

Women are less likely to study STEM subjects – but disadvantaged women are even less so

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*The gender divide in Science, Technology, Engineering and Mathematics study is more complicated than most researchers, policy makers, and practitioners previously thought, writes **Natasha Codioli McMaster**. She explains that young women's social circumstances play a key role in whether they choose to study STEM at university.*



There is a vast amount of research showing that women are less likely to study STEM subjects. This is a persistent finding in countries across the world and at all levels of education, and this ultimately leads to a divided workforce. With STEM subjects often paying higher salaries, it is a key contributor to the gender pay gap. Recent research also suggests that STEM skills are required for 1 in 6 non-STEM occupations, and estimates expect this to group considerably over time.

What was less clear, until recently, was how consistent these divisions were depending on children's social circumstances. To address this, I analysed data from a nationally representative cohort of more than 4,000 students in England. The data included information on students' subject choices in Higher Education and academic attainment. Students' parents were also interviewed and asked a wide range of questions about their social circumstances, such as their level of education, income, and job type.

My study showed that whilst young men were drawn towards STEM subjects regardless of their parents' social position, young women from less advantaged social backgrounds were particularly less likely to study STEM subjects. For the most advantaged third of students, there was no gender gap. This suggests that whatever is holding young women back from studying STEM is only acting as a barrier to relatively disadvantaged young women.

Qualitative exploration of the 'types' of young women who choose to study post-compulsory physics compliments these findings. Researchers on the ASPIRES project interviewed more than 70 students in depth throughout their schooling and found that girls studying physics tended to be from highly educated and well-off families, often with parents also working in STEM jobs.

It is becoming more apparent that this is not only the case in England. Another recent study has found similar results, this time using representative data from the Netherlands. Not only were gender differences in choice of STEM subjects smaller for

the most advantaged students, but the gender differences in choice of subjects typically dominated by women were also reduced. Young men from well-off backgrounds were more likely to study health and related subjects than their less well-off peers.



Gender norms, parenting, and family background

Why are privileged young women more likely to study STEM subjects? A focal issue in getting women into STEM is socialisation about what is 'for' girls and what is 'for' boys. This starts early, from the differences in toys advertised towards girls and boys to the ways in which adults engage with babies of different genders. Whilst advertising campaigns with a clear gender bias – like the recent GAP campaign in which girls were described a 'social butterflies' and boys as 'little scholars' – are often met with derision, they undoubtedly have an effect on children. Girls are expected to want to care for others, whilst boys are expected to want to build things. As children get older, boys are more likely to be praised for their natural intelligence, and STEM subjects are often seen as only for the brightest and most gifted students.

This explains to some extent why young women would be less likely to study STEM subjects, but not why more advantaged young women seem to be more resilient to these effects. One possibility is that their parents' education level is directly associated with their ideas about gender norms, and this is passed on to their children. There is evidence to suggest that higher educated parents have less traditional views about gender roles. Perhaps more educated parents are better at shielding their children from the stereotyping they will experience as they get older?

Students are not only stereotyped by gender but also their class background and family income. Students from less privileged backgrounds are rated as less able than their peers, even when they have similar levels of attainment, and as noted previously, STEM subjects are often seen as for particularly brainy students. So, disadvantaged students would likely need to have great resilience to deal with these multiple stereotypes.

How do we go forward?

The government's Industrial Strategy Green Paper highlights the need to increase STEM skills overall, with acknowledgment that increasing uptake of under-represented groups is a key way to address current skills gaps. The results of these studies could be extremely useful in closing the gender gap in access to STEM subjects as a whole. Currently, the majority of interventions aimed at getting more women into STEM are targeted at all girls and young women. Findings from this research suggest that perhaps more focus needs to be put into interventions targeting less advantaged girls in particular.

Students from lower SES groups are less likely to receive good quality careers advice but are the ones that need it most. A clear way to get more students to study STEM would be to give them knowledge of the wide range of careers available upon graduation after studying STEM, or of the subjects they need to study at GCSE and A-level to study STEM at university. Advantaged students, particularly those whose parents work in STEM spheres are most likely to already have access to this knowledge.

There are approaches that could help close the gap without targeting. The WISE campaign People Like Me helps dispel myths that there's just one type of STEM professional (usually male and from a well-off background). Whilst the EDF Pretty Curious campaign was clumsy in language, it challenges the notion that femininity is incompatible with STEM. There are also increasing examples of diverse scientists in popular culture, for example Iron Man is an accomplished engineer and most recently represented as a black woman. A move towards these positive representations may be particularly persuading for children growing up with strong traditional gender norms, or with other stereotypes to contend with. But we also need more representation of 'every-day' female scientists to combat the myths that only extremely academically gifted people are suited to science and maths.

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