

Member Spotlight

Sian Beilock wants to know why we choke under pressure

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AAAS Fellow Sian Beilock is fielding a two-year study of more than 600 first- and second-grade students, going back and forth between classrooms and her laboratory, using tools like fMRI to see how her subjects' bodies and brains react in various situations. (Photo: Jason Smith)

University of Chicago psychologist Sian Beilock has built a career on studying elite athletes, students and other strivers who “choke” under pressure. In 2010 she wrote a book on the subject, "[Choke: What the Secrets of the Brain Reveal About Getting It Right When You Have To.](#)"

Now, Beilock, a AAAS fellow, is trying to figure out why American kids lag behind much of the rest of the world in mathematics, the fundamental skill set for the jobs our economy will need most in the 21st century.

American 15-year-olds ranked 26th among their peers in 34 countries of the Organization for Economic Co-operation and Development when the OECD's Program for International Student Assessment tested them in [2012](#). That was down from 25th place in [2009](#). (PISA administers its test every three years.) “We're at risk of not having the math people we need for STEM careers,” Beilock says.

And American kids are feeling the heat—not as much from those international rankings as from the understanding that they are going to need a good education, and that there are only so many slots available in the best academic programs.

“There's lots of pressure and competing going on, starting with nursery school. I hear from parents that kids are stressed,” Beilock says. “A decade ago, people never would have thought that kids as young as kindergarten or first grade would have performance anxiety in particular subjects that would predict how well they would do across the school years.”

For a professional golfer playing for a large purse, or for a six-year-old trying to master her math facts, Beilock says, “what we learn, how well we do at something, is not just a matter of practice or of gaining knowledge. We also have to deal with the emotional factors that come into play.”

Beilock has been studying math anxiety for about 10 years now. She has recently added parents and teachers to the mix, to see if their attitudes might color students' experiences.

In an [earlier study](#), Beilock showed that the higher a teacher's math anxiety, the lower the scores of the girls in her classroom—but not the boys. Studies have shown that female [education majors](#) are more likely to have math anxiety

than any other group of college students, and more than 90 percent of elementary teachers are women. Young children notice gender, according to Beilock's study. A common stereotype holds that "girls are bad at math." For girls who are inclined to believe that stereotype in the first place, watching their female teachers struggle with math reinforces it, Beilock and her colleagues found.

As to parents, they do have a role to play in math education, for example talking about numbers, space-related concepts and counting at home, and making sure that all their children, boys and girls, get puzzles and Legos and other toys that get them thinking spatially, Beilock says. But at this point, she says, parents who conscientiously read bedtime stories to their children often don't see themselves as having any role at all in their kids' math education.

Currently, Beilock is fielding a two-year study of first- and second-grade students to evaluate what happens early on in school around subjects like math. Going back and forth between classrooms and [her laboratory](#), she is using tools like fMRI to see how her subjects' bodies and brains react in various situations. For example, Beilock has used fMRI technology to show that math anxiety can light up the brain's pain centers in some subjects. Actually doing math didn't cause the pain, though; it was anticipating math activity that registered hurt.

With this type of multiple methodology, "you can be in a very controlled environment [in the laboratory], and you can back up [findings] with somewhat less controlled experiments in the classroom," she says, adding she can do "fairly controlled" work even in the classroom. "When all the findings point in the same direction, you can be confident you are on the right track."

Some teachers are already using simple remedies that Beilock and [other researchers have shown](#) can help people succeed in stressful settings. Some students now [journal](#) about their feelings before important tests, for example, a technique Beilock wrote about in "Choke," that she says can alleviate anxiety and lead to higher scores. "People are interested in the topic of performing well. We all want to succeed," she says. "We [researchers] have to translate our work as a whole into something anyone can use" in the classroom.

Beilock's interest in the agony of defeat comes out of her own experience. She was an elite youth soccer player when she flubbed a tryout that might have led to the Olympics. Later, as a college student, she bungled an important test. When she became a psychologist, she decided to investigate why talented, hardworking people so often fall short.

"There is a little bit of 'mesearch' in what I do," Beilock says.