Bangladeshi girls choosing science, technology, engineering and maths

An exploration of factors that affect Bangladeshi girls’ achievement in, engagement with, and aspirations in STEM subject areas.

Research conducted in the London Borough of Tower Hamlets 2007–2008

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Bangladeshi girls choosing science, technology, engineering and maths

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Glossary

A-level (short for Advanced Level): Level 3 qualifications consisting of the AS level (Advanced Subsidiary) and the A2. A-levels are the qualifications traditionally taken in Years 12 and 13 (sixth form) after compulsory schooling for those wishing to continue studying academic subjects leading to university. There are also vocational A-levels available (see www.qca.org.uk).

CREST award (Creativity in Science and Technology): Awards recognise student’s investigations and project work in science, technology and ICT at three levels (Bronze broadly relating to Key Stage 3, Silver broadly relating to Key Stage 4 and Gold, broadly relating to A-level). Awards are run by the British Association for the Advancement of Science (BA).

GCSE: General Certificate of Secondary Education, the main academic qualification taken by 14 to 16 year olds (Grades D–G are at Level 1, Grades A* to C at Level 2 and used as entry requirements to Level 3 qualifications such as A-levels) (see www.qca.org.uk).

OCEAN maths: activities and workshops to help children make greater progress in learning maths through activities shared by parents and children.

SHINE NRICH: a programme of workshops for gifted children in subjects including maths to raise enjoyment, understanding, achievement and aspiration in maths.

STEM: an acronym used to refer to science, technology, engineering and maths. Some authors also use the acronym SET, referring just to science, engineering and technology.

Tiered exams: Some GCSE exams offer two papers at different levels: foundation and higher. Each tier leads to a range of grades. It is usually not possible to obtain A*–B on a foundation paper, for example.
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About the authors

Sarah Smart has worked at the Institute for Policy Studies in Education since 2004, conducting quantitative and qualitative research with teachers and pupils. She is concerned about the role of education in social justice, and has particular interests in gender, ‘race/ethnicity and class. She very much enjoyed her degree in human sciences, although she nearly missed out on studying science, having given it up after GCSE thinking it was boring. She is currently researching young people’s perceptions of social justice for her PhD.

Jebi Rahman’s interest in educational disadvantage began when A-level classmates studying sociology told her that Bangladeshi students were considered to be underachievers. She has since been involved in educational initiatives both in the UK and overseas and holds an MSc in Comparative and International Education from Oxford University. Although she did not continue with the natural sciences after A-level, she was very pleased to meet many Bangladeshi girls during this research project who were determined to fulfil their potential in STEM and other careers.
The study

The research was commissioned by the London East Thames Gateway Aimhigher Partnership and CfBT in response to the finding that Bangladeshi women are an under-represented group in occupations in science, engineering and technology (Jones et al., 2005). The aims of the research were to explore the factors that affect Bangladeshi girls’ achievement in, engagement with, and aspirations in science, technology, engineering and mathematics (STEM) subject areas in the London Borough of Tower Hamlets.

The research design

The research design had two strands: a quantitative analysis of contextual data for Tower Hamlets, and qualitative case studies. The contextual data was made up of the GCSE and A-level results in Tower Hamlets in 2006 and 2007. Case studies were carried out in three schools and a college in Tower Hamlets where more than 50% of the students were of Bangladeshi origin. They consisted of focus group interviews with 32 Year 10 girls, paired interviews with 12 Year 11 girls and group interviews with 20 sixth form students (64 girls in total). In addition, we interviewed science or maths teachers, and in one location a careers adviser (8 interviews in total). We also contacted parents through schools, recruiting at a parents’ evening and through a Saturday school. We interviewed six parents in total, two of whom were interviewed in Bengali (Sylheti dialect). All participants were guaranteed confidentiality and have been given pseudonyms to preserve their anonymity.

Bangladeshi identities and cultural change

Bangladeshi identities were thought of and lived by the participants in diverse ways. Their relationships with Bangladesh were complex. Some girls and parents referred to Bangladesh as ‘home’, visited regularly, had close links with family there, and felt that attitudes in Bangladesh played an important part in their decisions about life in London. In contrast other interviewees saw British or London Bangladeshi identities as quite different from the identities of girls in Bangladesh. The girls identified some things about themselves or their families as typically Bengali or typically Asian, but some as specific to their area of London, or their particular family traditions. There were also differences between girls from different socio-economic groups. Teachers did not always reflect the full extent of this diversity when talking about the girls, sometimes talking about the Bangladeshi girls in their school/college setting as though they reflected all Bangladeshi girls or all Asian girls in London.

