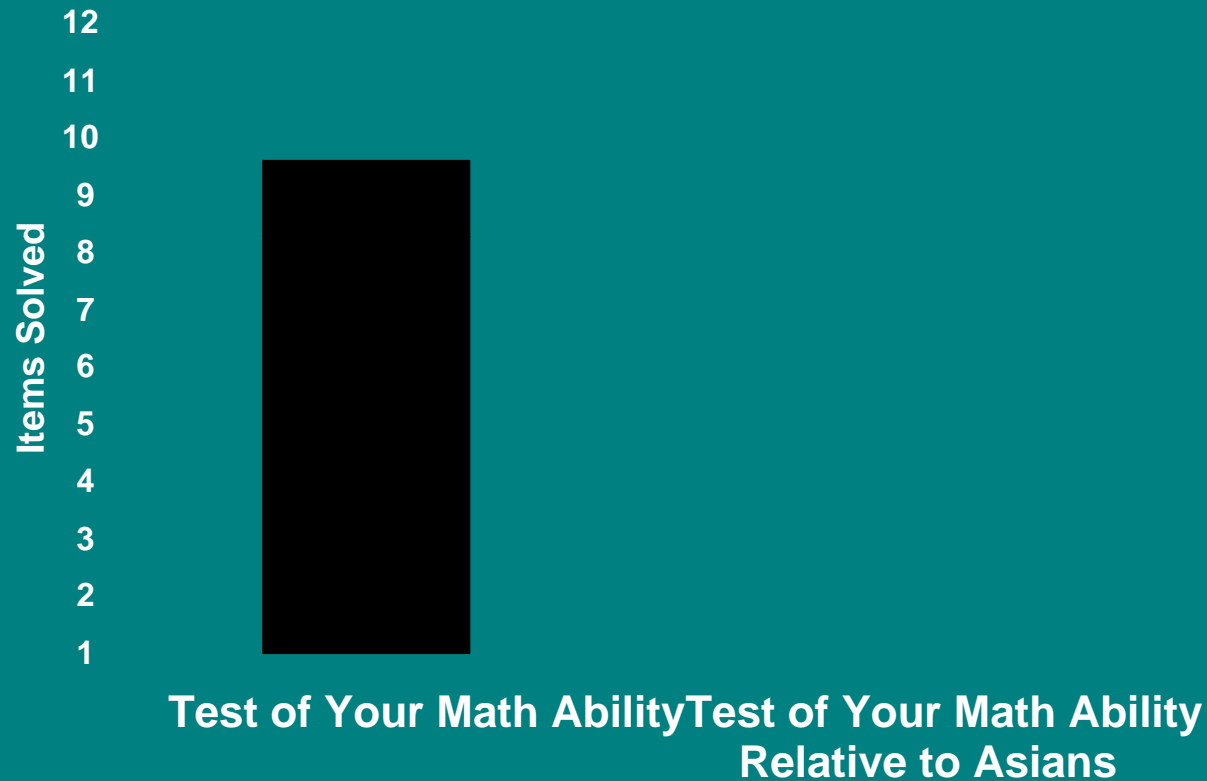


## Additional Studies Finding Performance Effects

- Latinos taking verbal tests
- Elderly taking short-term memory tests
- Low SES Students taking verbal tests
- Blacks and Miniature Golf
- Women taking tests of Political Knowledge, Driving, Chess
- White males taking tests of social sensitivity
- White Males Taking Math Tests

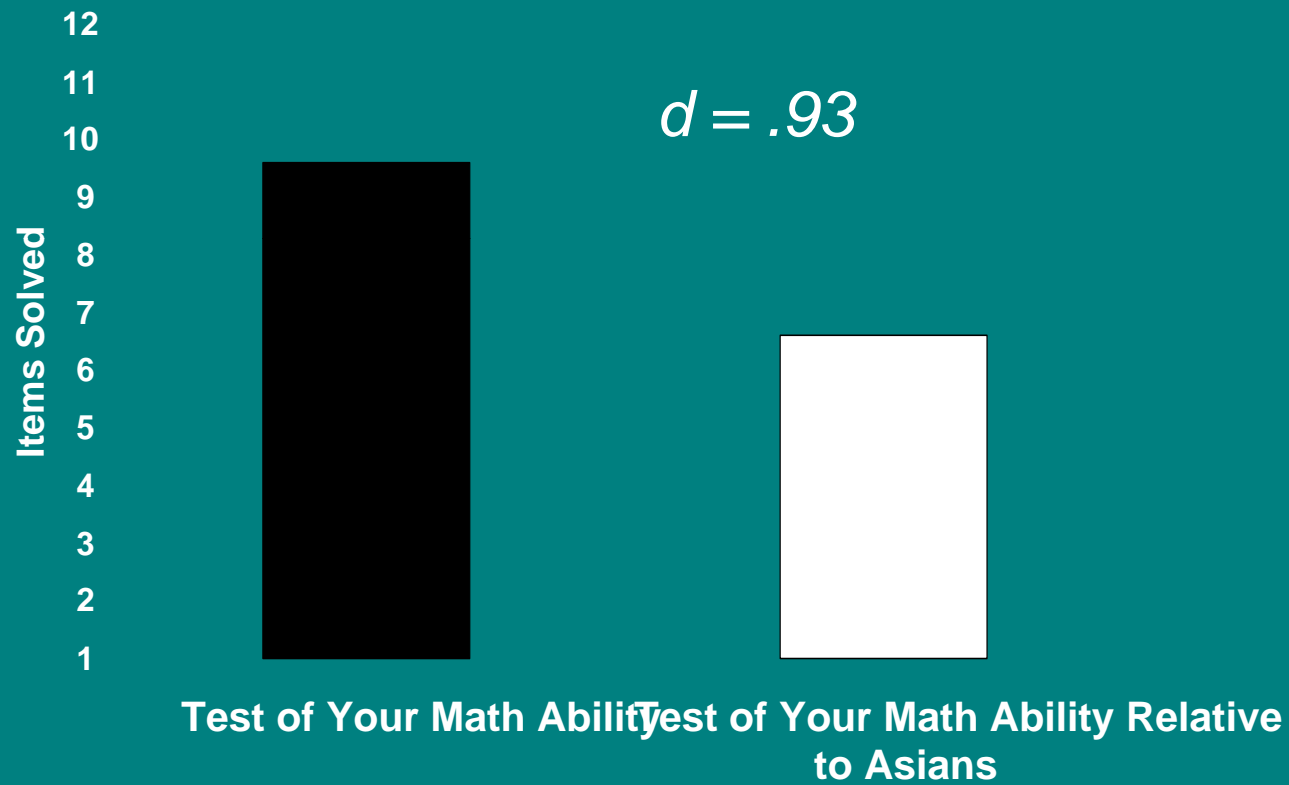
# When White Men Can't Do Math

Aronson, et al., (1999). *Journal of Experimental Social Psychology*.



