Factors influencing young people's STEM subject choice for Higher Education.

Results from the Longitudinal Study of Young People in England

The Longitudinal Study of Young People in England (LSYPE) provides: "evidence about the transitions young people make from secondary and tertiary education or training to economic roles in early adulthood" (NatCen, 2010). It is a representative survey and provides data about the subject areas chosen by young people aged 18/19 in England in 2009, together with information about these young people's views and attitudes to school and their future careers from the age of 13/14.

Using data from this study, factors associated with young people's STEM (Science, Technology, Engineering and Mathematics) subject choices for higher education were investigated. In particular, agency-related factors, such as subject choices at school and career decision-making for higher education were examined. From these data, individual preferences and attitudes emerge as important, alongside structural factors. Findings from this longitudinal study support and extend findings from other relevant research.

A summary of key findings is presented first. The next section summarises the context for this study. The data and methodology are presented in Section 3. Section 4 considers the variables chosen for this study and provides a descriptive analysis of each. Finally, the conclusion highlights the implications of the study.

1. Summary of findings

Data from the Longitudinal Study of Young People in England were analysed to investigate what factors influence whether young people study a STEM subject at higher education.

A number of factors were found to be associated with the subject area studied at higher education at age 18/19. Factors that were explored included: gender; ethnicity; whether a STEM subject at school was favourite or not; whether a specific subject at school was liked or not; belief that a STEM degree meant better pay or working longer hours; belief that a STEM degree is in demand or required for chosen for a particular career path; and the main reasons for going to university.

Overall, the results indicate that a range of factors are important to understanding young people's choices of subject area at higher education. Important factors are:

Gender

- 47.5% of men from the sample were studying a STEM subject, compared to 34.3% of women.

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Ethnic origin

- 39% of White young people entered a STEM subject are at higher education, compared to 43.1% of Mixed race and 41.4% of Indian ethnic origin.

Perceptions and attitudes

- Young people who said that a STEM subject was their favourite subject at school were more likely to study a STEM subject area in higher education: 55.4% compared to 34.9%. This relationship is true for young people's preferences expressed at age 13/14 and 14/15.
- Unsurprisingly, there was a negative association between disliking STEM subjects and entering a STEM subject area at higher education. Young people who said that a STEM subject was their least favourite subject at school and who then went on to study a STEM subject area in higher education was 27.9%.
- Young people who liked science and maths at age 13/14 were more likely to study a STEM subject area at higher education than those who said that they did not like these subjects.
- Young people who said that they liked English at age 13/14 were proportionately less likely to study a STEM subject area at higher education.

Belief in ability at maths, science and English

- Young people who believed they were good at science and maths at age 13/14 were more likely to be studying a STEM subject at age 18/19.

Attitudes toward STEM

- Young people who agreed (at age 16/17) that 'people with maths and science degrees get better paid jobs' were more likely to be studying for a STEM-related subject in higher education; 46.5% were studying a STEM subject area compared to 35.5% of those who disagreed.
- Young people who believed that those maths or science degrees are in demand were more likely to enter a STEM subject at higher education.

Reasons for young persons' choices

- Young people who said that going to university was essential for their career were more likely to study a STEM subject.

Other significant factors influencing STEM choices

- The most significant factor associated with studying a STEM subject at higher education was having this as a 'favourite subject' at school.
- Having a career plan was the second most relevant factor for STEM subject choice.

2. STEM subject choice in Higher Education

Of the 1.33 million people employed in SET occupations, 1.25 million were White and 1.12 million were male (Jones and Elias, 2005). The decrease in the number of students choosing and graduating from STEM courses since the 1990s has led to closer scrutiny of possible causes (Jenkinson and James, 2009). The Roberts report (2002) highlighted how the increasing demand of science, engineering and technology (SET) graduates was coupled with a decreasing number of young people choosing to follow a career in these subjects. Furthermore, the higher salaries for people who studied these subjects and employers' difficulties in recruiting people in these areas are attributed, partly at least, to this mismatch.

Within this overall decline in popularity of STEM subjects, the participation of women has been consistently lower than that of men. Whilst the proportion of female STEM graduates in the UK increased from 27% to 36% between 1997 and 2004 (with the biggest increases observed in the biological sciences, medicine and the physical sciences), the proportion of women in STEM was still considerably lower, compared with the proportion of women in non-STEM subjects of 53% in 2004, (DfES, 2006). Given that participation in these subjects is associated with access to a wider range of good career opportunities, this is an issue for some concern.

Additionally, some minority ethnic groups are also greatly under-represented in STEM occupations, with a clear need to address this imbalance (STEM Choices, 2011). The most under-represented groups are the Black Caribbean and the Bangladeshi populations, with only 2.3% and 1.6%, respectively (Jones and Elias, 2005). This compares with: 8.9% Chinese working in SET occupations; 7.2% Indian origin; 5% for White; 4.7% for Pakistani; and 4% for Black Africans (Jones and Elias, 2005).

Increasing the number of STEM graduates in a way that ensures greater equality and diversity requires an approach that considers a wide range of factors that influence career decision making. For example, previous subject choices seem important, with the probability of progressing into higher education are above 80% for young people who complete two or more A-levels (DfES, 2006). This probability increases to above 90% if STEM subjects are chosen as A-levels are STEM subjects: where two or more STEM A-level subjects are chosen, nearly three-quarters pursue STEM subjects (DfES, 2006, p 6).

In considering the choices that young people make in relation to their career, both structural and agency-related factors need to be taken into account to understand this complex issue (Wright, 2005). The next section explores these issues.

