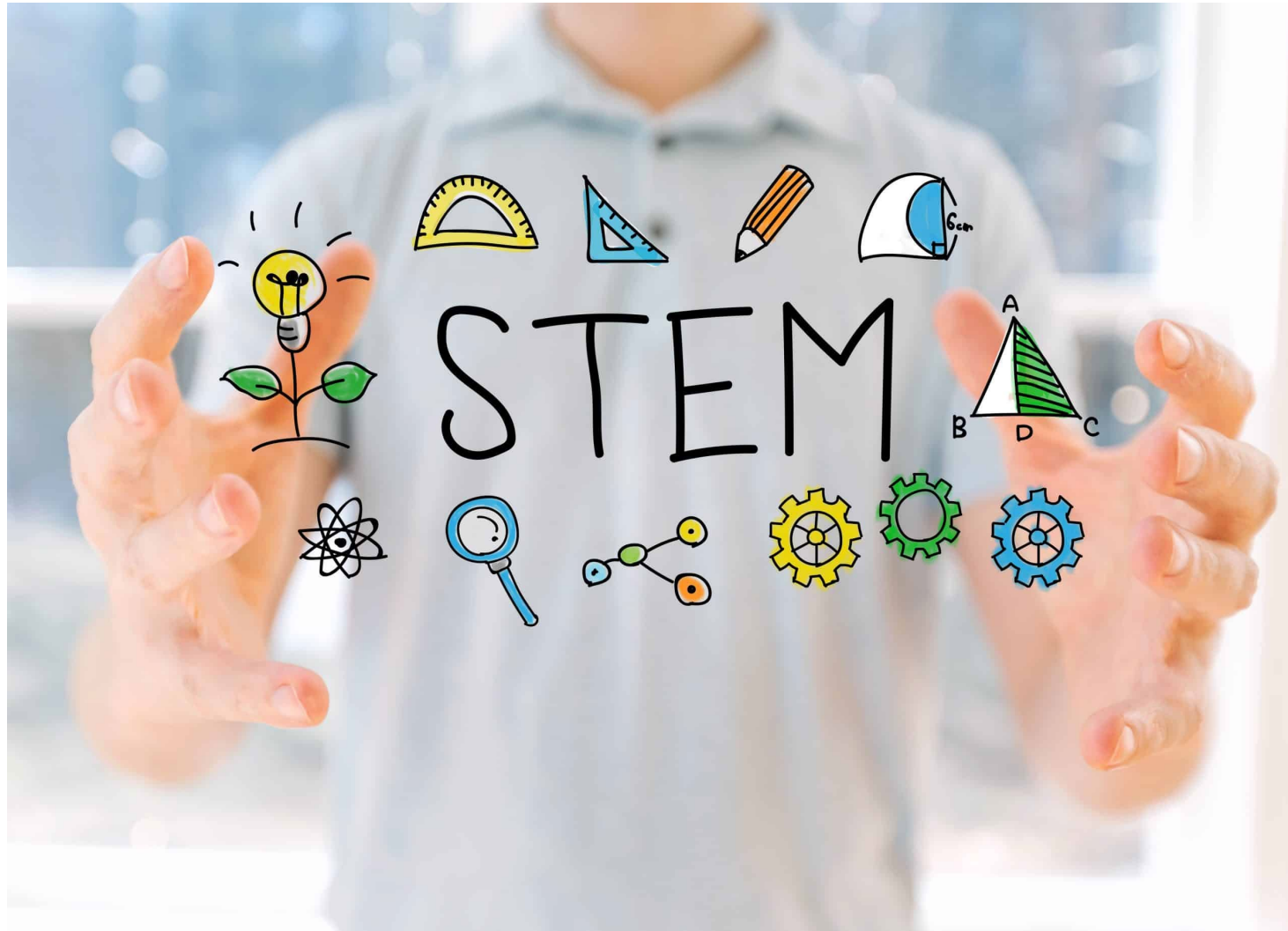


# Understanding STEM Stereotypes: A Look at the Newest Research and Strategies

Dr. Allison Master

# Why STEM (Science, Technology, Engineering, and Math)?



# Why (not) STEM?



# Why are girls less interested in STEM?



# Why are girls less interested in STEM?

- Adults give **boys more explanations** about STEM subjects
- **Adults' stereotypes** push girls toward language arts pathways and push boys toward math pathways



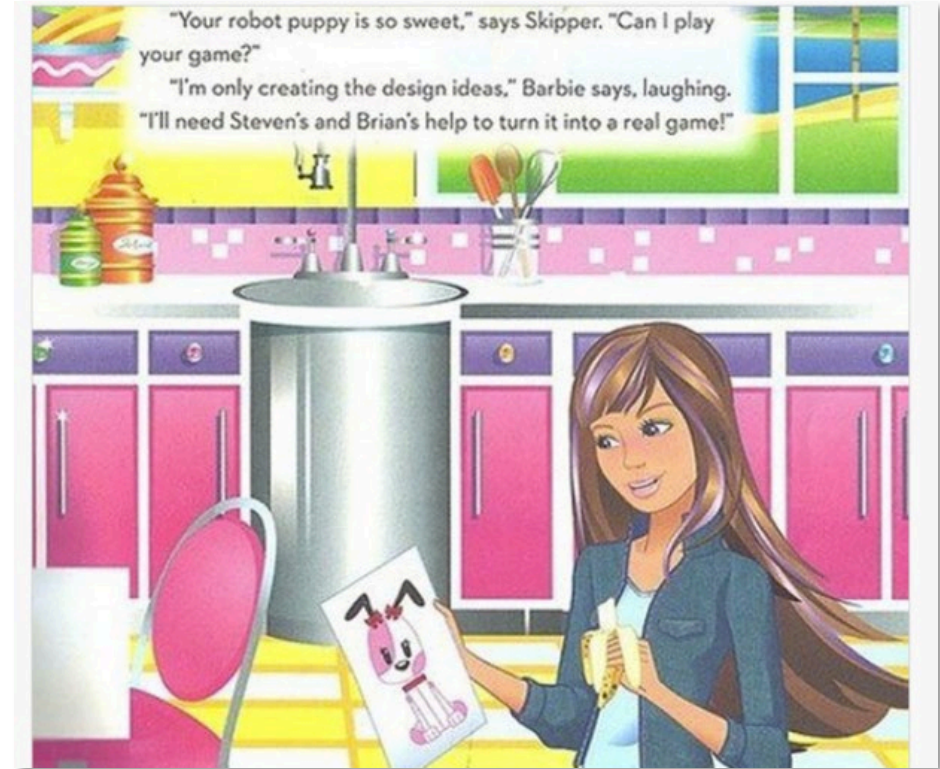
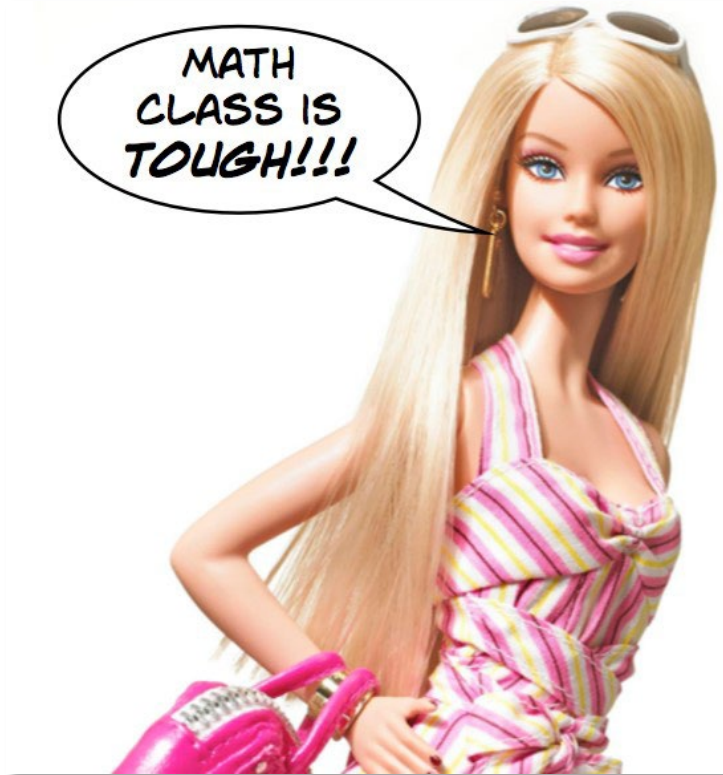
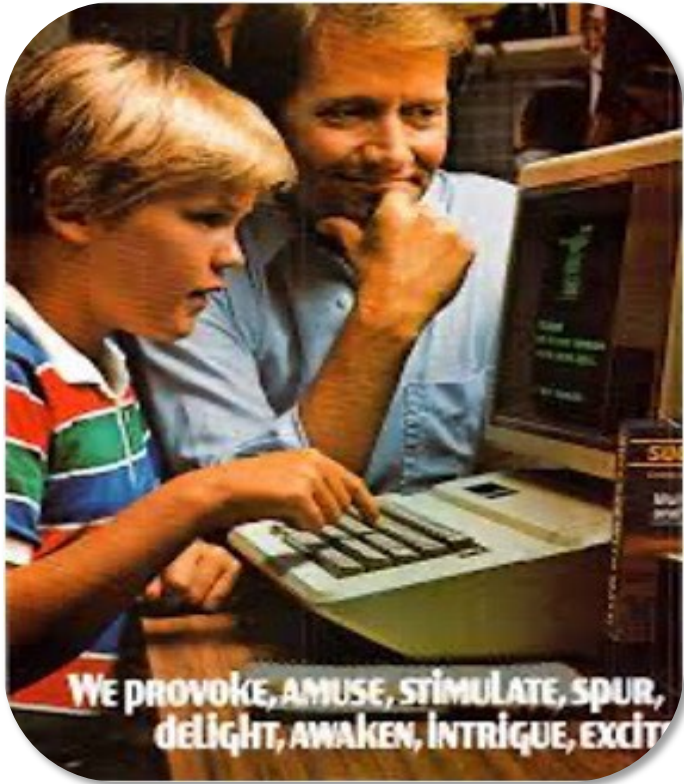
# Why are girls less interested in STEM?



