Using Clinical Science to Tackle
Code Review Anxiety

Carol S. Lee, PhD
@CSLee@mastodon.social
Developer Success Lab
Pluralsight

Carol Lee (Maine - EST) 2 years ago
@channel this doesn't require review (unless you really want to) but I just wanted to publicly say WE HAVE CODE IN GITHUB. Just feeling really pumped and proud of myself for diving into GitHub (tbd if I actually did it right)

🍓 1   📒 1   🎆 1   😊⁺

13 replies

Carol Lee (Maine - EST) 2 years ago
celebrate (2 MB) ▾

📷 Posted using /giphy

😂 1   😊⁺

Cat Hicks [PST] 2 years ago
phenomenal!!!!!!

Code Review Anxiety

Code Review Anxiety
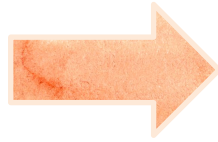
→ Fear of judgment, criticism, and negative evaluation while giving or receiving code reviews
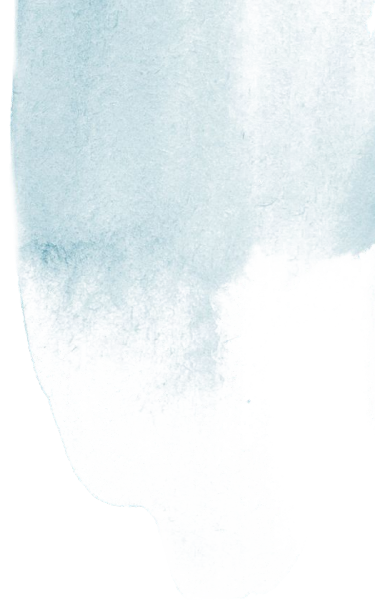
Quite common!

ANY developer can experience it!

Our sample: 1-65 yrs experience

Raise your hand if you've ever felt **anxious** about giving or receiving a code review.
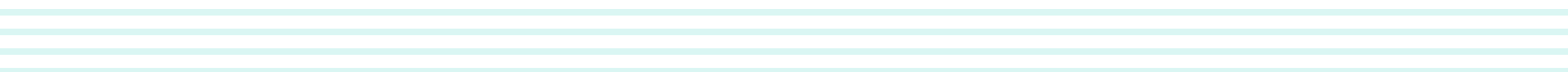
Raise your hand if you've **talked about** code review anxiety with your **team**.

We don't talk about code review anxiety.

Not talking about it makes it invisible.

When our experiences are invisible, we feel alone.
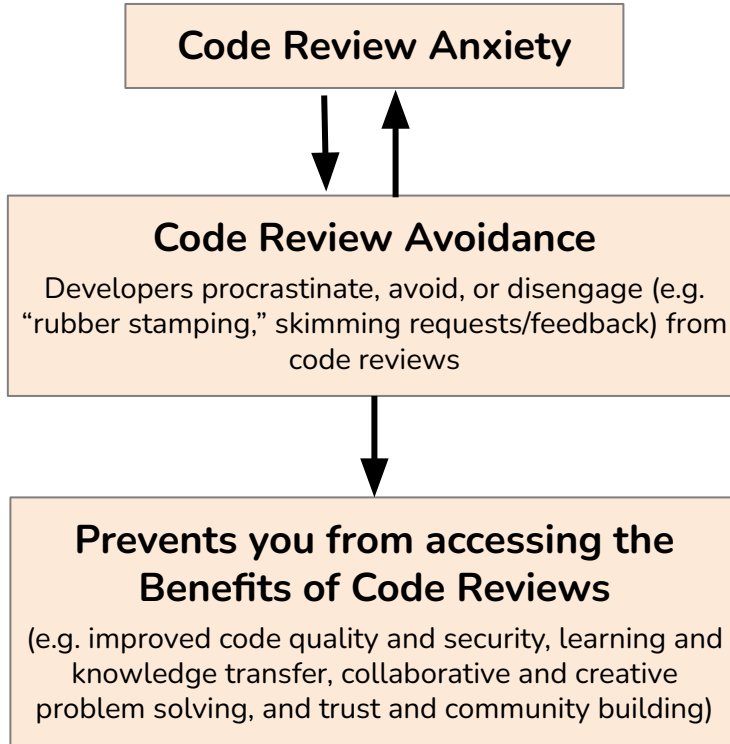
You are **not** alone.