In interview, participants reflected that there were sometimes particular expectations of them because they were Bengali. Some were anxious about discrimination that might arise from the popular perceptions linking terrorism and the Asian community, as one girl explained: ‘there are a lot of clever girls who are Bangladeshi but they don’t get jobs because [they dress in Hijab]’. They also talked about expectations within their own community about the kinds of jobs that were suitable for girls. However, some of the interviewees felt that these expectations were changing:

“When I was younger it was very limited the way I was thinking, because I was always thinking about our culture and how a woman’s role is. [But] as you get older, society has opened its mind up… I’m going to be a working person.”

Several girls envisaged challenging traditional expectations, and saw this as a positive thing. Shouldn’t it be like ‘This is a Bengali girl who’s doing this and not all Bengali girls do that’. So it will make you one in a million, so wouldn’t you shine out?“

Parents and a Bangladeshi teacher reflected that Bangladeshi girls were achieving better in education, and this meant they could aspire to more careers. However, neither the parents nor the teachers discussed cultural change to the same extent as the girls who participated.
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Implications:
There is a need to be open to the ways in which Bangladeshi cultural identities are changing, as Bangladeshi young people accept and modify some traditions and forge new cultural identities. Otherwise those that work with these young people will make assumptions based on fixed notions of Bangladeshi culture and identity.

Choosing to study STEM

There is no evidence that Bangladeshi girls in Tower Hamlets are under-achieving in science or maths relative to Bangladeshi boys, or other girls in Tower Hamlets. In Tower Hamlets in 2007, Bangladeshi girls entered and attained similar science and maths GCSEs to other girls and to Bangladeshi boys in Tower Hamlets. A smaller proportion of girls in Tower Hamlets attained two science GCSEs, and a maths GCSE, than girls nationally in 2007, although this may be explained by the levels of deprivation in Tower Hamlets. Reflecting national patterns, girls in Tower Hamlets are under-represented in physics and maths at A-level, where more boys than girls chose to study maths and physics in 2006 and 2007. However, more girls than boys chose to study biology and chemistry in 2006 and 2007. The proportion of girls taking A-levels who are studying for biology and chemistry A-levels in Tower Hamlets in 2007 was similar to the national patterns (unfortunately this data was not available by ethnicity).

We found that the girls’ subject choice at GCSE and A-level was influenced by a wide range of factors including career ambitions; interest in and enjoyment of the subject; self-perceived ability; perceived difficulty of the subject; the options on offer in the school/college; previous experience of studying the subject; the assessment method; and others. Girls described weighing up these factors before making decisions. Some consulted their parents, siblings or teachers, but participants agreed that the final decision rested with the girls themselves.

Science and maths were sometimes perceived as necessary only for careers in restricted fields. Biology and chemistry were considered good subjects by girls and parents because of their link to medical careers, and maths because of the link to accountancy and finance; however, this also had the effect of narrowing their appeal. Girls and teachers indicated that girls might choose not to study STEM subjects because they had no interest in medicine, accountancy or finance.

Implications:
Better information about STEM careers will help STEM subjects to be seen as relevant to a wider range of careers. There may also be scope for portraying these subjects as having worth in themselves, as well as for particular careers.

Science and maths were often described as difficult subjects. In some cases girls and parents felt that higher grades would be possible in other subjects and chose not to study science and maths. Girls described parents who boasted about their daughters’ studies in science because of the status of science and maths as ‘difficult subjects’. Teachers were aware of the perceptions of science and maths as hard subjects. While some teachers indicated that they felt higher attaining students were more likely to study science and maths, others argued that low attaining pupils could find them interesting and enjoyable too, and there was evidence among the girls that some of the lower attaining girls liked science.

Implications:
Pupils of all abilities can find STEM subjects interesting and relevant, and schools, teachers and careers advisers can challenge perceptions that STEM careers and subjects are only for high achievers.

Girls tended to regard STEM subjects as male subjects (especially physics and technology), both because the classes were male dominated, and because they felt there was more encouragement for boys to study them.
Technology is deemed to be like a male subject, very male dominated anyway. And I think loads of girls, they are directed in a different direction altogether, they [the school] are not really encouraging certain subjects.

Perceptions of scientific and mathematical subjects as natural, rational and logical further reinforce their masculine image, as these characteristics tend to be associated with men. This can compound concerns that they are difficult subjects. A Year 11 girl told us that ‘I know like one or two girls who are actually good at science and maths but they are too scared to take them’. Neither parents nor teachers made any reference to the perception of STEM subjects as masculine, although some college teachers observed that maths classes they had taught in the past had been male-dominated.

