

**"FAIL is not a four letter word:  
Why success is more likely  
when you're willing to fail"**

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March 9, 2020

## **K-Club**

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# Survey Drawing

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# 10<sup>th</sup> Annual Southeastern Pediatric Research Conference

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- Abstracts due this Friday, March 13<sup>th</sup> at 1pm
- Abstracts used at other conferences may be submitted
- Limited space available for poster presentations; 6 abstracts will be selected for oral presentations



# March K-Club – Introduction

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*Introduction by-*  
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← **Jen Heemstra**  
5,036 Tweets



⋮ 🔔 Following

**Jen Heemstra**  
@jenheemstra

Assoc Prof @EmoryChem, proud member of @HeemstraLab. Working to grow leaders, fight inequity, embrace failure...and make the world a better place. Tweets mine.

📍 Atlanta, GA she/her 🔗 [...gsthatchangethewayithink.blogspot.com](https://www.gsthatchangethewayithink.blogspot.com)  
📅 Joined July 2014

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# *A conversation I have often*

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**Me:** We started an education and psychology research project, and it's really fun, but it also terrifies me.

**Colleague:** Why is that?

**Me:** Because these topics are all new to me, and we launched it as a nationwide network, and *I'm terrified that we'll fail.*

**Colleague:** Well, what's your research project about?

**Me:** Overcoming fear of failure.

***Your turn to participate!***

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*text JENHEEMSTRA693 to 22333  
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**In 1 word, what is an area of your life where  
you are afraid of failing?**

# *What makes this possible?*



# Why study failure?

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- As researchers, **we** know that failure is:
  - painful
  - unavoidable
  - can be a key step on the path to success
- Leveraging failure toward success requires **perseverance** and **resilience**  
– the willingness to try again and do so effectively
- This raises the questions:
  - how and when do **students** acquire these skills?
  - **how can we help** students in our courses cultivate these skills?

# *We already know how to fail*



I learned all about failure by playing golf.

Anyone else?

How about mini golf?

# What do we do when failure is likely?



We're always hoping for a "hole in one" but sometimes that seems impossible. What do we do?

- Plan out what we think is the best option
- Execute that plan to our best ability
- If successful, celebrate our victory
- If unsuccessful...
  - ~~throw our putter into the bushes and go home~~
  - reassess the situation and keep trying, even though the "failure" will be on our scorecard; learn so you can do better next time



**In 1 word, what is an area of your life where  
you are comfortable with failure?**

# *Yes, but...that's golf and this is my career*



- It can feel easier to push ahead despite possible failure when the thing we're doing is "for fun"
- The stakes are much higher when we think about failing at work
- However, if we are afraid to fail, then we might:
  - avoid setting up an important experiment
  - subtly sabotage the experiment so that we have an excuse when it doesn't work
  - avoid seeking out help and advice
  - be more likely to "throw the reaction into the waste container and go home" instead of trying again

**So, what can we do about this as researchers and educators?**

# A career changing conversation (of many)

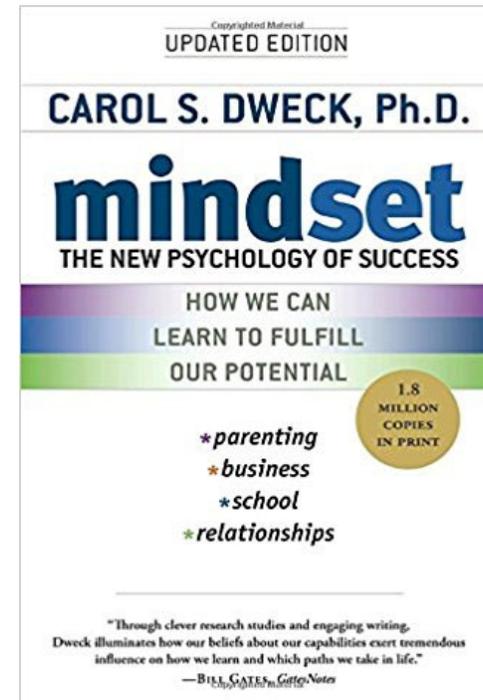


**My PhD advisor:** Have you read this book *Mindset* by Carol Dweck?

**Me:** No, what is it about?

**My PhD advisor:** That how you view your abilities can determine your success.

**Me:** Whoa. Sounds like I should read that.



The “can’t not”:

