

EDUCATION WEEK

How Much Math Anxiety Is Too Much?

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If Levi Vaughan, a 5-year-old kindergartner in Braidwood, Ill., makes it through math class [← Back to Story](#) without a meltdown, it's a good day.

The transition to school has been tough in other ways for Levi, said Stefanie Vaughan, his mother, but math has been uniquely challenging.

"His math papers get pulled out and he's in full-blown crisis mode," Vaughan said. "He has to leave the class."

So Vaughan reached out to a friend, Molly Jameson, a professor of educational psychology at the University of Northern Colorado who studies math anxiety in young children.

In 2013, Jameson developed a scale to help measure math anxiety in the youngest students. Vaughan's hope is that the scale will help her and Levi's teachers understand how much of Levi's distress is specifically related to his anxiety about math.

Jameson is one of a number of researchers trying to gain a better understanding of math anxiety in children like Levi.

A growing body of research shows that many adults and older students have anxiety about math. But only in recent years have researchers been looking to early childhood to understand the roots of the problem and how it is entangled with math performance and other psychological challenges.

"It's unclear in the literature if people who have low knowledge develop anxiety—in which case, they need skills—or if a low feeling of confidence leads to lack of knowledge," Jameson said. She said that understanding math anxiety could help teachers identify how and where to intervene when students are struggling.

And, she said, it's important to intervene early. For instance, adult women cite higher levels of anxiety in math than adult men, and women are also less likely to hold jobs in many science, technology, engineering, mathematics, or STEM, fields—but women who stay in STEM fields are less likely to report math anxiety, Jameson said.

"I think a lot of it starts in early elementary school," she added.

Measuring Math Anxiety

"We're consistently seeing we have a decent number of kids with math anxiety by 4th or 5th grades," said Colleen Ganley, a professor of psychology at Florida State University, "but we don't know when it starts, how it develops, what's happening before that, and how do they get there."

A first step is determining how to measure how math-anxious young students are in the first place. But the scales used to measure anxiety in adults aren't always appropriate for young children, and there is no single scale used by most researchers.

In her Children's Anxiety in Math Scale, Jameson uses a series of faces—a smiling face indicates a lack of anxiety, while a frowning face is associated with anxiety. Her scale has been used by researchers in the Philippines and Turkey, as well as the United States.

Ganley developed a different scale for her research that asks students to answer questions about their relationship with math on a scale of "yes, kind of, not really, and no."

Ganley said that while some early research indicates that adults can self-identify as math anxious, a 1st grader is not likely to be familiar with the word anxiety—or with some of the physical symptoms associated with it.

She said that some surveys ask if a child feels butterflies in his or her stomach in math class. But one child she surveyed said he felt butterflies because he loved math so much, and another associated that feeling with hunger.

Ganley said that on her scale, students are answering that they are anxious about math as early as 1st grade.

A Complex Link

Julianne Herts and Alana Foley, both researchers at the University of Chicago, recently published a paper showing that math anxiety can be present even in students who excel at math—and that anxiety can significantly impede their performance in the subject.

But that work focused on older students. Some researchers are beginning to look at how adults' attitudes and dispositions affect children.

Herts said that teachers' attitudes seem to matter, and that early-education majors "tend to be very math-anxious as a group." Parents' attitudes also seem to have an impact: In 2015, Sian Bielock, a professor at the University of Chicago, found that parental anxiety about math was tied to math anxiety among children. That effect can start early, even before school.

That finding lines up with Stefanie Vaughan's experience. Vaughan said she struggled with math in school, and the difficulty is now compounded because Illinois' math standards are "a different approach than what I grew up with."

Still others are beginning to look at how to address math anxiety.

Last year, for instance, a team of researchers led by Vinod Menon, a professor of psychiatry and behavioral sciences at Stanford University, found that working with a tutor seemed to improve 3rd graders' performance in math and reduce their anxiety.

The University of Chicago's Foley said that there's room for more research on what's happening in the earliest grades. "Anxiety and performance are correlated, and in adults it tends to be bidirectional," Foley said. "In children, we have the opportunity to ... tease out casual relationships."

The University of Northern Colorado's Jameson said she could imagine individual school psychologists or teachers using the math-anxiety scale to understand when a student's math struggles were related to emotions or to determine how an entire class was feeling about math.

"Is it a lack of motivation or knowledge or an emotional block?" she said.

But the University of Chicago's Herts said that even as more researchers develop tools to identify math anxiety, she would caution against overidentifying students as having math anxiety, because that could potentially foster even more wariness about the subject.

Meanwhile, Vaughan, the Illinois mother, hopes the research eventually translates into more-tangible approaches to helping children like Levi, who loves science and other subjects.

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"I hope he wouldn't feel immediately defeated when he sees math and just shuts down," she said. "I'd hope he would be able to realize that it might be tough, but to keep working and you'll get through."

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