3. Who studies what in higher education?

The LSYPE sample comprises young people in England who were 13/14 years old in 2004 (born between 1 September 1989 and 31 August 1990). Data were collected in six waves between 2004 and 2009. Table 1 shows the period in which the fieldwork took place and the approximate age of the participants at the time of the interview.

Table 1 Data collection periods for Waves 1-6 and young person's age at the time

	Period in which field work took place	Approximate age of respondent (young person)
Wave 1	Mar – Oct 2004	13/14
Wave 2	Apr – Sep 2005	14/15
Wave 3	Apr – Sep 2006	15/16
Wave 4	Jun – Oct 2007	16/17
Wave 5	Jun – Oct 2008	17/18
Wave 6	May – Oct 2009	18/19

The data provide information on the main activities that young people who took part in the study were involved with in 2009, when they were 18/19 years old. Just under 30% of young people were in higher education and 54% were not applying to enter higher education at the time (Table 2, below).

Table 2 Young people's activity in relation to higher education (HE) in 2009 (age 18/19)

	Numbers of young people	Percent
In HE	2,866	29.4
Accepted HE offer for 2009/10	1,261	12.9
Applied for HE in 2009/10 but awaiting offer	359	3.7
Not Applying to HE for 2009/10	5,273	54.0
Total	9,759	100

The focus is on young people in higher education and who provided information about their subject of study. The available sample contains 2,849 such valid cases. These cases were classified as STEM or Non-STEM, depending on the subject area chosen at higher education. A total 1,136 cases were classified as STEM (39.9%) and 1,713 were classified as Non-STEM (60.1%). Table 3 shows how subject areas were classified; further details about this variable are provided in Appendix 2.

Table 3 Subject areas studies chosen by young people

STEM	Non-STEM
Medicine and dentistry	Social studies
Subjects allied to medicine	Law
Biological sciences, veterinary sciences, agriculture and related subjects	Business and administrative studies
	Mass communications and documentation
Physical sciences	Linguistics, classics and related subjects
Mathematical and computer sciences	European, Eastern, Asiatic, African,
Engineering and technologies	American and Australasian languages, literature and related subjects
Architecture, building and planning	
	Creative arts and design
	Education
	Other

Next, factors associated with whether young people were studying a STEM-related subject or not will be discussed. Further information about these variables, including the exact process used in the survey, is provided in Appendix 2.

4. Factors influencing STEM subject choice

Data from the LSYPE provides valuable information about the factors that influence the participants' decisions about subject areas at higher education. A number of factors are associated with subject area choice in higher education at age 18/19, with a summary description provided below, in Table 4.

Table 4 Analysis of relevant variables by percentage

	STEM	Non-STEM
Male	47.5	52.5
Female	34.3	65.7
White	39.0	61.0
Mixed	43.1	56.9
Indian	41.4	58.6
Pakistani	50.7	49.3
Bangladeshi	38.2	61.8
Black Caribbean	42.3	57.7
Black African	36.5	63.5
Other	58.5	41.5
STEM subject favourite	55.4	44.6
Other favourite	34.9	65.1
STEM subject *least* favourite	27.9	72.1
Other *least* favourite	45.8	54.2
Like science	43.6	56.4
Don't like science	26.0	74.0
Like maths	44.4	55.6
Don't like maths	29.0	71.0
Like English	38.5	61.5
Don't like English	47.8	52.2
Good at science	41.8	58.2
Not good at science	27.4	72.6
Good at maths	41.8	58.2
Not good at maths	24.2	75.8
Good at English	39.0	61.0
Not good at English	49.8	50.2
STEM degrees=Better pay	46.5	53.5
Disagree	35.3	64.7
STEM degrees in demand	43.7	56.3
Disagree	32.0	68.0
Studying STEM=working longer hours	46.8	53.2
Disagree	37.2	62.8
Going to university is essential for career	51.1	48.9