- Fixed mindset creates fear of failure, and fear of failure can lead us to self-sabotage so that we have an excuse when things don’t work
- **What does that look like when we work in an industry where we face the possibility of failure every day?**

# *A shift in professional development*



## **Heemstra Group Retreat, August 9-12, Park City, UT**

### **Sun, Aug 9**

- 3:00 pm arrive
- 4:00-6:00 pm hiking or other activity
- 6:00 pm dinner
- 7:00-8:00pm opening remarks (Jen)

### **Mon, Aug 10**

- 7:30-8:30am breakfast
- 8:30-10:00 am Fear of failure and the power of hard work (Mindset book discussion)
- 10:00-10:15 am break
- 10:15-12:00 pm breakout session I – Troubleshooting short term challenges (led by Amber)

# What is mindset?

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Research by the Dweck group shows that our implicit theory of intelligence (“mindset”) can significantly impact our success

**Fixed Mindset:** Your basic qualities such as intelligence and talent are traits that are set. Talent and intelligence alone create success. You are driven by the desire to *appear* intelligent.

**Growth Mindset:** Intelligence and talent are just the starting point – you can develop in any ability through hard work. Thus, hard work leads to success. You are driven by the desire to *learn and improve*.

# What does this have to do with failure?

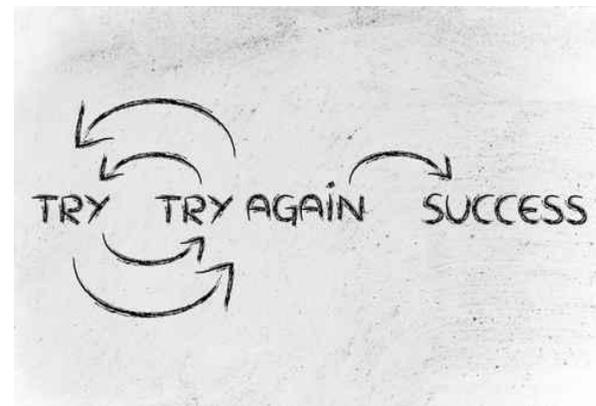
**Fixed Mindset:** You are more likely to avoid situations where failure is possible, as a failure delivers unwelcome (and unfixable) feedback about your talent level. *You do not have a productive path forward after a failure occurs.*

**Growth Mindset:** You are less afraid of new challenges, as a failure just indicates your current (not permanent) skill level. You are capable of overcoming short-term failure, as *you can envision a path to success through hard work and improvement.*