**Implications:**

Perceptions of STEM subjects as masculine and success in STEM subjects as due to ‘natural ability’ need to be challenged in order for more girls to consider studying them. Opportunities to reflect on gendered perceptions of STEM subjects could be built into professional development for teachers and careers advisers, and schools could develop plans to challenge images of subjects as masculine and feminine.

The experience of studying science and maths at school influenced later choices. Subject choices were constrained by a number of school/college level factors, including whether there was an option to study three sciences, whether other subjects had to be given up to study triple science, and the tier of exam paper entered. For some girls, the significance of these factors only became clear after their ‘choices’ had been made. Although very significant to the girls, these were not factors that teachers commented on at all, and the parents interviewed gave no indication of being aware of these decisions. A number of the girls commented negatively about the fast pace at which science content was taught at GCSE, describing ‘changing different topics all day’ and ‘getting too much information’ and feeling ‘rushed’ and confused by this. A Year 10 pupil reflected that:

I think I like sitting down actually going through stuff thoroughly and not just briskly going over it.

Girls said they did not enjoy studying science and maths when they had bad relationships with their teachers, and when they thought their teachers had poor subject knowledge. In contrast, participants said they enjoyed science and maths when they perceived the content to be relevant, and when they received clear explanations and a variety of learning activities. Some had experience of being the only girl in a technology class, and this impacted negatively on their enjoyment of the subject. Teachers also talked about the crowded curriculum and the difficulties they faced in making time for science/maths enrichment activities. Especially at GCSE they often felt that their teaching was so constrained by these factors that it made little difference in the subject choices of their pupils, although the girls’ comments suggest this was not the case. Parents did not comment on their daughters’ experiences of science or maths lessons, except to mention that they often did not understand the content their daughters were studying.

**Implications:**

As far as possible, girls who choose STEM subjects should be timetabled together. Both teachers and pupils are concerned about the crowded science curriculum at GCSE, especially for those who continue to study three sciences at GCSE, and in some cases girls think this makes science lessons less enjoyable.

Some STEM enrichment activities (such as maths clubs or science activity days at

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*Some science and mathematics GCSE exams offer two papers at different levels: foundation and higher. Each tier leads to a range of grades. It is usually not possible to obtain A*–B on a foundation paper, for example.*
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Implications:
Targeting of STEM activities should be coordinated in ways that include and encourage all those with an interest in or enjoyment of related subjects.

Career aspirations
Girls in the study had high career aspirations, most frequently hoping to work in law, medicine and teaching, but also including the diplomatic service, childcare, social work, office work, art therapy and hairdressing. The parents we interviewed were generally aware of the details of their daughters’ aspirations, and one commented how very frequently her 14-year-old daughter’s aspirations changed. Teachers seemed to have little knowledge of the aspirations of the girls they taught, often because they found the pressure of a crowded curriculum gave few opportunities for talking with girls about their career ideas. They were usually unaware of the destinations of previous pupils, and this may have contributed to some of their stereotyped ideas about the aspirations of Bangladeshi girls, which focused on law, medicine and teaching. While these were the most frequent aspirations among the girls we spoke to, the girls discussed a wide range of different careers and teachers did not seem to have appreciated this diversity.

Implications:
Teachers may be unaware of the range of ambitions among Bangladeshi girls, and are relying on outdated ideas about the futures that girls aspire to. Providing teachers with more information about the destinations of their pupils might help them encourage and support pupils in their career choices, and challenge some of the stereotypes about the careers Bangladeshi girls aspire to. Professional development sessions should provide time and space for teachers to reflect on gendered and racialised stereotypes of which careers are suitable for which students. Space should be created in the curriculum for teachers to discuss careers with pupils, and to challenge stereotypes held by pupils about STEM careers.

The girls told us that their parents were mainly supportive of their aspirations, and this was certainly true of the parents interviewed, who talked about having high, realistic and achievable ambitions for their daughters. All of the parents hoped their daughters would attend university, with a mother asking ‘What mother doesn’t want her daughter to go to university?’ The parents we interviewed were aware of the details of their daughters’ aspirations, and one commented how very frequently her 14-year-old daughter’s aspirations changed. Teachers seemed to have little knowledge of the aspirations of the girls they taught, often because they found the pressure of a crowded curriculum gave few opportunities for talking with girls about their career ideas. They were usually unaware of the destinations of previous pupils, and this may have contributed to some of their stereotyped ideas about the aspirations of Bangladeshi girls, which focused on law, medicine and teaching. While these were the most frequent aspirations among the girls we spoke to, the girls discussed a wide range of different careers and teachers did not seem to have appreciated this diversity.