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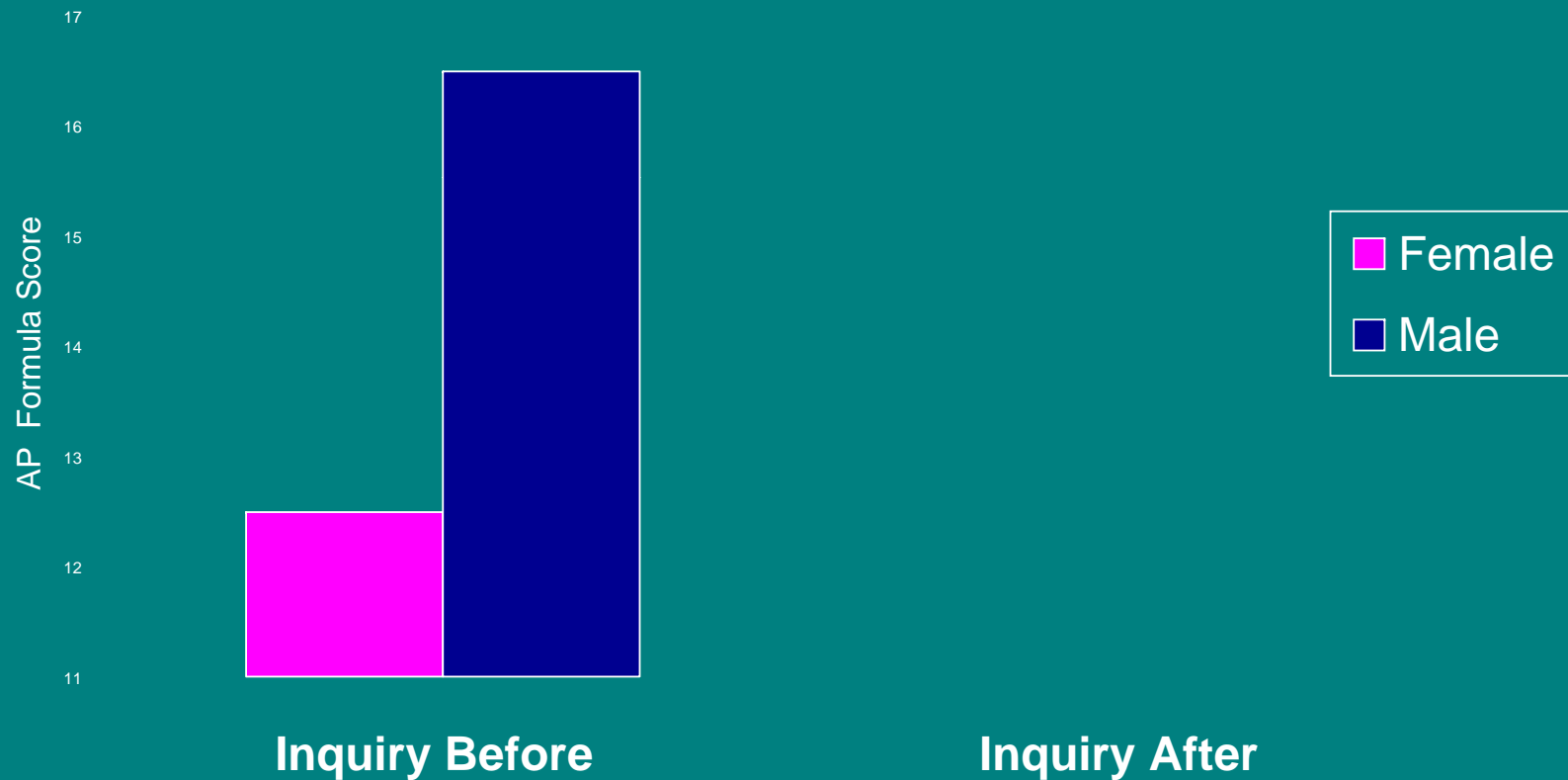


Stereotype Threat  
in the “Real World”

Educational Testing Service  
Field Study:

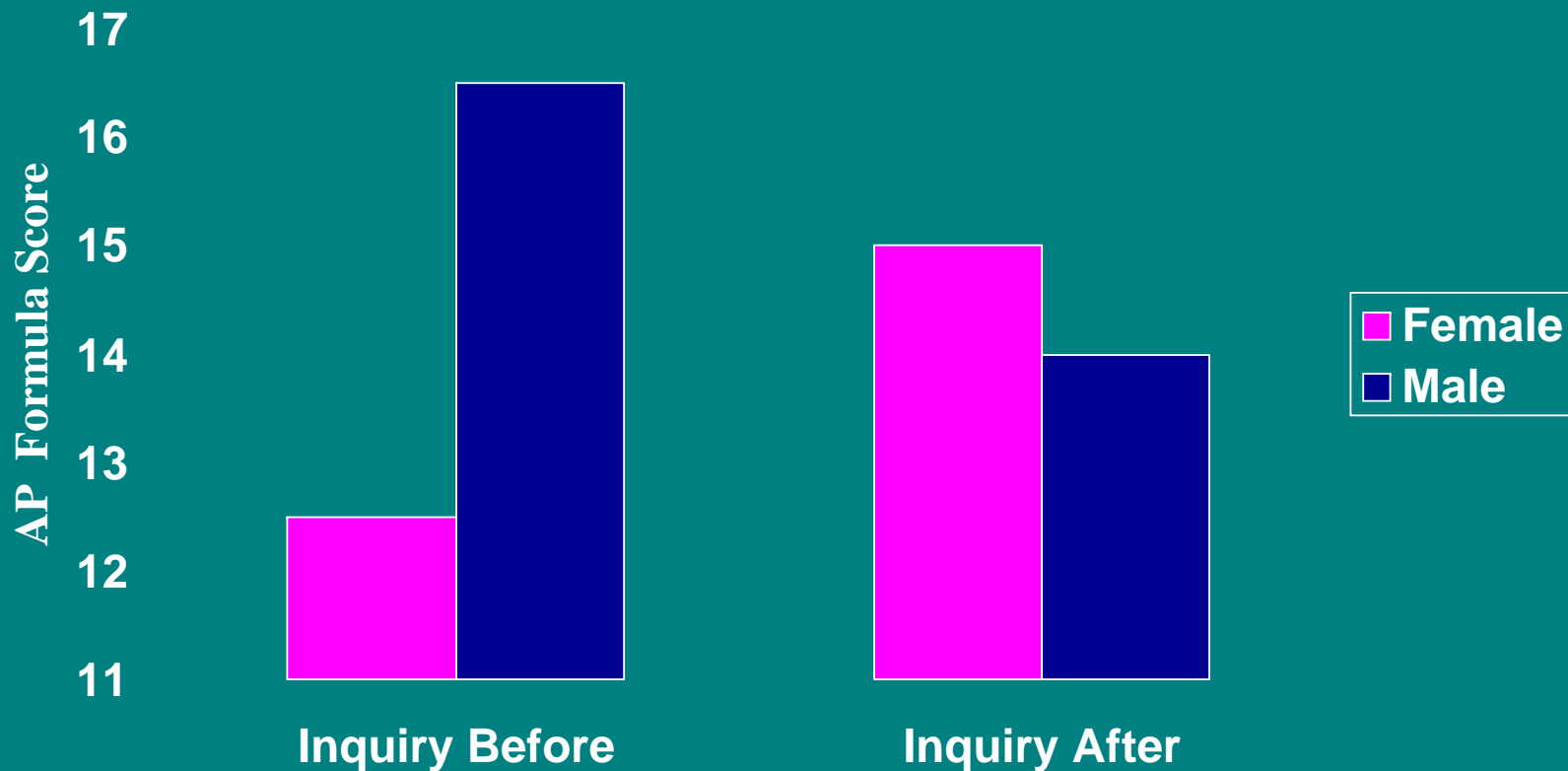
Asking About Gender before or After  
Before Taking AP

# ETS Field Study: Asking Gender Before Taking AP Calculus Test Hurts Girls



(Stricker, 2002). *Journal of Applied Social Psychology*.

# Educational Testing Service Study: Asking Gender Before AP Calculus Test Hurts Girls, Helps Boys





# Danaher and Crandall (2008)

## Reanalysis of ETS Study

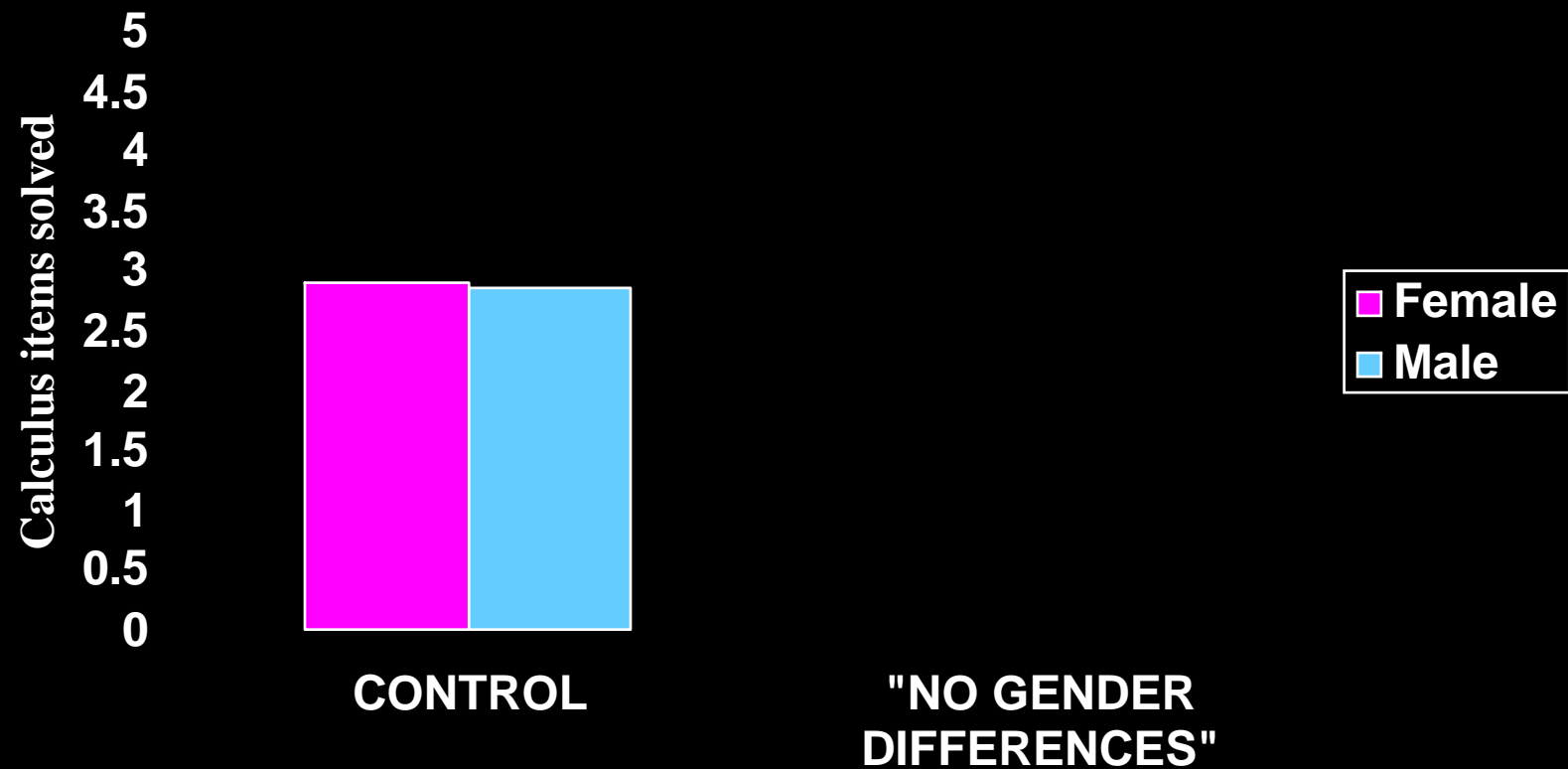
“Women benefited substantially on the calculus test when demographics were asked after testing rather than before. This simple, small, and inexpensive change could increase U.S. women receiving AP Calculus AB credit by more than 4,700 every year.”

