

July 25, 2008

Math Scores Show No Gap for Girls, Study Finds

By [TAMAR LEWIN](#)

Three years after the president of [Harvard, Lawrence H. Summers](#), got into trouble for questioning women's "intrinsic aptitude" for science and engineering — and 16 years after the talking Barbie doll proclaimed that "math class is tough" — a study paid for by the [National Science Foundation](#) has found that girls perform as well as boys on standardized math tests.

Although boys in high school performed better than girls in math 20 years ago, the researchers found, that is no longer the case. The reason, they said, is simple: Girls used to take fewer advanced math courses than boys, but now they are taking just as many.

"Now that enrollment in advanced math courses is equalized, we don't see gender differences in test performance," said Marcia C. Linn of the University of California, Berkeley, a co-author of the study. "But people are surprised by these findings, which suggests to me that the stereotypes are still there."

The findings, reported in the July 25 issue of *Science* magazine, are based on math scores from seven million students in 10 states, tested in accordance with the federal [No Child Left Behind Act](#).

The researchers looked at the average of the test scores of all students, the performance of the most gifted children and the ability to solve complex math problems. They found, in every category, that girls did as well as boys. (To their dismay, the researchers found that the tests in the 10 states did not include a single question requiring complex problem-solving, forcing them to use a national assessment test for that portion of their research.)

Janet Hyde, a professor at the [University of Wisconsin](#), Madison, who led the study, said the persistent stereotypes about girls and math had taken a toll.

"The stereotype that boys do better at math is still held widely by teachers and parents," Dr. Hyde said. "And teachers and parents guide girls, giving them advice about what courses to take, what careers to pursue. I still hear anecdotes about guidance counselors steering girls away from engineering, telling them they won't be able to do the math."

Girls are still underrepresented in high school physics classes and, as noted by Dr. Summers, who resigned in 2006, in the highest levels of physics, chemistry and engineering, which require advanced math skills.

The study also analyzed the gender gap on the math section of the SAT. Rather than proving boys' superior talent for math, the study found, the difference is probably attributable to a skewed pool of test takers. The SAT is taken primarily by seniors bound for college, and since more girls than boys go to college, about 100,000 more girls than boys take the test, including lower-achieving girls who bring down the girls' average score.

On the ACT, another college entrance test, the study said, the gender gap in math scores disappeared in Colorado and Illinois after the states began requiring all students to take the test.

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Schoolgirls' math skills now measure up to boys'

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WASHINGTON (AP) — Sixteen years after Barbie dolls declared, "Math class is girls are proving that when it comes to math they are just as tough as boys.

In the largest study of its kind, girls measured up to boys in every grade, from six through 11th. The research was released Thursday in the journal *Science*.

Parents and teachers persist in thinking boys are simply better at math, said Jai Hyde of the University of Wisconsin-Madison researcher who led the study. And girls were up believing it would avoid harder math classes.

"It keeps girls and women out of a lot of careers, particularly high-prestige, lucrative careers in science and technology," Hyde said.

That's changing, though slowly.

Women are now earning 48 percent of undergraduate college degrees in math; lag far behind in physics and engineering.

But in primary and secondary school, girls have caught up, with researchers attributing that advance to increasing numbers of girls taking advanced math classes such as calculus.

Hyde and her colleagues looked at annual math tests required by the No Child Left Behind education law in 2002. Ten states provided enough statistical information to review test scores by gender, allowing researchers to compare the performance of more than 7 million children.

The researchers found no difference in the scores of boys versus girls — not even in high school. Studies 20 years ago showed girls and boys did equally well on math at elementary school, but girls fell behind in high school.

"Girls have now achieved gender parity in performance on standardized math tests," Hyde said.

The stereotype that boys are better at math has been fueled, at least in part, by suggestions of biological differences in the way little boys and little girls learn. That is hotly disputed; Lawrence Summers, then the president of Harvard, was castigated in 2005 when he questioned the "intrinsic aptitude" of women for top-level math and science.

Joy Lee, a rising senior at Thomas Jefferson High School for Science and Technology in Alexandria, Va., says she always felt confident about math, but remembers how she would walk into a science class full of boys. "Maybe I was a little bit apprehensive about being the only girl, but that didn't last for very long," said Lee, president of a school club that tries to get young girls interested in science and technology, along with engineering and math.