You are **not** crazy, weird, or unskilled.

Code review anxiety is **normal**.

Code review anxiety is **normal**.

It can still be a **blocker**.

We can do something about it! ☺️

Code Review Anxiety

Code Review Avoidance

Developers procrastinate, avoid, or disengage (e.g. "rubber stamping," skimming requests/feedback) from code reviews

Prevents you from accessing the Benefits of Code Reviews

(e.g. improved code quality and security, learning and knowledge transfer, collaborative and creative problem solving, and trust and community building)

To **benefit** from code reviews, we need to **mitigate** code review anxiety.

How can we mitigate code review anxiety in a **science-driven** way?
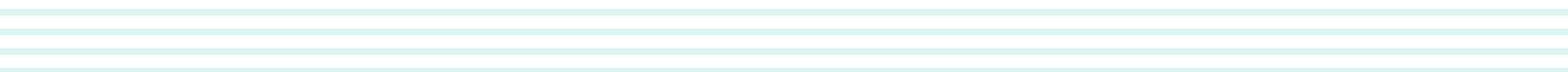
Non-Scientific Methods that DON'T WORK

METHOD #1: Dismissing code review anxiety as something experienced developers grow out of.

"It's an experience thing! You'll grow out of it."

- Anybody can have code review anxiety. Not an experience issue!
- Even if you *do* grow out of it, you still deserve support!

METHOD #2: Focusing on coding abilities instead of anxiety

"Here's how to write better code. When your code is solid, there's nothing to feel anxious about!"

- You can feel anxious about something you did well.
- Anxiety isn't something you deserve or earn your way out of.

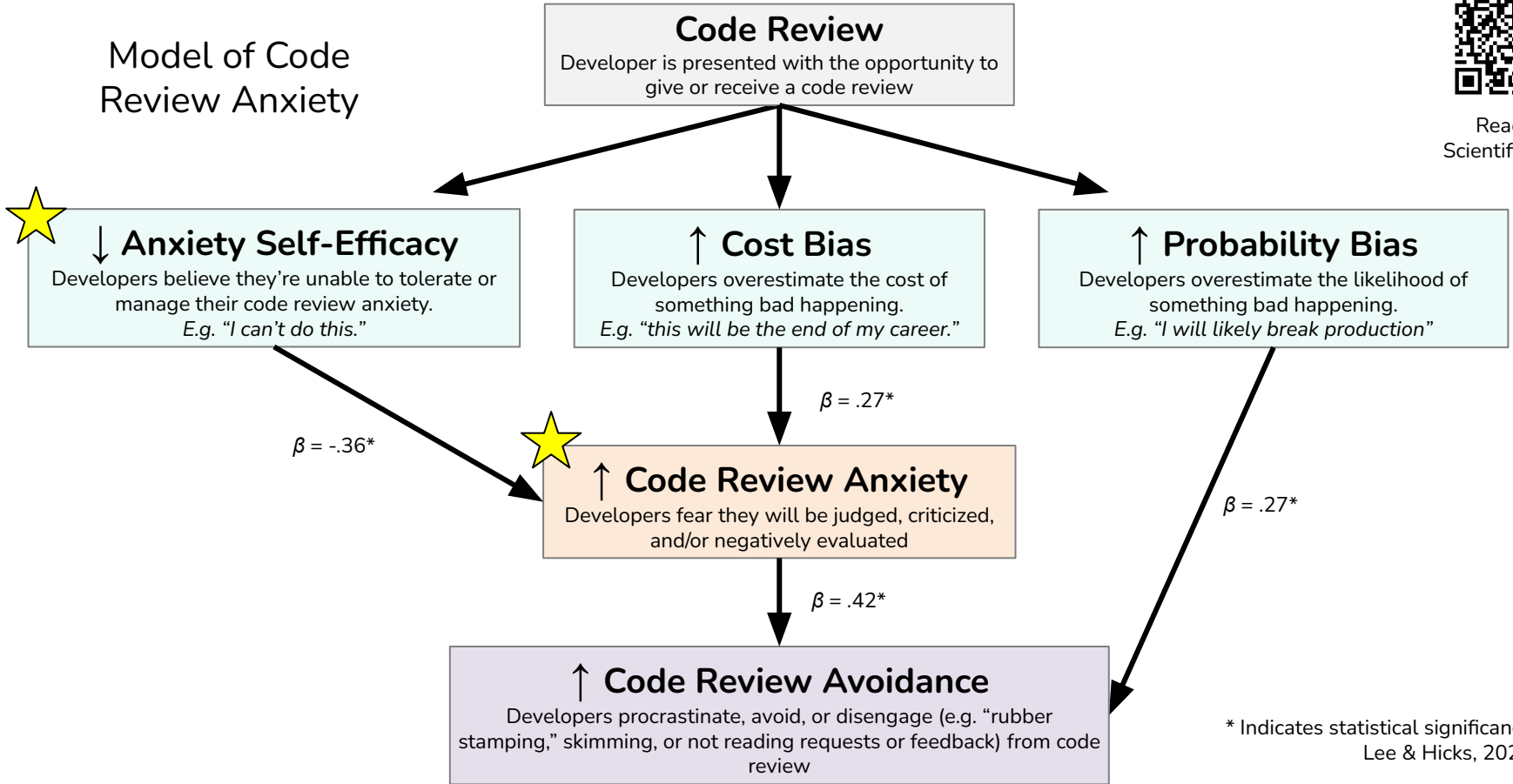# Mitigating code review anxiety in a **science-driven** way