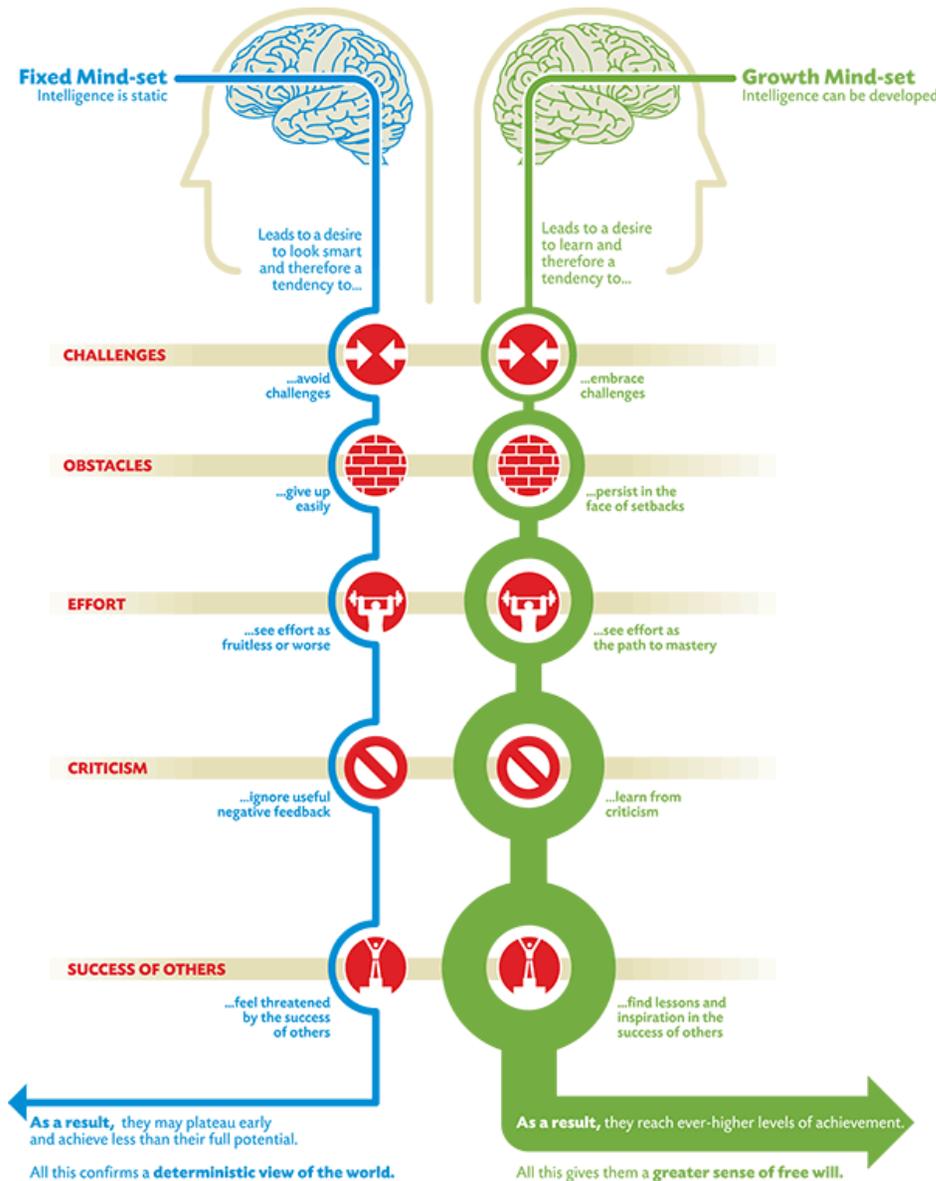


**FAILURE**

or



# It starts out small...



this seemingly small assumption that we make about our abilities can “snowball” into big outcomes

# *What happens when your experiment fails?*



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## Fixed mindset:

- you might not have tried the experiment in the first place
- you subconsciously do something wrong in the setup – now you have an excuse when it fails
- when you get bad result, you blame other people or external factors – they “ruined” your experiment
- you view trying again as fruitless
- but, might give it a halfhearted effort to keep advisor/professor happy

## Growth mindset:

- you acknowledge that experiment might not work
- you give your best effort to get things right
- when you get bad result, you view experiment as a challenge that you want to solve
- you view trying again as productive and fun because you believe hard work can (eventually) yield progress
- doesn't matter what others think, because you know you're giving your best

**Which of these pathways is more likely to lead to success in your research?**

# My classes need to hear this too

## The two mindsets

**Fixed:** Your basic qualities such as intelligence and talent are traits that are set. Talent and intelligence alone create success. You are driven by the desire to *appear* intelligent.

**Growth:** Intelligence and talent are just the starting point – you can develop in any ability through hard work. Thus, hard work leads to success. You are driven by the desire to *learn and improve*.

## What this might look like

"In this course, everybody studied. But there are different ways to study. Many students study like this: They read the textbook and their class notes. If the material is really hard, they read them again. Or they might try to memorize everything they can . . . If they did poorly on the test, they concluded that chemistry was not their subject. After all, 'I did everything possible, didn't I?'"

"The students with growth mindset completely took charge of their learning and motivation. Instead of plunging into unthinking memorization of the course material, they said: 'I looked for themes and underlying principles across lectures,' and 'I went over mistakes until I was certain I understood them.' They were studying to learn and not just to ace the test."

*Mindset by Carol Dweck*

## What does it look like when you don't do as well as you wanted to on a test?

### Fixed mindset:

- you are embarrassed by your failure
- you decide that this subject is not something you're "good at"
- you view studying as fruitless, and worse, a reminder of your lack of skill for the subject
- you have very little motivation to try to do better
- you either drop out of the course/subject or you start cheating

### Growth mindset:

- you recognize that you did not do as well as you wanted
- you decide that you can do better if you work harder or differently
- you seek out help from peers or instructor
- frustrating moments become exciting challenges to be overcome
- you work hard and will very likely see consistent improvement

