

WHAT YOUR COLLEAGUES ARE SAYING . . .

Vanessa is a rock star—both literally and as a math educator—and her book will help you understand the origins of math trauma and its practical solutions. Now is the time and this is the book to help your students develop a new relationship with mathematics and create a new story about themselves as mathematicians.

Dan Meyer

Director of Research, Amplify
Oakland, CA

In Math Therapy™, Vakharia delivers a powerful message wrapped in warmth and practicality. As someone deeply entrenched in the world of mathematics, I appreciate how she seamlessly weaves personal anecdotes with actionable advice. Her call for educators to embrace the role of math therapists resonates deeply with the ICUCARE framework, making this book not just important but essential reading for anyone invested in equitable math education.

Pamela Seda

Founder and CEO, Seda Educational Consulting, LLC
Coauthor, *Choosing to See: A Framework for
Equity in the Math Classroom*
Atlanta, GA

In her rousing and radiantly witty style, Vanessa Vakharia offers extremely practical advice for schoolteachers willing to accept that a student's emotional relationship with math is vitally important.

Francis Su

Author, *Mathematics for Human Flourishing*
Pasadena, CA

This book is a gift to society. For too long, many people have believed that they are not “a math person” when the reality is that this belief says much more about how they learned math than about themselves. Vanessa's book helps normalize these feelings, unpacks why the trauma has happened, presents a plan for healing the trauma, and paints a picture of what's possible. This is the perfect book for anyone who thinks that they're not good at math or don't belong in mathematics.

Robert Kaplinsky

President of Grassroots Workshops
Long Beach, CA

Vakharia has already been sounding the alarm about the very real trauma that so many experience in math class. Now she's put her therapeutic know-how into Math Therapy™, a book to help cure math trauma—or better yet, not inflict it in the first place!

Dan Finkel

Founder, Math for Love
Seattle, WA

I feel seen, as I know many will, in this book and WOW . . . I can read it. I'm tired of heavy academic language just to sound smart. Vanessa Vakharia is smart AND I can follow what's going on!! I love it.

Crystal M. Watson

Educator, Cincinnati Public Schools
Crystal M. Watson Consulting
Cincinnati, OH

Vakharia makes math an inclusive adventure. Drawing from her own experiences, she offers tangible, transformative steps to mend our uneasy relationship with math. Told in an unforgettable voice, this timely book is a beacon for educators committed to revolutionizing the math experience for all.

Anthony Bonato

Professor of Mathematics,
Toronto Metropolitan University
Toronto, Ontario, Canada

If you are interested in your students examining and rebuilding their existing relationships with mathematics, then this book is for you! Vanessa offers a clear path for educators to help motivate their students to makeover their connection to math and math class. Not only will you know how to better help your students build a positive math identity, but you'll also have the best time engaging with this joy-filled book!

Zak Champagne

Teacher, The Discovery School
Jacksonville, FL

Math Therapy™ is the book many educators didn't know they needed. The words of inspiration and practical strategies between these pages will change lives. Whether you believe you are a "math person" or not, this book will be a game-changer to help you heal and help others around you heal. It will become a guide for rewriting our collective math narrative.

Deborah Peart

CEO & Queen Mather, Mathematical Mind
Ocala, FL

As someone who hated math when I was a student and during my first few years as a teacher, I can attest to the power of addressing past traumas and developing a fresh and healthy relationship with mathematics. Vanessa's book is full of useful strategies and tips to help you shift your mindset about math and give you more confidence as a classroom teacher. It's a must-read for any teacher who has a less-than-favorable view of mathematics.

Mike Flynn

Author and Chief Executive Officer, Flynn Education, Inc.
Northampton, MA

Math class is so much more than teaching math. I have learned a great deal about my students by asking about their math stories, which for some include anxiety from past math experiences. In this book, Vanessa aligns our values to concrete strategies to help everyone see that they are a math person.

Howie Hua

Math Lecturer, Fresno State
Fresno, CA

She is not called "The Math Guru" for no reason! Vakharia does a fabulous job of providing specific examples of how to address math trauma, as well as activities and examples of what teachers can do each and every day to ensure this doesn't continue to happen in our classrooms. Her quick wit and strong voice make you feel that you are right there having a conversation with her, and this is a book you will not be able to put down!

Kristin Kanaskie Grotewold

K–5 Math Coach, Iowa Council of Teachers of Mathematics
Urbandale, IA

This book is a healing gift to math education. Vanessa walks you through how to help students (and yourself) heal their relationship with math. The stories alone are a masterclass in inviting students to (metaphorically) sit on her pink velvet couch and transform the way they see themselves in relation to math, and beyond.

Liesl McConchie

Math With the Brain in Mind
San Diego, CA

This book is a valuable and engaging resource for mathematics teachers to counter the pervasive mathematics trauma that exists within so many in our society. By healing, students can come to see that we are all mathematics people and that the ability to excel in this discipline lies inside them.

Lidia Gonzalez

Professor, Department of Mathematics and Computer Science,
York College, City University of New York (CUNY)
New York, NY

Math Therapy™ provides teachers with the tools to humanize their classrooms and help all students rediscover their inherent connection to mathematics. Educators reading this book will discover tools and strategies to talk to young mathematicians in a way that empowers them to take back their mathematical identity. Ultimately, everyone will feel validated by following the strategies of Math Therapy™.

Jamie Mitchell

Secondary Math Teacher, Halton District School Board
Ontario, Canada

Vanessa's book sheds light on the anxiety present in many math classrooms and provides concrete and easy-to-implement strategies for engaging students in mathematical reflections and building a positive math identity. Everyone who teaches math, at any grade, should read this book.

Ana Maria Estela

K–5 Math Coordinator, Trinity School
New York, NY

This book fights back against the notion that there's such a thing as a "math person" and challenges readers to eliminate any sort of limiting beliefs we have about ourselves. Vakharia breaks down everything wrong with the education system. Every educator needs to pick up this book to learn how we can repair this next generation of humans' relationship with math!

Kyne Santos

Author of *Math in Drag*
Ontario, Canada

Math Therapy™ is more than a guide to mathematical competence—it's a transformative journey toward emotional well-being and intellectual freedom. Vakharia demystifies math, turning it from a daunting subject into a path of discovery and growth. Essential for educators and anyone eager to embrace math's beauty without fear or frustration.

Kaitlyn Baptist

Registered Psychotherapist
Ontario, Canada

MATH THERAPY™

MATH THERAPY™

5 STEPS TO HELP YOUR STUDENTS OVERCOME MATH
TRAUMA AND BUILD A BETTER RELATIONSHIP WITH MATH

VANESSA "THE MATH GURU" VAKHARIA
FOREWORD BY JO BOALER

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Visit the author's website at
maththerapy.com
for downloadable resources.

FOREWORD

by Jo Boaler

Nomellini and Olivier Professor
in the Graduate School of Education
(Mathematics), Stanford University

When Vanessa asked me to write the foreword for this book, it only took me a nanosecond to say yes. Why? Because Vanessa is my good friend and because she is helping all of you reading this book to conquer math trauma and anxiety—your own and your students’, a mission that she and I are passionate about. Math anxiety is a real condition that robs people of pleasure and limits their life chances, and it is staggeringly widespread, as Vanessa describes in the book.

Neuroscientists have shown that, when people with math anxiety see numbers, a fear center lights up in their brain. That is the same fear center that lights up when we see snakes and spiders.¹ How great is it, then, that we now have a math therapist, also known as the Lady Gaga of math education, giving us practical strategies to rid us of anxiety and improve our own and our students’ mathematical relationships?

Every year, I teach undergraduate students at Stanford, and even among this high-achieving group of young people, I meet many who have significant mathematics damage, even trauma. Some students have told me they are so afraid of numbers they won’t use credit cards. This is because they have come from a school system that promotes the idea that you need a special “gift” to be good at math and that the gift is usually reserved for certain people. When these faulty ideas are combined with a system of teaching mathematics as a set of procedures that you must memorize and reproduce at speed, you have the perfect conditions to create math anxiety. I have been working for years to combat this math anxiety myself. Over a 10-week course I teach, the students change—they start to see mathematics

¹Adelson, R. (2014). Nervous about numbers. *APS Observer*, 27; Young, C. B., Wu, S. S., & Menon, V. (2012). The neurodevelopmental basis of math anxiety. *Psychological Science*, 23(5), 492–501.

differently, and they start to see themselves differently.² Vanessa and I know this change is possible, and we have both seen that it can create different lives for people. It is no wonder we are both so passionate about sharing the ideas in this book.

Vanessa and I agree that math fear also comes, in part, from the myth that being good at math means you are “smart.” Personally, I think that being a stand-up comic or a poet is much harder than factoring a quadratic, but the idea contributes to the pressure students feel. I also believe that people only think math is so difficult and inaccessible because they have experienced bad teaching. I love the story Vanessa tells in this book of being set free by the teacher she had in 12th grade. All of us as educators have the power to make that change for students.

As Vanessa points out in this book, we need to give people the opportunity to develop different mindsets, and that means changes all through the school system, from teaching ideas to testing and grouping. Many educators feel helpless in changing students’ relationships inside a system that gives students the wrong messages at every turn, but Vanessa highlights the changes that can and should be made by classroom teachers—and they are all about changing the culture of classrooms. This is backed up by research. The latest research on ways to encourage a growth mindset shows that mindsets do not change when we just share words with students; they change when we create mindset cultures.³ And the secrets of these mindset cultures are set out in this book.