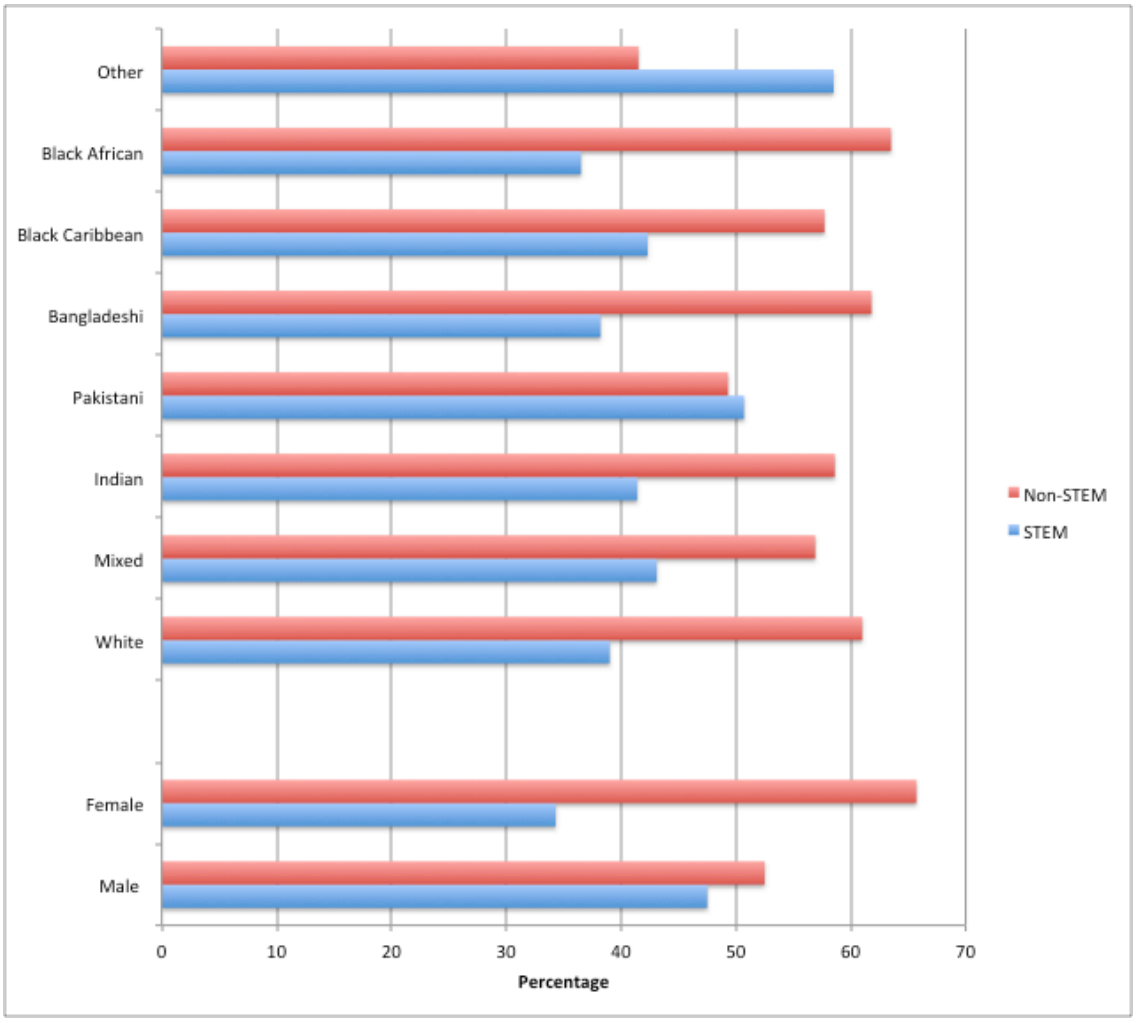
Not mentioned	38.0	62.0
Main reasons for going to university are personal or social	33.7	66.3
Not mentioned	43.5	56.5
Getting a specific job or career is an important reason for choosing university subject	43.5	56.5
Not important	27.2	72.8

The cross-tabulations for these variables are presented in Appendix 3 and discussion of these factors follows.

Gender

Overall, the proportion of higher education students who entered a STEM subject was 39.9%, compared to 60.1%. From the sample, 47.5% of men were studying a STEM subject at higher education, compared to 34.3% of women. Compared with men, a higher proportion of women were in higher education at age 18/19 (c31% of women and c25% of men in 2009).

Chart 1 Percentage studying a STEM or non-STEM subject at higher education by gender and ethnicity



Ethnic origin

Ethnic origin is associated with school attainment and with representation in science, engineering and technology occupations (SET). According to Strand (2010), between the ages of 11 and 14 Indian students outperform their White British peers, while Black Caribbean students falling behind. Differences in uptake can be explained by factors associated with aspirations (parental and young people), which override social and economic disadvantage. No relationship is indicated from the LSYPE data between the lower attainment of Black Caribbean students and social class or contextual variables, though some relationships are evident with in-school factors, such as teacher expectations (see also Strand 2009).

There are, however, significant differences amongst ethnic groups (see Table 4). Thirty-nine per cent of White young people who chose a STEM subject are in higher education compared with 43.1% of Mixed and 41.4% of Indian ethnic origin[1]. These data are nonetheless consistent with Jones and Elias (2005) indicating that, compared to the White population, other ethnic groups are proportionately more likely to choose a SET/STEM career.

Perceptions and attitudes

Pupil attitudes and perceptions affect their subject choices at school. Choices of subject choice by Year 9 pupils are influenced by:

- enjoyment of a subject;
- self-perception of their subject ability; and
- perceived usefulness of the subject (Crone, Morris and Walker, 2005).

Interest and enjoyment of subjects at school are also amongst the factors influencing Bangladeshi girls' choices at GCSE and A-level (Rahman and Smart, 2008), together with: self-perceived ability; perceived difficulty of the subject; and career ambitions.