# Gender Detectives



# Kids see stereotypes everywhere

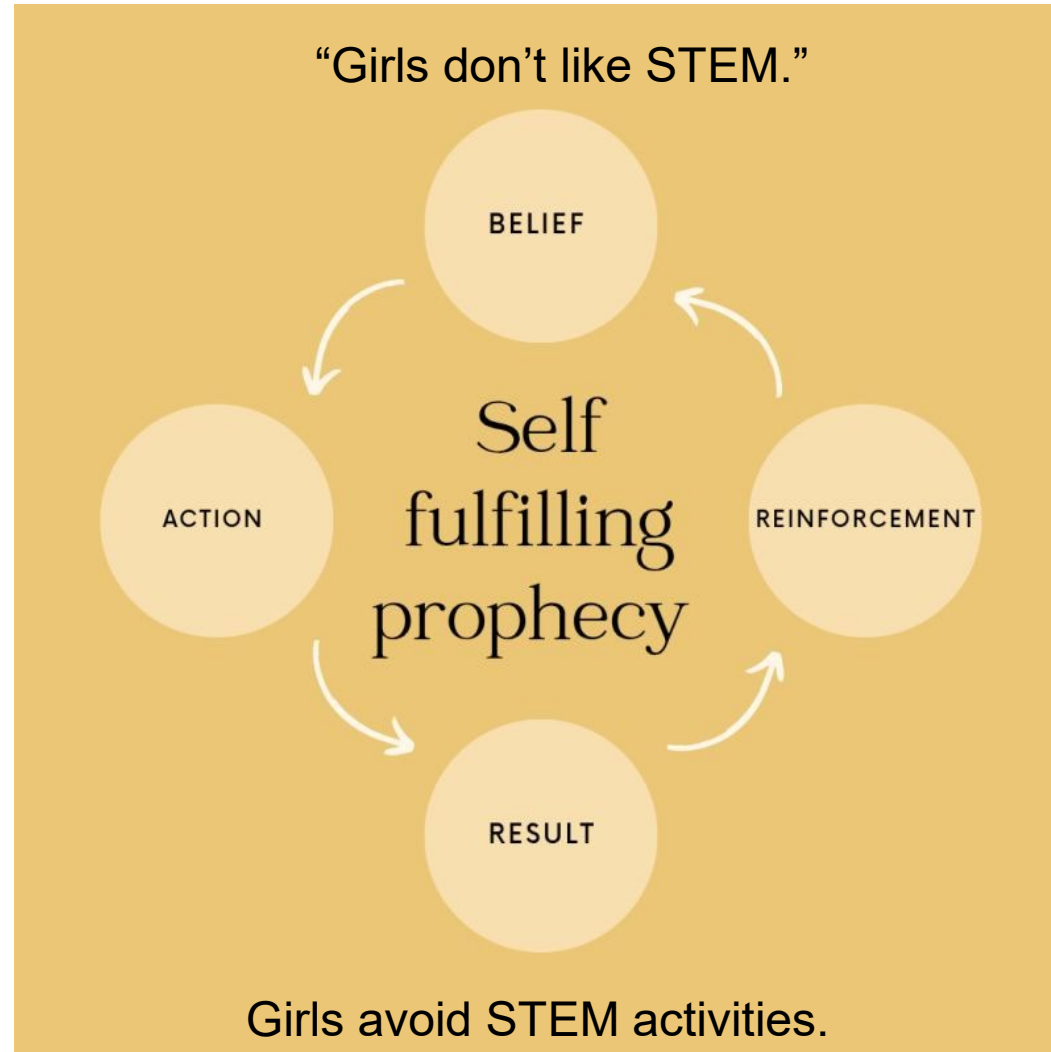


# Stereotypes create barriers



# Stereotypes become self-fulfilling prophecies

“I’m a girl, so I won’t do STEM.”



It looks like girls don’t like STEM.

We need to open the door



# The danger of the single story

“The single story creates stereotypes...

They make one story become  
the only story.”

