



Are boys and girls equally prepared for life?

- Girls outperform boys in reading in all countries and economies by the equivalent of one year of school.
- In most countries and economies, girls underperform boys in mathematics; and among the highest-achieving students, the gender gap in favour of boys is even wider.
- The gender gap in mathematics performance mirrors the gender gap in students' drive, motivation and self-beliefs.
- Boys and girls tend to benefit equally when they are perseverant and motivated to learn, and have confidence in their abilities to learn mathematics. Consequently, the performance of both boys and girls suffers at the same rate when they lack motivation to learn and confidence in their own abilities.

Students' confidence in their ability and their motivation to learn play a central role in shaping their performance in specific academic subjects. They are also valuable attributes that will help them meet challenges and make the most of available opportunities when they leave school. Girls' perceptions of themselves as learners of mathematics determine how well they motivate themselves and persevere in the face of difficulties when learning mathematics. They also influence the choices girls make about coursework, additional classes, and even educational and career paths. Many girls choose not to pursue careers in science, technology, engineering and mathematics because they do not have the confidence in their ability to excel in mathematics, despite having the capacity and skills to do so.

Even at 15, boys and girls already have different ideas about their career paths.

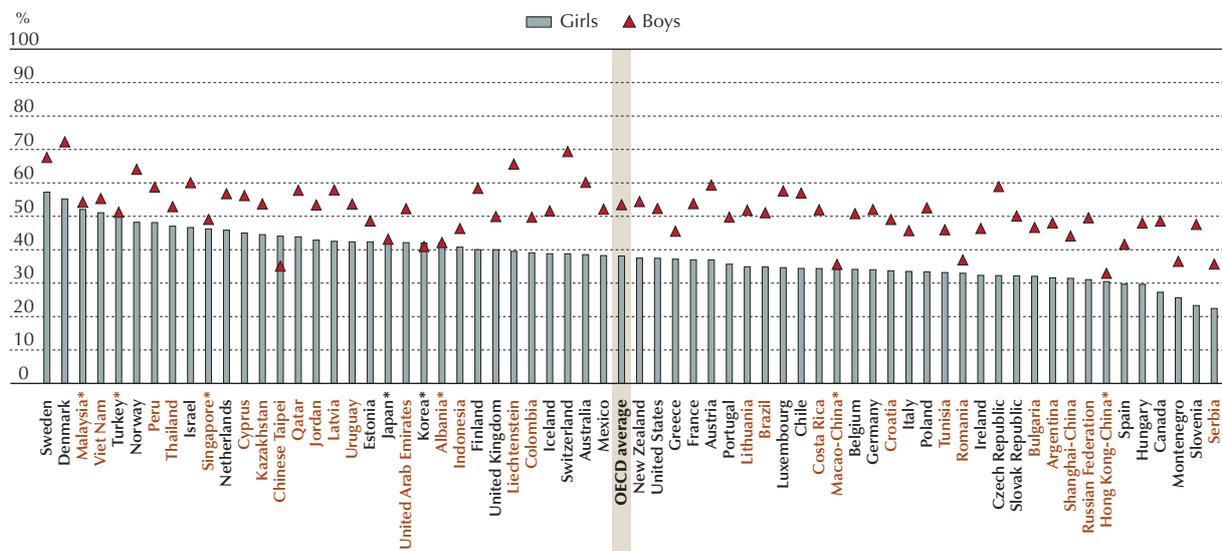
In 2012, PISA asked students about their intentions to use mathematics in their future studies and careers. Students were presented with five pairs of statements and were asked to choose the one of each pair that best described their intentions and desires for their futures. Students were first asked whether they intend to take additional mathematics courses or additional language courses after their compulsory schooling ends. On average across OECD countries, 57% of students reported that they intend to take additional mathematics courses, and 45% of students reported that they intend to major in a subject at university that requires mathematics skills; 55% reported that they intend to major in a subject that requires science skills.



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In all countries and economies except Albania, Costa Rica, Indonesia, Jordan, Kazakhstan, Malaysia, Portugal, Shanghai-China and the United Arab Emirates, boys are more likely to report that they intend to take additional mathematics courses (rather than additional language courses) after school finishes. Across OECD countries 57% of students overall intend to take additional mathematics courses: 63% of boys, but only 51% of girls.