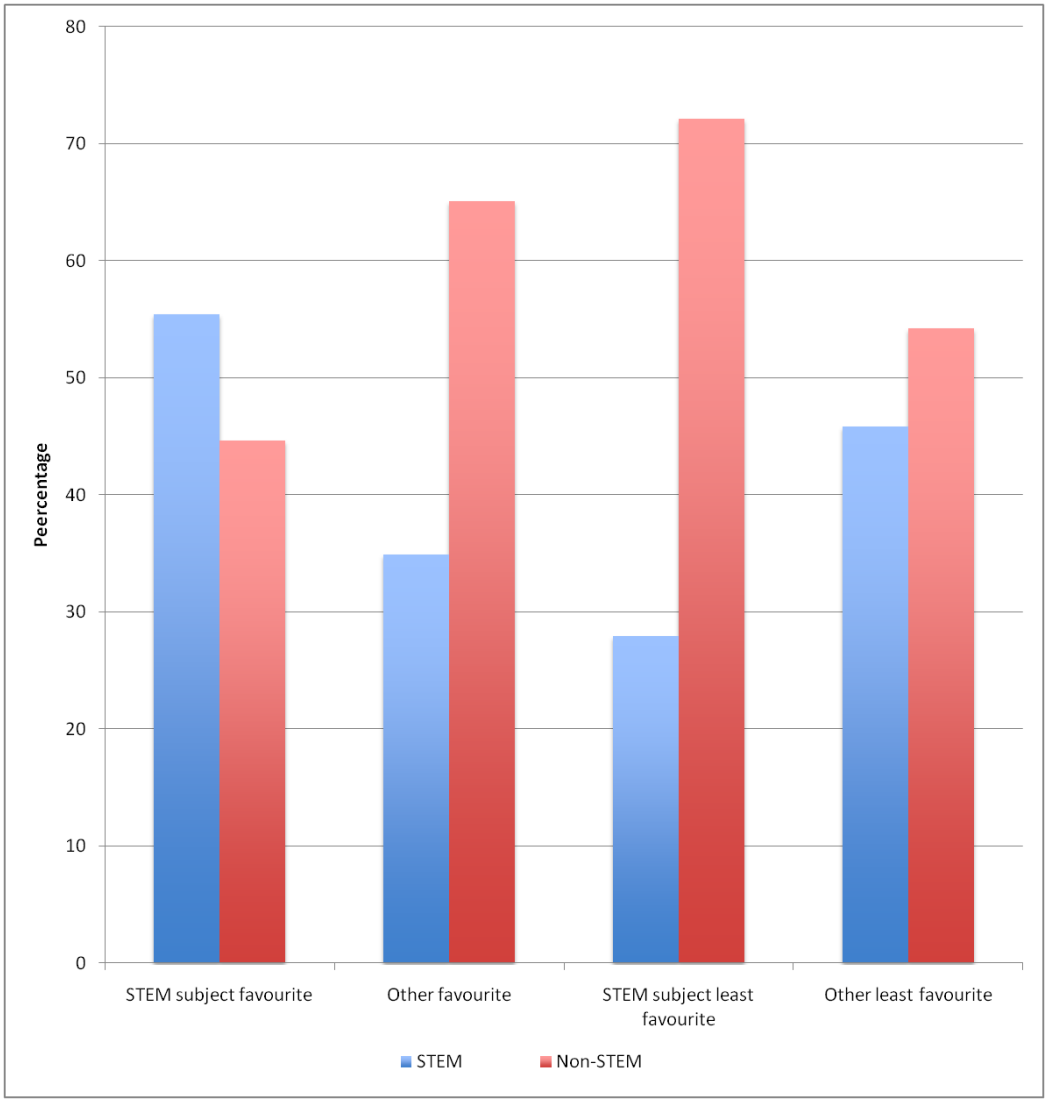
Again, data from the LSYPE survey indicate how young people who said that a STEM subject was their favourite subject at school were more likely to enter a STEM subject in higher education: 55.4% compared to 34.9%. This relationship is also true for young people's preferences expressed at age 14/15. For differences between male and female students and their favourite subjects at age 13/14, the relationship is significant in both cases. However, the relationship is almost twice as strong for men than for women. For male and female higher education choices and their favourite school subjects, see Appendix 3 (Tables A3 and A4).

There is also a negative association between disliking STEM subjects and studying a STEM subject at higher education. Table 4 shows that the proportion of young people who said that a STEM subject was their least favourite subject at school and who then went on to study a STEM subject at higher education was only 27.9%. This contrasts with 45.8% who said that a STEM subject was their least favourite subject at school and subsequently entered a STEM subject at higher education.

[1] Although this relationship is significant, a note of warning is made in relation to the small numbers, particularly for the Bangladeshi and Black Caribbean populations (see Table A1, Appendix 2).

Taking mathematics and science separately, there is a positive association between liking maths and science and choosing a STEM career after higher education. As seen in Table 4, those students who liked science and maths at age 13/14 were more likely to study a STEM subject for higher education than those who said that they did not like these subjects. Interestingly, liking English had the opposite effect. Young people who said that they liked English at age 13/14 were proportionately less likely to study a STEM subject at higher education, although this relationship is weaker.

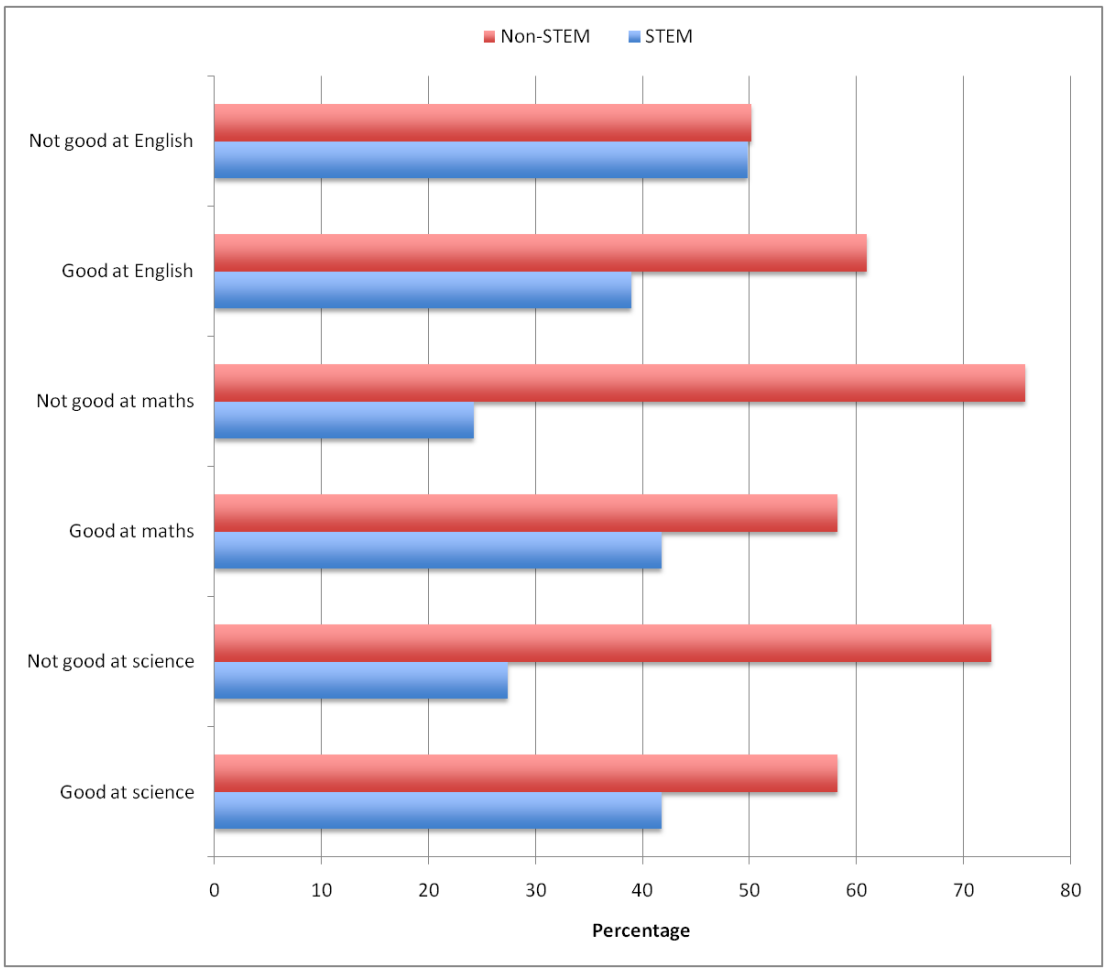
Chart 2 Percentage studying a STEM or non-STEM subject at higher education by subject preferences at school