Mindset is so important, as it is all about our ability to change. Research studies have found that when people learn about mindset they realize they are able to change in other ways, and they learn that all people are able to change—not only in terms of learning, but in their behavior and attitudes. This is why mindset interventions have helped students dial back on aggression and racism and improve their health, among other changes, as well as experience transformative changes in learning.⁴ But as with almost anything these days, this idea is not without controversy. There are people pushing back on the importance of mindset—and some are belligerent. I really think that it is impossible to bring forward anything positive and impactful without having a vocal minority that disagree, often aggressively. Often, such

²Boaler, J. (2024, January). “*If only I had known*”: Messages for students who would like to learn mathematics to high levels. youcubed. <https://www.youcubed.org/wp-content/uploads/2024/01/Student-Letter-2024.pdf>

³youcubed. (n.d.). *Mindset evidence: What is all the controversy about mindset?* <https://www.youcubed.org/resource/mindset-evidence/>

⁴Yeager, D. S., Trzesniewski, K. H., & Dweck, C. S. (2013). An implicit theories of personality intervention reduces adolescent aggression in response to victimization and exclusion. *Child Development*, 84(3), 970–988; Zahrt, O. H., & Crum, A. J. (2017). Perceived physical activity and mortality: Evidence from three nationally representative U.S. samples. *Health Psychology*, 36(11), 1017–1025.

detractors reject the idea that mindset is effective because they base their ideas on cases when people have only shared mindset ideas without changing the culture. Now we have new research that shows that mindset is extremely important, for learning and for life, when we do more than change words.⁵ Vanessa's book shows educators how to make these changes in culture.

I love all the chapters in Vanessa's book, but a particular favorite was the chapter on student motivation. As someone who has trained teachers for decades (in Stanford's teacher education program), I cannot tell you how many times I have been asked by new teachers what they should do with "unmotivated students." When I am asked that question, I always share something I heard a great teacher say. The teacher was Carlos Cabana, and one day, when I was visiting his classroom, I overheard his conversation with a student teacher. The student teacher asked what he should do with the "unmotivated students in the class" who were misbehaving. I may not be remembering the exact words Carlos used, but this is my memory of what he said:

I have never met a student who is not motivated to learn. I have met students who have constructed layers of ice around themselves that are so thick and so strong, it takes a long time to break through them. But that is my job.

There is so much in these statements, including Carlos's unwavering belief in the potential of all students. Students construct these layers of ice when they get the idea that they cannot be successful, and that is what we can change for students. To do that, we cannot be put off by the appearance of not caring or by their behaving badly. Those to me are signs that someone, somewhere in their lives has given the student the idea they can never be successful. And they have internalized the idea that it is better to act up than it is to fail.

We spend so much time in education worrying about knowledge and the way it is delivered to students—when students' beliefs and ideas about mathematics and themselves have so much more impact on their learning. Historically, we have barely given students' ideas and emotions any consideration in mathematics education. Vanessa's work is the antidote. *Math Therapy*TM is a handbook of ideas and strategies for giving your students mathematical confidence and the appreciation and self-love they need.

I invite you to learn from Vanessa's ideas and enjoy them. I smiled and laughed my way through the book, and I was even a little sad to come to the end. I particularly appreciated the many analogies. My personal favorite is

⁵youcubed. (n.d.). *Mindset evidence: What is all the controversy about mindset?* <https://www.youcubed.org/resource/mindset-evidence/>

the description of brain pathways being laid down as an experience of walking through deep, freshly fallen snow. Reading this book feels like having a conversation with a wise and caring friend, the one and only Lady Gaga of math education. Enjoy it, reflect on the words, and let Vanessa help you make real, actionable changes that can improve the lives of those you work with—and maybe even your own.

PREFACE

Anything Is Possible (Yes, Even Math!)

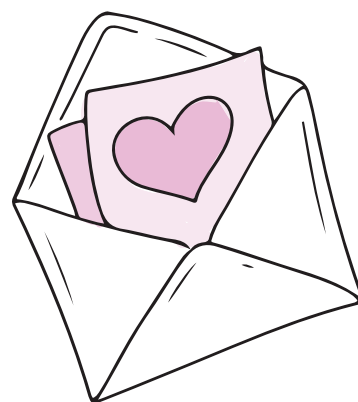
DEAR MATH-THERAPIST-IN-THE-MAKING

There is one job in this world that I truly believe has more power than any other to change the course of our future as a species, both on an individual and global level.

Who IS this powerful person I'm getting all fired up about? YOU! The most powerful person in the world is the math teacher. Yes, I may be biased, but hear me out!

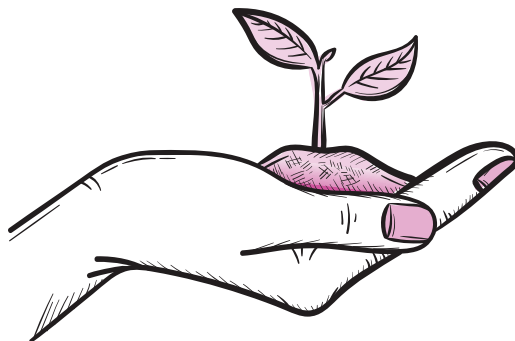
I believe that every single math teacher has an opportunity that *no other teacher has*. I'm not hating on the history and geography teachers—I love you guys! But here's the thing: By early to mid-elementary school, many of our students have gotten the message that there is this THING on the planet called math that certain people can—and can't—do (Hachey, 2021; Levine & Pantoja, 2021), and that belief takes root inside of them, more often than not, laying the foundation for a lifetime of limiting beliefs that start stacking up. The next time they face an obstacle, they might say to themselves, "Is this just another thing I was born unable to do?" Not making the soccer team turns into, "I guess I'm just not athletic." Getting passed over for a job turns into, "I'm unemployable—why bother trying?" Getting ghosted after a first date turns into, "I'm unlovable and destined to be single forever."

And on it goes. Whether or not a child is given permission to dream big or small often starts and ends with whether or not they are given the message that they are a "math person" . . . or not. That's why it is YOU who has the incredible power and privilege of changing their lives far beyond your classroom walls. It is YOU who holds the keys to unlocking their mathematical mindsets, releasing the dreams that lie within. And that's why I wrote this book. Math Therapy isn't just about helping students kick butt in math



class; what it's really about—and what I believe *education* is really about—is empowering students to develop the skills they need to live a life in which they truly believe that *anything is possible*, even a better relationship with math! And I want to help you *help your students* do just that.

I am not asking you to believe that every single child is capable of achieving an A+ in your class, of being a rocket scientist, or even of performing mental calculations with total accuracy. I am asking you to believe—really believe—that every child is capable of *building a better relationship with math than they have right now*. Our students *know* whether we believe in them or



not, and that in turn shapes whether or not they ultimately believe *in themselves*. I want you to imagine that you are a parent watching a child (caveat: *without* a physical disability) learn how to walk. No matter how long it takes for them to take their first steps, no matter how many times they fall in the process, and no matter how much they insist that walking is just too hard, I'm going to guess that you would never once pause to think to yourself, Hmmm . . . maybe little Johnny just isn't a "walking person"; maybe walking just isn't his thing—that's cool, he has other strengths. Am I right? You would coax and coach and cheer on little Johnny with ALL of the belief in your heart that, with patience and perseverance, little Johnny was going to be an amazing walker! It is THAT kind of belief I want you to bring to the table when it comes to your students' relationships with math. As hard as this is to hear, in many cases you might be the only adult in some of your students' lives who actually believes in their capacity to grow and change, both inside, and sometimes even outside, of math class. If THEY can sense that you believe they can make progress, they, too, will begin to believe it as well. Channel your inner Ted Lasso and B-E-L-I-E-V-E!



THE "OFFICIAL" PREFACE

Hello. My name is Vanessa Vakharia, and I failed Grade 11 math twice.

(Actually, almost three times—but who's counting?!)

Let me back up. I went to a fairly academic school in Toronto, which shall remain unnamed. Let's just say that their mantra was "We're not a high

school. We're a *collegiate institute*," which basically translated to "If you're not getting an A, we really don't want you around to give us a bad rep." Well, I was very busy doing the latter by insisting that my only interests included (a) becoming a rock star and (b) marrying Keanu Reeves, and I certainly wasn't getting an A in math class (or any class for that matter, except for art). I was the "weird" kid who wore blue lipstick, smoked cigarettes, and whose report comments seemed to always contain some variation of "Vanessa is not living up to her full potential." While all of this was going down, it seemed like almost everyone in my life was reaffirming my life choices by letting me know, in one way or another, that failing math was my destiny—girls like me weren't made for math: *I just wasn't a math person.*

Here's the thing: I totally agreed. It was the 1990s. Math was for losers, and I was meant for the Hollywood Hills. That was a no-brainer. But you know who (thankfully) didn't agree? My parents.

After I *finally* passed math in summer school, my parents decided it was time for a change. So off I went to the private "alternative" school down the street, which was low-key known as the "school for misfits." It. Was. Heaven.

It was NOTHING like my old school. First of all, it was in an office building. We had to take ELEVATORS to get to our classrooms. Second, we called teachers by their FIRST NAMES, which, for a teenager, is just about the coolest thing you can do. Third, and most important, there were only about 100 kids in the entire school, which meant that there were no cliques. There were no "jocks" or "nerds" or "math people" or "non-math people"—we were all just "misfits" who, for one reason or another, found ourselves in this magical space. The thing is, none of our teachers thought we were there because we couldn't hack regular school or because we were stupid—it was the opposite. They all believed that we were there because we were *smart* and that our inner light simply hadn't been given permission to shine through in a traditional educational setting. When I walked into my brand-new Grade 12 math class, I felt something I had never truly felt before: My teacher seemed to believe . . . *in me.*

I don't remember the exact details, but my first encounter with Ewa, my math teacher (and the teacher who would literally change the trajectory of my entire *life*), went a little something like this:

Me: Hey, hi, just wanted to let you know that I'm not so sure how this is going to go because I'm not a math person.

Ewa: Pardon me?

Me: I said, I'M NOT A MATH PERSON.

Ewa: (long, dramatic pause) That's. Not. A. Thing.

Everything changed after that. It's not like—POOF—I suddenly became a math genius or something, but my *relationship* with math changed. Like, TOTALLY changed. I started doing things I had NEVER done before. For example, when I didn't understand something, I raised my hand and asked for clarification. If something didn't make sense, I asked Ewa to explain it to me a different way. I took notes and did my homework and checked my answers at the back of the book, and when I didn't get something right, I sought out help because I believed that I had the *capacity* to understand it. I discovered that I loved the methodical nature of whittling complex algebraic equations down to a simplified expression; I reveled in the art of mathematical proofs, in the neatness of setting up and then solving a problem; and most of all, I found the unparalleled gratification of helping others discover their own ability to do something that they had been convinced they would never, ever be capable of doing. Check out Figures P.1 and P.2 for photos of Ewa and me back in the day and Figure P.3 for a more recent shot!