Percentage of girls and boys who plan to pursue a career that involves a lot of mathematics, rather than a lot of science

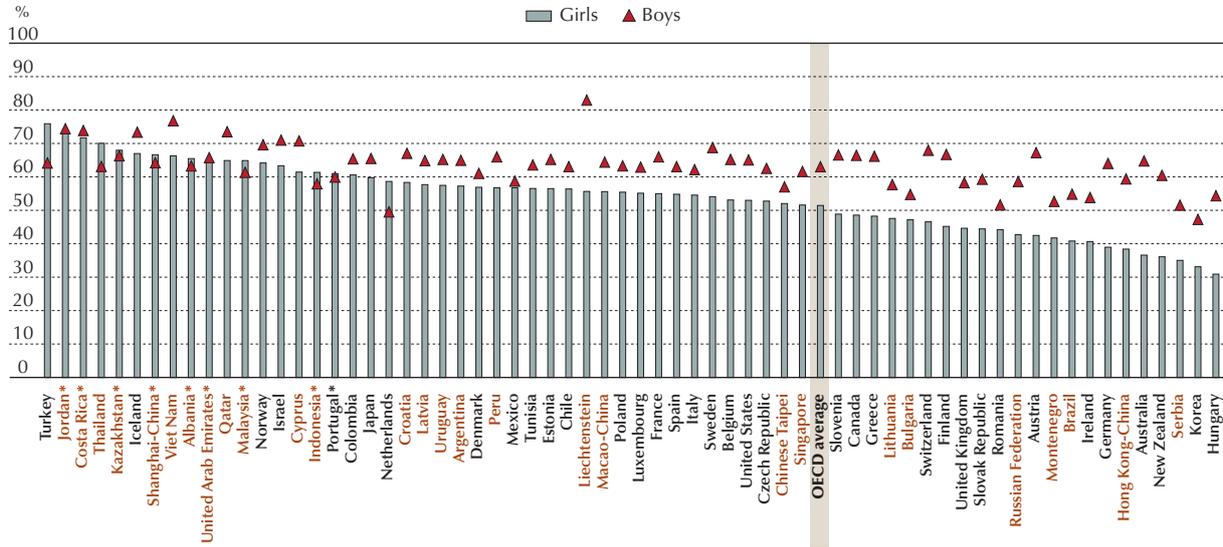


Note: An asterisk next to the country name denotes countries where the gender gap in these intentions is not statistically significant. Countries are ranked in descending order of the percentage of girls who intend to pursue a career that involves a lot of mathematics, rather than a lot of science. Source: OECD, PISA 2012 Database.

Boys and girls are also not equally likely to plan a career that involves a lot of mathematics, compared to careers that involve more science. On average, only 38% of girls, but 53% of boys, plan to pursue a career that involves a lot of mathematics rather than one that involves a lot of science. In addition, evidence from previous PISA cycles – when students were asked about the kind of career they expect to pursue as young adults – suggests that even those girls who envision pursuing scientific careers expect to work in fields that are different from those boys expect to pursue. Girls are, in fact, over-represented among students who expect to work in the health and social fields, while boys are over-represented among 15-year-olds who expect to work as engineers or computer scientists.



Percentage of girls and boys who intend to take additional mathematics, rather than language, courses after they leave school



Note: An asterisk next to the country name denotes countries where the gender gap in these intentions is not statistically significant. Countries are ranked in descending order of the percentage of girls who intend to take additional mathematics, rather than language, courses after they leave school. Source: OECD, PISA 2012 Database.

Gender gaps in student performance are striking...

PISA 2012 reveals that boys continue to outperform girls in mathematics in 38 participating countries and economies by an average of 11 score points (across OECD countries) – the equivalent of around three months of school. Across OECD countries 15% of boys but only 11% of girls achieve at the highest levels of proficiency in mathematics. By contrast, girls outperform boys in reading in all countries and economies by an average of 38 score points (across OECD countries) – the equivalent of one year of school.

...but boys and girls are equally capable of attaining the highest scores in mathematics.

Yet boys and girls can both achieve at very high levels. The average girl in Shanghai-China scores 610 points in mathematics, well above boys' average performance in every other country and school system that participated in PISA. Meanwhile, the average boy in Shanghai-China scores 557 points in reading, higher than girls' average performance in every other participating country and school system, except for Hong Kong-China, Japan and Singapore.