Belief in ability at maths, science and English

Believing that you are able to perform an activity successfully can influence your future courses of action. Data from the LSYPE survey indicates that where individuals believed they were 'good' at science and maths at age 13/14 were more likely to be studying a STEM subject at age 18/19. Equally, a negative association between students considering themselves good at English and choosing a STEM-related subject was also evident. A possible explanation is that students who see themselves good at English tend to see themselves as not so good a maths and science.

Chart 3 Percentage choosing a STEM or non-STEM subject at higher education by individual belief they are 'good' at a specific subject



Attitudes toward STEM

Respondents who agreed (at age 16/17) that 'people with maths and science degrees get better paid jobs' were more likely to be studying for a STEM-related subject in higher education. Indeed, of those agreeing with this statement, 46.5% were studying a STEM subject compared with 35.5% of those who disagreed. Agreeing that STEM careers lead to better paid jobs appears to affect career aspirations and subject choice for higher education. A positive relationship also exists between:

- choosing a STEM subject at higher education and agreeing that people with maths or science degrees are in demand; and
- believing that studying science or maths at university means working longer hours(please note that this applies to women, not men: 45% compared to 30.6% of those who disagreed, see Table A18, Appendix 3). So it may be that women who choose STEM careers are more realistic about it and have given more serious thought to the demands of the subject before making a decision.

No significant relationship was found between young people's subject studied at higher education and whether they agreed that subjects like science or maths are more difficult than others at age 16/17.

Reasons for young persons' choices

Some reasons for going to university and factors considered as important in choosing a degree are also significantly related to studying a STEM subject at higher education. Young people who said that going to university was essential for their career were more likely to enter a STEM subject. This is indicates that getting a specific job or career was an important motivator for choosing a university education, so studying a STEM subject appears related to having a clearer idea of what job or career they want. Conversely, those who entered a STEM subject for higher education were less likely to mention that their main reasons for going to university were personal or social.

4. Discussion and conclusions

After saying that a STEM subject was their favourite subject at school, having a career plan is the next most relevant factor associated with whether a STEM subject is studied for at higher education. Young people who said that their main reason for wanting to go to university and study a specific subject was that this was *necessary for the career they wanted to go into* were more likely to enter a STEM subject subsequently. This may be an indication that a degree is not seen as indispensable for a non-STEM career, whilst studying a STEM subject is related to having a clear career plan.

Recent qualitative research in to girls' career aspirations (Ofsted, 2011) suggests that role models also play an important role in encouraging girls to pursue a career in STEM. Seeing a woman successfully perform in a non-stereotypical STEM area was mentioned as a factor that led some of the young girls interviewed to enter a career that they otherwise would not have considered. Taking the results of the present investigation further, it can be suggested that the relationship between having an influential role model and choosing a STEM career is mediated by having a clear career plan:

ROLE MODEL→ CAREER PLAN→ STEM SUBJECT.

In other words, role models motivate the creation of a career plan, and since having a clear career is associated with studying a STEM subject, role models indirectly contribute to young people entering a career in STEM.

5. Implications for CEIAG

Overall, the results presented indicate that agency-related factors are important to understanding young people's choices of subject area for higher education. Structural factors are important, alongside the for increasing the supply of STEM graduates:

- helping students to enjoy and become enthusiastic about STEM subjects at school;
- building their confidence in maths;
- giving them access to CEIAG for the development of their career plan.

These key findings raise other questions such as which factors affect the development of subject preferences at school, and how can young people be encouraged to develop career plans and to consider STEM subjects in this process. These questions have been addressed by the literature; however, further research is still needed.

6. References

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Appendix 1 – Results of the empirical analysis

A binary logistic regression analysis was conducted using SPSS. The model's Chi-Square was 336.54 (df=37) with p<0.001, indicating that the model is significant. Many of the coefficients are significant and the odds ratios are shown in Table 5. The model's goodness of fit (-2 Log likelihood) was 3495.496.

Gender was found to be significantly related to studying a STEM career, i.e., it is unlikely that the difference observed between these two groups was merely by chance. In this case, p<0.001 – the observed difference is expected to have occurred by chance 0.1% of the time. The odds ratio for of male young people studying a STEM subject is 1.399, indicating that male students are 1.399 times more likely to choose a STEM subject than female students.