FIGURE P.1 VINTAGE HIGH SCHOOL YEARBOOK PHOTO OF EWA KASINSKA

FIGURE P.2 VINTAGE HIGH SCHOOL YEARBOOK PHOTO OF ME



SOURCE: Hudson Taylor

SOURCE: Hudson Taylor

FIGURE P.3 AN ADORABLE HOLIDAY PIC OF EWA AND ME FROM 2023!



- I went on to be Ewa’s student teacher in teacher’s college, she edited my first math book series for kids, and we are still bffs to this day!

SOURCE: Ewa Kasinska

Year: 2020-21	Semester: 2	
Course: OAC Finite Mathematics <i>Applications of matrix algebra to solving systems of equations and inequalities, combinatorics, probability, and applications.</i>	Code: MFNOA	Teacher: Ewa M. Kasinska
A truly breathtaking performance!		
Absents: 2 / 92	Lates: 2 / 92	Grade: 96
Class Avg: 59.1		Score: 0.00

I ended up with a 96% in Ewa’s math class. I know, I know—it’s not about the mark! But, guys . . . come on. It was a BIG deal. But what was a way BIGGER deal was that I had gone from “There are some things on this planet that I just can’t do” straight to “If I can get a 96% in math class after being told for most of my life that *I literally can’t*, WHAT ELSE CAN I DO IN THIS WORLD?!”

My entire life changed.

I hadn’t realized it, but the belief that math was this THING that I just couldn’t do had been holding me back in SO many ways. Years later, I discovered that this is known as a *limiting belief* (Heston, 2015). Limiting beliefs are essentially a type of negative thought that holds people back by creating impenetrable mental barriers that prevent them from moving

forward with confidence. That was exACTLY what had happened to me until I met Ewa. The limiting belief that there was just something that I couldn't do (math!) had subconsciously been in the back of my head any time I considered trying something new or dreaming my biggest dreams. It was like I was always waiting for the other shoe to drop, always waiting to discover what ELSE I was just innately incapable of doing. But after Ewa, everything was different. I wanted to try EVERYTHING. I wanted to show EVERY SINGLE PERSON on the planet that they had been sold a big fat lie, that there was no such thing as a “math person,” that there was no such thing as any KIND of person. I wanted to go after all of my crazy wild rock star dreams. I wanted to . . . start a band.

(Okay so, *spoiler alert*: I DID end up starting a band, and if you're asking yourself, What's the connection between healing your math trauma and being on stage in front of over 10,000 people opening for Bon Jovi, you're in luck—because you're eventually going to find out!)

What started as a somewhat personal vendetta against a system that had tried to shut me down turned into a very personal mission to show literally EVERYONE that they, too, could build a better relationship with math than the one they'd been sentenced to and that they, too, could rediscover what it was like to live a life of wondrous, boundless *hope*.

Now, okay, I know it might sound a little out there that I'm suggesting that building a better relationship with math might be basically like the gateway drug to building a life permeated by hope, but hear me out:



- *Most* kids are told, in one way or another, that they have a deficit when it comes to math and have carried that belief into adulthood (Sun, 2014).
- *Most* kids are told, early on in their lives, that *they are simply not that good at math* and should focus on their actual “strengths” will carry that belief with them for the rest of their lives.
- *Most* kids get the message that they just don't have what it takes, period.

Think about that for a second.

By the age of 6, 50% of our students are already exhibiting signs of math anxiety (Sokolowski & Ansari, 2017), and many have gotten the message that math is something on this planet that they are simply born *incapable* of doing. This belief that they innately can't do math is the scaffolding upon

which many of them build walls constructed and obstructed by limiting beliefs. Maybe some of you even got this same message and built up those same walls—you already know that I did! Being told that math “isn’t for us” or that we’re “not math people” or that we should “forget about math in favor of our other strengths” are some of the first experiences many of us have that suggest that there are *skills on this planet that are unavailable to us*.

Because math ability is so often culturally associated with intelligence, being told that we can’t do math has the painful effect of making us feel less-than, affecting our self-worth in all areas of our lives, both personal and professional. The culmination of experiences that lead us to the conclusion that we’re innately incapable of math can be traumatizing, and most of us never fully move on. But it doesn’t have to be that way.

ABOUT THIS BOOK

I wrote *Math Therapy* as a message of hope. It is the culmination of more than 20 years as a math educator, of hearing hundreds of math stories on my podcast and in interviews, and of helping thousands of students build a better relationship with math, and as a result, with themselves.

I was blessed with an incredible number of privileges that helped me build a better relationship with math: parents who cared, a private alternative school education, and a skilled teacher who believed in me. But your students, too, are blessed—because they have YOU.

I’m going to reiterate what I said at the start of this preface because it is THAT important: Math teachers have an opportunity to change the entire trajectory of a student’s life by helping them heal their relationship with math.

Now, even if you’re not an official teacher of math, we are all teachers of *math attitudes*. Regardless of what grade you teach, what role you play in education, or whether you consider yourself an educator at all, *your* relationship with math affects those around you. The way you do math, talk about doing math, or talk about *who* can do math has more of an impact than you might think. It teaches those around us how to feel about math, either directly or indirectly. That’s why it’s important for ALL of us to build a better relationship with math, and that’s why no matter who you are, the fact that YOU are about to learn all about how to heal from math trauma is, in itself, a gift that you will inadvertently regift to everyone you know.

ABOUT LANGUAGE

Let’s talk language. I have done my best to write in a way that feels the most accessible—and most authentic—to me (and hopefully you!), all the while being conscious that language is ever-evolving. In my work, when I want to write, teach, and speak in a way that is relatable to educators, students,

and anyone out there who wants to build a better relationship with math, I don't think that I can do it by using the pedantic language required by most academic institutions. I have often been underestimated, overlooked, and not taken seriously because of the way I speak. I have been told that I should say "like" less often, fix my "Valley girl" accent (I'm from Toronto, btw, so like . . . very far from any peak or valley), and "be more serious." Sorry not sorry—that's just not who I am. I wrote this book from my heart to yours, and I hope that you hear my voice in every word that I have written.

This is why I use ALL CAPS. A. Lot. And why I use *italics* and exclamation points liberally!

Language is constructed and in making language choices. I recognize that we are often complicit in its construction, which is why I want to acknowledge certain choices that I made. When I am writing about racialized people, I use the current most recognized term for the group—for example, *Black*, *Latine*, and *Indigenous*. I made the choice not to capitalize "white" when I am referring to race because that can be offensive to some. I use the phrase *people of color* to describe all those who are non-white. I use the phrase *underrepresented groups in mathematics* in keeping with the definition of the National Science Foundation to describe those whose representation in mathematics degree programs and math-related careers is lower than their representation in the U.S. population (National Science Foundation [NSF], n.d.). When I speak of "marginalized" students, I do so to describe those who additionally experience systemic disadvantages such as those related to race, ethnicity, socioeconomic status, gender, sexual orientation, disability, or other characteristics. When using terms such as *men*, *women*, *girls*, and *boys*, I refer to all who identify with these terms. I know that some do not identify with binary genders, and I have avoided using *he* or *she* when a person's preferred designation is not known, choosing instead to use non-gendered terms such as *students*, *individuals*, and *people* or the pronoun *they*. I admit that I use "you guys" at times. I don't literally mean *guys*! But "y'all" just doesn't roll off my tongue! All this is to say that I know that my language choices aren't perfect, but I hope that this at least begins to clarify why I made the choices that I did. I also want to add that when I'm telling stories throughout these pages (which I do, a LOT!) that, in some cases, names of people have been changed, and in other cases (aka where permission has been granted), they have not.

Now, let's talk about the f*#king elephant in the room: swearing. If you're familiar with my podcast or if you know me personally, you know that I swear—a lot. I know that salty language isn't everyone's cup of tea, but I also wanted to write this book in my authentic voice, so as a compromise, I have bleeped out a few letters to keep things PG!

Finally, I am Canadian. Before I started writing this book, I don't think I ever noticed how many language differences there are between us and America. I mean, I feel like we're the only ones who even call it "America"?!

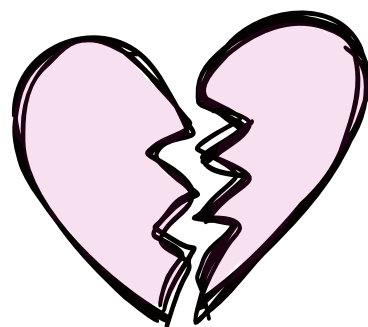
We say “100%”; they say “4.0.” We say “mark”; they say “grade.” We say “colOUR”; they say “color.” And on it goes. I have tried to make my language as universal as possible in this book, but if I went all Canadian on you somewhere in these pages, just blame the maple syrup!

SO WHY NOW? AND WHY YOU?

As Hillel the Elder is attributed with saying, “If not you, then who? If not now, when?” Those words come to mind now, as we are at a moment in time in which we have never needed math more, yet we have never been more divided when it comes to who can actually access that math. Headlines continuously warn us both that the majority of jobs in the next decade will require math and yet that the majority of students around the world are failing to meet math standards (Mervosh & Wu, 2022). As educators, we understand that behind those clickbait numbers are actual, real kids who are suffering; these are young people who don’t *coincidentally* happen to all be bad at math or to all be simply unmotivated or lazy or incapable of learning. But they do have something in common. These numbers represent children who, in one way or another, have likely experienced math trauma—a concept that has been mentioned in passing by many but that has not been properly defined, explored, unpacked, and addressed.