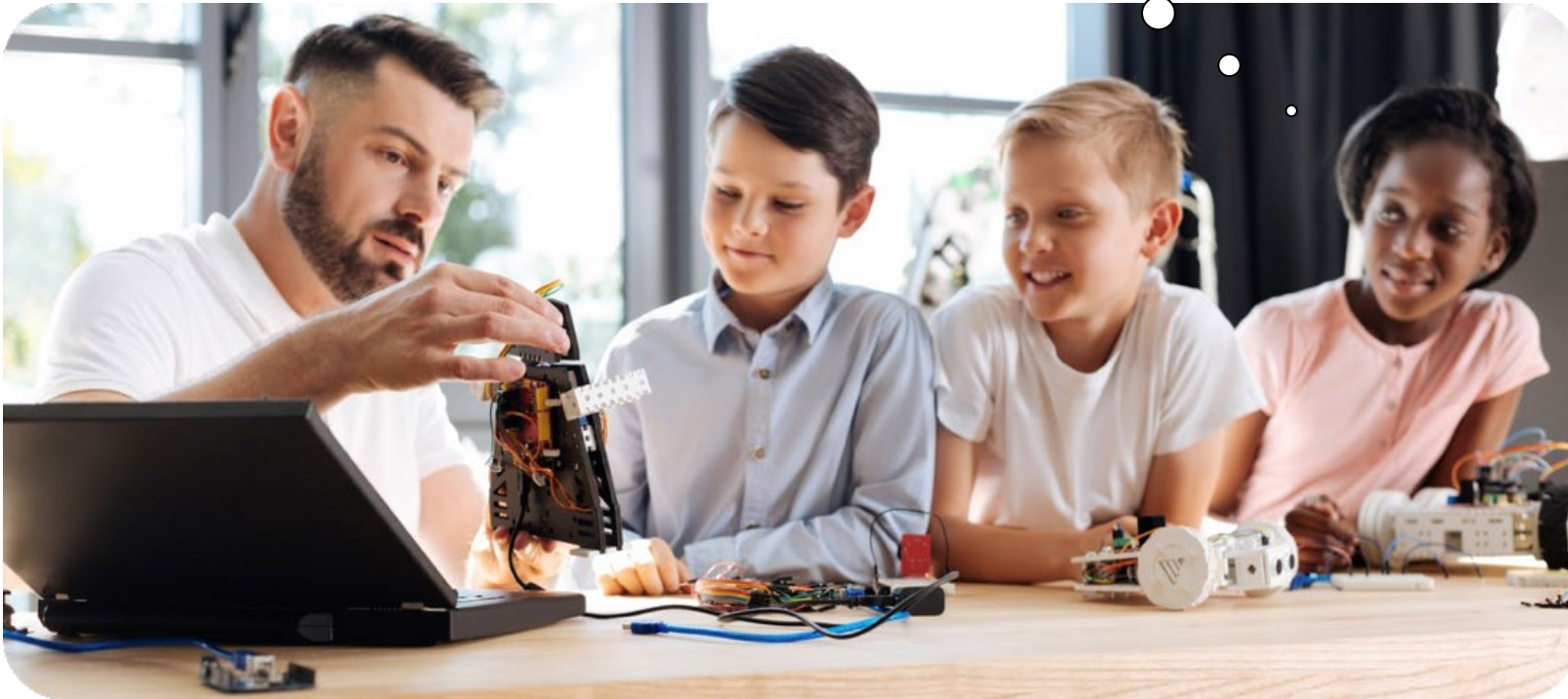


# STEREOTYPES

# NEGATIVE BELIEFS

“STEM is for boys.”

“I don't belong.”



# STEREOTYPES

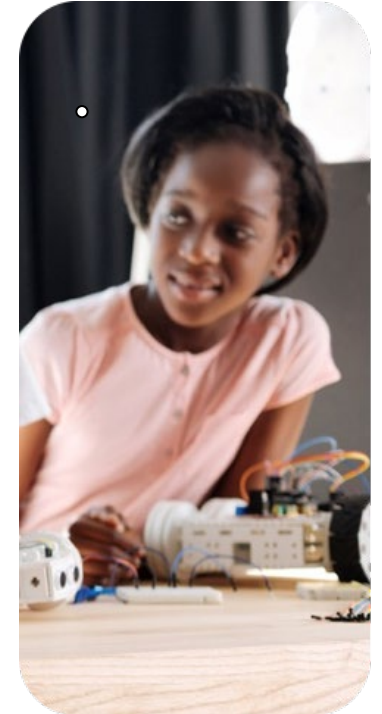
# NEGATIVE BELIEFS

# OUTCOMES

“STEM is for boys.”

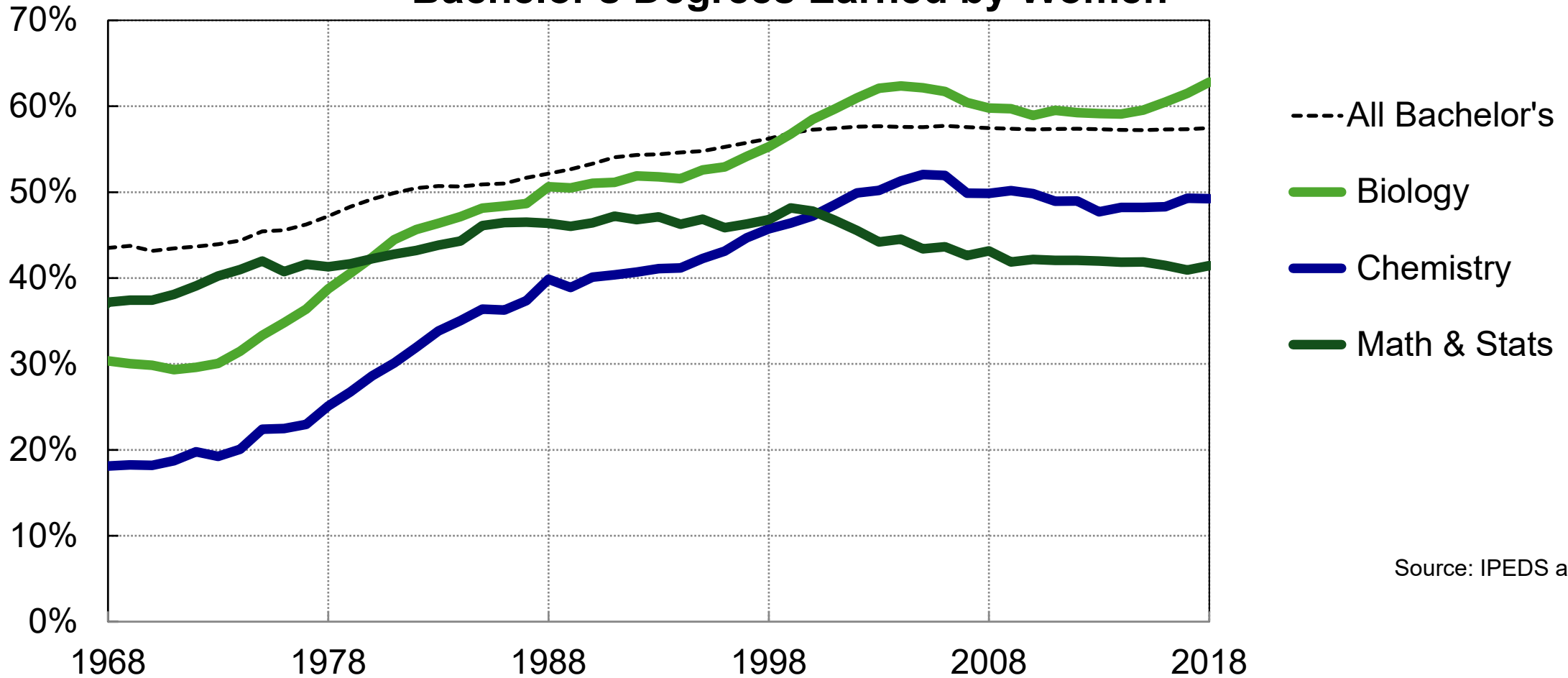
“I don't belong.”