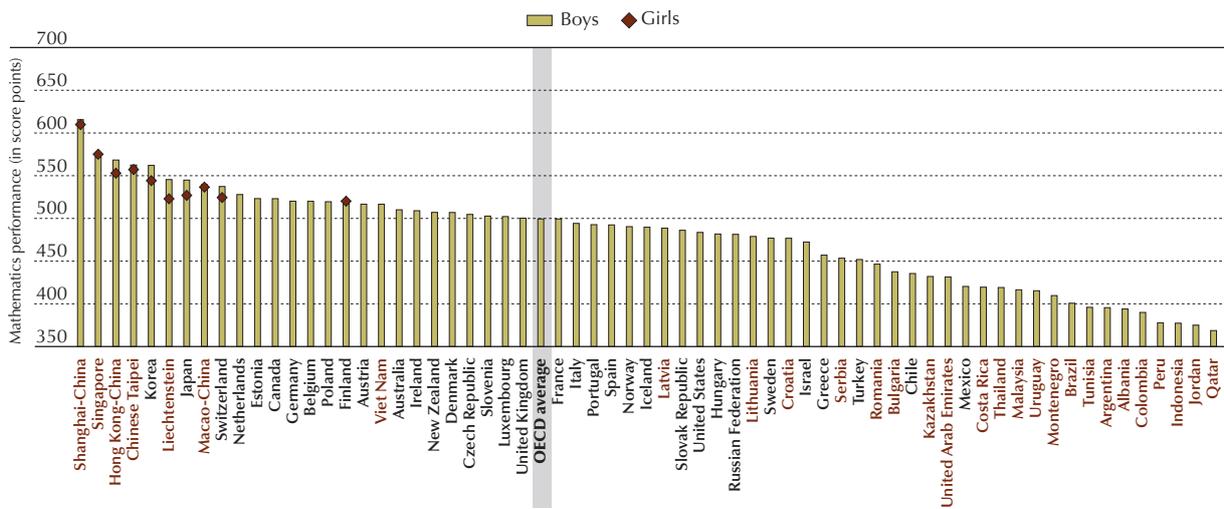
Gender differences in mathematics performance are much wider in some countries and economies than in others. The gender gap in mathematics is larger than 20 score points in Austria, Chile, Colombia, Costa Rica, Liechtenstein and Luxembourg; no gender gap is observed in 23 countries and economies; while in Iceland, Jordan, Malaysia, Qatar and Thailand, girls outperform boys in mathematics. In reading, the gender gap is smaller than 20 score points in Albania and Colombia while it is larger than 70 score points in Bulgaria, Finland, Jordan, Montenegro and Qatar.



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Interestingly, in mathematics, the gender gap in favour of boys is largest among the best-performing students. Among the poorest-performing students, performance differences related to gender are small or non-existent. By contrast, the largest gender gaps in reading are concentrated among the lowest-performing students. Among these students, very few girls, but large proportions of boys, have not yet mastered basic reading skills by the time they are 15. Across OECD countries, there is no gender gap among the poorest-performing 10% of boys and girls, while the gender gap among the best-performing 10% of boys and girls is 20 score points.

Boys' average performance in mathematics compared with the performance of girls in the 10 countries with the highest average performance among girls