# Field Experiment: Women in the Science Pipeline

Highest Level Calculus Students

# Field Study: Women in the Science Pipeline

## Highest Level College Calculus Students



Good, Aronson, & Harder (in press) *Journal of Applied Developmental Psychology*

# Field Study: Women in the Science Pipeline

Advanced Level Women Outperform Advanced Men  
in Calculus When Threat Reduced

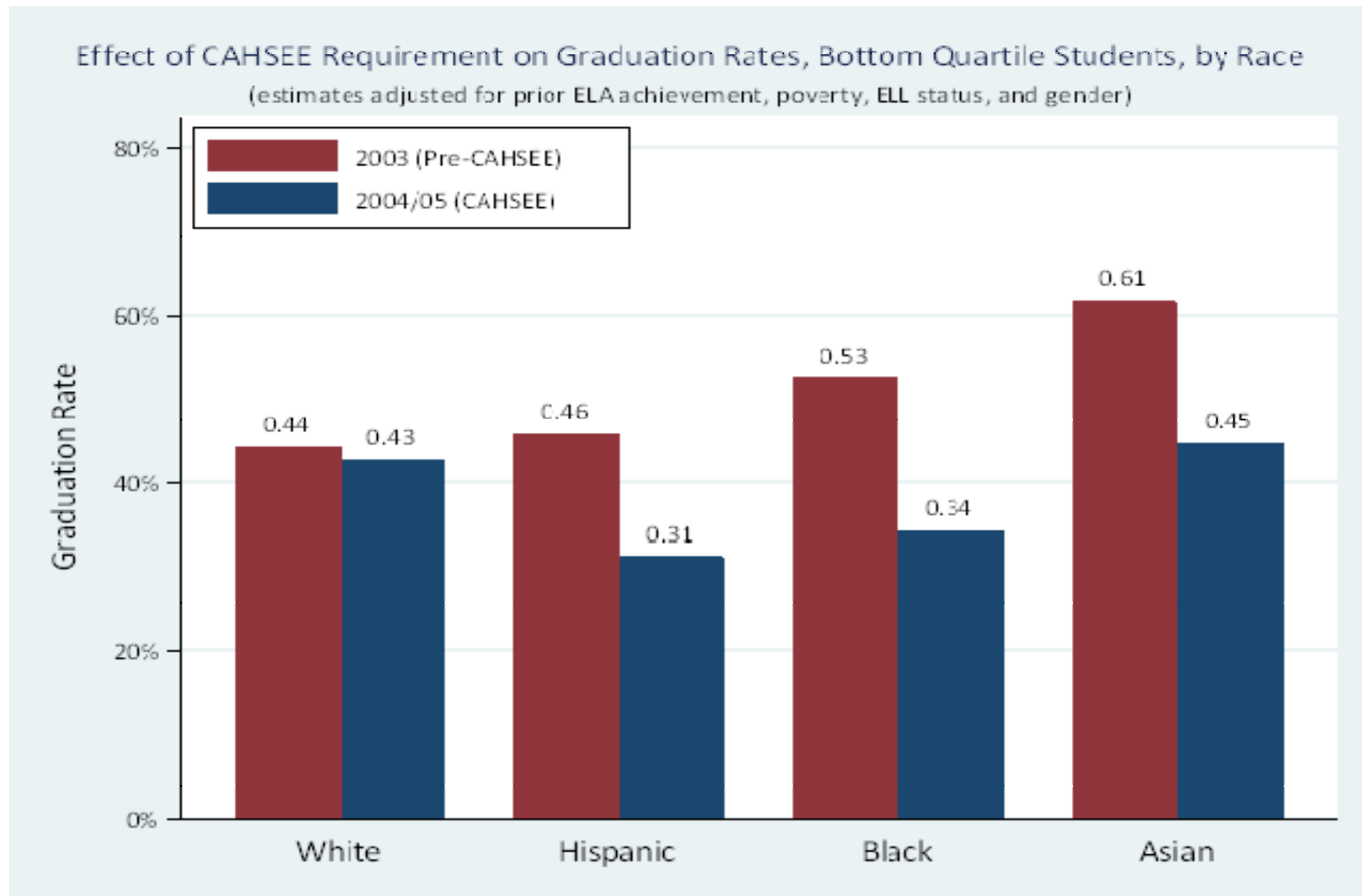


Good, Aronson, & Harder (2008) *Journal of Applied Developmental Psychology*

# California Exit Study Experiment: Comparing performance on High and Low Stakes Tests

High Stakes Tests Hurt Minorities and Girls

# Graduation effects are concentrated among minority students



**Estimated Differences in 10th Grade Scores on High Stakes (CAHSEE) vs. Low Stakes (11th grade ELA CST) Tests, for Average Student in Bottom Quartile of State ELA CST Score Distribution, Classes of 2006 & 2007**

	10th Grade Score	
	ELA CAHSEE	Math CAHSEE
Black	-0.263 *** (0.042)	-0.339 *** (0.042)
Hispanic	-0.215 *** (0.039)	-0.319 *** (0.039)
Asian	-0.277 *** (0.044)	-0.073 (0.044)
Female	-0.027 (0.020)	-0.192 *** (0.020)
FRPLE	-0.073 * (0.033)	0.002 (0.033)
ELL	-0.283 *** (0.024)	-0.002 (0.024)

Note: Coefficients indicate the difference in the estimated difference in scores on the CAHSEE and the 11th grade ELA CST between a given group and the reference category, conditional on the full model (which includes additional controls for 9th & 10th grade CST scores and district fixed effects).