As I will discuss in Chapter 1, *most* of us have experienced math trauma *at least* once, but those from communities that are traditionally (and currently) marginalized in math education are even more likely to be exposed (Duncombe, 2021; Gonzalez, 2023; Louie, 2017) to scholastic practices that might lead to math trauma, making it even harder for them to feel a sense of belonging in the world of math. When we neglect to heal students’ relationships with math and we neglect to provide equitable access to education, we elect to maintain a status quo in which we include some—but ultimately exclude most.

I know that some of you are likely wondering how you can carry out this work when the mere mention of emotions in math class can be the cause for alarm at the school, district, or even state level. Or when you have so much content to get through that it seems like math trauma can’t possibly make it onto your to-do list. I totally get it. Here’s what brain-based educator Liesl McConchie says: “A student’s emotional relationship with math is foundational to their cognitive relationship with math.” This is what I tell anyone who’s skeptical that helping a student build a better relationship with math will more likely than not lead to improved proficiency in actual math skills. Seriously. You can have the best content and pedagogy in the world, but if a student has shut down and built walls, it’s never going to reach them. THAT is why Math Therapy is a crucial first step in ANY sort of initiative directed at improving




math performance and proficiency, and hopefully this is helpful for you if you feel like you have to justify your commitment to this practice.

If you picked up this book, you are likely as worried about our collective relationship with math as I am. Maybe you're worried that your students won't be able to get into college or into a career trajectory that will enable them to support themselves; perhaps you're worried that they won't have the financial literacy needed to make wise decisions and live within their means; maybe you're nervous that they won't have the foundational math skills needed to decipher the proliferation of numbers and stats that permeate our screens, and as a result, they'll get sucked into some whack conspiracy theory and, like, join a cult; or maybe you're stressed out about the idea that a large percentage of today's students will be working in jobs that don't even exist today and that they simply won't be prepared with the skills needed to access those jobs. All of those concerns are totally valid and totally warranted. But you guys know where I stand: The one thing that worries me most, above all else, is that our students might grow up believing that they are undeserving of going after their wildest dreams. That, to me, is unacceptable. And that, to me, starts with math.

Every single child should have the privilege of believing that *anything is possible*. And in fact, *we* as a society, NEED them to believe that for our OWN benefit AS A SPECIES. I know it sounds extreme, but, guys, we

NEED kids to grow up believing that there are solutions to the unsolved mysteries of our time! We NEED them to believe that climate change can be mitigated, that racism can be extinguished, that cancer can be cured, that peace and love can one day reign supreme! **If not them, then who? If not now, when?!**



**Every single child
should have the
privilege of believing
that anything is
possible.**

In this book, you will discover the most important and impactful steps you can take to help your students heal their math trauma and build a better relationship with math. You will learn science-backed strategies that *really work* and unpack toolkits full of Actions, Activities, and quick adjustments to your classroom practice that you can implement effectively *right away, right now*.

I wrote *Math Therapy* as a message of hope, and it is *my* hope that you will bring your own magic to its pages. It takes a village to change the culture of mathematics, and it takes a leap of faith to believe that we can. I am so, so happy you're here.

yours in peace, love + pi
XOXO Vanessa

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I have so many people to thank that I am officially too overwhelmed by the prospect of leaving one of them out to even begin to list their names. So instead, I will say this: If you have ever believed in me, stood up for me, listened while I've ranted, laughed at my jokes, put in a good word for me, had my back, given me a pep talk, given me a reality check, helped me take care of myself, trusted me with a secret, given me a reason to trust you with one of mine, taught me literally anything, allowed me to read your birth chart, invited me to be a part of your journey on this planet, and/or—most importantly—given me the freedom to be myself, thank you. This book would not exist without you. ♥

To my Gemini twin, publishing soulmate, and dream editor, Debbie Hardin: there is no one else in the world I could have created this book with. Thank you for honoring my ALL-CAPS voice and for encouraging me never ever be too scared to use it. ILY.

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ABOUT THE AUTHOR (AND ILLUSTRATOR!)



Known as the Lady Gaga of math education, **Vanessa Vakharia** is the founder and director of The Math Guru, a super-cool boutique math and science tutoring studio in Toronto that's changing stereotypes about what math education looks like. She is also the host of the *Math Therapy* podcast, author of the *Math Hacks* Scholastic book series, math therapist, and lead singer/keytarist for the rock band Goodnight Sunrise. She has her bachelor of commerce degree,

teaching degree, and masters of math education. She appears regularly on national television and news outlets as an expert in math education and math positivity, and her #goals are to be Oprah-level famous and to totally change math culture so that STEM is finally as cool as every single Taylor Swift song ever written. Vanessa failed Grade 11 math twice, which was the best thing that ever happened to her.

CREATE YOUR OWN MATHOGRAPHY

MATHOGRAPHY

noun

ma·thog·ra·phy

A mathography is like a math autobiography. Instead of focusing on your whole life, you talk about your journey with learning math, doing math, and literally anything math related. It's a way to reflect on your relationship with math and what math means to you!

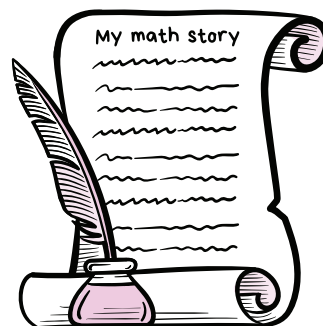
The exercise: Tell me your math story!

That's it.

There are no rules, and I want you to just go for it, but I will say this: You may not realize it yet, but we each have a story that we tell ourselves every day. We have stories about who we are and how we got here, and we subconsciously live our lives by those stories. We might even hear those stories come out when we meet someone new and say something like this:

“Hi, my name is _____, and I love Keanu Reeves! I don't have any plants because I literally can't take care of living things, and I'm not great at cooking, so I eat out a lot. I like to do yoga, but I'm kind of unmotivated, so I end up bingeing reality TV most of the time. I love juicy convos, hanging out with friends, and also need my alone time because I'm a low-key introvert.”

Notice how many things those few sentences tell us not just about this *mystery* person, but about how the person feels about THEMSELVES. Well, you can probably guess what I'm going to tell you next: We also all have stories about ourselves as math learners!



Now look, this isn't a huge exercise—it doesn't need to take hours, and I want you to have the freedom to do it in whichever modality feels authentic to you. If you want to take pen to paper, go for it. If you want to type it out, great. If you want to record a voice memo, amazing. If video confessionals are your thing, GET IT! If it makes you feel better, we're going to revisit this exercise later in the book (see Chapter 6), so you will have the chance to rethink and revise. Consider this a first draft—a low-pressure, low-key way for you to get a “before” snapshot of where you were when you started Math Therapy!

Oh—and you totally don't HAVE to do this—but I'm REALLY into journaling, and I think that having a dedicated space to write is SO important—for you AND your students! We're going to be talking about how to help your students



create their very own Math Therapy journal in Chapter 3, but now is a good time to pull out your math journal if you already have one, to buy a cute notebook to turn INTO your Math Therapy journal, or to download the journal pages I have created just for you (and your students) from the website I have created just for you at maththerapy.com!

Don't overthink it—just grab a cup of tea or whatever your drink of choice is, maybe light a candle, get in the zone, and just GO FOR IT. Remember, there are NO RULES. If you want to, send me your math story once you're done recording it, and either way, save it somewhere special so you can find it when it's time to revisit it. Ready . . . set . . . TELL ME YOUR MATH STORY!

CHAPTER 1

WHAT IS MATH TRAUMA ANYWAY?

In this chapter, we get to:

1. Figure out why so many of us are SO scared of math
2. Discuss the differences among stress, anxiety, and trauma
3. Dig into some of the main causes of math trauma
4. Explore what math trauma might look like in our classroom

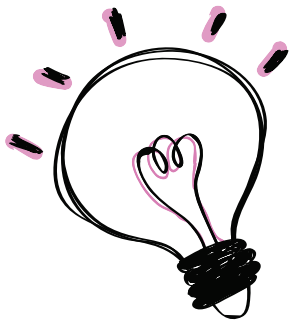
Hello, math-therapists-in-the-making! I know we're all VERY excited to get right into it, and I promise that more than 200 pages of tools, strategies, templates, and resources await to help us on our way. Throughout these pages, you will be learning exactly how to turn your classroom into a Math Therapy classroom by weaving the principles of Math Therapy into both your physical space as well as every single part of your teaching practice so that you cultivate a culture in which students are consistently building a better relationship with math—and with themselves. But first, we need to understand why so many of our students (and teachers . . . cough, cough) have developed math trauma over the course of our lifetimes. And to do that, we need to understand what math trauma is in the first place. And to do THAT . . . we need to talk about anxiety, which is more often than not the way that math trauma manifests in our classrooms and irl.

WHY ARE WE SO SCARED OF MATH?

I'm going to go rogue and start this chapter with a question: Why is “math anxiety” a thing we hear about all the time, but we almost never hear the term *history anxiety* or *geography anxiety* or even *science anxiety*?! Seriously,



type “math anxiety” into the search engine of your choice, and your web browser will serve you countless articles about the topic, but type “history anxiety” or “science anxiety” into that same search bar, and you’ll get articles titled “The History of Anxiety” or “The Science of Anxiety.” Anxiety around another discipline is just not a thing in the same way it is with math. Math anxiety is so widespread that studies show that as many as 93% of Americans identify as having some form of math anxiety (West, 2022)! That number includes children, adults, students, *and* educators! Sometimes it almost feels like we’re not even surprised that math anxiety is so commonplace; in fact, it’s almost MORE surprising



when someone doesn’t claim to be anxious about math. But have you ever stopped to wonder what it is about math that makes it so conducive to being anxiety-inducing for so many people?

Well, I have some theories.