## Fear of failure

- "Fear of trying and failing . . . If you go to an audition and don't really try, if you're not really prepared, if you didn't work as hard as you could have and you didn't win, you have an excuse . . . *Nothing is harder than saying 'I gave it my all and it wasn't good enough.'*"  
-Carol Dweck
- "If you aren't experiencing failure, then you are making a far worse mistake: You are being driven by the desire to avoid it"  
-Ed Catmull
- they "never believed that a failed approach meant that they had failed. Instead, they saw that each idea led them a bit closer to finding the better option."  
-Ed Catmull
- *Trying to avoid short term failure makes you more likely to fail in the long term*
- *The fixed mindset provides no path forward from failure, the growth mindset does*

## One of my stories . . .

In 8<sup>th</sup> grade, I was told by my teacher that I was "not skilled at science." This killed any enthusiasm I had for science. Fortunately, through a series of coincidences, I became involved in science olympiad in high school, where our teacher taught us that anyone can be a good scientist



## What if?

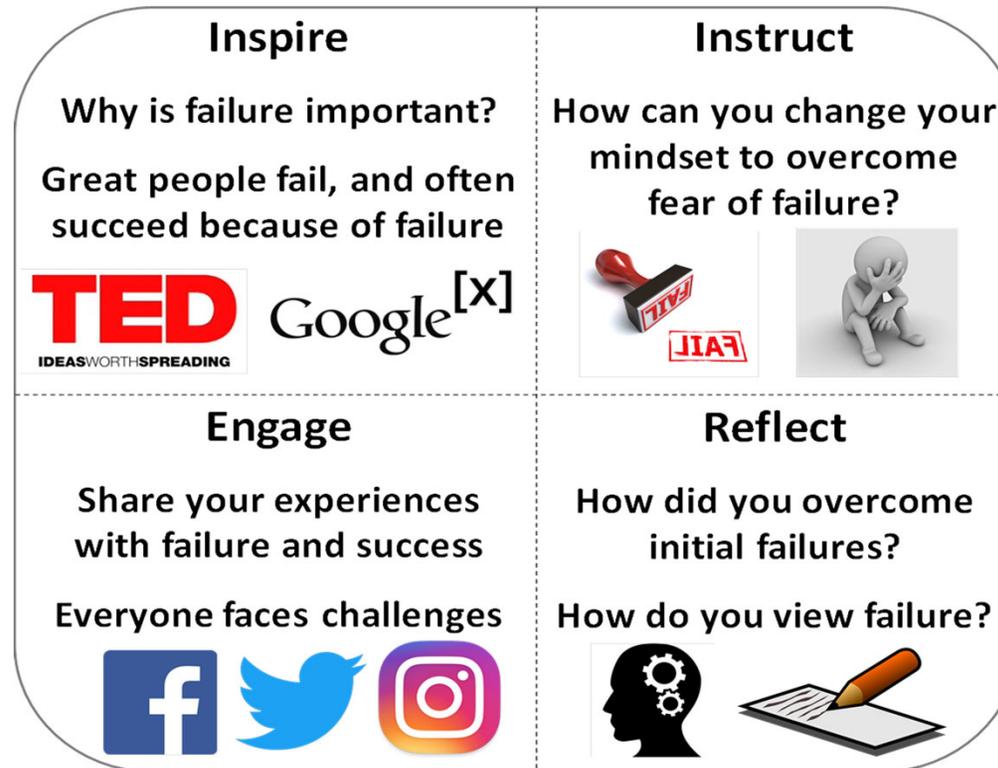
What would it look like if we each pushed ourselves to:

- be unafraid of failure and push bravely ahead, giving your best effort
- be excited to take on new challenges, knowing that these provide you the opportunity to grow and learn new things
- be motivated to consistently identify your weaknesses and confront them with hard work
- accept that others' abilities are not fixed, and thus everyone around you has tremendous potential for growth
- encourage the people around you to become better and grow, rather than comparing yourself to them

write down two areas of your life where you would benefit from a growth mindset and do the experiment – try changing your mindset and see what happens

Deliver a 50 min lecture on "The power of Mindset" – combines science behind mindset and some of my personal experiences