Not interested  
Choose other courses



# Largest disparities in CS/ENG

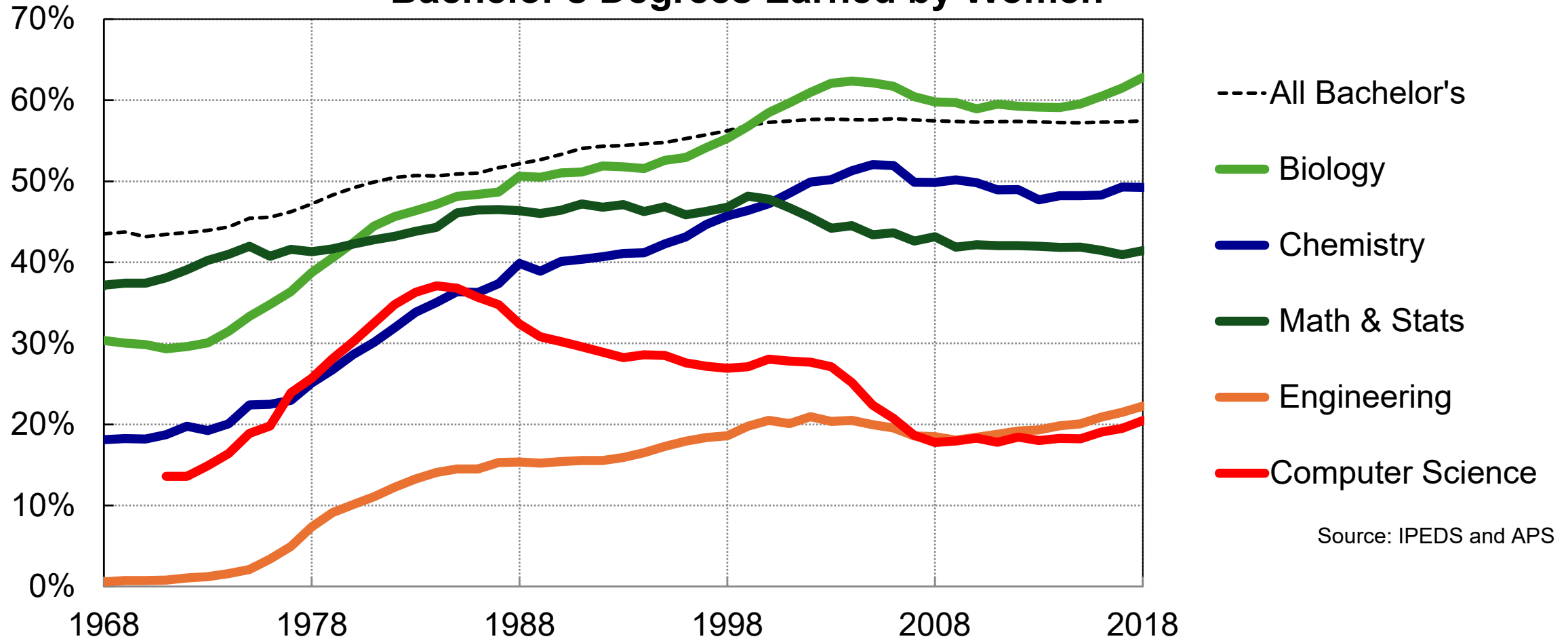
## Bachelor's Degrees Earned by Women



Source: IPEDS and APS

# Largest disparities in CS/ENG

## Bachelor's Degrees Earned by Women

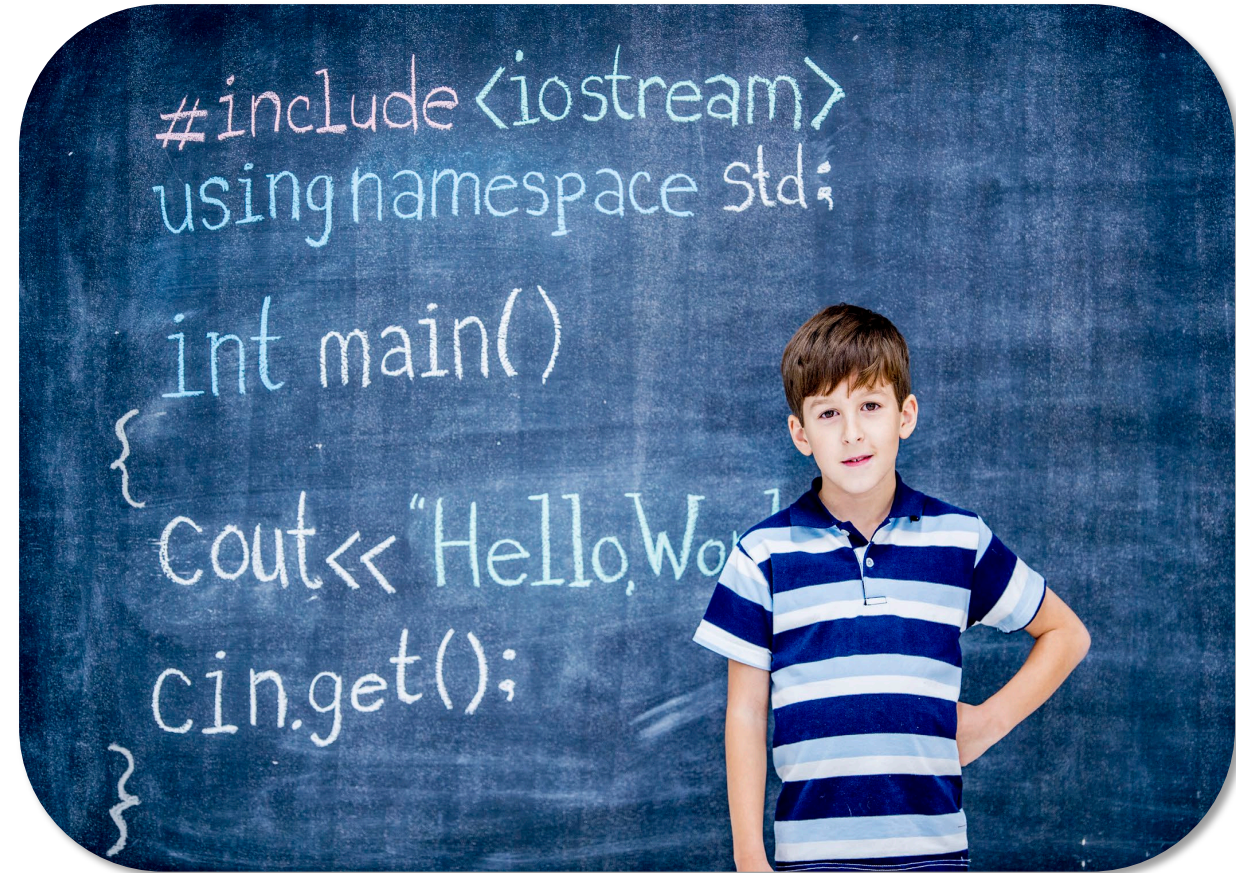


Source: IPEDS and APS

# Gender Gaps in STEM



# Gender Gaps in STEM



# Stereotypes push girls away



# Stereotypes push girls away



2020-05-31 10:08:03

# Stereotypes push girls away

How many 8-9-year-old girls avoid stereotyped STEM activity? **65%**

How many middle school girls avoid stereotyped STEM course?  
**80%**



# Differences by STEM Field in Elementary School



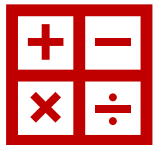
Engineering: Stereotypes favor boys by 1<sup>st</sup> grade