Implications:
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“Men do engineering, and stuff that you need
technology for. It’s only for men, you get me? And ladies,
they don’t get
no jobs out of it.”

these choices in similar terms, encouraging girls to select subjects at which they were good, and careers that suited their personality. Career choices were also related to how participants wanted to be seen by others. Several girls noted that certain careers would make them ‘shine’ in the community, while others might be less favourably regarded. Parents (and girls, although to a lesser extent) stressed the importance of a ‘decent’ job rather than a job that might have other people talking behind their backs. Girls, parents and a Bangladeshi teacher expressed a sense that a wider range of occupations were now perceived as ‘decent’ and prestigious, in addition to law and medicine.

In relation to STEM careers, a number of the girls mentioned aspirations in medical careers but far fewer expressed interest in careers in other sciences, engineering or technology, partly because girls and their parents knew relatively little about jobs in these sectors. Several teachers believed that parents and pupils had relatively little knowledge about these careers. However, there was little evidence that teachers had engaged in sustained discussion with girls and their parents about possible career pathways in STEM. Although most of the girls and parents believed that technology, engineering or mathematics could provide ‘decent’ careers for women, both girls and parents commented that Bangladeshi women were rare in these sectors. Most girls and parents did not express interest in technology or engineering careers for themselves or their daughters as these careers tended to be associated with men, as one Year 10 student told us:

‘Men do engineering, and stuff that you need
technology for. It’s only for men, you get me?
And ladies, they don’t get no jobs out of it’.

Science and technology were also associated with masculine traits. Girls tended not to see themselves as having the right interests and aptitudes for STEM careers in these areas, and their parents supported this view. Those girls who were seen as suitable for STEM careers were often seen as tomboys. A small number of girls and parents believed STEM careers (with the exception of medicine) might be unsuitable for girls because of the male-dominated working environment, and the physical demands that some associated with engineering.

Implications:
Provision of information about careers in non-medical sciences, technology, engineering and maths could help Bangladeshi girls and parents make informed choices. Information about careers related to biology and chemistry might be particularly useful for girls and parents, given the relative strength of recruitment to these subjects among girls. This information should challenge the perceptions that non-medical science, technology, engineering and maths are careers that require masculine characteristics.

A number of factors were mentioned that shaped career aspirations. Girls and parents stressed the importance of pursuing careers linked to subjects that the girls enjoyed. Girls and teachers agreed that the media could sometimes inspire people to think about a career, and teachers felt that the media did not often present scientists in a positive way although overall girls and teachers felt the influence of the media was limited. Career guidance had helped some girls to be very well informed about their career options, but some claimed they had received no advice at all. Individual guidance, especially mentoring from someone in a relevant occupation, was seen by the girls as the most valuable form of careers advice, and several spoke eloquently about their positive experience of mentoring (however, as mentors came from business and law, they had not encouraged the girls towards STEM careers). The careers adviser highlighted some of the difficulties of liaising with schools and getting to know pupils when providing careers advice.

Implications:
Girls saw individual advice and guidance as important; especially when it came from someone they had got to know through a mentoring relationship. Mentors from STEM occupations in these schools could help to break down some of the stereotypes around STEM careers, and challenge some of the perceived barriers.
Most of the girls had some work experience, but for many this was not in the area of work to which they aspired because they or the school did not have access to the relevant workplace, and the girls often felt it had little impact on their aspirations. Participants told us that work experience where they could contribute and complete tasks was the most useful, and a few girls felt that work experience of this kind had helped shape their career aspirations. In one school where pupils were offered taster days for different careers, a Year 11 girl suggested that:

‘They should make sure that there’s enough girls in each of the groups and not just in a particular girly thing. Because most of the girls, what did they do? Healthcare and teaching and stuff, and most of the boys did business’.

Work experience was not a factor referred to by teachers or parents when discussing the career aspirations of girls.

Implications:

For some girls, work experience was a factor in shaping their aspirations. Monitoring of the gender balance of work experience placements, and consideration of ways to challenge gender stereotypical placements would be helpful.

Girls were aware of some economic factors (such as the cost of a university education) that might impact on career aspirations and some could give examples of family members or friends whose plans had been curtailed by economic factors. However, they did not anticipate such difficulties for themselves. Teachers and parents were also aware of these factors, but saw them as only rarely significant.

