

# **Lilly Conference: Teaching for Active and Engaged Learning San Diego, CA**

## **Reducing Academic Anxiety Using a Mindfulness and Growth Mindset Approach**



**Tashana S. Samuel, Ph.D.**  
Principal Investigator  
Assistant Professor, Psychology  
Guttman Community College,  
City University of New York

**Sebastien Buttet, Ph.D.**  
Co-Principal Investigator  
Associate Professor, Economics  
Guttman Community College,  
City University of New York

**43% three-year graduation rate**



## Quick Facts about Guttman Community College

**Experiential learning and  
using New York City as a Lab**

**955 students**



**53 full-time faculty  
21 part-time faculty**

**69% of population 18 or under**

**91% minority students**

**Hispanic Serving Institution (HSI)**

**Across the street from Bryant Park**

Mindfulness

# Mindfulness

Is the intense non-judgmental attention, and focus on the present moment. It involves:

- awareness of bodily sensations (e.g. heart rate, sweating, breathing)
- deep breathing and meditation

# Mindfulness & Deep Breathing Exercise

## Breathe In:

Pretend you are smelling  
a flower

## Breathe Out:

Pretend you are blowing  
on a leaf



Breathe in

# **Mindfulness and Growth Mindset Research at Guttman Community College**





# Math Anxiety and the College Student

**math anxiety:** negative emotions associated with solving math problems (Richardson & Suinn, 1972)

In US, many students (from elementary school to college) suffer from math anxiety (Luttenberg, 2018)

Math anxiety could lead to

- Loss of interest in math classes
- Poor exam grades
- Withdrawals from courses mid-semester
- Poor or failing course grades
- Loss of interest in STEM disciplines

Beilock & Maloney, 2015



# Research: Mindfulness and Growth Mindset Approach (MAGMA) in the Classroom

- Addressing math anxiety is an EDI and social justice issue
- Based on successful pilot-tested mixed-methods study conducted in a year-long statistics class (Samuel & Warner, 2019)
- Significant math anxiety reduction over the course of the year, and math self-efficacy increase in statistics
- Current project is replication of research on a larger scale



**Samuel, T., & Warner, J. (2019). I can math!: reducing math anxiety and increasing math self-efficacy using a mindfulness and growth mindset-based intervention in first-year students. *Community College Journal for Research and Practice*.**

# Math Anxiety & Cognitive Processing: Neuropsychological Research (Lyons & Beilock, 2012)

**Interesting fact:** Math anxiety “hurts.” Same brain region activated during pain is also activated when a HMA person is anticipating a math situation

**Recommendation:** design interventions that will alleviate negative rumination during anticipation phase



**anticipation anxiety:**  
situational factors that induce negative thoughts and emotions in anticipation of a math situation

**Bilateral dorsal-posterior insula**

**execution anxiety:**  
anxiety associated when students are working on math problems

**Right caudate + left hippocampal regions**

# Combined Psychological Intervention Embedded in Classroom

## Mindfulness

(Thich Nhat Hanh; Kabat-Zinn, 2013)

non-judgmental focus on the  
present moment

+

deep breathing/meditation



## Growth Mindset

(Dweck, 2007)

Intelligence is not fixed; skills can  
be developed through effort,  
perseverance, openness to  
feedback, AND supportive  
behaviors from professors

# Math Anxiety Reduction Research at Guttman: Fall 2019 Semester

## Participants

- Faculty ( $n = 5$ )
- STEM Courses ( $n = 4$ : multiple sections)
  - Statistics
  - Quantitative Reasoning
  - Introduction to Business
  - Macroeconomics
- Students ( $n = 153$ )
- Intervention Groups vs. Control Groups
- Faculty participated in 8-hour PD workshop

# **Mindfulness and Growth Mindset Approach (MAGMA)**



# Mindfulness and Growth Mindset Approach (MAGMA): Procedure

## Pre-Intervention (1st day of classes)

Surveys:  
1. Math Anxiety  
(AMAS)  
2. Math Self-Efficacy  
(MSES)