# Conclusions from 300 Studies

- develops around age 10 in most children
- can affect even those students with lots of ability and lots of confidence in their abilities, from any group
- can arise as a function of grouping alone, integrated groups trigger it.
- mediated by anxiety, reduced working memory capacity, and reduced self-regulation capacity.
- Stereotype threat influences GPA as well as immediate performance: Accounts for about 10% of the GPA Gap



**Chronic Stereotype Vulnerability  
Can lead to Lower Ability**

# Chronic Stereotype Vulnerability Can lead to Lower Ability

- Avoidance of Challenge/practice
- Disengagement

# **From Vulnerability to Inability**

**"No circle is more vicious than the one having to do with intelligence. Children who may be only a little behind their peers to begin with tend to avoid those things that could have made them a little smarter. As a result they fall further and further behind. Meanwhile the kids who started out a little ahead are doing push-ups with their brains."**

**Judith Rich Harris**

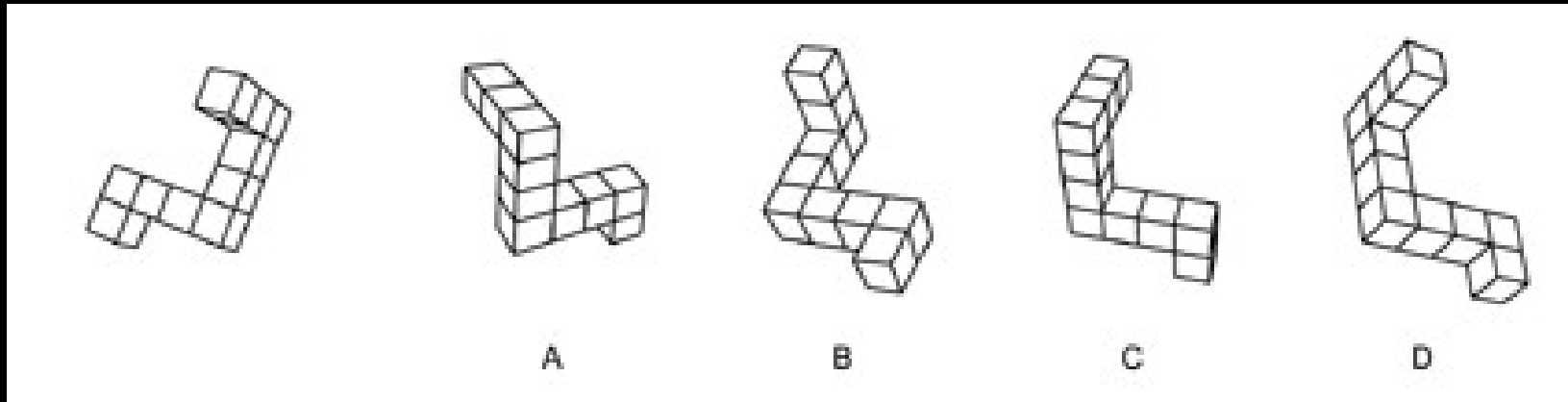
Part Two:

Reducing Threat  
Mindset Matters

# Biological Differences in Spatial Ability

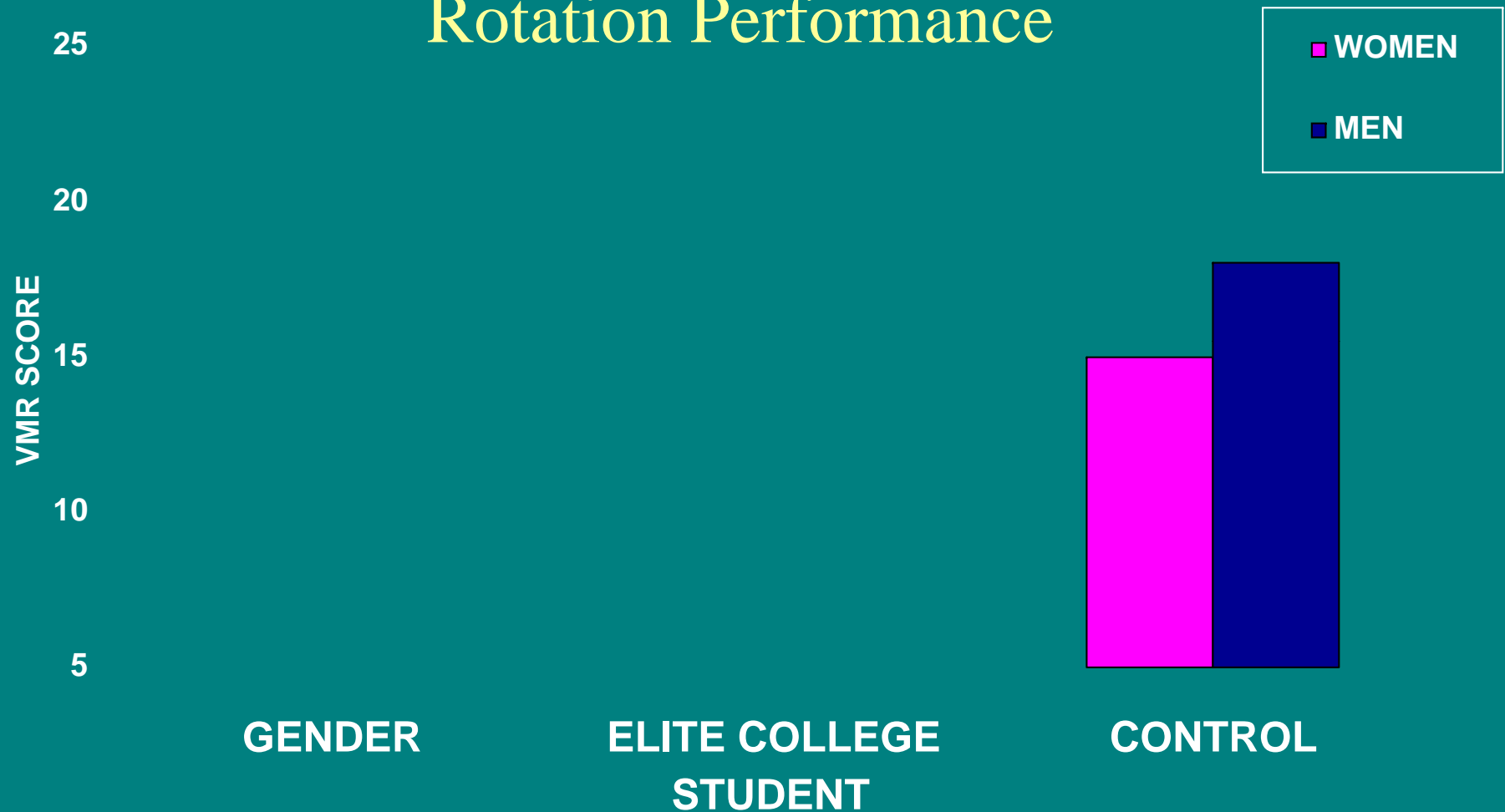
- Largest sex differences: Spatial Ability
- May account for most of the math test score gap
- Testosterone?

# Vandenberg Mental Rotation Task



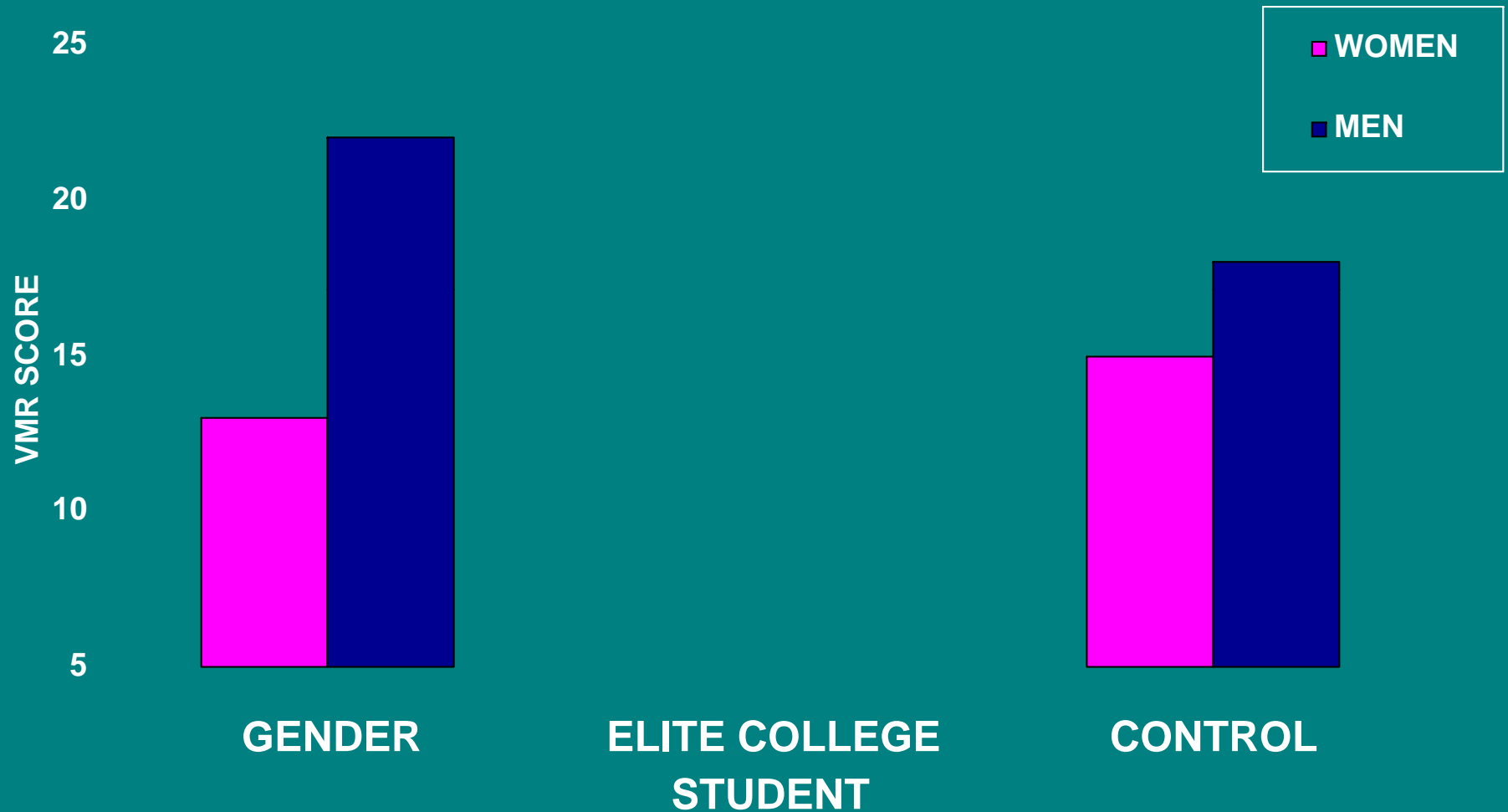
A meta-analysis containing 286 data sets and 100,000 subjects found a highly significant male advantage for mental rotation; this pattern remains stable across age and has not decreased in recent years.