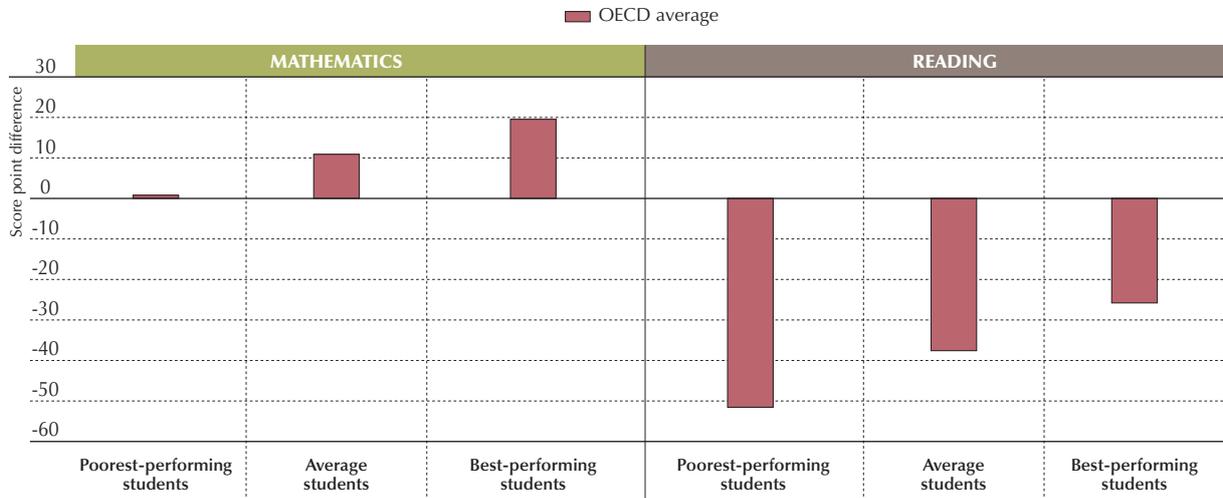
Countries and economies are ranked in descending order of the mean score in mathematics among boys. Source: OECD, PISA 2012 Database, Table I.2.3a.

Gender differences in specific mathematical skills...

Since it focused on mathematics performance, PISA 2012 collected detailed information about students' strengths and weaknesses in solving various types of mathematical problems. For example, the gender gap in favour of boys is wider (16 score points) when looking at students' ability to formulate concepts mathematically than when looking at students' ability to employ or interpret mathematical concepts (9 score points).



How the gender gap varies across the performance distribution



Notes: The gender gap reflects the difference between the performance of boys and the performance of girls.
 "Poorest-performing students" refers to the poorest-performing 10% of boys and the poorest-performing 10% of girls.
 "Best-performing students" refers to the best-performing 10% of boys and the best-performing 10% of girls.
 Source: OECD, PISA 2012 Database.

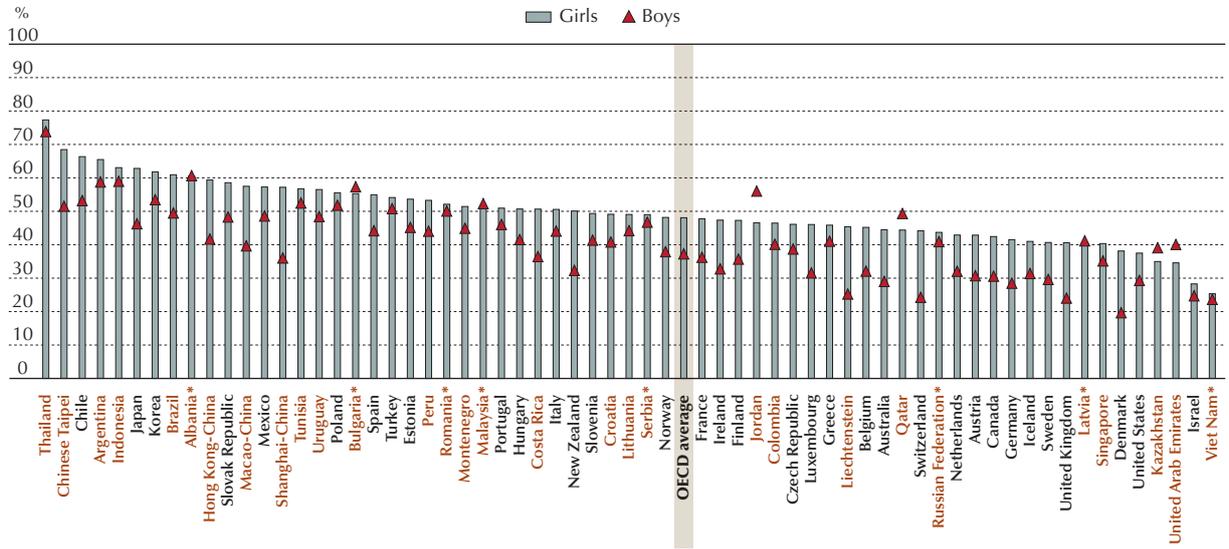
...and in attitudes towards mathematics...