Math Makes You Smart

As many of you know (because I won’t shut up about it), I’m in a rock band (see Figure 1.1). We

FIGURE 1.1 ME ON STAGE AT LONDON MUSIC HALL



SOURCE: Dan Boshart

have played over 400 shows; we've honed our craft for over 10 years, working with vocal coaches, practicing our instruments, writing songs that get played on the radio—we're like, actual, legit musicians. Now, let me describe a scenario that happens over and over again at our gigs:

Picture me on stage (looking glam, obviously). I'm running around—JUMPING around—doing stage dives, singing at the top of my lungs on key while shredding sick solos on my keytar (which is basically a keyboard that you wear like a guitar with all sorts of effects on it that make it sound cool). I do this for 45 to 60 minutes straight during any given show, and at the end of our set, I usually get off stage and chat with the audience. Now, almost every time, someone will come up to me and be like, "Wow, you guys were so great, blah blah blah," and I'll be like, "Cool, thank you so much," and they'll say, "I know it's so tough being an artist; do you do this full time, or do you have another job?" and I'll say, "We definitely all have other jobs—I'm actually a math teacher," and then THEY will step back, shocked, and say, "OMG, WOW, YOU MUST BE SO SMART."

Let me repeat that: "You. Must. Be. So. SMART."

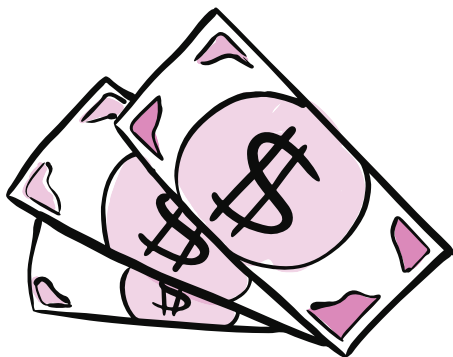
Here I am, shredding complicated keytar solos *while* singing IN TUNE *while* doing coordinated acrobatics, but none of THAT is enough to qualify me as "smart." The fact that I know math, however, is apparently the factor that seals my fate as being *intelligent*. What's that about?

Let's face it: We consider those who are "good at math" to be smarter than everyone else. We can likely all agree that Picasso and Mozart were incredibly talented individuals, but would we ever call them "smart?" That label tends to be reserved for the mathematically capable, cementing the idea that if you aren't good at math, then, well, you must be *unintelligent*, or worse—stupid. How. Stressful. Is. That?!

It's this classification of mathematics as *the* thing that makes someone smart—or not—that makes it so conducive to generating mass amounts of anxiety among most people. I mean, how stressful to think that if you don't understand a math concept right away then—BAM—you're not smart? Imagine the pressure! It is that pressure that ultimately generates a sense of anxiety around math. *Students aren't necessarily scared of math, of numbers, or of shapes; they're scared of being labeled as stupid.*

Math Makes You Money

There is nothing scarier to a parent than reading a headline like "STUDENTS ARE NOT MEETING OUR MATH STANDARDS" followed by a headline like "ALL FUTURE JOBS WILL REQUIRE MATHEMATICS SO WATCH OUT IF YOU DON'T WANT TO BE BROKE FOREVER." Fine, I'm



exaggerating—but only slightly. Seriously. Mass media are great at scaring the crap out of us.

For the past 10 years, I have been on the media list for math education in Canada. What that means is that any time there’s a “math crisis” (e.g., standardized test scores drop by a single percentage point or more students are struggling in math class than they were last year or whatever the hot new math crisis might be), I’m the one that vari-

ous media outlets will call for input. Every time this happens, I try to explain that the narrative that students need to get As in math in order to get anywhere in life is way more harmful than any of these manufactured crises, and furthermore, that narrative is possibly even *responsible* for the collapse of students’ waning math abilities in the first place! I’m not going to pretend that grades don’t matter—because they do—but I think we have to ask ourselves: At what cost?



HOT TIP

When your students start to fixate on getting the highest grade possible, help them pause and reflect on the “why.” Do they need a specific grade for a certain reason? Are they just getting swept up on the hamster wheel of getting the highest mark possible? Are they comparing themselves to others? Focusing on the *why* doesn’t eliminate the desire to achieve, but it does help students put things in perspective!

The idea that math ability correlates with your capacity to feed and shelter yourself is like, the most stressful thing I’ve literally ever heard, and I’m not even remotely surprised that, as a result, students and parents find math so stressful. I can’t even tell you how many calls I get a week from parents looking for a math tutor for their kids because they’re terrified that they will have NO future without an A in math class. *Students aren’t scared of math; they’re scared of having no hope for the future!*

Math Makes You Genetically Superior

Back in 2019, I was asked to be on a radio talk show to discuss a study that had proven that brain scans had shown there were no gender differences in math ability among children (Hunt, 2019). Cool. First of all, I would argue that there was literally no need for that study IN THE FIRST PLACE, as we already KNOW that there are no genetic gender differences in math ability, but apparently this radio host—along with much of the world—needed further evidence. After I argued this point to the host who was interviewing me, he gazed off into the distance and then said—on-air—“Hmmm, right . . . but . . . I wonder what happens to kids’ brains after puberty. Maybe there are gender differences in math ability at THAT point.” I was SHOOK, but the interview ended, and I couldn’t help but think to myself, Wow, all of this guy’s listeners are now walking away thinking that there might be a genetic—AND GENDERED—component to math ability, despite ALL RESEARCH PROVING OTHERWISE. It made me so mad because *there is no math gene*. Let me say that again: THERE IS NO MATH GENE!



Despite the fact that it is exceedingly rare for anyone to have a brain that is so remarkable that it actually even remotely matters when it comes to being born with an exceptionality regarding math ability, the narrative that nature plays a significant role in mathematical intelligence has been around for literally ever. In 1879, French polymath Gustave Le Bon wrote that even in “the most intelligent races” there “are a large number of women whose brains are closer in size to those of gorillas than to the most developed male brains.” He continued his insult with, “This inferiority is so obvious that no one can contest it for a moment; only its degree is worth discussion” (Pitman, 2023, p. 243). It would be nice to think that we’ve come a long way since then, but over a hundred years later, here we are trying to argue that men have better spatial abilities than women that make them more equipped to take on mathematics than their female counterparts (Bartlett & Camba, 2023), and it doesn’t stop there. We still hear parents speak of a mythical math gene they feel their kids have—or haven’t—inherited, despite research that there is *no such thing*. Given this pervasive, stubborn narrative, it’s no wonder so many of us are scared of math: We’ve been told over and over again that we’re either born “with it” or “without it” and that there’s nothing we can do to change that. The result is that many of us feel an unrelenting lack of control and nagging paranoia at the thought that we might be one of the unlucky ones born at a deficit. Like, that’s pretty terrifying if you ask me—downright scary. *Students aren’t scared of math; they’re scared of being genetically inferior.*



IN THE MOMENT

What do you think?

How many of your students' parents are under the assumption that math ability is genetic? Come up with some responses to keep in your back pocket the next time this comes up in conversation. You might cite the points I have made in this chapter, keep relevant links or articles on hand for interested parents, or even simply have a succinct "That's fake news" argument ready for when you need it. Helping your students' parents change their minds about math ability will ultimately help your students change their minds as well!



Math Makes You Miserable

On October 21, 1992, Mattel released a talking Barbie doll. When you pushed her little voice box thing, she would squawk, "Math class is tough." I'm not kidding—this was a real thing, and many young educators grew up WITH THIS DOLL because this was barely even 30 years ago, guys! The narrative that math is HARD is a pervasive one. Basically, every single Hollywoodized depiction of math paints it as a subject that only the nerdiest of the nerds can do (more on that later), and in our own schools, math gets a bad reputation for being the "hard" subject and the one students should avoid at all costs if they want to boost marks on their transcripts. I'm going to spare you my rant (for now) on how this bad rep is bolstered by the fact that

kids are taught to fear hard things because they might lead to failure, and failure is bad and should be avoided at all costs (I'm rolling my eyes as I type this, but don't worry, we're going to deal with this pesky myth when we get to Chapter 3!). All that being said, math is positioned as being really, really hard—and that can be scary for most people because as a society (let's say it together): We hate hard things! *Students aren't scared of math; they're scared of being deeply uncomfortable.*



IN THE MOMENT

Take a trip down memory lane!

Can you think of any toys you had in your childhood that may have affected you in terms of your math ability? Maybe you specifically played with toys that helped you develop numeracy skills or spatial ability, or maybe you had a sibling who received very different messaging from the toys they played with? Think about it!

STRESS, ANXIETY, AND TRAUMA: OH MY!

In 2018, I was asked to do a talk about math anxiety for 100+ math professors at the Field's Institute, an international center for scientific research in mathematical sciences. It was one of the most awkward presentations I have *ever* given because, as my talk progressed, it became increasingly clear that my audience of (mostly white, cis male) math professors thought that math anxiety was total bullsh*t. They were legit rolling their eyes and snickering as I described what math anxiety looked and felt like, and when I polled the crowd, the consensus was that none of *their* students experienced anything of the sort! Ha! Yeah, right! What was even more shocking was that when I implored them to consider what areas of their lives they might have experienced anxiety in, they doubled down and insisted that anxiety was a made-up thing and that they didn't "believe in it." I'm not kidding!

In 2018, 9.4% of American children and teens were diagnosed with anxiety (Centers for Disease Control and Prevention, 2023). That number more than tripled to 31.9% in 2022 (National Institute of Mental Health, 2023) and is currently trending upward. I started my tutoring company in 2010, and I can tell you that at that time I literally never heard the word "anxiety" from my students. Sure, my teenage students would talk about how *stressed* they were all the time, but they wouldn't claim to have *anxiety* until years later.

Since anxiety is so often the product of underlying trauma, I think it's important for us to take a moment to really dig into what anxiety is and how it might present in our classrooms.

Math Anxiety

While **anxiety might feel like a buzzword in society right now, it's been around literally forever.** Simply put, the anticipation of potential threats in our immediate environment, which is what anxiety is all about, is actually just meant to keep us safe from danger. Back in the day, we really did need to consistently be on the lookout for danger. Think about it: At any point, we could legit be eaten by a tiger—like actually—so our brains developed this system to protect us from literal life-threatening situations. We really did need to be ready to fight that tiger—or run away from it—at any given moment!