The overall effect of ethnic origin was found to be significantly related to studying a STEM degree (Wald statistic=18.840, df=8, p=0.016). However, contrasting all the ethnic origin categories shown in Table 5 against the 'White' group, none of the differences are significant.

Students who said that a STEM subject was their favourite subject at age 13/14 were 1.766 times more likely to study a STEM subject at higher education than those who did not mention this. Conversely, the chances of studying a STEM subject area at higher education for young people who said that a STEM subject was their least favourite at age 13/14 were much lower (72.7% of the chances of someone who did not dislike STEM subjects).

Table 5 Results of the logistic regression analysis

Sex: Female (Reference group)	
Sex: Male	1.399***
Ethnic group: White (Reference group)	
Mixed	1.298
Indian	0.847
Pakistani	1.205
Bangladeshi	0.786
Black Caribbean	1.111
Black African	0.790
Other	1.605
Whether STEM-related subject *least* favourite (age 13/14)	
Yes	0.727**
Whether STEM-related subject *favourite* (age 13/14)	
Yes	1.766***
Whether likes science (age 13/14)	
Yes	1.527**
Whether likes maths (age 13/14)	
Yes	1.221
Whether likes English (age 13/14)	
Yes	0.796*
Consider themselves good at science (age 13/14)	
Yes	1.270
Consider themselves good at maths (age 13/14)	

Yes	1.572**
Consider themselves good at English (age 13/14)	
Yes	0.771
Whether agrees people with science or maths degrees get better paid jobs (age 16/17)	
Yes	1.365**
Whether agrees people with science or maths degrees are in demand by employers (age 16/17)	
Yes	1.243
Whether agrees studying science or maths at university means working longer hours (age 16/17)	
Yes	1.265*
Whether going to university is essential for the career want to go into (16/17)	
Yes	1.650***
Whether personal or social reasons main reasons for going to university (16/17)	
Yes	0.846
Need degree in subject to get specific job/career (age 17/18)	
Important	1.618***

***p<0.001, **p<0.01, *p<0.05*

A preference for science and English at age 13/14 can also affect the possibilities of choosing a STEM subject later on. Young people who liked science were 1.527 times more likely to study STEM at higher education compared to those who did not express such a preference. 'Liking English', on the other hand, had the opposite effect, as those students that said they liked English were less likely to study a STEM subject at higher education. However, it may also be said that the difference observed in relation to liking English was less pronounced than that observed in relation to 'liking science'. Young people who liked English were 0.796 times as likely to study a STEM career as those who did not. This indicates that an odds ratio of 1.256 of studying a STEM subject area for those who did not expressed a preference for English compared to those who did. Since these odd ratios are relatively close to 1 (the 'no-difference' point), it may be said that the effect of 'liking English' on studying a STEM subject is relatively low.

The data show a significant difference between young people's ideas of their mathematical abilities and the subject studied at higher education. As seen in Table 5, those who considered themselves good at maths were 1.572 times more likely to enter a STEM subject area compared to those who did not. The difference between considering oneself good at science and English and studying a STEM subject were not significant.

The model includes three items regarding young people's beliefs about STEM careers. Young people who agreed that people who study science or maths degrees get better paid jobs were more likely to study a STEM degree. Believing that studying science or maths at university means working longer hours was also significantly related to studying a STEM subject later on in life. However, in this case the difference was less pronounced (the odds ratio is 1.265, suggesting a similar 'low' effect to the case mentioned above in relation to liking English).

Finally, having a clear idea of future career plans was positively associated with choosing a STEM subject area at higher education. The likelihood of studying a STEM subject was 1.650 times greater

for someone who said that going to university was essential for the career they wanted to go into. Similarly, signalling the need of a specific degree to pursue a specific job or career was also related to studying a STEM subject at higher education. In this case, the odds ratio was 1.618 indicating a relatively high effect.

Appendix 2 – Variables relevant to this study

Variable	Comments
W6HESubGroup2 – Dependent variable 1 Medicine and dentistry 2 Subjects allied to medicine 3 Biological sciences, veterinary sciences, agriculture and related subjects 5 Physical sciences 6 Mathematical and computer sciences 7 Engineering and technologies 9 Architecture, building and planning 10 Social studies 11 Law 12 Business and administrative studies 13 Mass communications and documentation 14 Linguistics, classics and related subjects 15 European, Eastern, Asiatic, African, American and Australasian languages, literature and related subjects 17 Creative arts and design 18 Education 19 Other	This is a variable derived by the LSYPE team indicating the young person's subject studied at higher education (grouped into broad areas). It includes all respondents who indicated that they were in higher education at the time of Wave 6 (age 18/19) and who had provided a subject area of study.
W1FaveS What is your favourite subject at school? 1 Mathematics 2 Science (biology, chemistry, physics) 3 Design and Technology 4 ICT/Information and Communication, Technology/Computing 5 Home Economics 6 History 7 Geography 8 Physical Education (p.e.)/Games/Sport (including individual sports) 9 Business studies or economics 10 Humanities, social studies or vocational studies 11 Art 12 English 13 Modern languages (e.g. French, German, Spanish) 14 Music 15 Drama or media/film/television studies or communication studies 16 Religious studies 17 Sex and health education 18 Citizenship 19 Other (specify) Don't know None	Responses 1, 2, 3 and 4 were recoded as 'STEM' and the remaining as 'Non-STEM'.
W1HateS What subject at school do you like least? [Responses as in W1Faves]	[Same as W1Faves]
W1LMath I am now going to ask you about some of the subjects that you study at school and how much you might like or dislike them. How much do you like or dislike...	Recoded into Like/Don't like

