Girls more anxious about mathematics, STEM subjects compared to boys

April 21 2016

David Geary and his team determined that, overall, girls experience negative emotions about mathematics that can result in avoidance of math topics. Credit: MU News Bureau

Global studies have shown that women are underrepresented in some science, technology, engineering and mathematics (STEM) subjects and fields. Even in countries with higher gender equality, sex differences in math and technical scores persist. Now, using international data, a team of psychologists from the University of Missouri, the University of California-Irvine and the University of Glasgow in Scotland, have determined that, overall, girls experience negative emotions about

mathematics that can result in avoidance of math topics. Often called "mathematics anxiety," scientists believe that several factors other than math performance are resulting in higher mathematics anxiety in girls compared to boys.

"We analyzed student performance in 15-year olds from around the world along with socio-economic indicators in more than 60 countries and economic regions, including the U.S. and the United Kingdom," said David Geary, Curators Professor of Psychological Sciences in the MU College of Arts and Science. "Analysis revealed that girls' mathematics anxiety was not related to the level of their mothers' engagement in STEM careers, nor was it related to gender equality in the countries we studied. In fact, the gender difference in mathematics anxiety was larger in more gender-equal and developed countries. In more developed countries, boys' and girls' mathematics performance was higher and their mathematics anxiety was lower, but this pattern was stronger for boys than for girls."

According to the study, in 59 percent of the countries analyzed, gender anxiety differences are more than twice the magnitude of gender differences in mathematics performance, indicating that factors other than performance are resulting in higher mathematics anxiety in girls than boys. Altogether, the study highlights the complexity of the gender differences in mathematics performance and anxiety, Geary said.

The study also analyzed the possible role of parental views on the value and importance of mathematics for their daughters and sons. In contrast with what many believe, parents in more developed countries placed a stronger emphasis on the mathematical development of their sons than their daughters—despite the fact that these more developed countries actually have larger proportions of mothers working in the STEM sector.

"Policies to attract more girls and women into subjects such as computer

science, physics and engineering have largely failed," said Gijsbert Stoet, reader in psychology at the University of Glasgow and a co-author of the study. "Gender equality is a key humanistic value in enlightened and developed societies, but our research shows that policy makers cannot rely on it as the sole factor in getting more girls into subjects like physics and computer science. It is fair to say that nobody knows what will actually attract more girls into these subjects. Policies and programs to change the gender balance in non-organic STEM subjects have just not worked."

The study, "Countries with higher levels of gender equality show larger national sex differences in mathematics anxiety and relatively lower parental mathematics valuation for girls," was published in *PLOS ONE*.

Provided by University of Missouri-Columbia