



## Encouraging girls' participation in mathematics

### Summary of additional research into gender and participation in STEM subjects

#### [The gender equality paradox in STEM education. Gijsbert Stoet & David C. Geary, 2018](#)

The research found that countries with high levels of gender equality have some of the largest STEM gaps in secondary and tertiary education. It also found that boys often expressed higher self-efficacy, more joy in science and a broader interest in science than girls. These differences were also larger in more gender equal countries and were related to the students' personal academic strength. Some implications (Interventions) are discussed.

#### [Gender differences in boys' and girls' perception of teaching and learning mathematics. Marcus Samuelsson & Joakim Samuelsson, 2015](#)

Gender differences between boys and girls in the perception of the classroom setting, and their relationship to achievement in mathematics and aspects of self-regulated learning skills are the focus for this article. Factors of importance for girls' performance in mathematics were teacher and peer support. Such results concerning mathematics are supported by general findings indicating that teacher and peer support are positively connected to academic attitudes, achievement, emotions, learning, motivation and self-efficacy.

#### [How can we increase girls' uptake of maths and physics A-level? Institute for Fiscal Studies \(IFS\), 2018](#)

In partnership with the STEM Skills Fund, the IFS conducted a study to understand the barriers that stop girls from taking maths and physics at A level.

#### [Comparative Advantage and Gender Gap in STEM. Sofoklis Goulas, Silvia Griselda and Rigissa Megalokonomou. 2020](#)

In this paper, we study how the relative comparison of one's own academic strengths and weaknesses with respect to her classmates affects a student's decision to select and specialize in a STEM field.

[Does academic self-concept drive academic achievement? Kirstine Hansen & Morag Henderson, 2019](#)

A UCL article, not the full research report.

[4 Ways To Improve And Increase Self-Efficacy. Madhuleena Roy Chowdhury, 2020](#)

Self-efficacy is the belief we have in our abilities and competencies. This article is an exploration of the practical know-how of building, maintaining, and improving self-efficacy to aim for a better living. Through scientifically backed evidence and proven tips and tricks, this piece will open to you a whole new zone of improved self-confidence and guide you to achieving your desired state of well-being.

[Metacognition and confidence: comparing math to other academic subjects. Shanna Erickson and Evan Heit, 2015](#)

It appears that both overconfidence and anxiety can adversely affect metacognitive ability and can lead to maths avoidance. The results have implications for educational practice and other environments that require extensive use of maths.

[Female teachers' math anxiety affects girls' math achievement. Sian L. Beilock, Elizabeth A. Gunderson, Gerardo Ramirez, and Susan C. Levine, 2009](#)

The effect on students in primary schools, particularly years 1-3 (although this is an american piece of research so refers to 'elementary school' age).

[A Mr Barton collection of research into academic self-concept and motivation](#)

Craig Barton's takeaways from research into self efficacy, self concept, achievement and motivation.

[Boys overestimate their maths ability more than girls. 2019](#)

An article looking at data from Diagnostic Questions. Boys are more confident than girls regardless of ability, study finds.

[Post-16 maths participation 2014/15 and 2015/16. Published 2017.](#)

Analysis of post-16 participation in maths study for the 2014 to 2015 and 2015 to 2016 academic years. Progression rates to A level by grade and gender.

[Hey I am good at this. One school's solution to recruiting more girls into Computer Science. 2019](#)

Strategies (e.g. older girls mentoring) to encourage girls to choose computing. "Girls don't want to be in courses if they don't feel a sense of belonging," Birch said. "So the idea was to give younger students a connection with an older student who was already in the program."

[Professor Sir Adrian Smith's review of post-16 mathematics, 2017](#)

Recommendation 16: The Department for Education should commission a study, from pre-school onwards, into the cultural and other root causes of negative attitudes to mathematics, including gender and other sub-group effects. Recommendation 17: The Department for Education should, in any future work to improve careers provision and related advice, prioritise and make clear the importance of mathematics to a wide range of future careers.

[The relationship between A-level subject choice and league table score of university attended. Catherine Dilnot, 2018](#)

"Doing facilitating subjects, particularly maths, may be a sensible choice of A-level for those aspiring to high-ranking university, even if the content is not required for the intended course."

[Females show more sustained performance during test-taking than males. Pau Balart & Matthijs Oosterveen, 2019](#)

They found that girls were typically worse in maths and science than boys. However, the gender gap closed when the tests lasted for more than two hours. Girls are BETTER than boys when it comes to exams lasting longer than two hours because they have 'better self-discipline and planning skills'.

[The A level gender gap: attainment and entries. Education Policy Institute](#)

Animated interactive chart for 1996 - 2018. 2019 data found at <https://epi.org.uk/publications-and-research/a-level-results-2019/>

[Stereotype Threat](#) is a situational predicament in which people are or feel themselves to be at risk of conforming to stereotypes about their social group. It is purportedly a contributing factor to long-standing racial and gender gaps in academic performance. Stereotype threat has become one of the most widely studied topics in the field of social psychology. A wikipedia page and links to several research articles on Stereotype Threat.

[Girls' comparative advantage in reading can largely explain the gender gap in math-related fields. Thomas Breda and Clotilde Napp, 2019](#)

"Adequate information campaigns on future career prospects may be a welfare-improving way (because students can make better informed choices) of reducing the importance of the comparative advantage in students' decision making and, therefore, the gender gap in enrolment in math-related fields. Similarly, interventions involving teachers or parents targeted at limiting the role of the comparative advantage in educational choices could also be effective. Of course, these options should complement rather than replace interventions directly aimed at limiting the negative effects of gender stereotypes.

[There are infinite possibilities for women in maths and your capacity is much, much greater than you believe – Professor June Barrow-Green, Maths Historian at the Open University. 2019](#)

Great article with practical ideas and links. Section titles: Why it is vital we remember and celebrate female pioneers of maths. Helping students to visualise a maths related career. Promoting relationships between maths and other subjects. Advice for girls and women who want to study maths. Overcoming unconscious resistance. Everybody's capacity for maths is much, much greater than they believe.

[Closing the STEM gap. Why STEM classes and careers still lack girls and what we can do about it. Microsoft - with KRC Research, 2018](#)

Section headings (page numbers): Provide role models (6) Generate excitement (8) Provide hands-on experience (10) Provide encouragement (12) Encourage a growth mindset (15) Turning insight into action (18)