PISA reveals that students' attitudes towards mathematics are already well-formed by the time students are 15. Many students, particularly girls, feel anxious about mathematics and have low levels of confidence in their own abilities, even if they perform well in mathematics. What is particularly worrisome is that, even when girls and boys perform equally well, girls are more likely to feel anxious towards mathematics, and have less confidence in their own mathematical skills and in their ability to solve mathematics problems than boys.



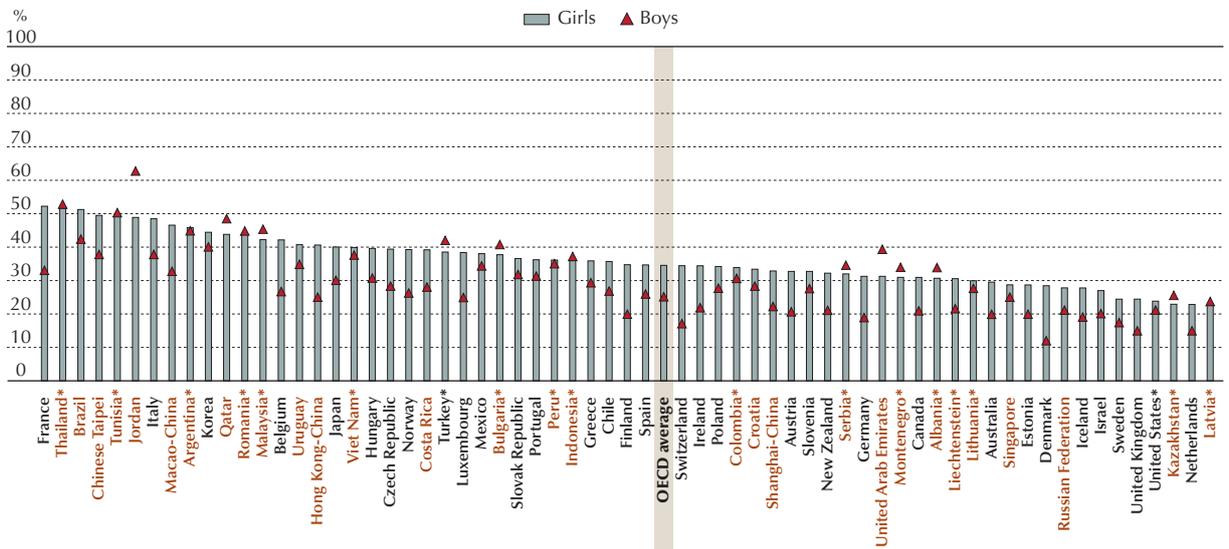
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Percentage of girls and boys who believe that they are just not good in mathematics



Note: An asterisk next to the country name denotes countries where the gender gap is not statistically significant. Countries are ranked in descending order of the percentage of girls who agree or strongly agree with the statement "I am just not good in mathematics". Source: OECD, PISA 2012 Database, Table III.4.2b.

Percentage of girls and boys who report feeling helpless when doing a mathematics problem



