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Field

Are girls too good at reading to study math?

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ABSTRACT
Women remain strongly underrepresented in math-related fields. We showed that the difference between 15-y-old students' math and reading abilities influences the gender gaps in self-concept in math and in intentions to pursue math-related studies and careers.

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Girls have better academic paths than boys, achieving better results at the undergraduate and postgraduate levels. However, they are still significantly underrepresented in math-related fields. This situation is a concern since these fields of study lead to the highest-paid jobs in fast-growing sectors, which are the least subject to wage gaps between women and men.

Gender differences in math test scores are now very limited in most countries, and they cannot explain the vast differences in education and career choice between the sexes. Social scientists have therefore turned to other explanations such as differences in self-confidence, preferences, or discrimination.

In a paper just published in PNAS, we revisit the role of abilities and test scores to explain occupational gender segregation. We show that taking into account not only math scores but also reading scores can account for a large part of the differences in intended studies between girls and boys.

For this, we use individual data from the PISA international survey conducted in 2012. The study of math and reading test scores on a sample of 300,000 15-year-old students in 64 countries (the 35 OECD countries and 29 partner countries) confirms that boys are slightly better than girls in math at that age. In contrast, girls are much better at reading. The gap in reading in favor of girls is three times greater than the gap in math for boys. This difference gives girls a

comparative advantage for reading compared to boys. Two-thirds of girls are better in reading than in math, whereas this is the case for only one-third of boys.

The PISA 2012 survey also includes questions about the intention to pursue studies and careers related to math. Boys are more likely than girls to pursue math-related studies, and the small gender gap in math performance can explain only about 10% of this gender gap in intention.

The results are radically different when one explores the role of the comparative advantage for mathematics, i.e., the difference between the math and the reading scores, rather than the math score only. The comparative advantage in math/reading accounted for 75% of the difference between the sexes their intentions to study math are assessed. Girls are mostly better in reading than in math and at the time of making choices, they may favor humanities because they perceive themselves as verbal persons. They undertake this choice even though their career prospects may be better after math-related studies.

The PISA 2012 survey also makes it possible to measure students' declared interest and self-confidence in math. We find that these variables are much less able to explain the gender gap in intention to study math than are students' differences in performance between math and reading. Besides, as observed for the gender gap in intention to study math, math performance only explains very little of the gender gaps in interest for math or self-confidence in math. In contrast, there is almost no gender gap in these variables among girls and boys having the same comparative advantage for math versus reading. This piece of evidence suggests that self-concept and interest in a field are established by comparing one's performance in the two different domains. Even if girls perform as well as boys in math, the fact that they are much better in reading harms their self-confidence in the former discipline.

This critical role played by gender gaps in test scores and in comparative advantage at age 15 raises questions about their origin. In line with a previous article in *Science*, we suggest that they are probably of cultural background, determined by previous socialization processes, in the family, and at school. For example, we observe that the gender gap in comparative advantage is more significant in countries where the stereotype associating math with men is stronger. We also note that the way educational systems are organized can reduce these gaps.

To promote equal representation of girls and boys in math-related fields, trying to improve the scores of boys in reading, should be effective. Another option would be to improve the information provided to students. Especially when they choose their future studies so that they can be less reliant on their comparative advantage and more on actual career prospects. These interventions would have to be carried out in addition to those intended to limit gender stereotypes and their impact from an early age on the academic paths of girls and boys.