The thing is, even though most of us aren't really at risk of being eaten by giant wildlife, our brains still sometimes think we are. Our brain's emergency hotlines flare up even when there's no real danger and the line starts ringing off the hook. This can cause those nervous, worried feelings we call anxiety. It's our brain trying to protect us, but it can get a little too

overcautious, making us feel uneasy even when there's no real threat. While some level of anxiety is normal and can be motivating, excessive or prolonged anxiety can interfere with daily life. It involves both emotional and physical symptoms, such as increased heart rate, restlessness, and difficulty concentrating.

Now, similar to generalized anxiety, **math anxiety** is a heightened emotional response specifically related to the *perceived presence of math*. Take that in for a moment. Math anxiety doesn't just pop up when legit math is involved; all that is required to trigger math anxiety is the *perception* of math. For example, have you ever met someone who's like, "I'm SO bad with directions, don't even bother handing me that map!" or someone who's all, "Oh no, technology and I just don't get along" and gets into a frenzied panic when their laptop is frozen, subsequently smashing all the keys and having a near meltdown?! I'm telling you right now, in many cases, what lies beneath that panic is *math anxiety*! Now, if math anxiety can spike just at the mere hint of math, imagine how bad it can get when actual hardcore math is present—something that I'm sure you're faced with every day in your classroom!



Math anxiety doesn't just pop up when legit math is involved; all that is required to trigger math anxiety is the perception of math.

Math anxiety might look like a student acting as if they're on edge in your class all the time, not just before a test. It might manifest as someone fidgeting, sweating, feeling sick, and even having trouble breathing. It might look like a student handing in a blank quiz paper even though a few days ago they knew the content, or it might even look like your student who regularly gets A's insisting that she sucks at math and feels like a total failure. It's incredibly important that your students know that anxiety has *nothing* to do with math ability. If your students have math anxiety, it doesn't mean they're bad at math, but it can impact their math performance because it decreases a cognitive resource called working memory, which means that when anxiety is present, there's less working memory to apply to the actual math task at hand (Boaler, 2014)!

Now that we have an understanding of what math anxiety looks like, let's talk about what is often lurking below the surface: math trauma.

Math Trauma

Trauma is a big word. Before I start talking about trauma as it relates to math and the classroom, I want to note that there is an entire field of study dedicated to trauma-informed education and ACEs (adverse childhood events), and that this is not that. I don't know about you, but when I first

started hearing about trauma, I always assumed that, for something to be labeled traumatic, it had to be some giant dramatic thing . . . that is, until I learned about *sneaky trauma* (also known as *microtrauma* or *little t trauma*). *Sneaky trauma* refers to smaller, often benign-seeming experiences, that make a person feel upset, insecure, or unworthy. We'll talk about this a little more in a sec, but first, I want to note that for the remainder of this book, when we talk about math trauma, we will be mostly talking about microtraumas that we as educators deal with in our classrooms every day. If at any point you feel that one of your students is experiencing something beyond the scope of your understanding or expertise, please reach out to your school leaders or appropriate mental health experts in your district.



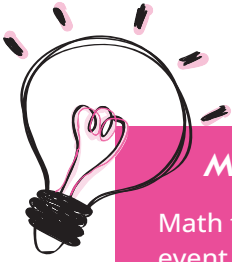
If at any point you feel that one of your students is experiencing something beyond the scope of your understanding or expertise, please reach out to your school leaders or appropriate mental health experts in your district.

It's really important to note that trauma refers to an emotional or psychological *response* to an event or series of events that are distressing or harmful and is often the catalyst for the development of chronic anxiety, or what is sometimes referred to as post-traumatic stress disorder (PTSD). When we talk about trauma, we are never talking about an event in and of itself, but instead about one's *experience* of that event. Two people can experience the exact same event, and one might experience it as sneaky trauma and the other might not!

I really like the way Gabor Maté talks about it because he explains why it is imperative for us to acknowledge and work on healing trauma:

Trauma is a wound that leaves a scar or imprint in your nervous system or in your psyche and shows up in multiple ways that are not helpful to you later on . . . if you look at the nature of a wound, on the one hand if it's raw and open it really hurts, so if somebody touches that wound that you sustained a long time ago that you haven't healed yet, you'll react like you're being tormented all over again . . . on the other hand, wounds scar over and the scar tissue has certain features. It's very hard, it's rigid, it's not flexible, so people tend to be rigid when they're traumatized, and it also doesn't grow; trauma very often stops emotional growth and development. (Maté & Maté, 2022, p. 21)

We can't expect our students to take risks or exhibit vulnerability when they are protecting the tenderness of an open wound, nor can we help them grow and flourish when scar tissue is holding them rigidly in place.



MATH TRAUMA

Math trauma is an emotional or psychological response to an adverse event or series of adverse events that have to do with *math*. When I talk about math trauma in this book, I am talking about having a bad experience with math that sticks with you. It's not just finding math hard or boring or stressful; it's feeling scared, stressed, or even ashamed *because of* past experiences with math.



For many, traumatic experiences with math lead to debilitating long-lasting emotional and psychological consequences, which is why it is SO important that we gain a better understanding of how it occurs inside—and outside—of our math classrooms.

For many, traumatic experiences with math lead to debilitating long-lasting emotional and psychological consequences, which is why it is SO important that we gain a better understanding of how it occurs inside—and outside—of our math classrooms. As Jo Boaler so aptly puts it, “*Mathematics, more than any other subject, has the power to crush students’ spirits, and many adults do not move on from mathematics experiences in school if they are negative*” (Boaler, 2016, p. xii). I’m sure we can all call to mind the many adults we know who likely have unpacked math trauma lurking beneath the panicked look that overcomes them when the check comes at dinner or their kind-of-bragging-but-low-key-embarrassed claims to not be able to balance a checkbook.

WHY MATH TRAUMA MIGHT DEVELOP

Before we dive deeper into how math trauma might present itself in our classrooms, I want to take a step back and really explain what sneaky trauma looks like and why math trauma might develop in the first place. Personally, I like to compare *sneaky trauma* to microaggressions. Hear me out: Microaggressions are small, subtle, or unintentional comments, actions, or behaviors that can hurt or offend someone.

For example, I was at a concert watching my absolutely favorite band, The Beaches (go listen to them RIGHT NOW! THEY ARE AMAZING! AND CANADIAN!). Anyway, The Beaches are a 4-piece, all-female band, and they are known for how incredibly energetic they are on stage. At the time of writing this, they have literally gone viral, and I bet by the time this book

comes out, they'll have won 10 Grammys, and I'll be able to say, "Told ya so!" Well, this guy standing next to me at the show turns to me and goes, "I just can't get into them. There's just not as much energy when it's all girls on stage, you know?"

I. Was. Floored.

I would love to say that I said something witty and amazing in return, but I stood there truly shocked. I couldn't believe it. This guy was seriously insinuating that if there are no MEN on stage, the energy level scientifically DROPS? It was appalling and just straight up inaccurate, and what I really wanted to say was, "Oh yeah? What's your sample size? How many all-female bands have you ever seen perform?" I would bet you \$100 his answer would have been: "One." This is a CLASSIC example of a microaggression. Microaggressions might seem minor, but they can make someone feel uncomfortable, insulted, or even excluded because of their race, gender, or other personal characteristics. When they take place consistently or repeatedly, they have a compounding effect and can be really damaging—*little t trauma* works the EXACT same way! We often don't label or unpack minor-seeming events that happen to us because they seem so benign, but the resulting experiences can be just as detrimental as those caused by *Big T trauma*. So, big or small, what types of events can cause math trauma in the first place? Let's take a closer look at three of the main areas of our students' lives where math trauma might happen: in the media, in the home, and in the classroom.



HOT TIP

Microaggressions are a mega cause of little t math trauma, and you can do something about it! If you ever spot any microaggressions in your classroom, call them out! Use such occasions as an opportunity to gently explain that jokey statements (e.g., anything emphasizing a stereotype) might seem light and funny to the person making the comment, but they actually reinforce damaging labels. These conversations are good opportunities for discussion and growth and go a long way in helping to cultivate a Math Therapy classroom!

Let's Blame Matt Damon

When I was in teacher's college, I did my first practicum at a local high school down the street, where most of my friends had gone when we were younger. On my first day, I walked into the math office and met with the head of the math department, who was this old dude who smoked cigarettes between classes and then PUT THE BUTTS IN HIS POCKET. He told us that that really pissed his wife off because when she threw his clothes in the washing machine you can imagine what kind of disaster ensued. (This has nothing to do with the story but I'm just trying to paint a picture here!) So I meet with the head of the math department, and the first thing he says to me is, "So, tell me. What is a pretty girl like you doing becoming a math teacher?"



And guys, this wasn't like, 1954. This was freaking 2008!!!

So where do whack ideas like this even COME from?!

Well, I have a question for you, and I want you to think long and hard: Have you EVER seen a movie in which the cheerleader character is good at math? Seriously. Have you? Okay, if by any chance you answered YES, I want you to literally put this book down and message me RIGHT NOW and tell me WHAT MOVIE because I have now asked this question to thousands of humans and not ONE person has said yes.

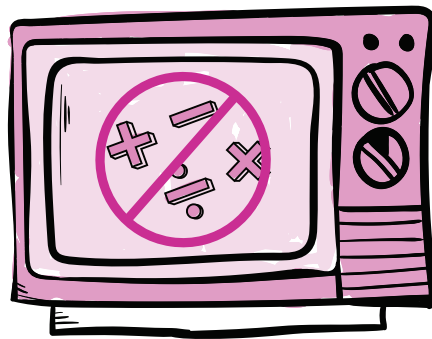
We all know the classic teen-movie plot: Hot, popular cheerleader lacks the smarts to get by in school. Her nerdy-but-lovable friend helps her pass math class, and in exchange, hot-popular cheerleader gives her a makeover so that the friend can get the guy she's been crushing on. From *Mean Girls* to *Clueless* to *The Big Bang Theory* to reality TV like *Love Is Blind* and *Too Hot to Handle*, this trope is literally everywhere! Just imagine being a girl who grew up watching those movies (which you may very well be!) and think about the message being sent: You can either be cool and popular OR you can be good at math . . . and a giant loser.