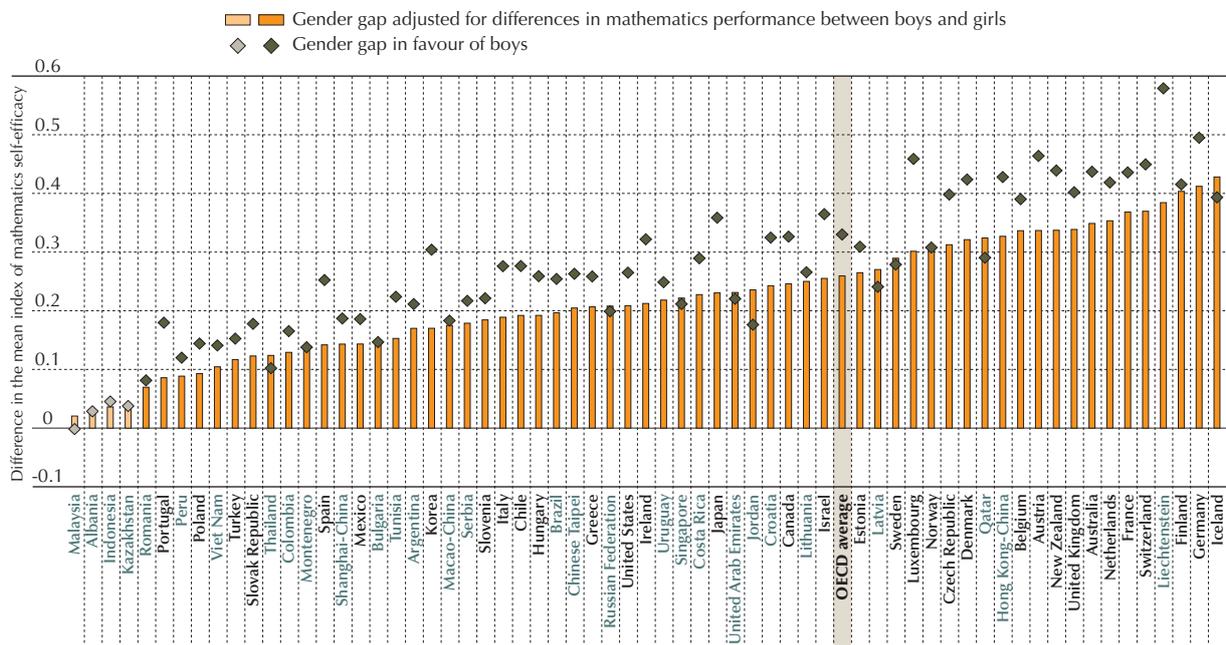
Note: An asterisk next to the country name denotes countries where the gender gap is not statistically significant. Countries are ranked in descending order of the percentage of girls who agree or strongly agree with the statement "I feel helpless when doing a mathematics problem". Source: OECD, PISA 2012 Database, Table III.4.3b.



...have consequences on students' lives far beyond compulsory schooling.

Gender gaps in drive, motivation and self-beliefs are particularly troubling because these factors are essential if students are to achieve at the highest levels. And PISA results show that the relationship between drive, motivation and mathematics-related self-beliefs on the one hand, and mathematics performance on the other, is particularly strong among the best-performing students. Unless girls believe that they can achieve at the highest levels, they will not be able to do so.

Gender gaps in students' beliefs in their ability to learn and use mathematics



Note: Statistically significant differences at the 5% level are marked in a darker tone. Countries and economies are ranked in ascending order of the difference between boys and girls in the index of mathematics self-efficacy, after adjusting for differences in mathematics performance. Source: OECD, PISA 2012 Database, Table III.7.3a.

Indeed, a substantial proportion of the difference in mathematics performance related to gender can be explained by differences in boys' and girls' self-beliefs and motivation to learn mathematics. Once these are taken into account, the most able girls underachieve compared to the most able boys in only a small set of countries and by a much narrower margin. This does not mean that if girls' motivation and self-beliefs improved to the extent that they matched those of boys that they would perform equally well as boys. But given girls' lower levels of confidence in their own abilities, school systems, teachers and parents should try to find – or create – more effective ways of bolstering girls' beliefs in their own abilities in mathematics, both at school and at home.



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The gender gap in mathematics performance has remained stable in most countries since 2003, as has the gender gap in mathematics self-beliefs. In the short term, changing these mindsets may require making mathematics more interesting to girls, identifying and eliminating gender stereotypes in textbooks, promoting female role models, and using learning materials that appeal to girls. Over the longer term, shrinking the gender gap in mathematics performance will require the concerted effort of parents, teachers and society, as a whole, to change the stereotyped notions of what boys and girls excel at, what they enjoy doing, and what they believe they can achieve.

The bottom line: The gender gaps in mathematics performance has largely remained stable over successive PISA assessments – which is not a good sign, considering that PISA results also show that both boys and girls can perform at the highest levels. More troubling, still, is the fact that the gender gap extends to students' attitudes towards learning mathematics, which has repercussions in life well beyond school. Shrinking these gender gaps requires a concerted effort by parents and educators to challenge and eliminate gender stereotypes and bolster girls' beliefs in themselves.

For more information

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See [OECD \(2013\), *PISA 2012 Results: Ready to Learn: Students' Engagement, Drive and Self-Beliefs \(Volume III\)*, OECD Publishing.](#)

[OECD \(2013\), *PISA 2012 Results: What Students Know and Can Do: Student Performance in Mathematics, Reading and Science \(Volume I\)*, OECD Publishing.](#)

[OECD \(2012\), *Closing the Gender Gap: Act Now*, OECD Publishing.](#)

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