"I definitely do encourage other girls to pursue those interests and to not be scared to take those courses just because there are not very many girls or because they think they're not good enough to do it," Lee said.

Still, while there are fewer women in science and technology, there are more women in college overall. To Hyde and her colleagues, that helps explain why girls consistently score lower on average on the SAT: More of them take the test, which is needed to get into college. The highest-performing students of both genders take the test, but

girls lower on the achievement scale take it, skewing the average.

For the class of 2007, the latest figures available, boys scored an average of 530 on the math section of the SAT, compared with 499 for girls.

On the ACT, another test on which girls lag slightly, the gender gap disappeared in Colorado and Illinois once state officials required all students to take the test.

As Hyde and her colleagues looked across the data for states' testing, they found something they didn't expect: In most states they reviewed, and at most grade levels there weren't any questions that involved complex problem-solving, an ability necessary to succeed in high levels of science and math. If tests don't assess these reasoning skills, they may not be taught, putting American students at a disadvantage to students in countries with more challenging tests, the researchers said.

That might be a glaring omission, said Stephen Camarata, a Vanderbilt University professor who has researched the issue but was not involved in the study.

"We need to know that, if our measures aren't capturing some aspect of math that's important," Camarata said. "Then we can decide whether there's an actual male or female advantage."

A panel of experts convened by the Education Department recommended that the tests be updated to emphasize critical thinking.

While some states already have fairly rigorous tests, "we can do a better job," said Linda Briggs, the department's assistant secretary for elementary and secondary education.

"If we're going to be globally competitive, we need students who are able to do high-level math skills," she said.

Back in 1992, Barbie stopped saying math was hard after Mattel received complaints from, among others, the American Association of University Women.

So far, while her current career choices include baby doctor and veterinarian — Dallas Cowboys cheerleader, too — Barbie has not branched out into technology or engineering.

The Mercury News

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What math gender gap? Study finds girls, boys equally adept

VAST STUDY SHOWS GIRLS AND BOYS ARE EQUALLY ADEPT

By Lisa M. Krieger
Mercury News

Article Launched: 07/25/2008 01:37:03 AM PDT

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Girls = Boys.

A new study puts to rest one of the most widespread myths about boys' and girls' aptitude in math. After analyzing 7 million test scores, researchers found no difference.

The findings demonstrate great strides since the 1970s, when major studies showed pronounced differences in the scores of males and females. By the 1980s, younger students were matched - but girls fell behind when they hit adolescence.

Study authors at the University of California-Berkeley and University of Wisconsin-Madison offer several theories behind the improvements, including changes in educational approaches and career expectations.

"Stereotypes are very, very resistant to change, but as a scientist I have to challenge them with data," said Wisconsin's Janet S. Hyde, lead investigator of

the study, published in Friday's issue of the journal Science.

Using vast data generated by the No Child Left Behind legislation, which mandates annual testing of youths from elementary school through high school, the new study concludes that the gender gap has vanished among students of all ages.

Among math whizzes, there remain sex differences.

But they don't add up to anything definitive. For instance, there are more white boys than girls with scores in the 99th percentile. But among Asian-Americans, it's reversed: Girls outperform boys. (Reliable data was not available for Hispanics, blacks and American Indians.)

The concept of male supremacy in math became established among many educators and psychologists in the 1970s with the publication of the book "The Psychology of Sex Differences," written by Stanford emeritus professor Eleanor Maccoby and University of Southern California emeritus professor Carol Nagy Jacklin.

The notion has driven generations of girls away from advanced high school math, legitimizing a pernicious sexual stereotype, feminist scholars have asserted.

But attitudes - and aptitudes - have been changing. In 2005, after former Harvard University President Lawrence Summers suggested that women may be biologically unsuited to succeed at math, he was ultimately subtracted from the top post.

"Going back to my mother's generation, for example, women were commonly encouraged to avoid math courses," said Suzanne Antink, a calculus teacher at Palo Alto High School. "I experienced a male math teacher my senior year with

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the same idea - from his point of view there was no reason for women to be in his class. We have come quite a way since then."

Today, roughly half Palo Alto High's calculus students are girls, and the Advanced Placement Statistics course is 60 percent female.