* Maths? 1. Like it a lot 2. Like it a little 3. Don't like it very much 4. Don't like it at all Don't know	
W1LEng [Same as LMath]	[Same as W1LMath]
W1LSci [Same as W1LMath]	[Same as W1LMath]
W1GMath And still thinking about some subjects at school, how good would you say you are at... * Maths? 1. Very good 2. Fairly good 3. Not very good 4. No good at all Don't know	Recoded into Good/Not good
W1GEng [Same as W1GMath]	[Same as W1GMath]
W1GSci [Same as W1GMath]	[Same as W1GMath]
W4STEMatt (1 – 4) I'd like to ask you some questions now about studying specific subjects at university, in particular aboutstudying for a degree in either a science or in mathematics. I am going to read out some things that peoplehave said about studying for a degree in these subjects and for each of these, please say whether youagree or disagree (RANDOMISE ORDER STATEMENTS APPEAR) CODE ONE SCORE ONLY FOR EACH ANSWER 1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree Don't know Refused 1. Subjects like science or maths are more difficult than most other subjects[2] 2. Studying science or maths at university means having to work longer hours than most other students 3. People with science or maths degrees are in demand by employers 4. People with science or maths degrees will usually get better paid jobs than students with other types of degree	Recoded into Agree/Disagree
W4WHYHE Now thinking about yourself. You said you plan to apply for a place at university [Text fill: answer from whenapply23]. What are YOUR main reasons for wanting to go to university?	Derived variable (LSSYPE team) W4WHYHEYP0d ("YP's main reasons for wanting to go to university : Is essential for the career want to go into") was used as Mentioned/Not mentioned.

[2]Not included and crosstabulations not presented since there relationship was not significant (p>0.05).

OPEN QUESTION PROBE 'Anything else?' 'Any other reasons? Don't know Refuse	Derived variables W4WHYHEYP0j, W4WHYHEYP0kand W4WHYHEYP0l were combined into a variable that indicated that at least one of these personal or social reasons were mentioned. YP's main reasons for wanting to go to university : The social life/ lifestyle / meeting new people / it's fun To leave home/ get away from the area Makes you independent/ maturity / personal development / learning
W5SubReasIntro I am going to read out some reasons why people might choose to study a particular subject at university. For each of these could you tell me please how important it was to you when you were thinking about what subject you wanted to do at university, SubReas1 How important was it to you when you were thinking about what subject you wanted to do at university.16 Because you need a degree in this subject to get a specific job or career you want to do after university. Was this…. READ OUT Very important Fairly important Not very important Not at all important Don't Know Refused	Recoded into Important/Not important

Appendix 3 – Cross-tabulations of significant variables[3]

Table A1 Subject area choices in higher education by ethnic group

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
White	913 (39.0)	1,428 (61.0)	2,341 (100)
Mixed	31 (43.1)	41 (56.9)	72 (100)
Indian	55 (41.4)	78 (58.6)	133 (100)
Pakistani	36 (50.7)	35 (49.3)	71 (100)
Bangladeshi	13 (38.2)	21 (61.8)	34 (100)
Black Caribbean	11 (42.3)	15 (57.7)	26 (100)
Black African	23 (36.5)	40 (63.5)	63 (100)
Other	48 (58.5)	34 (41.5)	82 (100)
Total	1,130 (40.0)	1,692 (60.0)	2,822 (100)

Chi-Square=16.52; df=7; p<0.05; CV.=0.077

Table A2 Subject area choices in higher education by favourite subject at age 13/14

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
STEM subject	386 (55.4)	311 (44.6)	697 (100)
Other	732 (34.9)	1364 (65.1)	2096 (100)
Total	1118 (40)	1675 (60)	2793 (100)

Chi-Square=90.33; df=1; p<0.001; CV.=0.181

Table A3 Subject area choices in higher education by favourite subject at age 13/14 (male)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
STEM subject	258 (61.9)	159 (38.1)	417 (100)
Other	320 (40.1)	478 (59.9)	798 (100)
Total	578 (47.6)	637 (52.4)	1215 (100)

Chi-Square=51.18; df=1; p<0.001; CV.=0.207

Table A4 Subject area choices in higher education by favourite subject at age 13/14 (female)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
STEM subject	129 (45.9)	152 (54.1)	281 (100)
Other	412 (31.7)	886 (68.3)	1298 (100)
Total	541 (34.3)	1038 (65.7)	1579 (100)

Chi-Square=19.96; df=1; p<0.001; CV.=0.114

Table A5 Subject area choices in higher education by least favourite subject at age 13/14

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
STEM subject	244 (27.9)	632 (72.1)	876 (100)
Other	868 (45.8)	1,028 (54.2)	1,896 (100)
Total	1,112 (40.0)	1,660 (59.9)	2,772 (100)

Chi-Square=79.41; df=1; p<0.001; Cramér'sV.=0.170

[3] Continuity correction used for all 2x2 tables.

