

## **A comment by Ken Pope**

The University of Wisconsin-Madison issued the following news release: No Gender Differences in Math Performance

We've all heard it. Many of us in fact believe it. Girls just aren't as good at math as boys.

But is it true? After sifting through mountains of data - including SAT results and math scores from 7 million students who were tested in accordance with the No Child Left Behind Act - a team of scientists says the answer is no. Whether they looked at average performance, the scores of the most gifted children or students' ability to solve complex math problems, girls measured up to boys.

"There just aren't gender differences anymore in math performance," says University of Wisconsin-Madison psychology professor Janet Hyde, the study's leader. "So parents and teachers need to revise their thoughts about this."

The UW-Madison and University of California, Berkeley, researchers report their findings in the July 25 issue of Science.

Though girls take just as many advanced high school math courses today as boys, and women earn 48 percent of all mathematics bachelor's degrees, the stereotype persists that girls struggle with math, says Hyde. Not only do many parents and teachers believe this, but scholars also use it to explain the dearth of female mathematicians, engineers and physicists at the highest levels.

Cultural beliefs like this are "incredibly influential," she says, making it critical to question them. "Because if your mom or your teacher thinks you can't do math, that can have a big impact on your math self concept."

To carry out its query, the team acquired math scores from state exams now mandated annually under No Child Left Behind (NCLB), along with detailed statistics on test takers, including gender, grade level and ethnicity, in 10 states.

Using data from more than 7 million students, they then calculated the "effect size," a statistic that reports the degree of difference between girls' and boys' average math scores in standardized units.

The effect sizes they found - ranging from 0.01 and 0.06 - were basically zero, indicating that average scores of girls and boys were the same.

"Boys did a teeny bit better in some states, and girls did a teeny bit better in others," says Hyde. "But when you average them all, you essentially get no difference."

Some critics argue, however, that even when average performance is equal, gender discrepancies may still exist at the highest levels of mathematical ability. So the team searched for those, as well. For example, they compared the variability in boys' and girls' math scores, the idea being that if more boys fell into the top scoring percentiles than girls, the variance in their scores would be greater.

Again, the effort uncovered little difference, as did a comparison of how well boys and girls did on questions requiring complex problem solving. What the researchers did find, though, was a disturbing lack of questions that tested this ability. In fact, they found none whatsoever on the state assessments for NCLB, requiring them to turn to another data source for this part of the study.

What this suggests, says Hyde, is that if teachers are gearing instruction toward these assessments, the performance of both boys and girls in complex problem solving may drop in the future, leaving them ill-prepared for careers in math, science and engineering.

"This skill can be taught in the classroom," she says, "but we need to motivate teachers to do so by including those items on the tests."

The study's final piece was a review of the granddaddy of all high school math tests, the SAT. The fact that boys score better on it than girls has been widely publicized, contributing to the public's notion that boys truly are better at math. But Hyde and her co-authors think there's another explanation: sampling artifact.

For one thing, because it's administered only to college-bound seniors, the SAT is hardly a random sample of all students. What's more, greater numbers of girls take the test now than boys, because more girls are going to college.

"So you're dipping farther down into the distribution of female talent, which brings down the average score," says Hyde. "That may be the explanation for (the results), rather than girls aren't as good as math."

Still, will all of this be enough to finally shift this long-held attitude? Hyde can't say, but she remains determined to do so.

"Stereotypes are very, very resistant to change," she says, "but as a scientist I have to challenge them with data."

The study's other authors are Sara Lindberg, Amy Ellis and Carolyn Williams of UW-Madison, and Marcia Linn of UC, Berkeley. The work was funded by the National Science Foundation.

Ken Pope

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"Keep in mind that you are always saying 'no' to something. If it isn't to the apparent, urgent things in your life, it is probably to the most fundamental, highly important things. Even when the urgent is good, the good can keep you from your best, keep you from your unique contribution, if you let it."

--Helen Keller (1880-1968)