Several teachers mentioned a cultural bias towards careers in medicine among Bangladeshi families. While one or two of the girls talked about medicine being ‘an Asian thing to do’, and cited a number of family members in medical careers, there was little evidence that interviewees felt pressured into these kinds of careers, and both girls and parents were positive towards careers outside the medical profession. Participants acknowledged that there were ‘traditional’ careers that were associated with Bangladeshi girls. However, almost all of the girls told us that cultural traditions were changing, and many felt that their career aspirations should not be limited by tradition. Girls saw social factors such as tradition, cultural expectations and religion as dynamic, fluid and open to change. While some saw potential restrictions, others saw themselves as engaged in a process of social change and planned to challenge expectations. Parents also spoke about the cultural changes in their community. In contrast, teachers placed a great deal of emphasis on cultural norms and family attitudes to STEM careers and careers for women, and much less on the possibility of cultural change.

Implications:

As previously, it is important that teachers, careers advisers and those working with Bangladeshi girls are aware of cultural change, and the ways in which these communities are challenging tradition.

For the girls, a particularly significant factor in career choice was whether they believed a career could be combined with family responsibilities. This was often seen to be more important than media or tradition, and some girls indicated that they had ruled out career options on the basis of their observations that the career would not combine well with family life. Several female teachers commented that the ‘family-friendly’ nature of teaching would make it a very suitable career for the girls.

Implications:

Girls and teachers had relatively little information on which to base judgements about the compatibility of different career options and family responsibilities. Given the importance girls in the study attached to finding a family-friendly career, careers advice could incorporate information about ways STEM employers are creating family-friendly working environments to encourage female applicants.
This research set out to examine the attitudes of Bangladeshi girls in secondary schools towards science, maths and technology subjects, and their reasons for choosing or not choosing to study these subjects and take up careers in Science, Technology, Engineering and Maths (STEM) professions.

The report begins with a short literature review setting out the background to the research. We then give details of the methodology used. Chapter 4 sets out analysis of attainment data in science for girls in the London borough of Tower Hamlets. Chapters 5, 6 and 7 report the findings of the qualitative work, beginning with the girls in Chapter 4, followed by the parents and the teachers. Chapter 8 sets out a summary of the findings and some conclusions for policy and practice.
Bangladeshi girls choosing science, technology, engineering and maths

Chapter 1: Introduction

This research set out to examine the attitudes of Bangladeshi girls in secondary schools towards science, maths and technology subjects, and their reasons for choosing or not choosing to study these subjects and take up careers in science, technology, engineering and maths (STEM) professions.

The report begins with a short literature review setting out the background to the research. We then give details of the methodology used. Chapter 4 sets out analysis of attainment data in science for girls in the London borough of Tower Hamlets. Chapters 5, 6 and 7 report the findings of the qualitative work, beginning with the girls in Chapter 4, followed by the parents and the teachers. Chapter 8 sets out a summary of the findings and some conclusions for policy and practice.
Chapter 2: Background to the Research

This literature review considers the representation of Bangladeshi women in science, technology, engineering and maths (STEM), beginning with what is known about their participation in STEM careers, then reviewing STEM degrees and school-level STEM qualifications.

There is national concern about recruitment to science, technology, engineering and maths (STEM) careers, which are thought to be important for the international competitiveness and capacity for innovation of the UK economy (Roberts 2002). Women are under-represented in these professions (Greenfield 2002), and women from minority ethnic groups often face a double penalty in representation in science careers (ibid). In 2005, researchers from the University of Warwick identified Bangladeshi females as a disadvantaged group in science careers, estimating that only 177 Bangladeshi women were employed in science, engineering, and technology (SET) occupations (Jones 2005).

Recruitment to careers in science, engineering and technology is limited by the number of graduates with degrees in relevant subjects, and there is concern that the UK does not produce enough graduates qualified in these subjects (Roberts 2002). Fewer women obtain first degrees in the physical sciences, computer science and engineering and technology than men, and women gain fewer first class degrees in these subjects (Woodfield and Earl-Novell 2006). Bangladeshi women are under-represented in university admissions (Ofsted 2004), under-represented in biological, physical and mathematical science courses, but slightly better represented than White girls on computer science and engineering and technology courses…

The total number of students studying A-level mathematics, physics and chemistry has been declining for some years, although there were some small improvements in 2007. Considerably fewer girls than boys study for A-levels in mathematics and physics and slightly fewer for A-level chemistry (see Table 1 below).

