

Who chooses science? A longitudinal investigation of the role of primary and secondary school factors in shaping science enrolments in Ireland¹

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INTRODUCTION

There has been a good deal of policy attention in recent years to encouraging school leavers into science-related fields of study. Deciding to pursue a science profession is shaped by exposure to related subjects over the school career. This study provides new insights into the way school experiences from as early as primary level can influence take-up of biology, chemistry and physics for the Leaving Certificate and beyond.

DATA AND METHODS

The research draws on data from Cohort '98 of the Growing Up in Ireland study, following over 6,000 young people from 9 to 17 years of age. Information was collected on family background; whether or not the parents worked in a science-related job; their attitudes to, and performance in, Maths at primary level and Maths and Science in junior cycle, and whether they aspired to a science-related career. Information was collected from the school principal of each young person on the gender and social mix of the school, its size, the perceived adequacy of its facilities and the subjects it provides. Cross-classified multilevel models were used to look at the impact on the take-up of Leaving Certificate science subjects of both the primary and second-level school attended.

RESULTS

Almost all second-level schools in Ireland offer biology for the Leaving Certificate. However, access to physics and chemistry is related to the social mix of students in the school: all fee-paying schools offer physics and chemistry, while schools serving

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more disadvantaged populations (DEIS schools²) are less likely to offer any of the three science subjects, contributing to inequality in access to science. Gendered assumptions also appear to be built into the provision of subjects, with girls' schools less likely to provide physics.

Providing science subjects is not enough to ensure take-up, and important differences are found within and between schools. Science career aspirations among young people are often formed as early as age 9 and have a long-term impact on the probability of taking physics and chemistry. These aspirations are positively associated with having a family member working in a science-related field. Attending a single-sex school is associated with less gender stereotyping in girls' engagement with physics and boys' engagement with biology.

Science take-up reflects both individual social background and school social mix. Students attending DEIS schools are less likely to take science subjects for the Leaving Certificate, even if their school provides these subjects, and take-up of physics and chemistry is much higher among those with graduate parents. Early positive engagement with maths appears to operate as an important gateway, with negative attitudes to the subject formed at primary level steering students away from physics and chemistry later on.

CONCLUSIONS

Early positive experience of maths emerges as an important foundation for later science engagement. Providing primary school students with engaging and accessible maths education appears to be an essential foundation for extending STEM engagement. This is all the more important given evidence of a widening gender gap in attitudes to primary maths.

Furthermore, aspirations towards a science-related career appear to emerge early for some young people but formal career guidance in Ireland tends to be channelled towards students at the end of senior cycle. As a result, science careers may be limited as a potential option to those whose parents are in related fields and/or those who show an early aptitude for maths.

Our findings suggest that practice at school and classroom level needs to move away from the framing of maths and science as difficult and only suited to more advantaged and higher-achieving students. Changes in practice at primary level are likely to pay dividends in fostering a more inclusive view of science.

² The Delivering Equality of Opportunity in Schools (DEIS) programme provides additional resources and supports for schools serving more socio-economically disadvantaged populations.