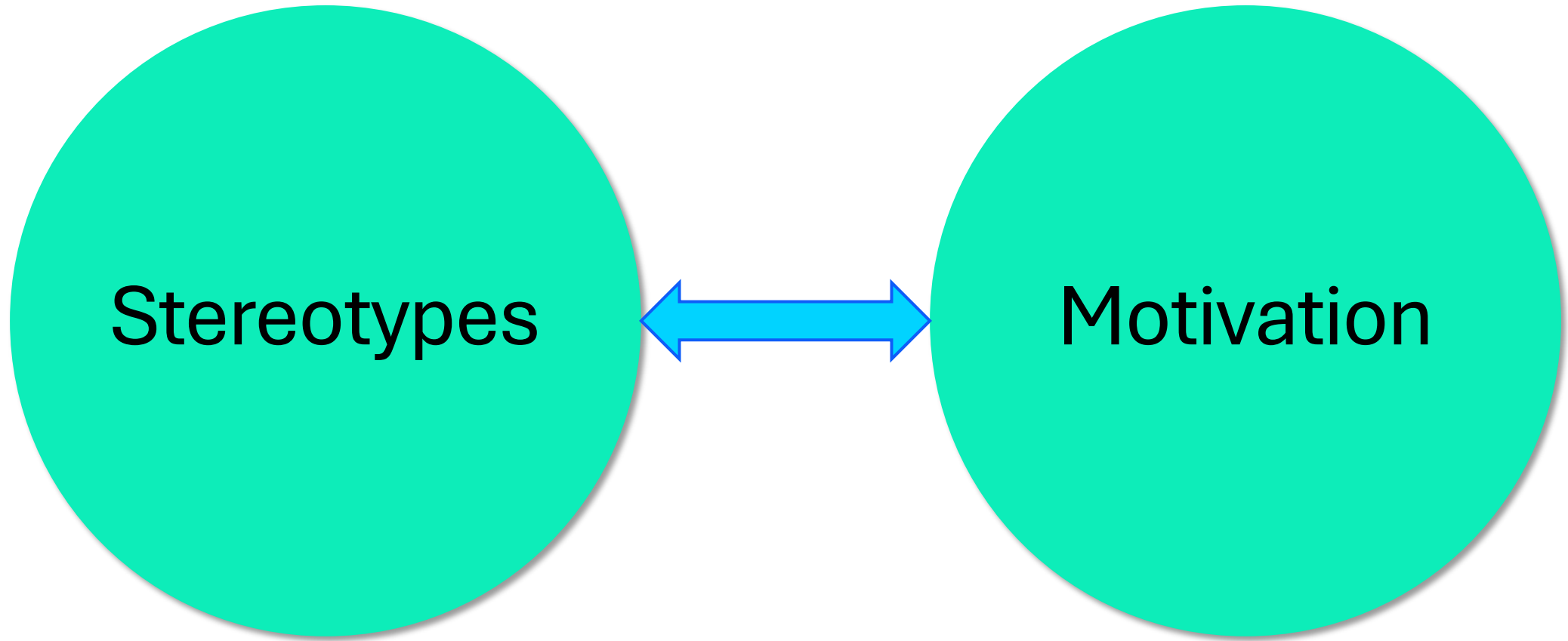
Computer science: Stereotypes favor boys by 3<sup>rd</sup> grade

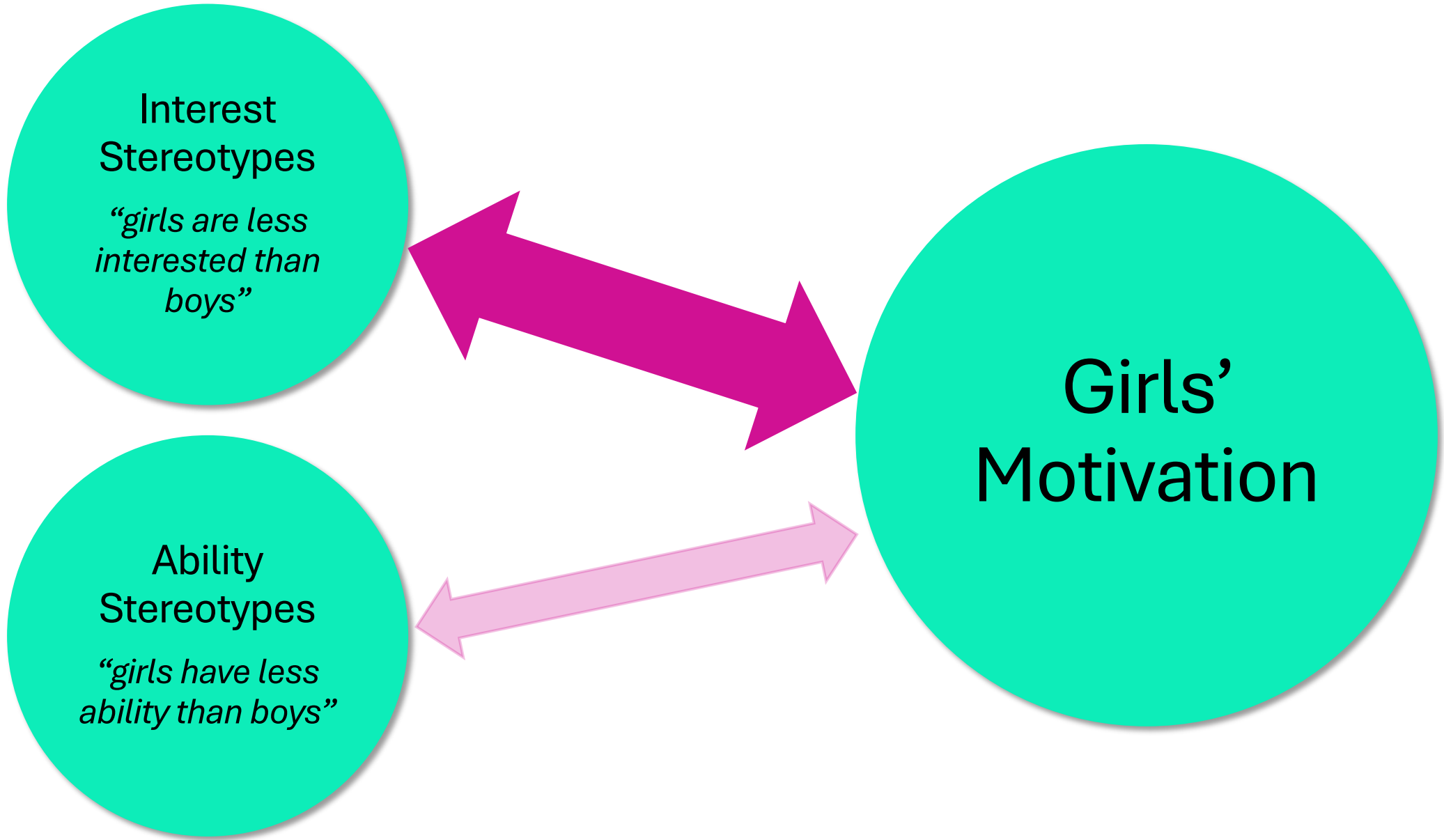


Science: Stereotypes are neutral



Math: Stereotypes are neutral or favor girls





**Interest  
Stereotypes**

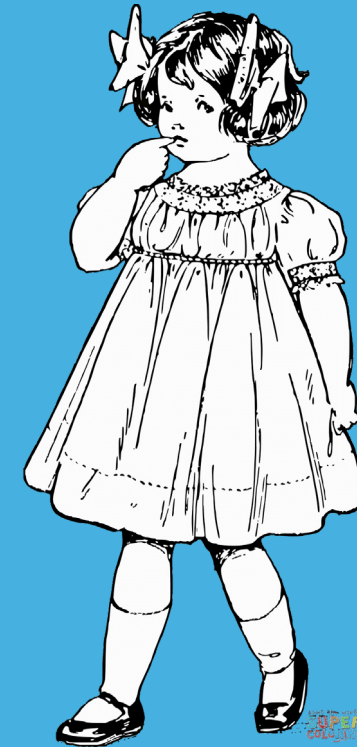
*“girls are less  
interested than  
boys”*

**Ability  
Stereotypes**

*“girls have less  
ability than boys”*

**Girls'  
Motivation**

I can, but I don't want to.