STEP ONE: Develop an empirical model of code review anxiety

- Identifies the key mechanisms leading to code review anxiety that our intervention should target

Model of Code Review Anxiety

Code Review
Developer is presented with the opportunity to give or receive a code review

↓ Anxiety Self-Efficacy
Developers believe they're unable to tolerate or manage their code review anxiety.
E.g. "I can't do this."

↑ Cost Bias
Developers overestimate the cost of something bad happening.
E.g. "this will be the end of my career."

↑ Probability Bias
Developers overestimate the likelihood of something bad happening.
E.g. "I will likely break production"

$β = -.36*$

$β = .27*$

$β = .27*$

↑ Code Review Anxiety
Developers fear they will be judged, criticized, and/or negatively evaluated

$β = .42*$

↑ Code Review Avoidance
Developers procrastinate, avoid, or disengage (e.g. "rubber stamping," skimming, or not reading requests or feedback) from code review

* Indicates statistical significance
Lee & Hicks, 2024

Read the Scientific Paper!

Mitigating code review anxiety in a **science-driven** way

STEP TWO: Develop an evidence-based intervention

- Single-session cognitive behavioral workshop over Zoom
  - Has been shown to decrease anxiety, decrease avoidance, and improve anxiety self-efficacy
  - More accessible, lower time burden

Code Review Anxiety Intervention

1. Assess Anxiety

    - Hard to do something about it if you don't even know it's happening!

2. Reduce Physiological Arousal

    - It's hard to think or act when you have intense physiological symptoms (e.g. hyperventilating, racing heart)

3. Challenge Biased Thoughts

    - Anxiety functions by making us think negatively biased things about ourselves and the world around us

4. Reduce Avoidance by Proactively Engaging

    - Avoidance makes our anxiety worse in the long term!

Identify any Thinking Traps

Situation: I made a mistake, and my reviewer told me to fix it.
Thought: She regrets hiring me because I'm so incompetent.

Thinking Trap	Definition	Example Thought
Catastrophizing	Predict something extremely negative is going to happen without any evidence	I am going to break production.
Dichotomous Thinking	Considering only the extremes and nothing in between	I am a complete failure.
Minimizing	Discount positive experiences, outcomes, or qualities	They only said it was good because they feel bad for me.
Mind Reading	Believe you know what others are thinking, failing to consider other, more likely, possibilities	They think I'm stupid.
Negative Filter	Attending to only the negative aspects of a situation	I made a mistake.
Overgeneralizing	Single instance is seen as indicative of all others	I made a mistake last time so I'll make one this time.
Personalizing	Assuming an action is directed to or because of oneself	They left a long comment because they think I'm dumb
Should Statements	Have a fixed idea of what should happen & overestimate how bad it is that these expectations aren't met	I shouldn't make any mistakes

Challenge Biased Thoughts

We can challenge the validity of these thoughts,
instead of accepting them as the truth.

Thought: She probably regrets hiring me because I'm so incompetent.

- Am I 100% sure of this? NO.