# Identity Salience Influences Women's Mental Rotation Performance



McGlone & Aronson (2006). *Journal of Applied Developmental Psychology*.

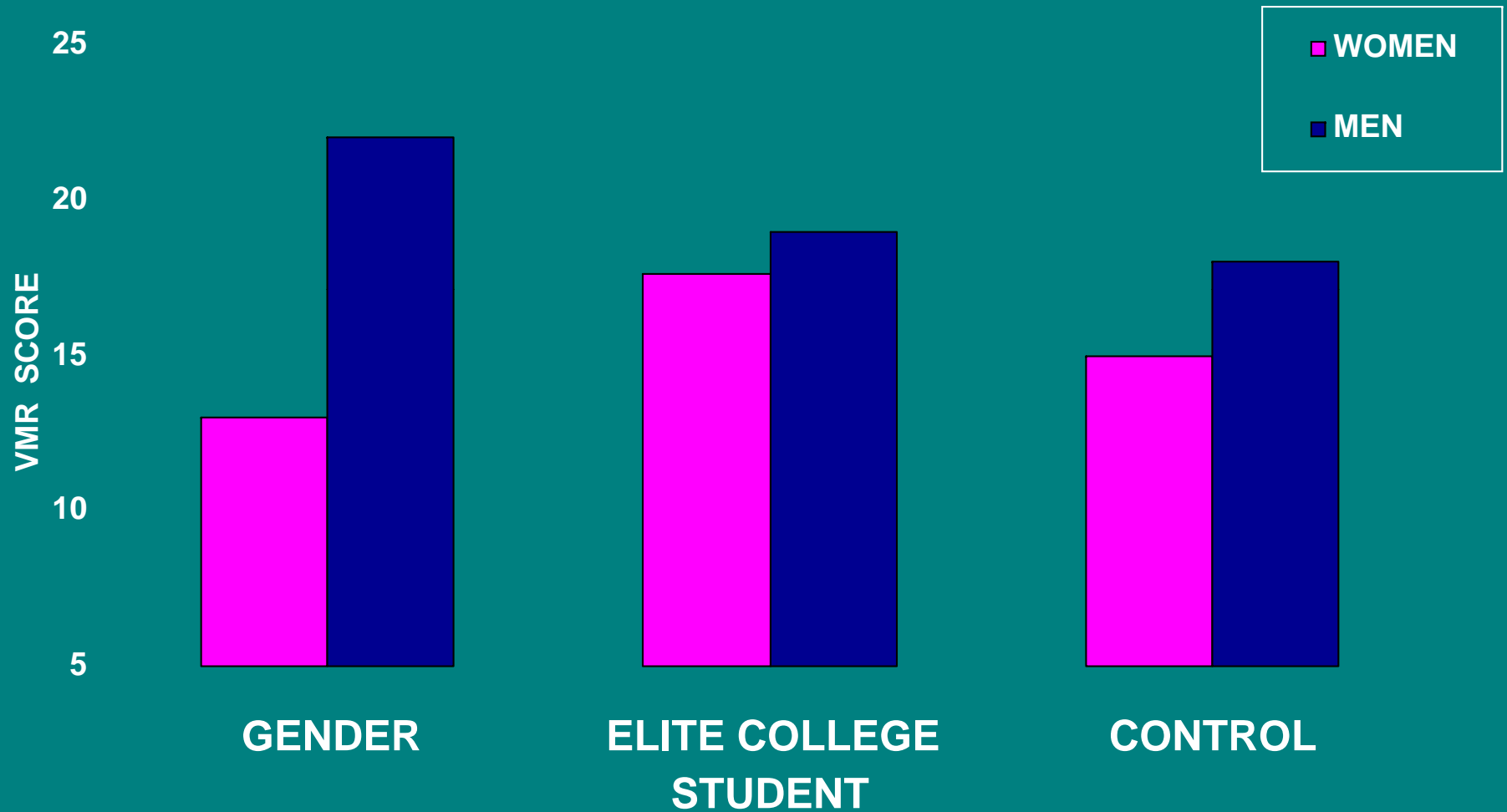
# Identity Salience Influences Women's Mental Rotation Performance



McGlone & Aronson (2006). *Journal of Applied Developmental Psychology*.



# Identity Salience Influences Mental Rotation Performance



# Reducing Stereotype Threat: The role of conceptions of intelligence

“The mind is much more like a muscle than we’ve ever realized... it needs to get cognitive exercise. It’s not some piece of clay on which you put an indelible mark.”

James Flynn, intelligence expert, 2007

# Intelligence and How to Get It

WHY  
SCHOOLS  
AND  
CULTURE  
COUNT



RICHARD  
NISBETT

# Experiment

Aronson (in preparation)

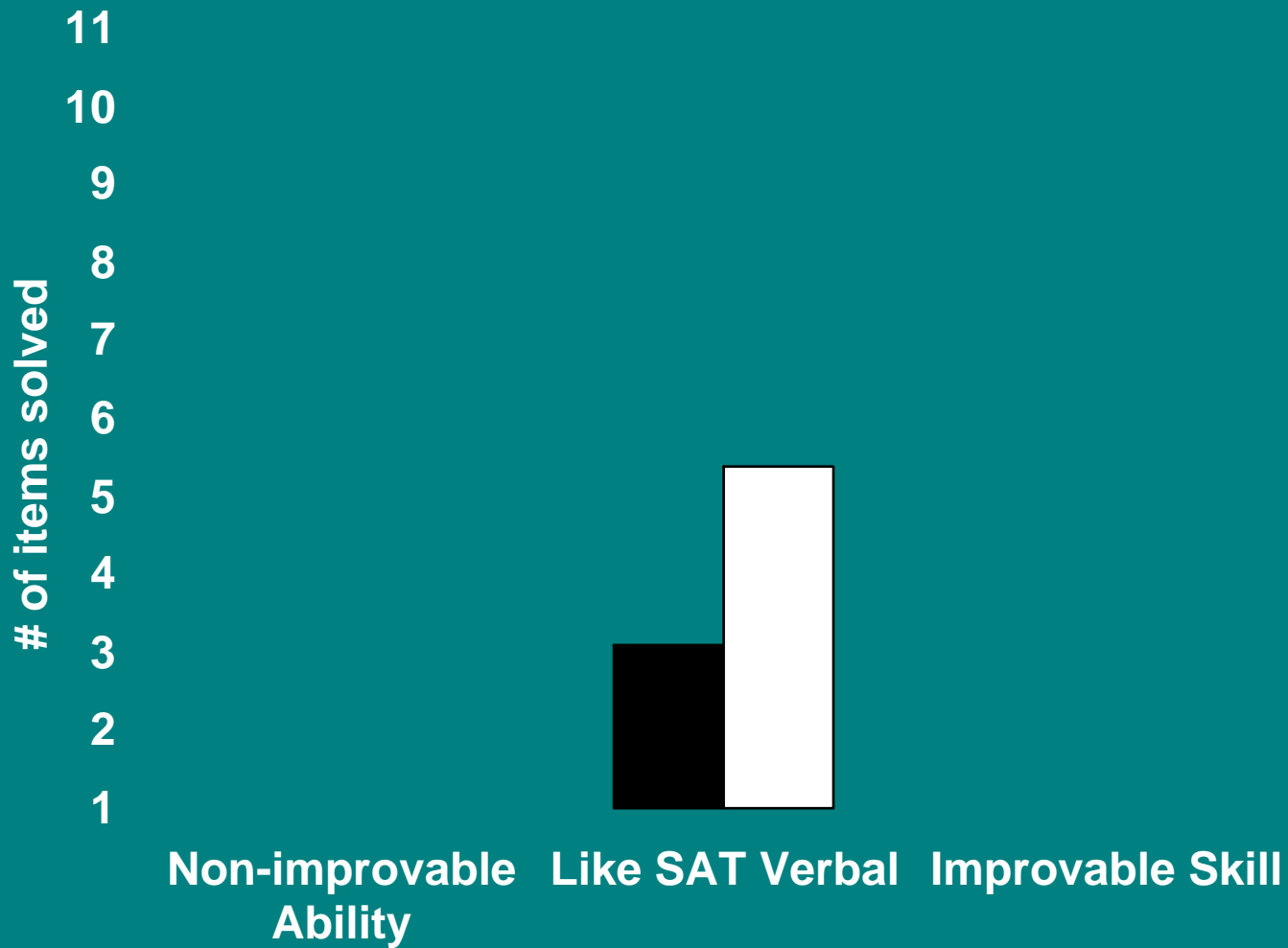
Question:

What if you were led to believe ability is malleable? Would it reduce effects of stereotype threat?