# There's more to teaching than lecture



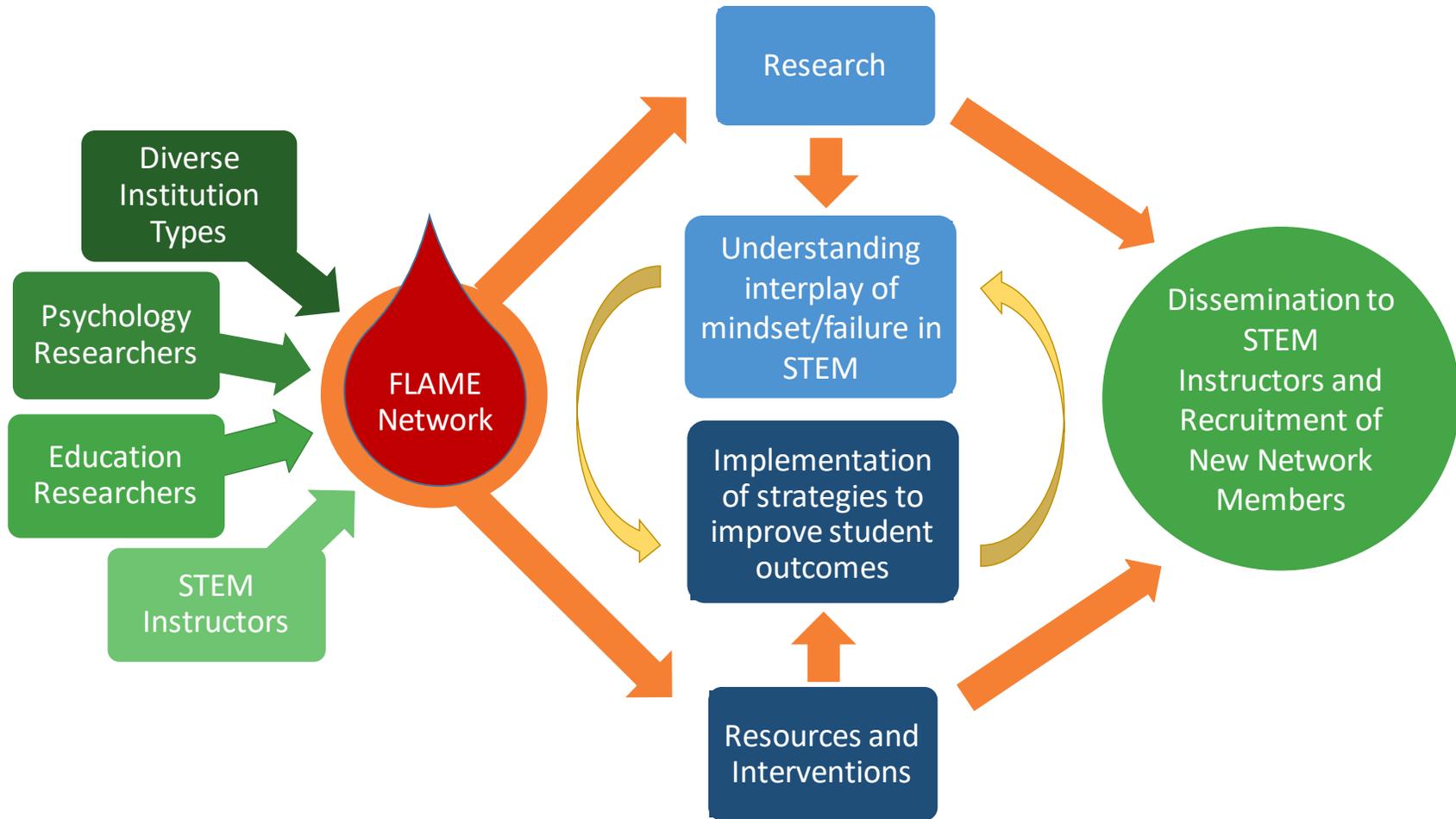
- Created a 4-part “failure training” curriculum that combines videos, lecture, social media, and reflective writing
- Recognized this could be better, get assessed, and be disseminated...if we start doing education research  
...and then I failed

# Sometimes failure makes it better



- What if we gather an interdisciplinary team of psychologists, education researchers, and STEM instructors across multiple institution types?
- Hired two postdoctoral researchers
- Found the right acronym
- Failure as a part of Learning: A Mindset Education network (FLAMENet) is born!