## Intervention

### Start of each class (AA):

**Instructor & students:**  
Chime/1-minute deep  
breathing exercise

**Instructor & students:**  
5 positive affirmations  
about math\*

### During each class (EA):

**Instructor:**  
Emphasize EFFORT,  
reframe negative comments  
about math  
and ways they can help  
+  
Reminders to be engaged,  
and focus on the present  
task  
+  
NO RED PENS

## Post-Intervention (last week of classes)

Surveys:  
1. Math Anxiety  
(AMAS)  
2. Math Self-Efficacy  
(MSES)

Focus Group Interview:  
Students

Focus Group Interview:  
Faculty

Resource  
cards  
distributed  
to students  
mid-  
semester\*

Surveys:  
1. Math Anxiety (AMAS)  
2. Math Self-Efficacy  
(MSES)

## Control/No Intervention

Surveys:  
1. Math Anxiety (AMAS)  
2. Math Self-Efficacy  
(MSES)

Mindful Deep Breathing (1-minute)

# The Power of Words:

## Growth Mindset Affirmations

(developed by Tashana Samuel, Ph.D., & Jared Warner, Ph.D.)

- Professor (Samuel) believes I can understand today's lesson
- I am capable of understanding math
- Today's lesson might be challenging, but I'm up for the challenge
- I expect to make mistakes today, and then learn from those mistakes
- Math is beautiful/magical when I see how it all fits together

# Results

# Assessments (mixed methods)

## Quantitative data

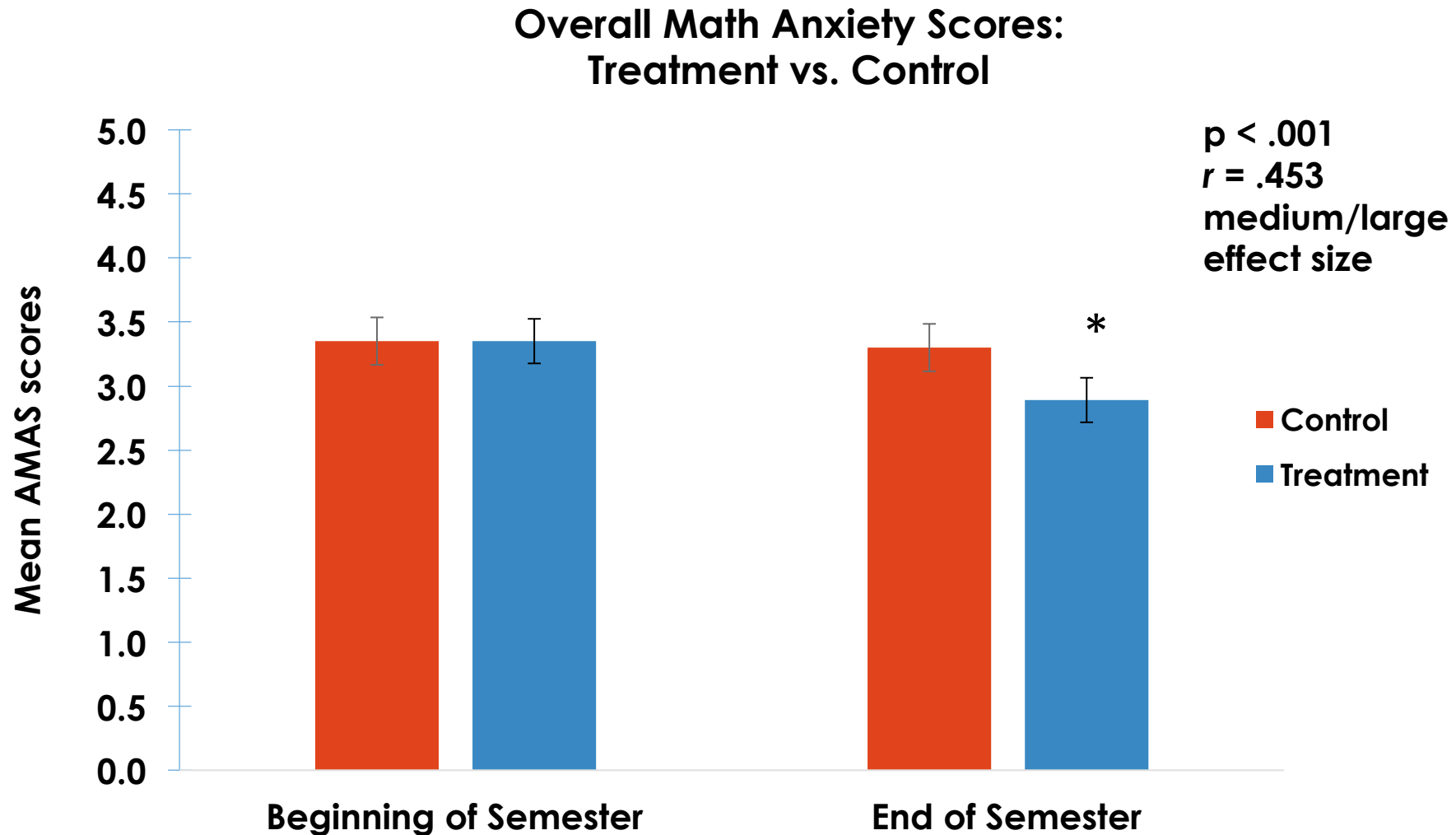
- Pre- and post- Math Anxiety survey (AMAS)/pre-post