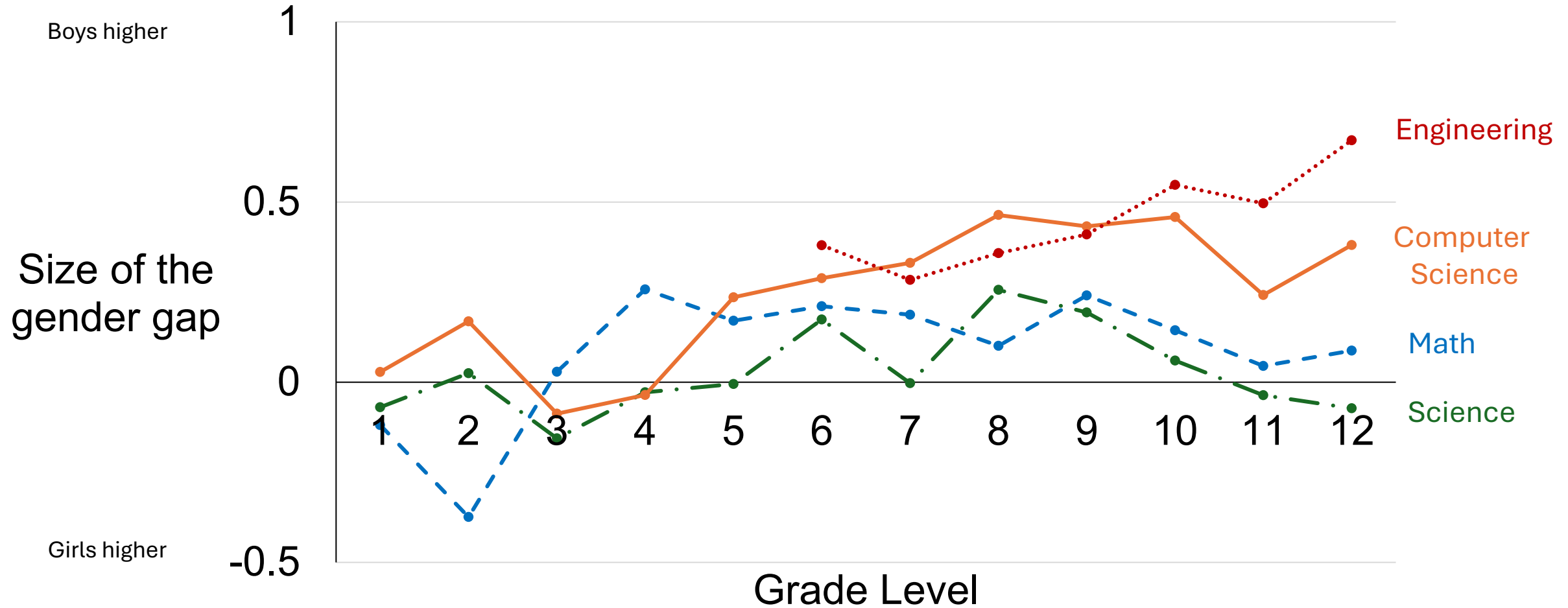


# “I don’t belong”



Credit: Marley Allen-Ash

# Gender Gaps in Belonging



Gaps in belonging start in middle school and are largest in computer science and engineering.

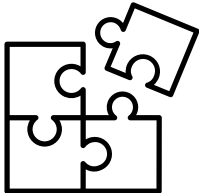
# What if these stereotypes are true?