IN THE MOMENT

Name one movie or TV show where the cheerleader character is also good at math. I dare you. My DMs are open . . . !

In graduate school, I studied the effects of media representations of math on teenage girls, the results of which culminated in my master's thesis, *Peace, Love & Pi: Imagining a World Where Paris Hilton Loves Math* (Vakharia, 2010). The results were shocking and heart-breaking. Every single one of the Grade 12 girls I interviewed told me that their social status in school was more important to them than being good at math, and more telling, that they all felt the pressure to choose one over the other. Melissa, who was secretly scoring straight A's in her math class, told me that she felt as if she outwardly expressed her love of math she might risk having "no one to eat lunch with." She also ended up picking a career path that had nothing to do with math because as a girl who loves brand name designers, fashion, and celeb culture, she felt that there was a mismatch between "math's personality" and her own.



Being told that the only way to belong in the world of math is to shed your literal identity CAN BE TRAUMATIZING!

So what does this have to do with math trauma? Being told that the only way to belong in the world of math is to shed your literal identity CAN BE TRAUMATIZING! Just ask famed drag-queen-mathematician Kyne Santos (see Figure 1.2), who often talks about how they were made to feel as though they had to choose between EITHER being a drag queen OR a mathematician since no one would ever take them seriously if they chose to stick with both. Kyne is now making herstory with their book *Math in Drag*, but still gets told that they can't be taken seriously as a mathematician because of the way they look (which is laughable given they have a mathematics degree from one of Canada's top universities and over 1 million followers on TikTok who would agree that Kyne is *the only reason* they have finally learned to love math!).

Kyne is one of many who have been told that they must choose between being their authentic selves and being a mathematician (Gonzalez, 2023; Hottinger, 2017). Our students are being given this message by the media *every single day*. We hear it from the *Goodwill Huntings* of Hollywood that broadcast the message that to be a mathematician you need to be an awkward white dude with no social skills and prodigy-level mental math skills. We see it in the lack of diversity our kids are exposed to on their screens. Seriously, ask anyone if they've ever seen a Hollywood representation of Black people being good at math, and the only thing you'll hear anyone say is, "What about *Hidden Figures*?!" That movie was made in 2016 (and referencing the early 1960s!), and we're still hanging onto that TO THIS DAY because there has been NOTHING else; and we feel it in the social media trends that emerge almost monthly that tell girls they can either be "pretty" or good at math (see <https://rb.gy/su72fi>) or that reinforce the

FIGURE 1.2 KYNE SANTOS, AKA THE QUEEN OF #MATHTOK!



SOURCE: Kyne Santos

stereotype that certain groups (like girls) are innately bad at math (see #girlmath [Ehsaei, n.d.]), while others (boys, certain racial groups) are innately good at math. Oh, and don't get me started on the constant bullying on social media platforms that serves to uphold the stereotype that if you're a girl and you ask questions you're an embarrassment to the entire FIELD of math (Goodyear, 2020).

This is not an exhaustive list, and I could truly go on about this forever (I mean, I DID write a whole thesis about it!), but my point is that these media representations of what it means to *be good at math* can be incredibly traumatizing for our students who are young people in the midst of identity formation, navigating who they are (and want to

be) as human beings. Many of your students are being told that *who they are as people* is incongruent with the identity of someone *who is good at math*. Just think about that for a second. Imagine how much cognitive dissonance and stress that might cause a young person, and now imagine that young person being bombarded with that message multiple times a day. The traumatizing nature of math in the media is an example of little t trauma: We're so used to the way math is portrayed that we barely notice it, but the repeated, consistent nature of these microaggressions ultimately has a traumatizing effect on many.



HOT TIP

Students love a noncurricular task in math class! Challenge your students to find an example of math in the media and have them do an analysis of how math is being represented. Allow them their choice of media (advertising, social media, television shows, movies, even music) and ask them to present their findings to the class. This activity allows for rich discussion and debate about media representations of math and how they make your students see not only math but themselves as math learners!

The Apple Doesn't Fall Far

While most parents are well-meaning and wouldn't dream of intentionally traumatizing their kids, a lot of math trauma stems from family dynamics. Sneaky trauma in the home can be caused by parents telling their child that they “inherited their bad math skills” or that “the apple doesn't fall far from the tree” when it comes to math. Even though we now know—without a doubt—that there is no math gene, well-meaning parents still say stuff like this to their kids all the time; I hear it at least once a week from my students' parents! It is super traumatizing to feel as though your own parents don't believe in you—or even worse, that they are convinced that you were born with an innate math deficiency!



Being compared to a super-smart sibling can also be traumatizing, as can being yelled at by a family member for not understanding a math concept or for not getting a good grade on a math test. I love my parents, but I can tell you right now that I FOR SURE have math trauma that stems from my parents insisting that scoring 95% on a math test wasn't good enough. They would always say something like, “What happened to the other 5%?” and it sometimes made me feel like I wasn't smart enough and never would be, no matter how hard I tried. TMI, but this quest for perfection still plagues me TO THIS DAY—as I'm sure it does for many of you reading this.

In the Classroom

Math trauma often develops as a result of negative experience in our schools. These experiences might include things like public embarrassment, the pressure to perform, being singled out or labeled, a lack of student support, and classroom practices that can do more harm than good.

This is probably the scariest section to read because you might be like, “OMG, PLEASE tell me I'm not legit causing math trauma IN MY OWN CLASSROOM?!” But before you freak out: Remember, knowledge is power! Once you know what might lead to math trauma, you have the power to prevent it! Also, kids bring math trauma *into* your class *from* other classrooms, and it's important to know how and why that might happen so that you can help them heal from it. (*Spoiler*: We're going to deal with that when we get to the second step of Math Therapy, so you're already on the right track!)

Public Embarrassment

I have often heard people say something like, “Students don't hate math. They hate feeling embarrassed, ashamed, and defeated *by* math.” If you ask any student what they hate about math class, one of the first things they will

likely tell you is that they hate being called on when they don't have their hand raised. This is, more often than not, the result of a traumatic experience with public embarrassment. I remember all too well the feeling of sitting in math class SO stressed out that my teacher was going to call on me when I simply didn't understand the material being taught. I would sit in class with a knot in my stomach for the entire 60 minutes, PRAYING I wouldn't get picked to answer a question. When it inevitably did happen, my face would turn red, I would stammer that I didn't know the answer, and then I would sit there ashamed and embarrassed as my teacher made it clear that they were disappointed in me. Not a good feeling. Couple that with the experiences many of my students have had in similar situations where not only were they embarrassed in front of their teacher, but in front of classmates who would join in with a chorus of giggles. Totally traumatizing, especially for a young person!



IN THE MOMENT

Can you think of a time where you might have felt embarrassed, publicly? How did you feel in that moment, and did it make you want to stop doing whatever it was that led to that embarrassment in the first place? If not, how did you find the strength to persevere? Keep this in mind around your students and use this as inspirational fuel to relate to them and to pep talk them when they need it!

Pressure to Perform

In 2023, I gave a talk to high school students at a “prestigious” private school about embracing failure in math class. I thought I was totally crushing it, channeling my inner self-help guru, being all like, “MATH IS ALL ABOUT MAKING MISTAKES, FAILURE IS AN OBSTACLE NOT AN ABSOLUTE, BLAH BLAH BLAH.”

Imagine my surprise when, after what I considered to be a ROUSING speech, a group of students approached me and said, “Your talk was BS.”

I looked around to make sure they were talking to ME, and when I realized they were, I was like, “Ummm, pardon me?”

“Your talk was total BS,” they continued. “You say that we should embrace failure, but how can we when the whole point of high school math is to get into college, and we can't get into our top choice college without at least 90% in Algebra 1?”

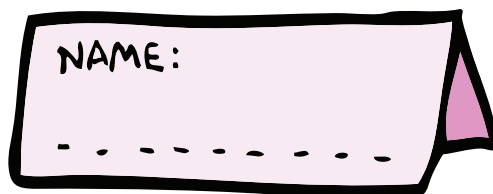
Well, they had me there. I was stumped. They were getting mixed messages. Here, their teachers and admin were telling them that they needed to

embrace risk-taking and failure and that nothing bad would happen to them as a result, but if you think about it, they were basically being lied to. Outside their classroom walls, they were being told that if they didn't adequately perform, they would be out of their top-choice school—something they had been told to work toward for their entire academic career thus far!

Being lied to? Misled? Being told one thing and then gaslit to believe another? Math trauma, math trauma, and MORE MATH TRAUMA!

Labels

When I was in Grade 7, I was sent to a school with a special program for “gifted” students. I had no idea why, nor did I know what being labeled “gifted” really meant. At my new school, all that label appeared to mean is that those of us in the program were weirdos. The kids in the other Grade 7 classes didn't really talk to us, and we were treated like we should be smarter than them, always. Truthfully, I have no idea how my middle school experience would have been different had I been in any other Grade 7 classroom, but I do know that after that I never felt like I was allowed to “not get it” when it came to school. I was gifted. I was supposed to be smart. I wasn't supposed to struggle. That sentiment would follow me throughout high school, causing me to feel like a total failure when I started slipping in math class when Grade 9 rolled around.



Now, you might wonder what might be so bad about a label that would make a child feel “smart,” right? I mean, isn't that better than labeling a kid as “slow” or “weak” or “behind?” The truth is that all labels can be harmful, even those that sound positive on the surface. Over the past few years, the gifted label has come under scrutiny (Mindshift, 2017) for several reasons, including the fact that it causes many children to feel like I did: like they are less-than if they ever struggle academically and that their mathematical know-how is supposed to be a result of nature, not nurture. It can also be isolating for many students and can cause them to identify their self-worth solely with academic success, which can be incredibly unhealthy. However, just as with most things, there are pros and cons to not just the gifted label but *any* label meant to help educators identify how a child might benefit from different approaches to teaching (Lambert, 2024). In many cases, labels are useful because they help us categorize and understand, and doing away with them entirely isn't as necessary as



The truth is that all labels can be harmful, even those that sound positive on the surface.

understanding that labels carry baggage and that we can help our students unpack that baggage with compassion and grace.