# Interdisciplinary = better



# *FLAMEnet intervention streams*



Developed and implemented two intervention streams (with more on the way!):

- Exam debrief (lecture courses).
  - Students review incorrect answers and misconceptions from an exam and develop a plan for improvement on subsequent exams
  - Prompts and messaging are specifically designed to encourage a growth mindset, mastery goal orientation, and productive coping skills.
- Reflections on learning through failure (lab courses)
  - Students reflect on their responses to research failures or challenges throughout the course.
  - Students use these reflections as inspiration to create a digital communication product (e.g. video, podcast) sharing insights with their peers about how to learn from failure
  - Goal is to encourage a growth mindset, mastery goal orientation, and productive coping skills
  - Digital communication assignments from one year will be shown to students in the subsequent year to enable peer-to-peer communication

# How to we measure fear of failure?

Factor Name	Abbreviation	Sample Item
Fear of Shame or Embarrassment	FSE	"When I am not succeeding, I worry about what others think of me."
Fear of Devaluing One's Self-Estimate	FDSE	"When I am failing, I blame my lack of talent."
Fear of Having an Uncertain Future	FUF	"When I am failing, it upsets my "plan" for the future."
Fear of Important Others Losing Interest	FIOLI	"When I am not succeeding, some people are not interested in me anymore."
Fear of Upsetting Important Others	FUIO	"When I am failing, I lose the trust of people who are important to me.")

- PFAI developed to measure fear of failure for broad population
- 25 items across 5 factors
- Is this valid for undergraduate STEM students?
- How do we assess STEM-specific fear of failure?

# How to we measure fear of failure?

## Box 1. Revised PFAI

I believe this is never true of me. (1)	I believe this is sometimes true of me. (2)	I believe this is true of me half of the time. (3)	I believe this is true of me most of the time. (4)	I believe this is true of me all of the time. (5)
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### *Fear of an Uncertain Future*

- 2. When I am failing, my future seems uncertain.
- 4. When I am failing, I blame my lack of talent\*.
- 5. When I am failing, I believe that my future plans will change.
- 8. When I am failing, it upsets my "plan" for the future.

### *Fear of Important Others' Losing Interest*

- 11. When I am not succeeding, people are less interested in me.
- 13. When I am not succeeding, people seem to want to help me less.
- 17. When I am not succeeding, people tend to leave me alone.
- 21. When I am not succeeding, some people are not interested in me anymore.
- 23. When I am not succeeding, my value decreases for some people.

### *Fear of Upsetting Important Others*

- 3. When I am failing, it upsets important others.
- 14. When I am failing, important others are not happy.
- 19. When I am failing, important others are disappointed.

### *Fear of Experiencing Shame and/or Embarrassment*

- 18. When I am failing, it is embarrassing if others are there to see it.
- 24. When I am failing, I worry about what others think about me.
- 25. When I am failing, I worry that others may think I am not trying.

Note: Item numbers refer to original placement in Conroy's brief PFAI

\* Item originally loaded on *Fear of Devaluing One's Self-Estimate* subscale

- Created STEM-specific version of PFAI
- Survey taken by 1309 undergraduate students in STEM courses across multiple universities and disciplines
- Used exploratory factor analysis to search for new measure structure
  - Decreased 5 factors to 4 factors
  - Decreased 25 items to 15 items
- Research ongoing to validate measures for coping and mindset

# *So, what about when you do fail big?*



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- Remember that 2015 retreat where we talked about mindset and fear of failure?
  - My tenure vote was 2 months later. It did not go how I had expected ...and it was the best thing that ever happened in my career
  - Resilience – accepting adversity and coping with it
  - Transformative resilience – embracing adversity, growing through it, and using it to impact others in a positive way
  - As a result of that experience, I now:
    - recognize I'm stronger than I thought I was
    - am a more empathetic mentor and colleague
    - cultivate a lab dynamic that is forever changed
    - have vision and clarity for transforming academic culture
    - care more about achieving my goals than what people think about me



**In what area of your life or research can you  
adopt more of a growth mindset?**

# *Final thoughts*

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- Failure is not the goal
- The goal is to:
  - have the courage to try your best even when failure is possible
  - have the wisdom to seek out help before, during, and after a failure
  - have the resilience to keep going and keep growing
  - have the vision to transform your failure and adversity into purpose

**Being willing to fail and making the most of your failure may just be a key to your success!**

# Acknowledgements

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Rachel Bender **Jenny Yu**  
...and all of our lab alumni!



## Collaborators:

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**Lisa Corwin (Univ. Colorado)**  
**Ben Le (Haverford)**



 @jenheemstra @HeemstraLab (student run!)

 thingsthatchangethewayithink