The proportion of Bangladeshi students (both male and female) studying a science A-level is lower than most other ethnic groups (Elias et al 2006). However, Elias et al suggest that the majority of this difference is explained by the smaller numbers of Bangladeshi students who achieve the necessary GCSEs. Looking only at pupils with at least five A* to C grades, students from all minority ethnic groups (including Bangladeshi students) are more likely than their White counterparts to study and pass an A-level in chemistry, although Bangladeshi students are less likely to study and pass an A-level in physics than their White peers (Elias et al 2006).

At GCSE, girls tend to outperform boys and a greater proportion achieve A* to C grades in GCSE science (UKRC 2005). The performance of Bangladeshi pupils at GCSE has been improving rapidly, the percentage of

| TABLE 1: Total entries (and percentage of all candidates) for selected A-levels in 2007, UK          |
|------------------------------------------------|------------------|
| Male                                      | Female          |
| Biology                                  | 22537 (6.1%)    | 32026 (7.3%) |
| Chemistry                                | 20210 (5.5%)    | 20075 (4.6%) |
| Physics                                  | 21357 (5.8%)    | 6109 (1.4%)  |
| Mathematics                              | 36030 (9.8%)    | 24057 (5.5%) |
| Further mathematics                      | 5556 (1.5%)     | 2316 (0.5%)  |

Source: JSQ 2007
Bangladeshi pupils obtaining five *A* to *C* grades rose from 43% in 2004 to 53% in 2005 and 58% in 2007 (compared to an average of 59% of all pupils nationally) (DCSF 2008).

When levels of deprivation are taken into account, Bangladeshi pupils make significantly more progress in secondary school than White British pupils with the same characteristics (Ofsted 2005).

Bangladeshi girls outperform Bangladeshi boys at GCSE (in 2007 64% of Bangladeshi girls achieved at least 5 *A* to *C* grades compared to 52% of Bangladeshi boys).

A longitudinal study of young people (DCSF 2007) reports that Bangladeshi pupils in England (both boys and girls) achieve well and aspire to stay in education, an aspiration that is supported by their parents. There is relatively little research focusing specifically on British Bangladeshi girls, although some studies have looked at South Asian girls, or Muslim girls. Basit (1996, 1997) and Abbas (2003) suggest that the parents of Muslim/South Asian girls are both cautious about the secular nature of schooling and wish to remain culturally distinct, but also actively encourage their daughters in gaining academic qualifications. Archer (2002) describes school-aged Muslim girls with aspirations to progress to post-compulsory education, and Ahmad (2001) highlights the relative success of Pakistani and Bangladeshi women in tertiary education. She suggests that given the indirect and institutional racism Pakistani and Bangladeshi women encounter, this success is indicative of their determination and resilience. Ahmad (2001) and Basit (1996) describe Muslim girls who hope for upward social mobility through education and careers, and intend to work at least until they marry, and often after this. Around half of the women interviewed for a Department of Work and Pensions research project were in employment, with a particular priority attached to work that could be fitted around marriage and family (Aston et al 2007). Taken together, these findings give a picture of Bangladeshi girls as having high aspirations and parents who are supportive of these aspirations. However, Mac an Ghaill and Haywood (2005) suggest that in Newcastle there is a serious anomaly between parents’ high expectations of Bangladeshi young people, and teachers’ low expectations of their school achievement. Several studies suggest that Bangladeshi young people are often stereotyped as ‘caught between cultures’ (Ahmad 2001, Mac an Ghaill and Haywood 2005).

A considerable amount of research has looked at girls’ experiences of studying STEM subjects (e.g. Francis, Hutchings and Read 2004, Mendick 2006), and their aspirations in STEM careers (Francis 2000, Francis et al 2003). There is no work looking specifically at the attitudes of Bangladeshi girls towards STEM subjects or careers, although Proulx (2008) shows that more than 40% of high achieving Bangladeshi students aspire to careers in medicine, and that science, maths and law were popular degree aspirations. Thus, given the under-representation of Bangladeshi women in these careers identified by Elias et al, this research was commissioned to provide a picture of the situation relating to Bangladeshi girls in Tower Hamlets. The main objectives of the research are outlined in the following chapter.
Chapter 3: Methodology

What are the attitudes of Bangladeshi girls towards science, maths and technology at GCSE level?

The study had five key areas of investigation. These were developed in conjunction with Aimhigher. The research questions, which informed the study, were as follows:

- What are the attitudes of Bangladeshi girls towards science, maths and technology at GCSE level?
- What choices do Bangladeshi girls make about science and maths (and technology) after their GCSEs?
- What are the attitudes of Bangladeshi girls studying towards science, maths, technology and engineering at A-level towards these subjects?
- What choices do Bangladeshi girls who study science, maths, technology and engineering at A-level intend to make post A-level?
- What role do the following factors play in their attitudes towards STEM subjects: their experience of studying these subjects at GCSE/A-level, their career aspirations, their school, their family, their peers, the media? What other factors (if any) are important?