Shelby Pefley, 13, sees similar ratios in her math classes. She plans to take Algebra 2 at Egan Middle School in Los Altos next school year.

"Some of the smartest people in my class are girls. We all just hang out together," Shelby said. "There are so many girls, we're all just together."

Girls are doing better because they are taking more advanced courses in high school, according to the research team. After tackling subjects like multi-variable algebra, analysis and calculus, girls are scoring higher on tests.

"Now that enrollment in advanced math courses is equalized in high school, we don't see gender differences in performance on state tests," said co-author Marcia Linn, a UC-Berkeley professor of education.

Women, who have more career options these days, now earn 48 percent of all mathematics bachelor's degrees.

"If you plan on being a full-time homemaker or elementary school teacher, you may think you don't need math," said Hyde, a psychology professor. "But if you're thinking about a serious career - and want to make sure it is lucrative or prestigious - you'll take more math."

Additionally, psychologists have learned that a major factor in predicting academic success is self-confidence. Girls may be getting more

encouragement about their math abilities now than previously.

The research team studied a total of 66 different No Child Left Behind-based assessments from 10 states, including California. They calculated the degree of difference between scores in standardized units. In 21, boys did slightly better than girls; in 36, girls did slightly better than boys; in nine, they were matched.

"But when you average them all, you essentially get no difference," said Hyde.

In a separate analysis, they conceded that a gap persists in one important test, the pre-college Scholastic Aptitude Test.

However, the researchers pointed out that the SAT is not an indication of overall ability, because it is not administered to a random sample of students. What's more, far more girls take the SAT than boys, "so you're dipping further down into the female talent pool, which brings down the average score," said Hyde. "That may be the explanation for (the results), rather than girls aren't as good as boys in math."

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From the Los Angeles Times

Math scores for girls and boys no different, study finds

The analysis of standardized test results for more than 7.2 million students in grades 2 through 11 contradicts a pervasive gender stereotype.

By Wendy Hansen

Los Angeles Times Staff Writer

July 25, 2008

The notion that boys are better than girls at math simply doesn't add up, according to a study published today in the journal *Science*.

An analysis of standardized test scores from more than 7.2 million students in grades 2 through 11 found no difference in math scores for girls and boys, contradicting the pervasive belief that most women aren't hard-wired for careers in science and technology.

The study also undermined the assumption -- infamously espoused by former Harvard University President Lawrence H. Summers in 2005 -- that boys are more likely than girls to be math geniuses. Girls scored in the top 5% almost as often as boys, the data showed.

"Both parents and teachers continue to hold the stereotype that boys are better than girls" at math, said psychologist Janet Hyde of the University of Wisconsin at Madison, who led the study. "That's just not accurate."

Hyde and her colleagues examined detailed data from math tests administered between 2005 and 2007 as part of the No Child Left Behind initiative.

Comparing the average scores of girls and boys in California and nine other states, the researchers found that neither gender consistently outpaced the other in any state or at any grade level.

Even on test questions from the National Assessment of Education Progress that were designed to measure complex reasoning skills, the gender differences were minuscule, according to the study.

"There's nothing in any of these data that would suggest that girls can't do math or aren't doing well in math," said Diane Halpern, a professor of psychology at Claremont McKenna College who was not involved in the study.

However, she noted that girls generally scored better on tests closely aligned with the classroom curriculum, including the standardized tests used for No Child Left Behind.

Boys typically score higher than girls on the math portion of the SAT, a fact often cited as evidence of greater math ability.

But since more girls than boys take the college entrance exam, the results aren't comparable, Hyde said.

Studies in the 1990s found that boys and girls in elementary school scored equally well on math tests but that by the time students reached high school, boys outscored girls on tests involving complex problem-solving.

Hyde said that pressure to get into selective colleges has prompted girls to take more advanced math classes, including calculus, and she said that may explain the improvement in test scores.

Hyde said it might take time for the new data to dispel lingering stereotypes, and she remained worried that girls would continue to be steered "away from careers that require a lot of math, like engineering."

Cathy Kessel, president of the Assn. for Women in Mathematics, said that even nonacademic issues like child care could dissuade young women from entering math-oriented fields.

"There may not be any one factor," said Kessel, a consultant in math education in Berkeley. "It's probably more complicated."

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