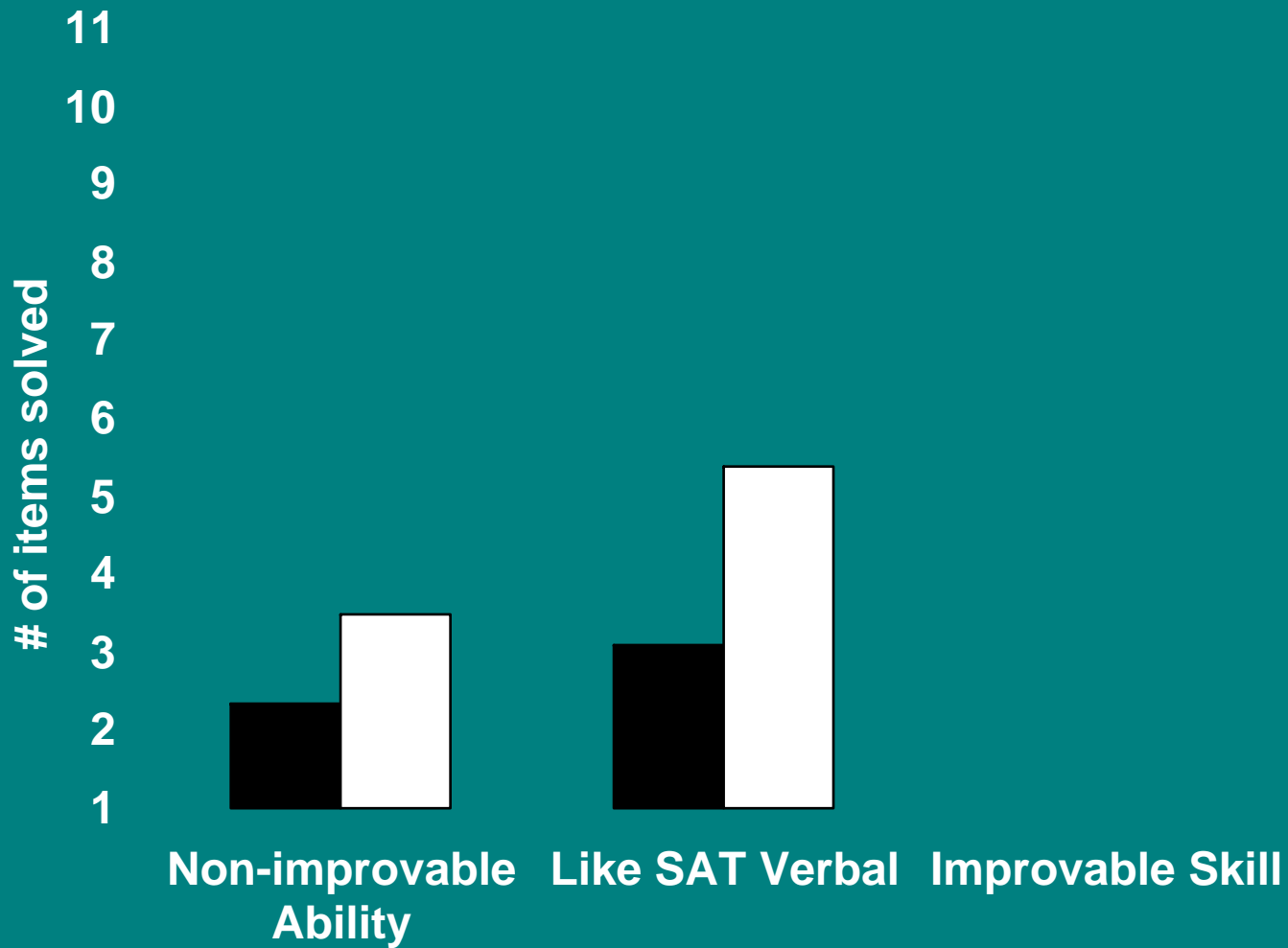
Method: Framing test as a measure of a fixed or a malleable ability

Measure: Blacks' and Whites' Test Performance

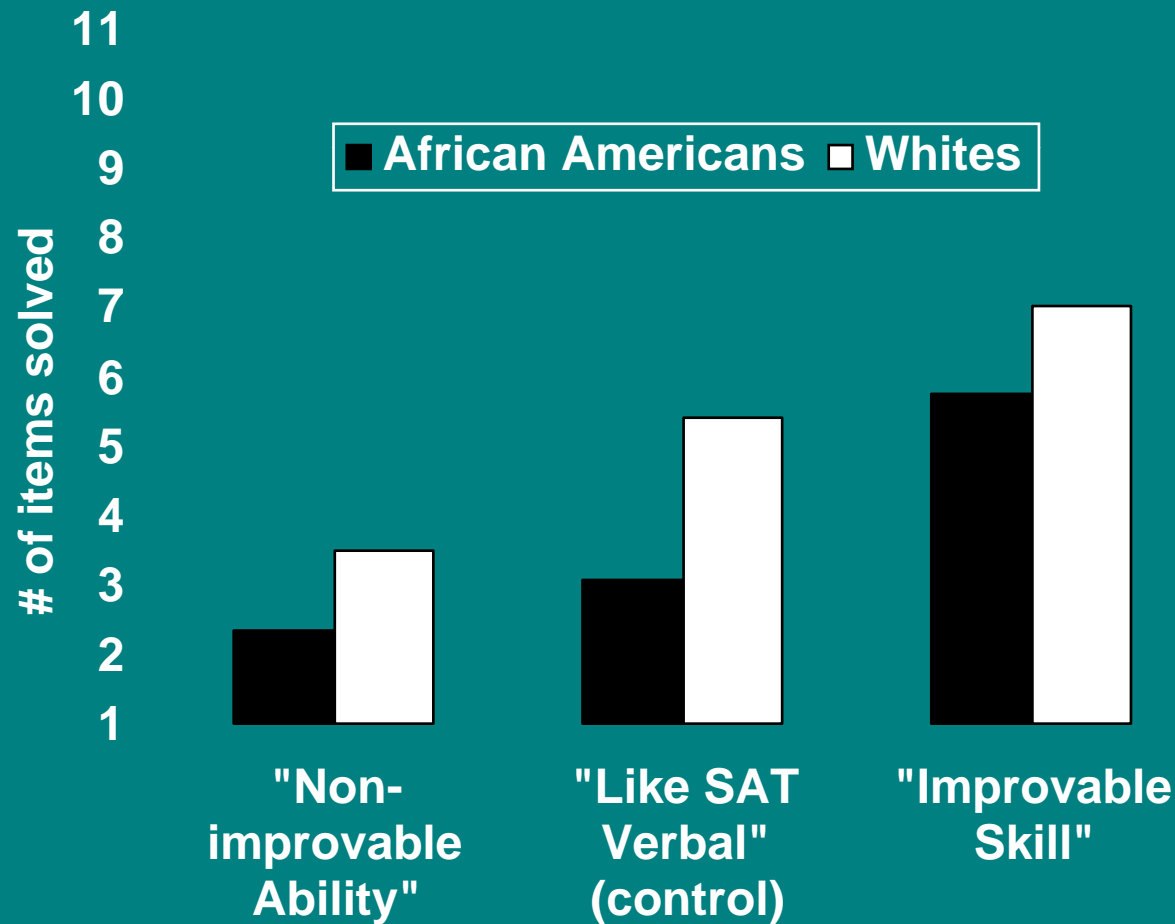
# Conceptions of Ability and Test Performance