The research has two strands: quantitative analysis of contextual data for Tower Hamlets and qualitative case studies.

Analysis of contextual data

To give a more detailed view of the situation in Tower Hamlets, we have analysed GCSE and A-level results for pupils in the borough in 2006 and 2007. The data was provided by the Research Performance and Development Unit at Tower Hamlets Council and has been analysed with basic descriptive and inferential statistics using SPSS.

Case studies

We developed an interview schedule based on our research questions and the literature review. This was piloted with members of the Bangladeshi community involved in secondary education.

Using data about the percentage of pupils of Bangladeshi origin in schools, we approached schools in Tower Hamlets with more than 50% of students of Bangladeshi origin, and three agreed to participate. We also approached the sixth form department of a further education college with a large number of Bangladeshi students.

- School 1 is a community school for girls aged 11–19. Over 90% of the girls are of Bangladeshi origin (2006 data).
- School 2 is a co-educational community school for pupils aged 11–16. Approximately 50% of the pupils are of Bangladeshi origin (2006 data).
- School 3 is a co-educational community school for pupils aged 11–16, with post-16 options available in a limited number of subjects. Over 80% of the pupils are of Bangladeshi origin (2006 data).
- The college has over 9000 students, of which more than 2000 are in the sixth form. Almost 50% of all the college’s students are of Bangladeshi origin (Ofsted 2005, 2002–3 data).

In each case study school we conducted focus groups with Bangladeshi girls in Year 10, both high and low attainers, and interviews with pairs of Year 11 girls (one who was interested in studying science, and one who was not). In School 1 we also conducted focus groups with science students in Year 12. In the college we conducted two focus groups and one paired interview with groups of students who were studying science. Focus groups contained between four and six girls, and were selected to give as much variation as possible (from different ability groups, taking different exams and intending to make different subject choices). We have more girls represented who have chosen to study science (especially among Year 12 and 13 students), as it was this choice to study science in which we were particularly interested.

Girls were selected in conjunction with teachers. It was therefore teachers who made judgements about which girls were included in the category ‘Bangladeshi’, based on their knowledge of the girls. In total we spoke to 64...
Bangladeshi girls choosing science, technology, engineering and maths

girls: 32 in Year 10, 12 in Year 11, 8 in Year 12 and 12 in Year 13. More details about the girls are given in Chapter 5.

In each case study location we conducted individual interviews with teachers of science or maths. We also approached a careers adviser or teacher with responsibility for careers in each location, but in two schools these requests were declined. The teachers are described in Chapter 7.

In all schools we approached parents about being interviewed, although this was only successful in School 2. At the college we were able to attend a parents evening and meet parents through this. In order to contact more parents, we attended a Saturday school where it was possible to interview two more parents, giving a total of six parent interviews. All parents were offered the opportunity of being interviewed in their mother tongue. Two interviews were conducted in Bengali (Sylheti dialect), thus giving access to parents who would not have otherwise have participated. Further details of the parents are given in Chapter 6.

The following table gives details of the interviews conducted within each school and the college.

With the permission of participants, all interviews were recorded. With the exception of interviews not in English from which full notes were taken, recordings were fully transcribed. Codes relating to the research questions and literature were developed, and the data was coded using the NVivo qualitative data analysis software.

All participants have been given pseudonyms, and schools have been anonymised.

<table>
<thead>
<tr>
<th>Research sites</th>
<th>Year 10</th>
<th>Year 11</th>
<th>Years 12 &amp; 13</th>
<th>Teachers</th>
<th>Parents/community</th>
</tr>
</thead>
<tbody>
<tr>
<td>School 1</td>
<td>high attainers focus group</td>
<td>Pair interview 1</td>
<td>Focus group 1 (science students) Focus group 2 (science students)</td>
<td>Head of science</td>
<td>Science teacher</td>
</tr>
<tr>
<td></td>
<td>lower attainers focus group</td>
<td>Pair interview 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 2</td>
<td>high attainers focus group</td>
<td>Pair interview 1</td>
<td>Science teacher</td>
<td>Teaching assistant/ father (in English)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lower attainers focus group</td>
<td>Pair interview 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 3</td>
<td>high attainers focus group</td>
<td>Pair interview 1</td>
<td>Science teacher</td>
<td>Father (in Bengali)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lower attainers focus group</td>
<td>Pair interview 2</td>
<td>Careers adviser</td>
<td>Father (in English)</td>
<td>Mother (in Bengali)</td>
</tr>
<tr>
<td>College</td>
<td>Focus group 1 (science students) Focus group 2 (applied science students) Pair interview 1 (maths students)</td>
<td>Maths teacher Maths teacher Science teacher</td>
<td>Father (in Bengali)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday school</td>
<td></td>
<td></td>
<td></td>
<td>Father (in English)</td>
<td>Father (in English)</td>
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</tbody>
</table>
Bangladeshi girls choosing science, technology, engineering and maths