- Am I placing unrealistic and unattainable standards on myself that I wouldn't expect another person to achieve? YES. It's my first time doing this!

- Does making a mistake really mean that I'm incompetent? NO. Everyone makes mistakes, including super star coders, and they aren't considered incompetent!

Develop a Rational Response

We can develop a more realistic and self-compassionate point of view. This reduces anxiety AND avoidance!

She probably regrets hiring me because I'm so incompetent.
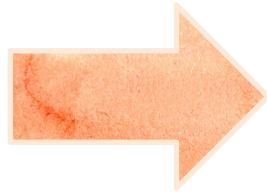
Everyone makes mistakes; It's just a part of learning!

So…. does the intervention work?
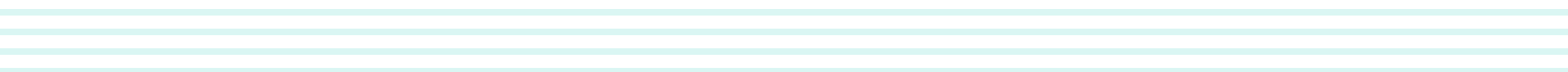
STEP THREE: Empirically test the intervention

- 59 Developers with code review anxiety

- Randomized Controlled Trial
  - Standard method for clinical trials
  - Makes sure that the effects are due to intervention, not just because anxiety fluctuates over time
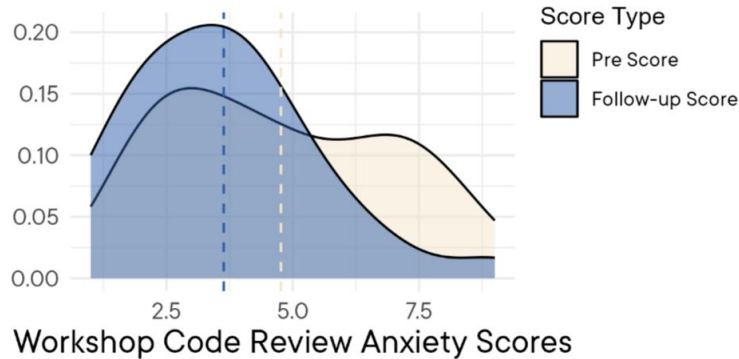
STEP THREE: Empirically test the intervention

- Our intervention decreases code review anxiety!
  - Developer felt LESS anxious ☺️
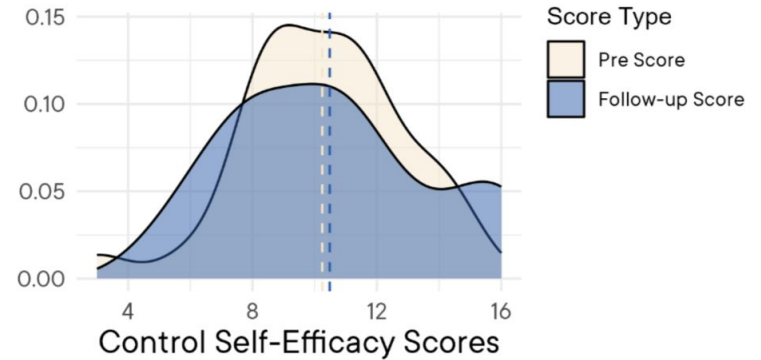 - Intervention group had a larger decrease in anxiety scores
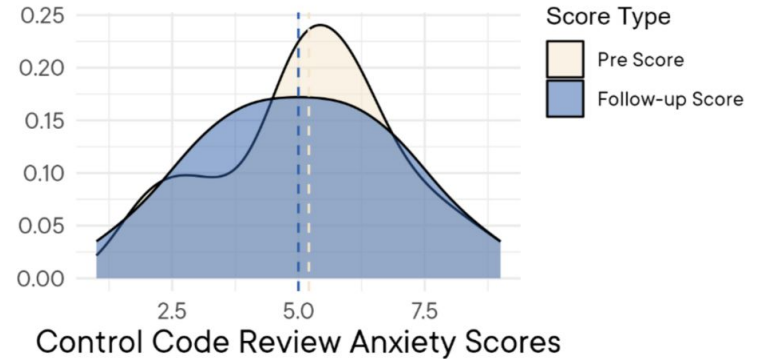
STEP THREE: Empirically test the intervention

