

Think you're good at math? A new study shows it may be because you had equitable math teachers

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A new study finds that high school students identify more with math if they see their math teacher treating everyone in the class equitably,

especially in racially diverse schools. The study by researchers at Portland State University, Loyola University Chicago and the University of North Texas was published in the journal *Sociology of Education*. Dara Shifrer, associate professor of sociology at Portland State and former middle school math teacher, led the study.

Who can do well in [math](#)? How you answer that question may depend on where you live. Whereas people in East Asian countries tend to believe that hard work can lead anyone to succeed at math, people in the United States are more likely to believe that people need natural talent in the subject to succeed. This perception means that [students](#) in the U.S. may be particularly susceptible to racial and [gender stereotypes](#) about who is and is not "good at math."

"Americans don't realize what strange stereotypes we have about math," says Shifrer. "It really sets kids up for failure here."

The fact that some [high school students](#) are more likely to give up on math than others has important implications for their individual futures and for the lack of diversity in STEM (science, technology, engineering and math) careers.

"U.S. STEM spaces are not a meritocracy," says Shifrer. "The cultural biases that we have around people's identities, status characteristics like race and gender, and our cultural stereotypes about math and science and who belongs there play a key role in who enters these fields and does well in them. The more that educators and students are aware of that and take action to counteract it, the more it could really shift access and representation."

In the study, Shifrer and colleagues sought to determine if teachers could counteract cultural biases and help students develop a positive "math identity"—the sense of seeing themselves as 'a math person' or as a

person who can succeed in math. In particular, they hypothesized that ninth graders who perceived their math [teacher](#) as being more equitable—treating everyone in the class fairly and providing clear resources for success—would have stronger math identities.

To test this hypothesis, the team used data from surveys of nearly 30,000 ninth graders from across the United States collected in 2009 by the National Center for Education Statistics. These surveys assessed how equitable students thought their [math teachers](#) were by having them rate their agreement with statements like, "my math teacher treats every student fairly" and "my math teacher thinks all students can be successful."

In their analysis, the researchers grouped students by their race and gender and by the racial composition of their [school](#)'s student body—that is, whether they attended a racially diverse school, a school where they were racially distinct or a school where most of their peers shared their race. They also controlled for factors that might be alternate explanations for a seeming relationship between perceived teacher equity and math identity, such as prior achievement in math, type of school, social advantages and teacher's preparation to teach math.

The results showed that students who perceived their math teachers as being more equitable had stronger math identities than those who saw their math teachers as less equitable.

"If teachers are teaching in a way that the kids perceive as equitable and efficacious, then it really makes a big difference in how the students feel about math," says Shifrer.

The researchers also found that this positive effect of equitable teaching on students' attitudes toward math was strongest in racially diverse schools.

"It seemed like teachers mattered more in those schools maybe because race is more evident in those schools," says Shifrer. "Kids are looking around and noticing that there are differences in students' race and maybe they're thinking more about whether they're the kind of student that's good at math. The teachers really had a space to make a difference in schools like that."

While the relationship between teacher equity and math identity was evident across races, there was an interesting exception. Black students, in general, had strong math identities, regardless of their teacher's actions.

"There's some kind of resiliency where these students persist and strive against racist stereotypes," says Shifrer. "They discount these dominant narratives and think, 'I belong here; I'm good at this.'"

Shifrer says similar findings have been found in other studies looking at the educational attitudes of Black students.

"[Black students] are often more positive towards school and towards what education can do for them," she says. "But there's not been a lot of work fleshing out the details."

One limitation of this study is that the researchers can't say definitively that the teacher's behavior came before the student's feelings about math.

"It could be that kids who identify more with math perceive their teachers more positively," says Shifrer. "But it makes sense that teachers who are behaving more equitably are going to improve the way kids are feeling in the classroom."

Learning about the factors that affect student math identity is important

because a student's attitude towards the subject influences the courses that they take as well as their future career selections. This study suggests that teachers may have a larger role to play in helping students develop a positive math identity than previously recognized.

More information: Dara Shifrer et al, The Relationship between Ninth Graders' Perceptions of Teacher Equity and Their Math Identity: Differences by Student Race and School Racial Composition, *Sociology of Education* (2023). [DOI: 10.1177/00380407221149016](https://doi.org/10.1177/00380407221149016)

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