## Qualitative data

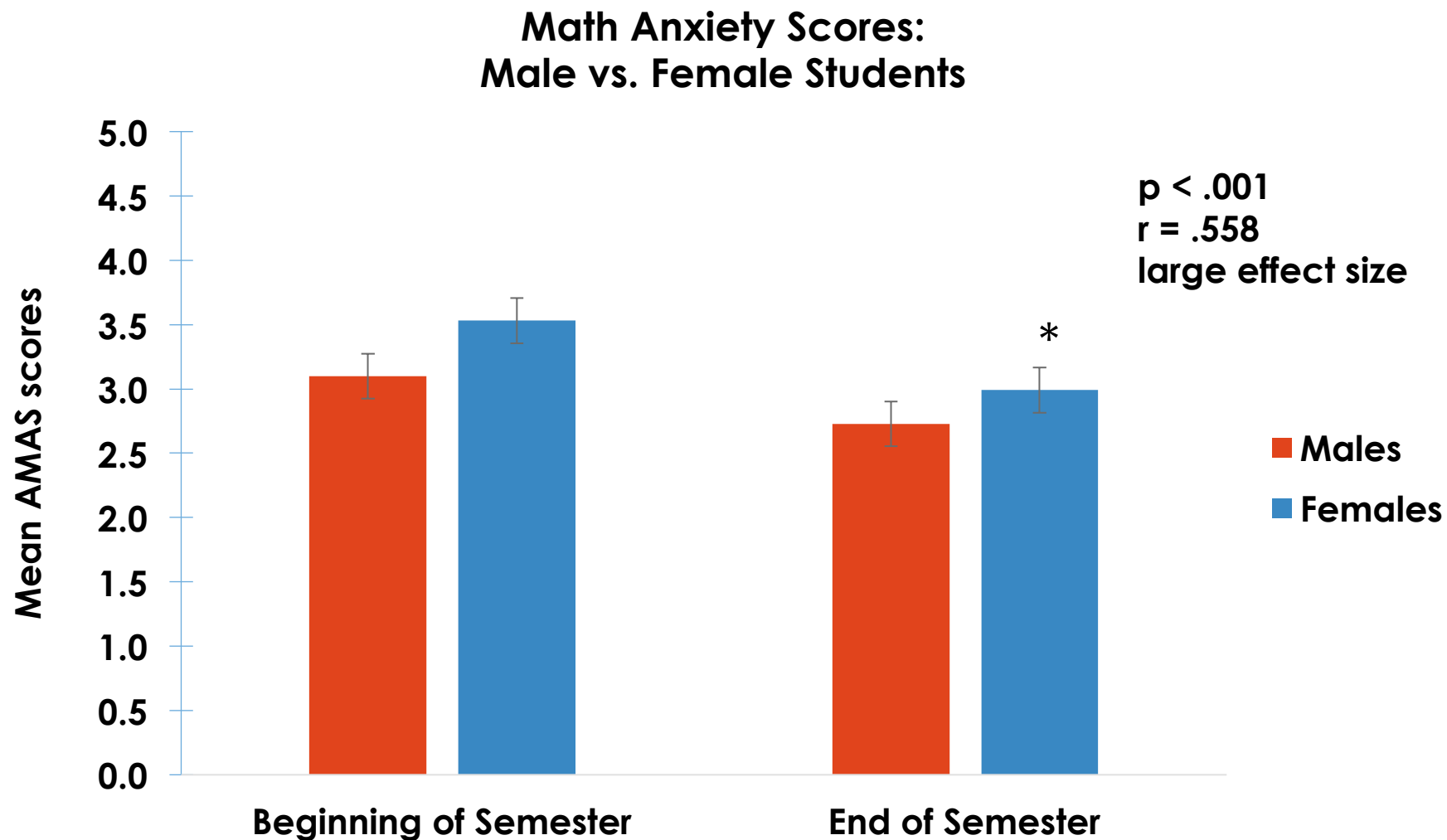
- Student focus group interview
- Faculty focus group interview