Generally not true for young children

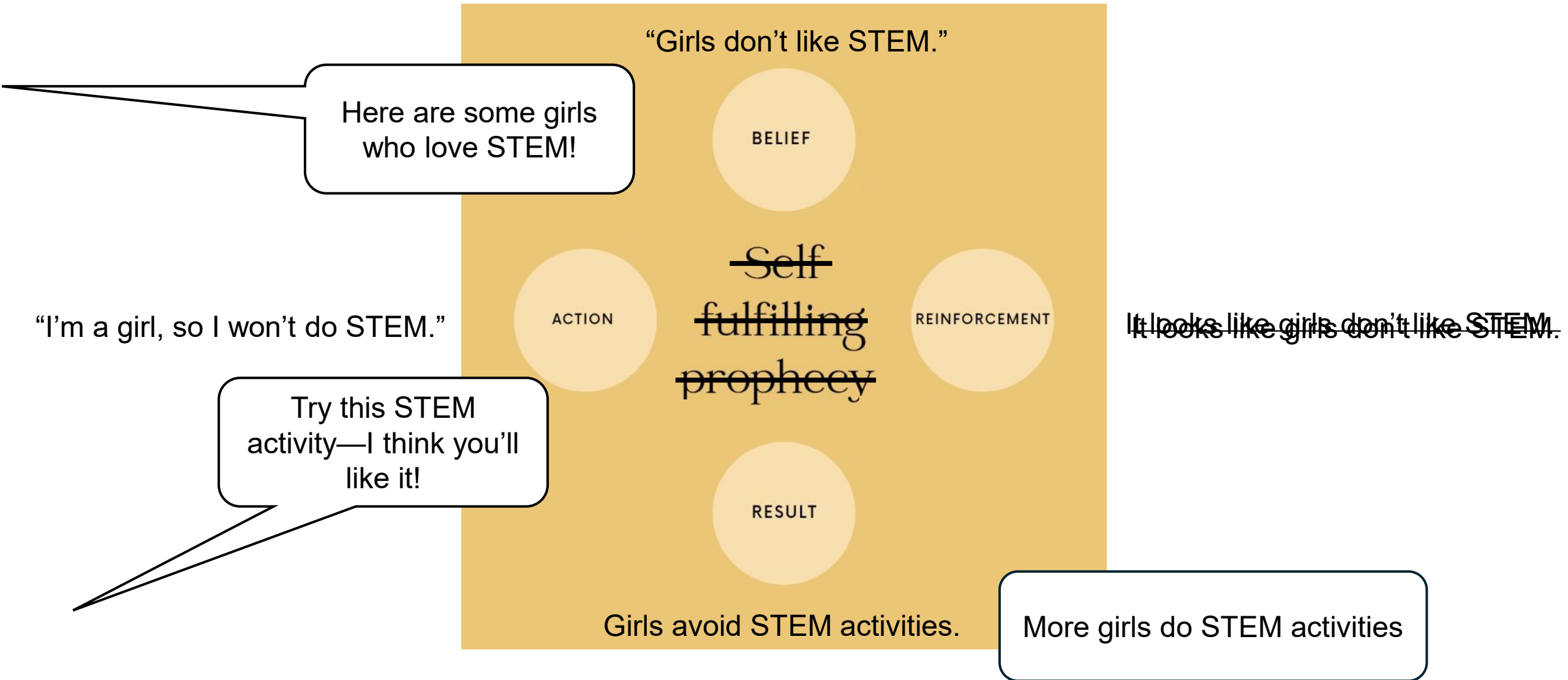


Should never limit opportunities



Even if true on average, can be harmful for individuals

# We can stop self-fulfilling prophecies



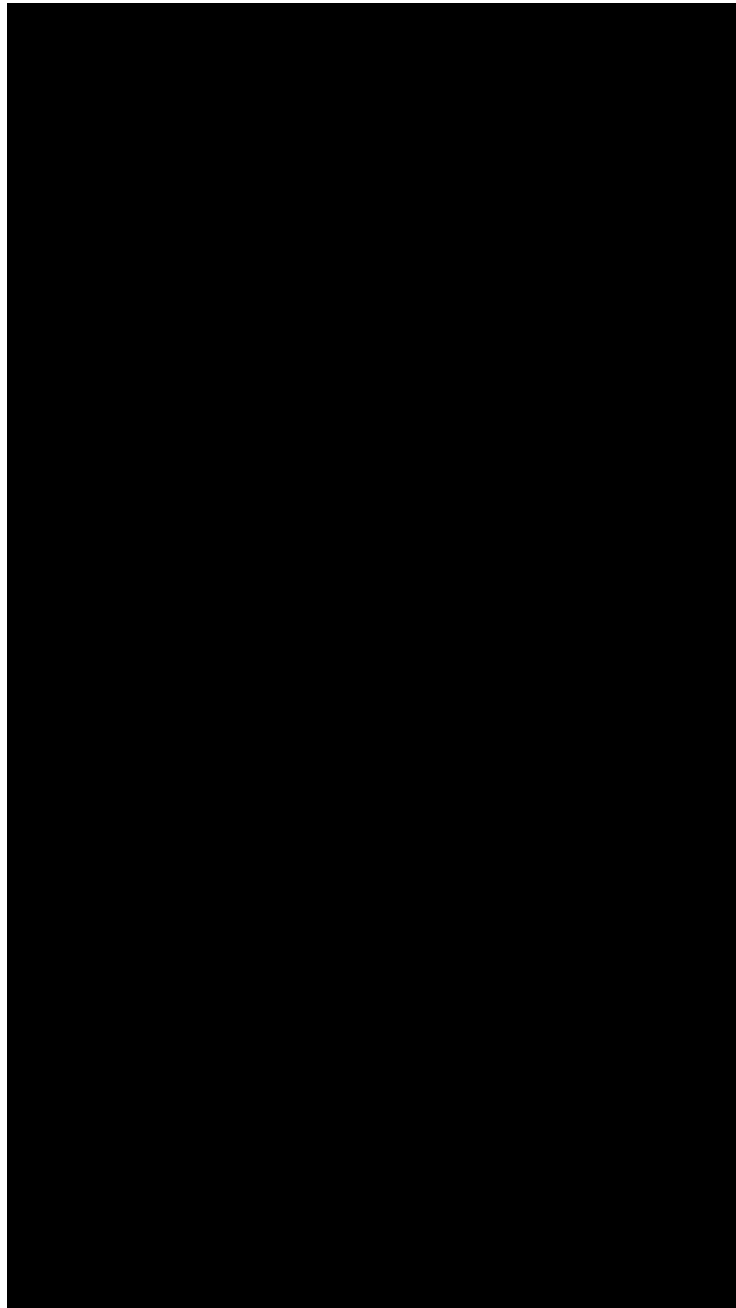
# Breaking the Cycle

Videos with testimonials from girls

- **Interest** video: what they enjoyed about computer science
- **Ability** video: their success in computer science
- **Comparison group**: no video

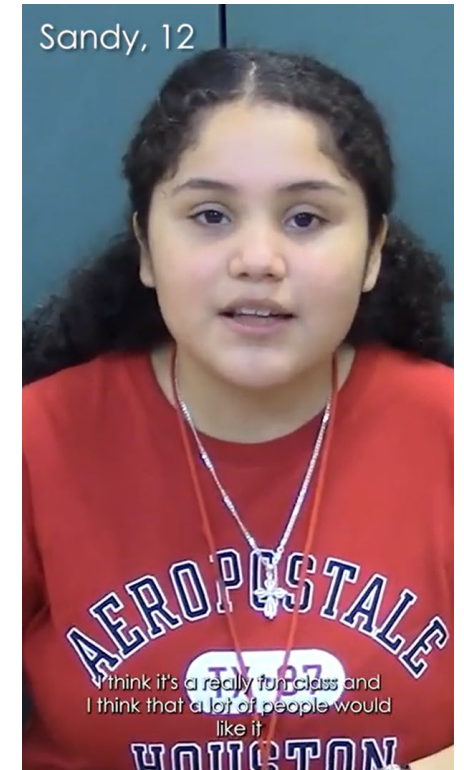
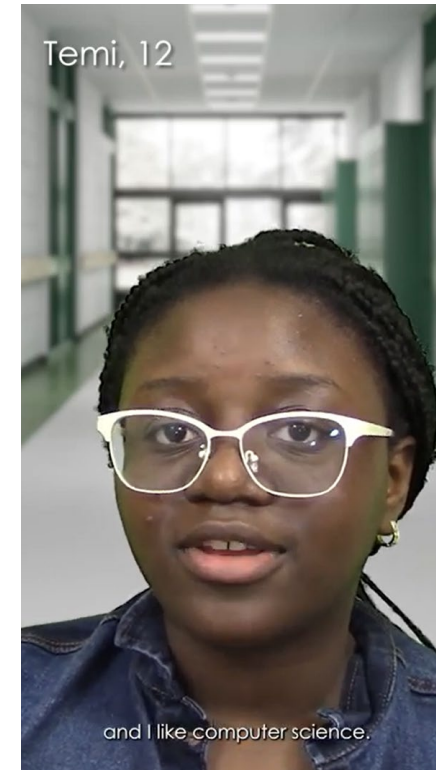
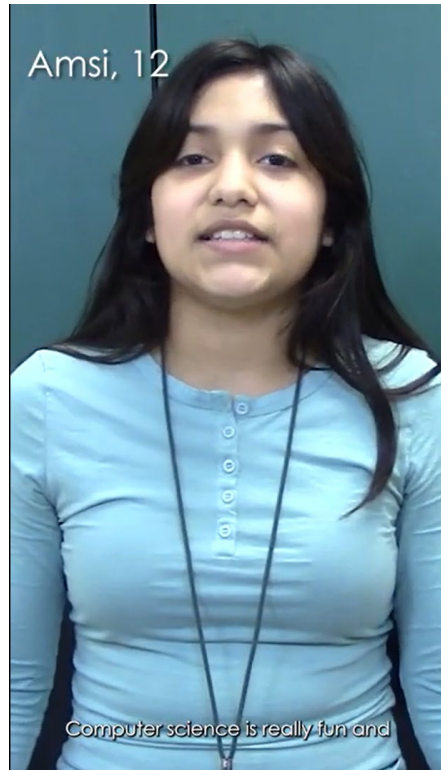


# Interest Video



# Interest Video Quotes

Full Video:



# Ability Video Quotes

Full Video:



# Breaking the Cycle

- 260 sixth graders saw interest video, ability video, or no video
- Both videos made **girls more interested** in taking coding
  - Among students who did not see video, boys were more interested than girls
  - Among students who saw a video, no gender gap
- Videos also made **girls feel more like they belonged** in the class

# Breaking the Cycle: Course Choice

- Girls were **3x\*** as likely to pick coding as primary choice for elective: **20% Interest/Ability** vs. 6% Comparison
- Girls were **2x\*** as likely to enroll: **30% Interest/Ability** vs. 15% Comparison

# How can educators break the cycle?

Challenge stereotypes



Do you think that's  
fair?