Table A6 Subject area choices in higher education by least favourite subject at age 13/14 (male)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
STEM subject	89 (32.4)	186 (67.6)	275 (100)
Other	488 (52.4)	444 (47.6)	932 (100)
Total	577 (47.8)	630 (52.2)	1,207 (100)

Chi-Square=33.23;df=1; p<0.001; Cramér'sV.=0.168

Table A7 Subject area choices in higher education by least favourite subject at age 13/14 (female)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
STEM subject	156 (25.9)	446 (74.1)	602 (100)
Other	380 (39.4)	585 (60.6)	965 (100)
Total	536 (34.2)	1,031 (65.8)	1,567 (100)

Chi-Square=29.27; df=1; p<0.001; Cramér'sV.=0.138

Table A8 Subject area choices in higher education by whether young people like science (age 13/14)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Like science	975 (43.6)	1263 (56.4)	2238 (100)
Don't like science	145 (26.0)	412 (74.0)	557 (100)
Total	1,120 (40.1)	1,675 (59.9)	2,795 (100)

Chi-Square=56.37;df=1; p<0.001; Cramér'sV.=0.143

Table A9 Subject area choices in higher education by whether young people like maths (age 13/14)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Like maths	887 (44.4)	1109 (55.6)	1,996 (100)
Don't like maths	232 (29.0)	568 (71.0)	800 (100)
Total	1,119 (40.0)	1,677 (60.0)	2,796 (100)

Chi-Square=56.07;df=1; p<0.001; Cramér'sV.=0.142

Table A10 Subject area choices in higher education by whether young people like English (age 13/14)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Like English	899 (38.5)	1,435 (61.5)	2,334 (100)
Don't like English	221 (47.8)	241 (52.2)	462 (100)
Total	1,120 (40.1)	1,676 (59.9)	2,796 (100)

Chi-Square=13.56; df=1; p<0.001; Cramér'sV.=0.071

Table A11 Subject area choices in higher education by whether young people consider themselves good at science

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Good at science	1,025 (41.8)	1,427 (58.2)	2,452 (100)
Not good at science	94 (27.4)	249 (72.6)	343 (100)
Total	1,119 (40.0)	1,676 (60.0)	2,795 (100)

Chi-Square=25.39; df=1; p<0.001; Cramér'sV.=0.096

Table A12 Subject area choices in higher education by whether young people consider themselves good at maths

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Good at maths	1,053 (41.8)	1,466 (58.2)	2,519 (100)
Not good at maths	67 (24.2)	210 (75.8)	277 (100)
Total	1,120 (40.1)	1,676 (59.9)	2,796 (100)

Chi-Square=31.52; df=1; df=1; p<0.001; Cramér'sV.=0.107

Table A13 Subject area choices in higher education by whether young people consider themselves good at English

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Good at English	986 (39.0)	1,543 (61.0)	2,529 (100)
Not good at English	132 (49.8)	133 (50.2)	265 (100)
Total	1,118 (40.0)	1,676 (60.0)	2,794 (100)

Chi-Square=11.26; df=1; df=1; p<0.01; Cramér'sV.=0.065

Table A14 Whether YP agrees with statement: People with science or maths degrees get better paid jobs (age 16/17)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Agree	493 (46.5)	567 (53.5)	1060 (100)
Disagree	457 (35.3)	838 (64.7)	1295 (100)
Total	950 (40.3)	1405 (59.7)	2355 (100)

Chi-Square=30.02; p<0.001; df=1; Cramér'sV.=0.114

Table A15 Whether YP agrees with statement: People with science or maths degrees are in demand by employers (age 16/17)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Agree	755 (43.7)	973 (56.3)	1,728 (100)
Disagree	170 (32.0)	362 (68.0)	532 (100)
Total	925 (40.9)	1,335 (59.1)	2260 (100)

Chi-Square=22.70; df=1; p<0.001; Cramér'sV.=0.101

Table A16 Whether YP agrees with statement: Studying science or maths at university means working longer hours (age 16/17)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Agree	401 (46.8)	455 (53.2)	856 (100)
Disagree	525 (37.2)	887 (62.8)	1412 (100)
Total	926 (40.8)	1342 (59.2)	2268 (100)

Chi-Square=20.21; df=1; p<0.001; Cramér'sV.=0.095

Table A17 Whether YP agrees with statement: Studying science or maths at university means working longer hours (age 16/17) (male)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Agree	202 (49.8)	204 (50.2)	406 (100)
Disagree	255 (48.2)	274 (51.8)	529 (100)
Total	457 (48.9)	478 (51.1)	935 (100)

Chi-Square=0.16; df=1; p=0.686; Cramér'sV.=0.015

Table A18 Whether YP agrees with statement: Studying science or maths at university means working longer hours (age 16/17) (female)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Agree	194 (45.0)	237 (55.0)	431 (100)
Disagree	264 (30.6)	600 (69.4)	864 (100)
Total	458 (35.4)	837 (64.6)	1295 (100)

Chi-Square=25.91; df=1; p<0.001; Cramér'sV.=0.142

Table A19 Going to university is essential for the career they want to go into (age 16/17)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Mentioned	258 (51.1)	247 (48.9)	505 (100)
Not mentioned	756 (38.0)	1235 (62.0)	1991 (100)
Total	1014 (40.6)	1482 (59.4)	2496 (100)

Chi-Square=28.20; df=1; p<0.001; Cramér'sV.=0.107

Table A20 Main reasons for going to university are social or personal reasons (age 16/17)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Mentioned	247 (33.7)	485 (66.3)	732 (100)
Not mentioned	767 (43.5)	997 (56.5)	1764 (100)
Total	1014 (40.6)	1482 (59.4)	2496 (100)

Chi-Square=19.93; df=1; p<0.001; Cramér'sV.=0.090

Table A21'Need degree in subject to get specific job/career' is an important reason for choosing university subject (age 17/18)

	STEM (per cent)	Non-STEM (per cent)	Total (per cent)
Important	919 (43.1)	1212 (56.9)	2131 (100)
Not important	144 (29.6)	343 (70.4)	487 (100)
Total	1063 (40.6)	1555 (59.4)	2618 (100)

Chi-Square=29.65; df=1; p<0.001; Cramér'sV.=0.107