# overall **reduction** in math anxiety

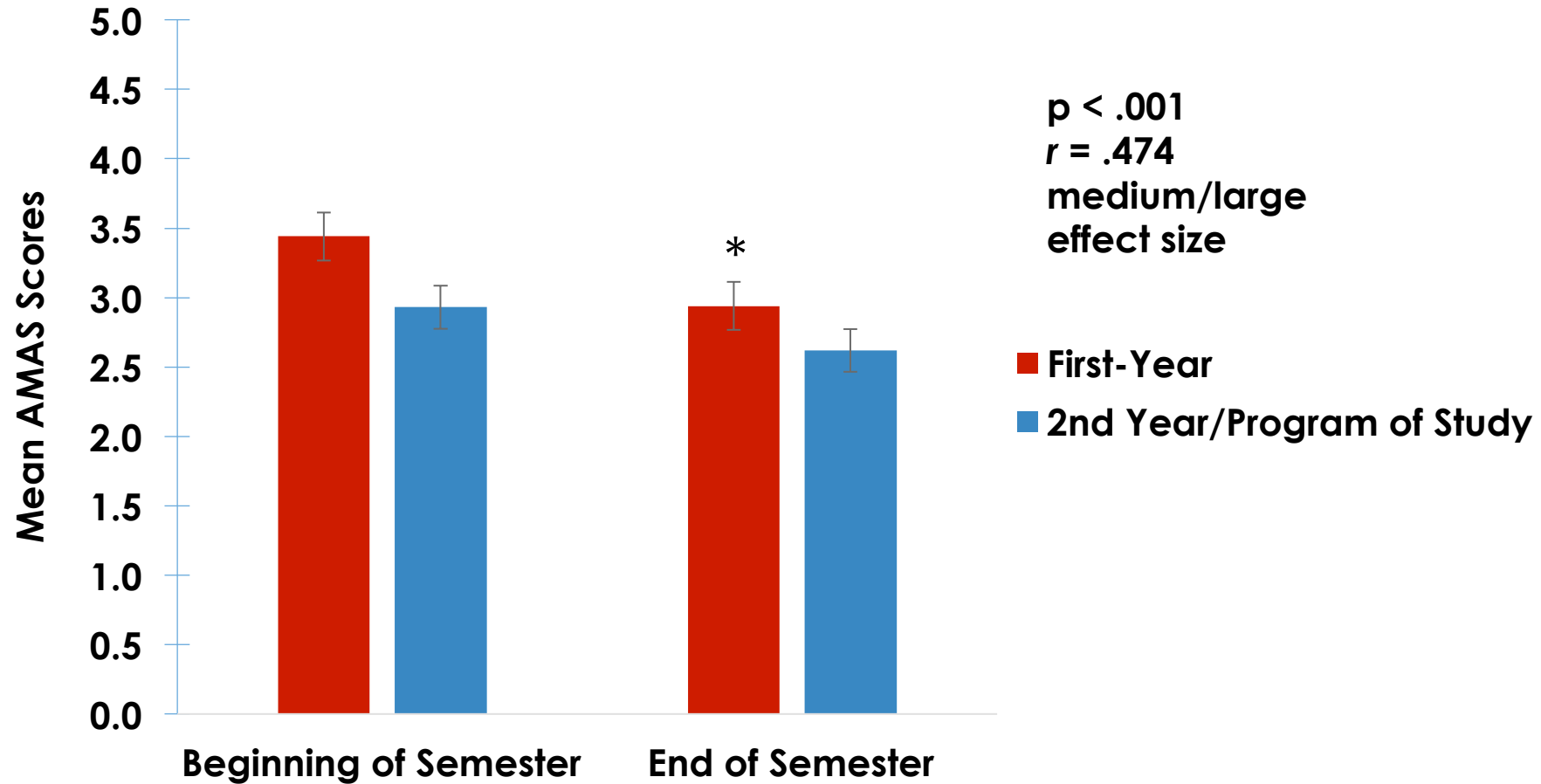


# math anxiety **reduction** in female students



# math anxiety **reduction** in 1<sup>st</sup> year students

Math Anxiety Scores:  
First-Year vs. Program of Study Students



# Preliminary Qualitative Data: Student Quotes

“It has actually helped quite a bit because when I started I just had so much anxiety, and it’s easier to manage and get through and remembering that learning happens when you make mistakes.”

“It’s very calming to do the deep breathing...especially on those stressful days. I found it to be useful, I wish more students could participate in this.”

“I also say positive statements outside of class...at work. I change some of the wording but it has helped me to be patient.”

# Preliminary Qualitative Data: Faculty Quotes

“For my [more challenging class] I’ve found myself taking deep breaths in the stairwell on my way going down to the class, and so that was helpful for me. I just think it came to be like another tool in my arsenal of things to use. I never felt it was a tool to control students...it was never about that. It was a good way for them to kind of settle and relax. And it also made them feel like I was concerned about their health because I was making sure that they didn’t get too stressed out about making mistakes...it helped me develop another dimension of my relationship with students.”



# more faculty qualitative data...

“I actually thought that even the people who didn't participate...I just think them being in the classroom, hearing it...some of them said they didn't want to be there during that part. I said, ‘well, you don't have to participate, just wait for the minute or two. And then I felt like that was probably good for more reasons because they're at least hearing them, seeing them even though they don't want to say them. I just feel it's highly probable that the intervention did have an impact. No matter if the student was participating or not.”

# Next Steps and Takeaways

## Next steps

-to address reading and writing anxiety in students taking English/writing intensive courses

## Takeaways

- Math anxiety/academic anxiety is a debilitating problem for many college students
- A culture of care in the classroom is necessary for reducing academic anxiety
- The mindfulness and growth mindset approach (MAGMA) appears to be effective in reducing math anxiety in “vulnerable” students over the course of the semester
  - Females
  - 1<sup>st</sup> year students