# Conceptions of Ability and Test Performance



# Conceptions of Ability and Test Performance



# Reducing the effects of Stereotype Threat In the real world: Shaping implicit theories

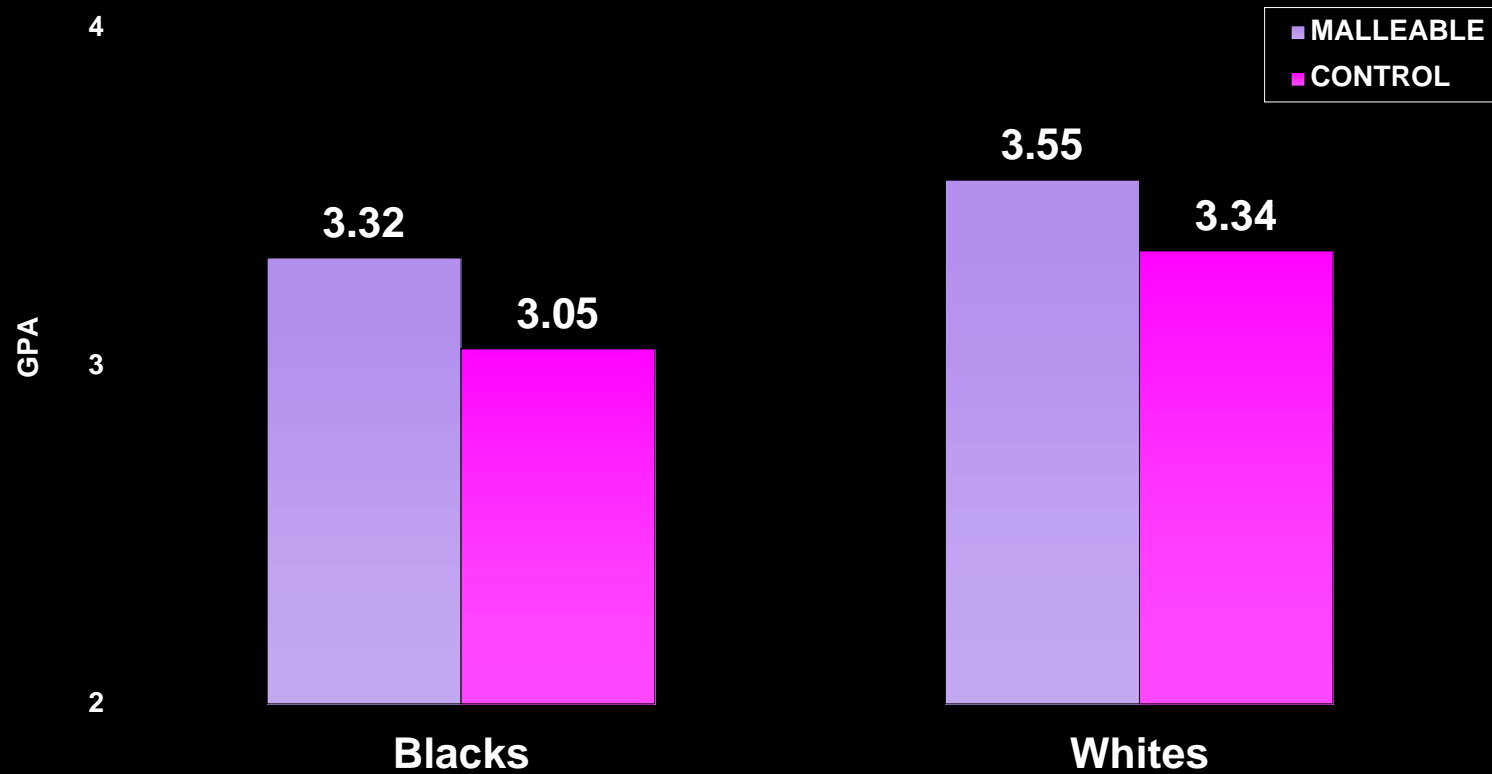
Question: Can getting people to believe in expandable intelligence reduce effects of stereotype threat on GPA?

- Method: Attitude change
- Measure: End of year GPA



# Year End Follow-Up:

## GPA



Aronson, Fried & Good (2002). *Journal of Experimental Social Psychology*.

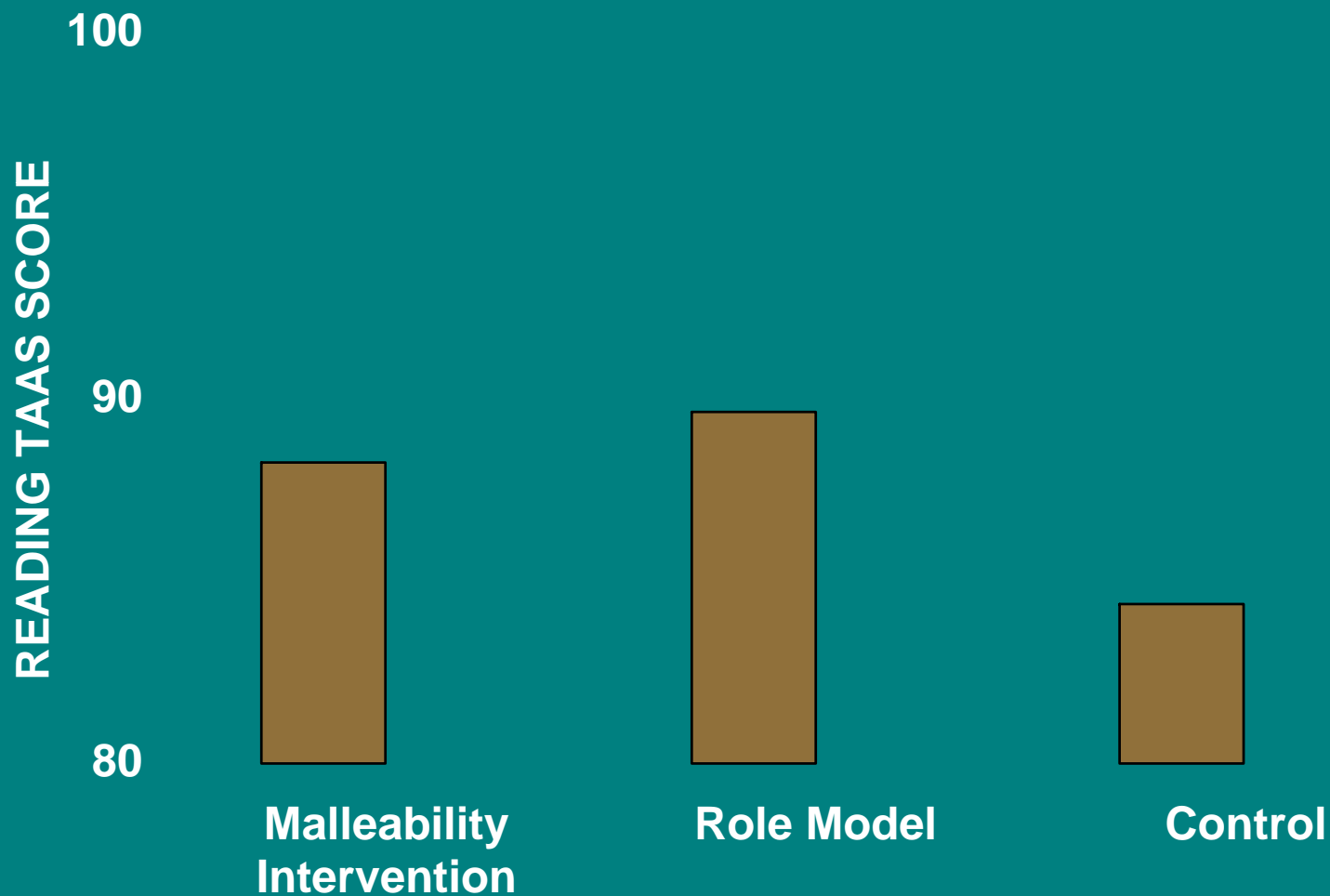
# Reducing Stereotype Threat in Middle School: A field Intervention

Question: Can psychological intervention raise test scores of minority students?