Given the influx of assessments, IEPs, learning differences, and mental health diagnoses that now permeates our classrooms, it is important for us as educators to help our students understand that they are *more than* the labels that they have been given! Labels are useful when they help us adjust our classroom practices or teaching methods to meet a student's needs but harmful and traumatizing when they are used to dismiss or categorize students in ways that limit the way in which they are understood as complex, ever-changing individuals.

Lack of Support

You might be thinking: The whole reason we have labels is so students can receive the extra support they may need. But what happens when that support simply isn't available? Sadly, we all know that with increasing class sizes and cuts to education budgets, that is what we as educators face every single day. As hard as we try to honor all of our students, there is usually only one of us there to serve 30 to 40 students with diverse needs in each one of our classrooms. A lack of teacher support ultimately leads to a lack of student support, and labeling our students without bolstering those labels with the support needed can lead to trauma, as it sends the message to students that they are difficult, hard to handle, or even annoying, and that there is nothing we can do to help them.

Let me be loud and clear: This is not the fault of us as educators. This results from the failure of the system we work in. Nevertheless, acknowledging this downfall is so important in helping our students heal. Labels aside, even our unlabeled students end up feeling those feelings of inadequacy and defeat if they are unable to feel supported when they are struggling. This might include students with learning gaps, those who are unable to afford support outside the classroom, and even those who face barriers that prevent them from getting homework done because they are needed to care for siblings at home or must work after school. Helping these students feel supported by acknowledging their circumstances and showing empathy can go a long way in preventing math trauma and healing math trauma that has already formed.

Classroom Practices

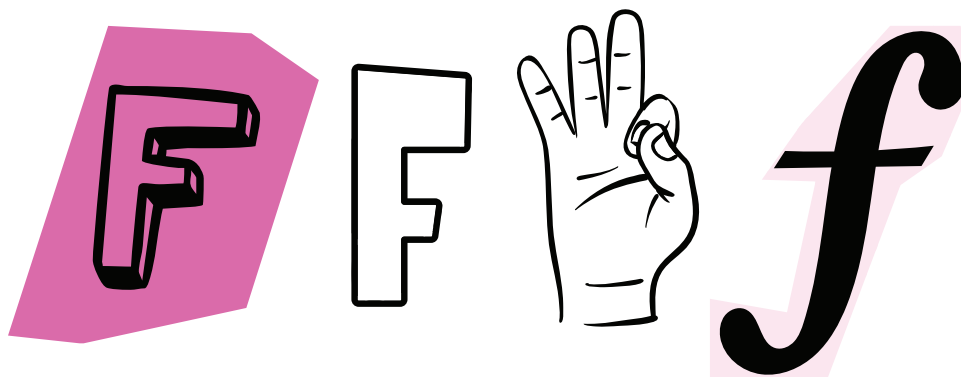
Okay, I promise I'm not going to tell you that everything you're doing in your classroom is horrible and traumatizing, I promise—PROMISE!

What I will say instead is that many of the classroom practices we as teachers grew up with may have caused math trauma . . . for US! Math education is currently undergoing a revolution, and part of that revolution includes

reexamining the classroom practices we have become so accustomed to and investigating how they may be part of the reason *so many adults* today HAVE math trauma!

Let's take timed tests, for example. Current research shows that the use of speed to measure understanding actually causes students so much anxiety that they underperform relative to their actual mathematical knowledge (Boaler, 2014). Not only do timed tests not accurately measure how much a student actually knows, but they lead to high levels of anxiety and negative experiences with math that ultimately cause math trauma! Now, there are many classroom practices just like this that we educators have been using for years because they've become the fabric of the systems in place. These practices include the way we group and assess students, the method used to teach certain content, how we create rubrics, and much more. I'm going to save this discussion for Chapter 4 when we talk about how to unpack and heal math trauma in the classroom because we're going to go over ways in which you can adjust some of these practices so that they satisfy the requirements laid out by your district, while simultaneously taking into account their potential to cause math trauma.

WHAT MATH TRAUMA MIGHT LOOK LIKE IN THE CLASSROOM

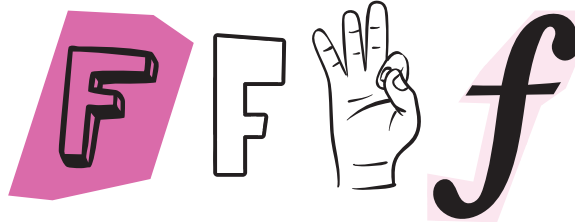


I'm going to end this chapter with a snapshot of what math trauma might look like in our classrooms based on the four classic trauma responses: fight, flight, freeze, and fawn. The four trauma responses evolved as survival strategies in the face of danger and developed over thousands of years as adaptive behaviors to help early humans respond to threats and ensure survival. As I mentioned earlier in this chapter, while these responses were beneficial for survival in dangerous situations, today these instincts can still kick in when we face stress or perceive danger, but they might not always be as helpful in modern situations as they were back in the day!



IN THE MOMENT

Can you spot any of these four trauma responses in your classroom? Bonus points if you go through your class list and give some thought to each of your students and what behaviors they typically exhibit that may be indicative of one of the four trauma responses. Save this list for later, as we'll want to revisit it in future discussions!



FIGHT

- irritability
- anger
- aggression
- “moving toward”

FLIGHT

- panic
- anxiety
- perfectionism
- “moving away” (avoiding!)

FREEZE

- spacing out
- feeling stuck
- dissociation
- depression/shame

FAWN

- people-pleasing
- avoiding conflict
- difficulty saying no
- prioritizing others

Fight

Our *fight* response developed as an evolutionary protection so that we could defend against danger. Remember that tiger we talked about earlier or other equally terrifying threats we were always dodging. We needed to be prepared to legit grab our spears and fight back! In our classrooms, a student who has experienced past math trauma might go into fight mode when they sense danger. Sure, a math test doesn't seem quite as threatening as a tiger, but our amygdala doesn't exactly know the difference—the same emergency hotline system gets activated regardless of the danger! This fight response might manifest as frustration or defensiveness, competitiveness, anger, or even hyperactivity and overachieving.

Flight

Let's face it, not everyone wants to tackle a tiger with a spear. *Flight* is the trauma response that instead tells us to RUN FOR OUR LIVES instead of facing a scary situation head on. You can see how both fight and flight would be potentially useful . . . depending on the size of the tiger (or math test)! In our classrooms, we tend to see flight A LOT. Flight commonly manifests in student behaviors that might look like avoidance, disinterest, and distraction.

Freeze

Sometimes when in danger, staying really still could make someone harder to notice, like playing dead might work to avoid being seen by . . . you guessed it . . . a giant tiger! Think of it as being as quiet and motionless as possible to avoid being a target. In the classroom, a student might feel completely paralyzed when confronted with a challenging problem. We see this in students who suddenly draw a blank when faced with their test paper—picture those who sit quietly, unable to attempt the question, essentially *freezing* in the face of the challenge (Kubala & Lebow, 2022).

Fawn

Finally, our *fawn* response developed as a way to appease or even befriend a potential threat to reduce the risk of harm. Back to that tiger: Instead of fleeing the scene or battling this giant mammal, perhaps you might choose to pet the tiger . . . make soothing noises . . . or become its bff to avoid getting eaten? You do you! In our classrooms, this might show up as a student seeking constant approval, overapologizing for not understanding a concept, agreeing with what the teacher says and claiming to understand even when they don't, and an inability to assert needs even when asking for an accommodation might actually help them feel better about the math they're learning.



IN THE MOMENT

Which of these 4 F's is your style? I'm totally a flight girl when I'm dealing with relationship drama, but a fawn girl when I'm dealing with online haters . . . what about you?



HOT TIP

Keep an eye out for the 4 F's in your classroom! Seeing your students' behaviors through the lens of the 4 F's can help you view them through a lens of empathy and compassion rather than the frustration that it's totally normal to feel when we see our students struggling and don't know how to help. Which of the 4 F's can you spot in your classroom? What do they look like? Which students exhibit them and when? Go through your class list and make notes; these will give you valuable insight as you go through Math Therapy with your classroom!

BEFORE WE MOVE ON

Not so fast! I know you're excited to get to the next chapter, but first—let's celebrate our progress and let it all sink in!

Treat Yourself

I am a big believer in celebrating every little bit of progress we make in this life because, hey, life is short, but also because we are often so fixated on the final destination that we NEVER take the time to celebrate the journey! At the end of every single chapter, I'm going to give you a teeny, little something sweet to do so that you can *feel good* about what you've learned. I want you to take these moments to use what you've learned in this chapter to *treat yourself*, okay? Don't skip this; it's the best part!

This end-of-chapter treat is all about showing yourself grace. Stress, anxiety, and trauma are parts of *most* of our lives, so don't be hard on yourself when they pop up. Instead, realize that they are just a part of you, like everything else.

So: I want you to think about one amazing character trait that you have that has gotten you through a particularly stressful time in your life. Picture that stressful time and then hone in on the amazing, magical trait that got you through it. Can you see it? Can you *name* it? Seriously, speak its name into the ether. Now, I want you to take your magical trait on a hot date! Time to treat the trait that's gotten you through a tough time by doing something fun. Take it out to dinner, give it a rom-com movie night, throw on twinsie face masks—do something nice to treat your trait (aka one part of YOURSELF that ROCKS) before moving on to the next chapter. You deserve it!

ASK YOURSELF

This is your chance to process by reflecting on what you've learned in this chapter.

1. Did this chapter change your perspective on why so many people are scared of math? Why or why not?
2. Are the ideas presented in this chapter different from your current educational philosophy? If so, how?
3. Can you think of examples from your classroom that illustrate the difference between stress, anxiety, and trauma?
4. What surprised you most about the causes of math trauma listed in this chapter? Which cause did you find most surprising?
5. Can you think of an example of how math trauma presents itself in your classroom? Describe it in detail!
6. Will any of the information learned in this chapter change your classroom practice, even just a little bit? What and how?