Why can't girls be  
scientists?

Keep asking why!

# How can educators break the cycle?

## Early positive experiences



# How can educators break the cycle?

**Early positive experiences** can change stereotypes



# How can educators break the cycle?

Make STEM **social**



Photo from Girls Who Code

# How can educators break the cycle?

Make STEM **helpful**



# How can educators break the cycle?

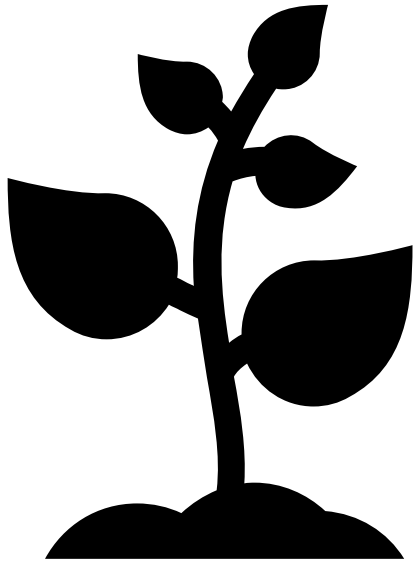
Find positive, relatable **role models**



Photo from Dr. Colleen Lewis

# How can educators break the cycle?

Teach **growth mindsets**



Let's see what you could learn and do better next time!

Mistakes are a part of learning and I can try again

# How can educators break the cycle?

## Changing **environments** and **representation**



# How can educators break the cycle?

**Think** before you speak

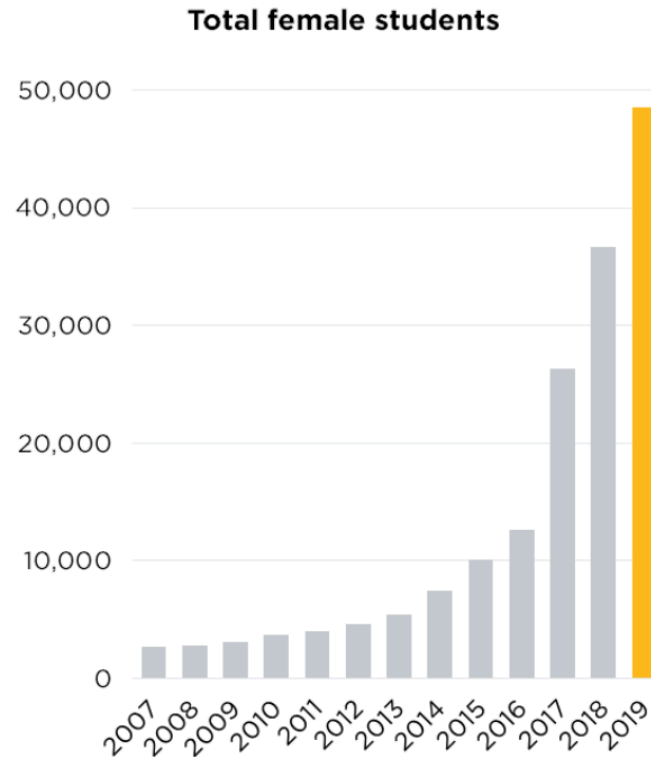
Girls are just as good as boys at math!

If that's true, why did she have to say it?



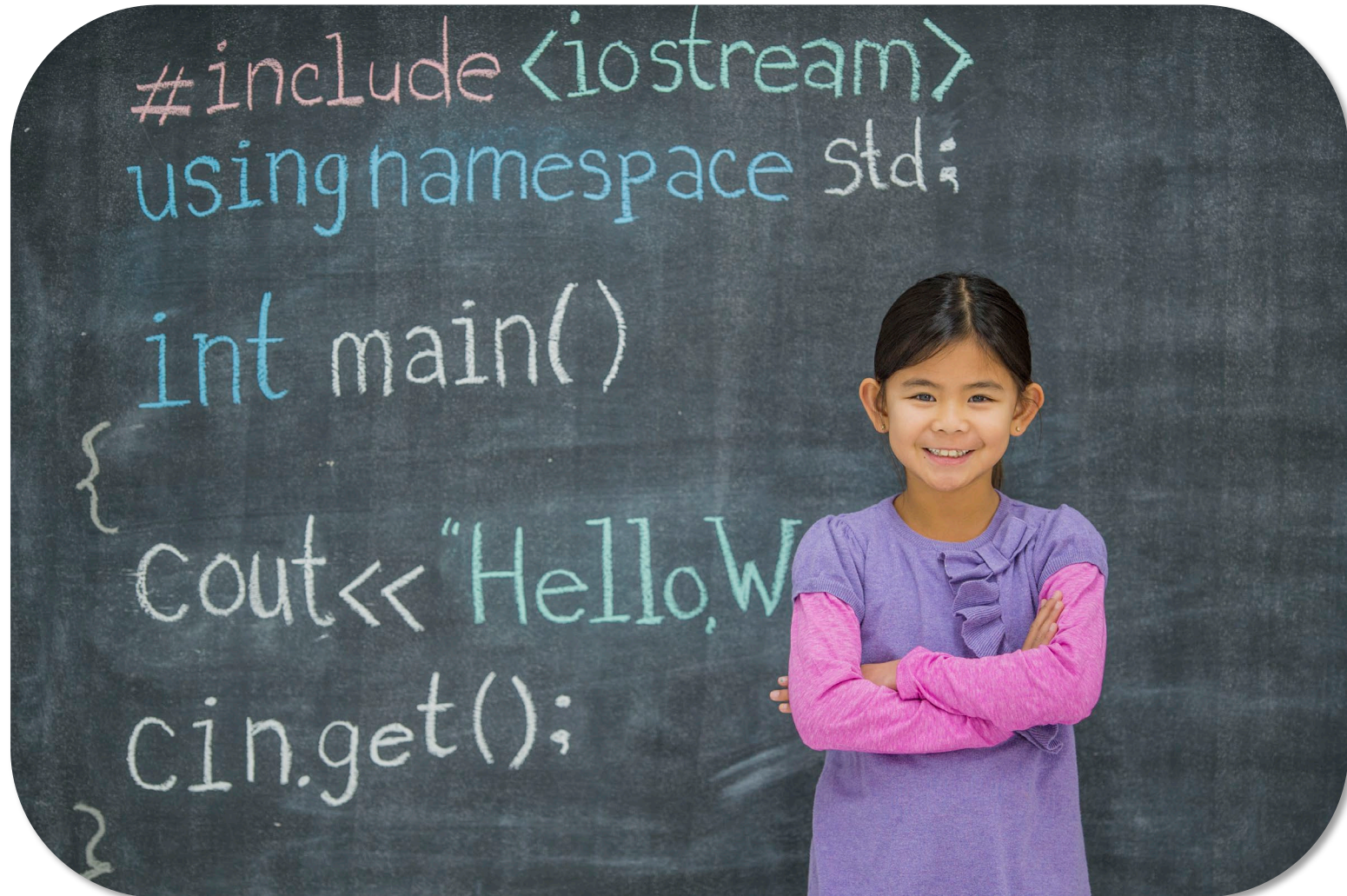
# How can educators break the cycle?

Emphasize girls' **growing interest** in computer science classes



Participation in AP computer science

STEM is everywhere, for everyone!



# To learn more about our research:

Lab website: <https://uh.edu/education/iamlab/>

Social media: @allisonmaster.bsky.social