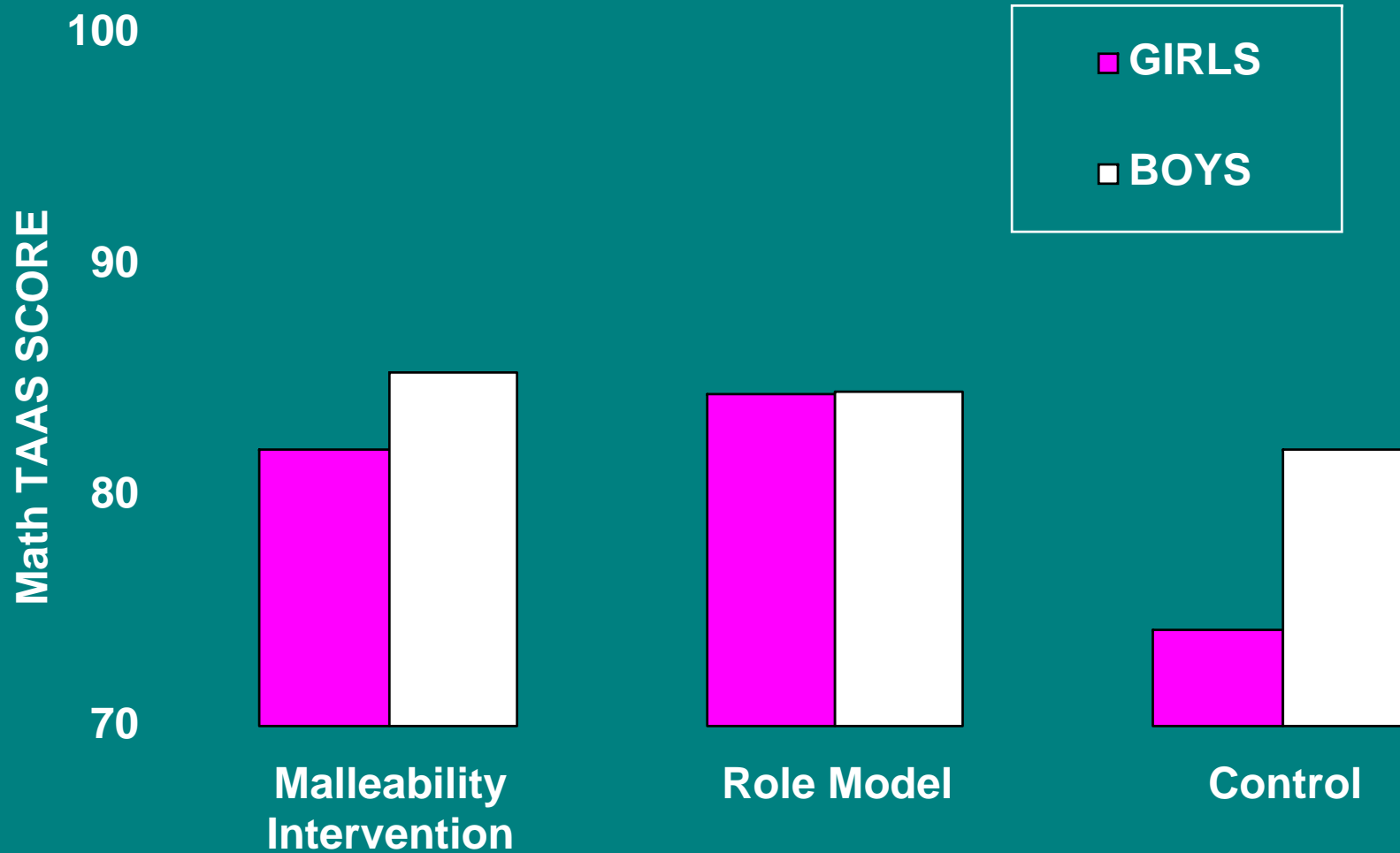
- Method: mentoring study; attitude change
- Conditions:
  - Malleability of intelligence
  - Role Models: senior students who stress the normality of early difficulty
  - Control (drug abuse message)
- Measure: Texas Assessment of Academic Skills (TAAS)

# 7th Grade Reading TAAS--Latinos

Good, Aronson & Inzlicht (2003) *Journal of Applied Developmental Psychology*.



# 7th Grade Girls' Math TAAS



Good, Aronson & Inzlicht (2003) *Journal of Applied Developmental Psychology*.

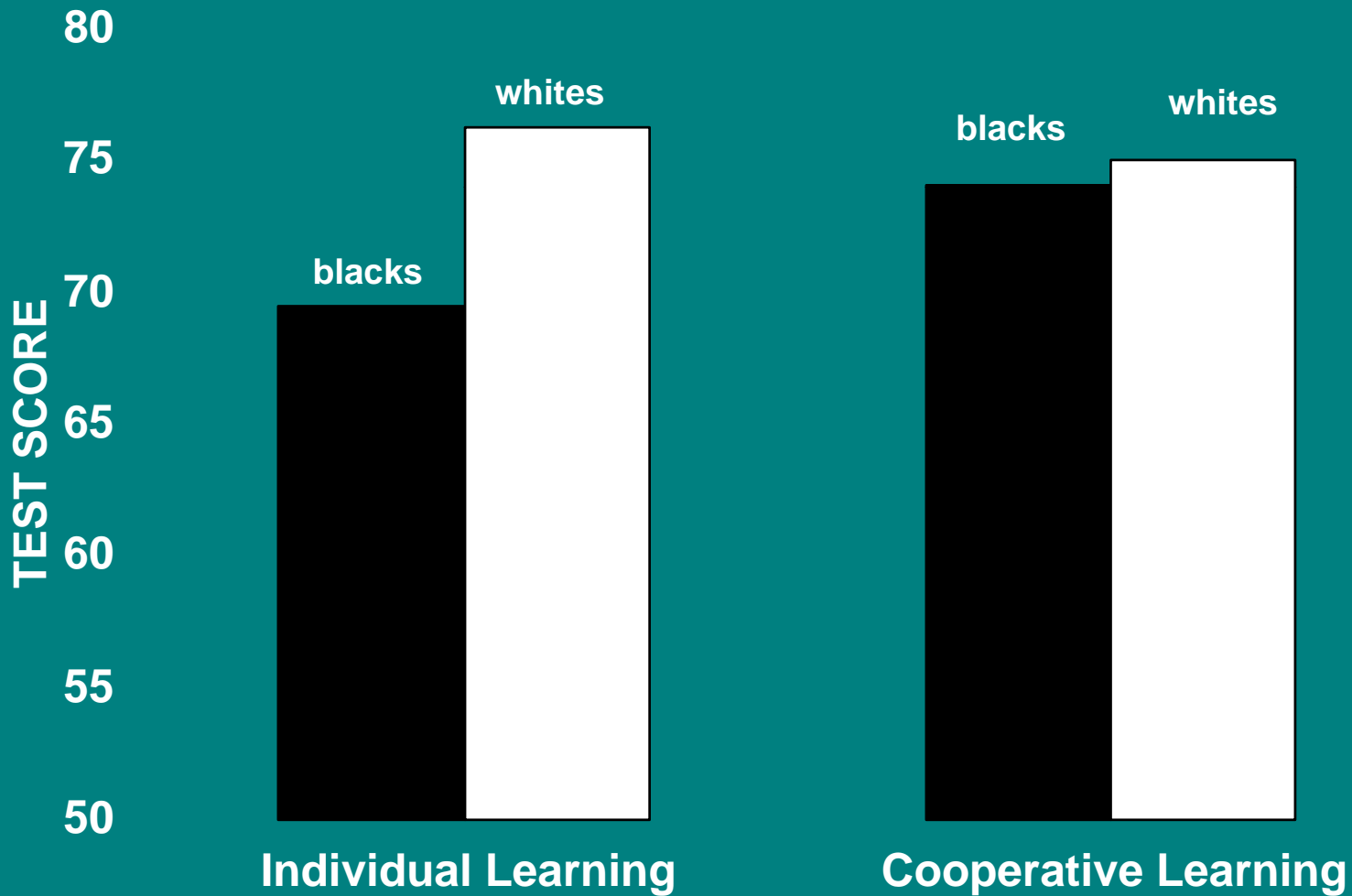
# Cooperative Learning

Slavin & Oilicke (1981)

Method: Study Cooperatively or Alone

Measure: Test performance

# Verbal Test Performance



# Some Policy Implications

- Strict, high stakes testing regimes may be hurting minorities; some believe exit exams should be discontinued
- If they are kept, steps need to be taken to reduce their harmful effects
- Psychological interventions are far cheaper and often more effective than large expensive ones

# Reducing Effects of Stereotype Threat: Effective Strategies

- De-emphasize ability; emphasize effort, persistence
- Stress the malleability of intelligence
- Exposure to Role Models who overcame struggles
- Cooperative learning



"By nature emplanted, for nurture to  
enlarge"

Richard Mulcaster, 1581

First Headmaster of Merchant Taylors' School in London

Thank You!

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