

# Gender gap persists at highest levels of math and science testing

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A study that examined 30 years of standardized test data from the very highest-scoring seventh graders has found that performance differences between boys and girls have narrowed considerably, but boys still outnumber girls by more than about 3-to-1 at extremely high levels of math ability and scientific reasoning.

At the same time, girls slightly outnumber boys at extremely high levels of verbal reasoning and writing ability.

Except for the differences at these highest levels of performance, boys and girls are essentially the same at all other levels of performance.

The findings come from a study performed by Duke University's Talent Identification Program, which relies on SAT and ACT tests administered to the top 5 percent of 7th graders to identify gifted students and nurture their intellectual talents. There were more than 1.6 million such students in this study.

Researchers Jonathan Wai, Megan Cacchio, Martha Putallaz and Matthew C. Makel focused in particular on gifted seventh graders who scored 700 or above on the SAT's math or verbal tests, which is higher than most high school juniors score.

Among these students at the very top of the performance curve, the differences in verbal and mathematical performance have maintained a persistent [gender gap](#) over the last 15 years, said Jonathan Wai, a post-

doctoral research associate at Duke TIP, and lead author on a paper appearing in the July/August issue of the journal *Intelligence*.

The ratio of 7th graders scoring 700 or above on the SAT-math was about 13 boys to 1 girl when it was measured in a landmark study 30 years ago, but that ratio dropped dramatically in the 1990s, Wai said. Since 1995, the gap has remained steady at about 4 boys to 1 girl.

The top scores on scientific reasoning, a relatively new section of the ACT that was not included in the earlier study, show a similar ratio of boys to girls.

Much has been said and written about the small numbers of women found in top positions in science, technology, engineering and mathematics (STEM), and there are probably many social and cultural reasons for that gap, said Wai. But there do appear to be some real differences in math and science reasoning that may factor into the disparity.

"Our research only serves to inform the debate," Wai said. "It's apparent that there are still differences in ability levels due to gender, even as women have occupied more STEM jobs in the last 30 years. We will continue our research, but for now it seems that ability is still a factor in the equation."

In earlier work that examined how many of these talented youngsters went on to earn Ph.D.s, publications, patents and tenured professorships, Wai and his colleagues at Vanderbilt University, David Lubinski and Camilla Benbow, found that differences in math ability did seem to affect what happened 20 years down the road. "Differences in ability within the top 1 percent make a difference in predicting real world achievement in STEM and other areas," Wai said. "What matters is ability, not the sex of the individual, in predicting these outcomes."

Acknowledging that there are some differences in ability might further the efforts to get more women into math and science, Wai said. For example, it would be good to know more about what made the test performance gap close so dramatically between 1981 and 1995.

"Perhaps that's something we could use."

The research team, which included Megan Cacchio, a 2006 Duke graduate who started this study as her undergraduate honors thesis, also looked at 13 years worth of SAT and ACT data for U.S. high school students. They found a similar pattern among the top performers. In 2009, males scoring a perfect 800 on the SAT-math outnumbered females about 2 to 1.

"Even though there are more female role models in math and science now than 30 years ago and sex biases may have eased, we're still seeing these differences among the most talented students," Wai said. The current study doesn't address how those differences might affect a person's career path directly, but "interests and preferences are probably more important than abilities," he said.

"The more important question is whether these differences explain any of the gender differences in career choices and the kinds of behaviors linked to career success, and if so how much," said Jacquellyne Eccles, McKeachie-Pintrich Distinguished University Professor of Psychology and Education at the University of Michigan, and director of the Gender & Achievement Research Program. "This is a very hard question to answer when the social and cultural forces influencing career choices and persistence/engagement are also very strong."

**More information:** Wai, J., et al., "Sex differences in the right tail of cognitive abilities: A 30 year examination." *Intelligence* (2010). [doi: 10.1016/j.intell.2010.04.006](https://doi.org/10.1016/j.intell.2010.04.006)

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