- Our intervention increases anxiety self-efficacy!
    - Developers were better able to tolerate and manage anxiety! ☺
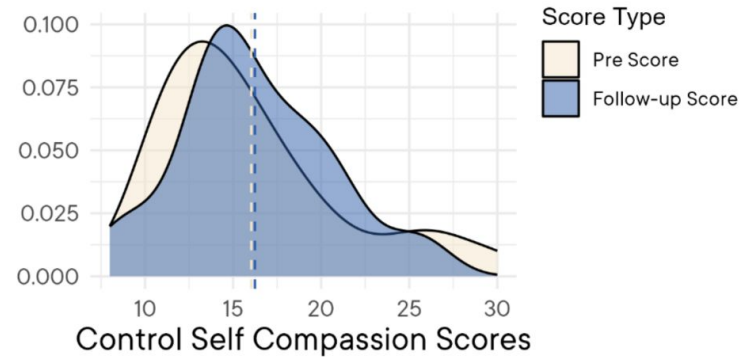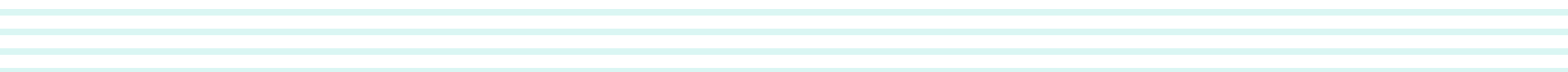   - Intervention group had a larger increase in self-efficacy scores

STEP THREE: Empirically test the intervention

- Our intervention increases self-compassion!
  - Developers were kinder, and more validating towards selves
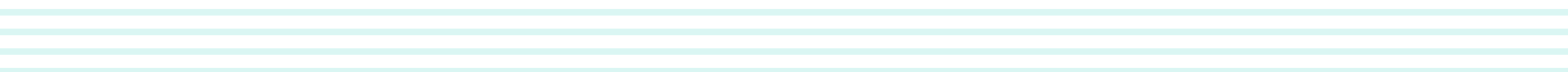 - Intervention group had a larger increase in self-compassion scores

How can I put this science into practice?

Talk about code review anxiety.

Not talking about it makes it invisible.

When our experiences are invisible, we feel alone.

It's important for folks to know...

You are **not** alone.

You are **not** crazy, weird, or unskilled.

Code review anxiety is **normal**.

We can do something about it! ☺️

Quotes

" I left having never felt so seen.... To be in a Zoom room with other developers who experience similar levels of anxiety was truly priceless. Even after the session ended, a few other devs and myself stayed on with Carol for about 20 more minutes; the psychological safety of that Zoom room felt special, and I wanted to absorb it for as long as possible. "

" Knowing that code review anxiety is an almost universal experience has really helped with some feelings of imposter syndrome. Acknowledging that it's a real thing, knowing other people regardless of experience or skill have similar thoughts and experiences, and having techniques to deal with it has been incredibly empowering and valuable. "

" We ended up having a few people commenting along the lines of "I'm so glad to hear this isn't just a 'me' problem" "

Read the Scientific Paper!

Self-guided and self-paced workbook that distills the intervention tested

Read the Scientific Paper &
Download the Workbook

TL;DR

Read the Scientific Paper &
Download the Workbook

- **Code review anxiety is normal.** It impacts developers across experience levels.

- **Code review anxiety can be a blocker.** It leads to avoidance and procrastination & is maintained by low anxiety self-efficacy.

- **We can do something about it.** A single cognitive-behavioral workshop effectively reduces code review anxiety, increases anxiety self-efficacy, and increases self-compassion.
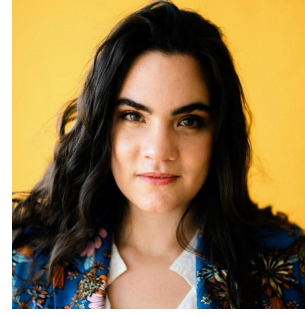
Code Review Anxiety Team

Carol Lee, PhD
Linkedin: /carol-lee-phd
Mastodon: @CSLee

Kristen Foster-Marks, MA
Linkedin: /kristenfostermarks
Mastodon: @KFosterMarks

Cat Hicks, PhD
Linkedin: /drcathicks
Mastodon: @grimalkina