Chapter 4: Achievement in science and maths in Tower Hamlets

This higher proportion of boys is unusual; nationally girls outperform boys at GCSE, and it was a reversal of the 2006 pattern.

This section of the report presents data on examination results in science in Tower Hamlets in 2006 and 2007.

**General Certificate of Secondary Education (GCSE)**

In 2007, there were results for 2584 pupils at the end of Key Stage 4 (aged 15), and for 2622 in 2006. Of these, 53% (55% in 2006) are for Bangladeshi pupils, 18% (20%) for White British/English pupils, 12% (9%) for Black African or Black Caribbean pupils, and the remainder for pupils of other ethnic groups.

In 2007, the achievement of all pupils in Tower Hamlets was in line with the national average. 60% of pupils in Tower Hamlets achieved five or more A* to C grades, with 59% of Bangladeshi pupils achieving five or more A* to C grades. Nationally, 59% of pupils achieved five A* to C grades. In 2006, achievement was also similar to national levels: 57% of pupils in Tower Hamlets achieved five or more A* to C grades, compared to the national average of 59%. 58% of Bangladeshi pupils in Tower Hamlets achieved five or more A* to C GCSEs in 2006.

In 2007, 47% of the pupils in Tower Hamlets achieved two or more science GCSEs at A* to C, with the same proportion of boys as girls achieving this. Forty-five per cent of Bangladeshi pupils achieved two or more science GCSEs at A* to C, of which 44% were girls and 46% boys (see figure 1). This higher proportion of boys is unusual; nationally girls outperform boys at GCSE, and it was a reversal of the 2006 pattern. The average proportion in England was 50%. Forty-six per cent of pupils and 50% of Bangladeshi girls in Tower Hamlets gained a GCSE grade A* to C in mathematics. This is lower than the 56% of all pupils who achieved a GCSE grade A* to C in mathematics in England in 2007.

The patterns were very similar in 2006, with the proportion of pupils in Tower Hamlets achieving two good science grades similar to those in England as a whole, but fewer pupils in Tower Hamlets achieving a A* to C in maths (44% compared to 55% in England).

At GCSE there are a number of different science qualifications that can be taken by pupils. In 2007 5% of pupils in Tower Hamlets

**FIGURE 1: Percentage of pupils achieving two or more science GCSEs at grade A* to C, in 2006 and 2007 (N=2622 in 2006 and 2561 in 2007)**

<table>
<thead>
<tr>
<th></th>
<th>2006 %</th>
<th>2007 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>White British boys</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>White British girls</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td>Bangladeshi boys</td>
<td>42%</td>
<td>42%</td>
</tr>
<tr>
<td>Bangladeshi girls</td>
<td>43%</td>
<td>43%</td>
</tr>
<tr>
<td>Other ethnic groups boys</td>
<td>39%</td>
<td>39%</td>
</tr>
<tr>
<td>Other ethnic groups girls</td>
<td>39%</td>
<td>39%</td>
</tr>
</tbody>
</table>

% achieved two or more science GCSEs grade A* to C 2006
% achieved two or more science GCSEs grade A* to C 2007
Bangladeshi girls choosing science, technology, engineering and maths

...at GCSE there is no evidence of Bangladeshi girls underachieving in science or maths.

achieved three separate science GCSEs, 57% a double science award, 5% a single science GCSE, 15% applied science double award, 6% applied science GNVQ and 12% did not achieve a science qualification. These proportions are similar to the national balance, although applied science is higher\(^2\). A similar percentage of Bangladeshi girls in Tower Hamlets compared to all girls in Tower Hamlets achieved a GCSE in triple science (6%), and single award science (3%) (see fig 4.2). More Bangladeshi girls in Tower Hamlets achieved double award science compared to all girls in Tower Hamlets (71% compared to 63%) and fewer achieved a GCSE in applied science (9% compared to 15%). A similar percentage of Bangladeshi girls compared to all girls gained no science qualification (10%). Bangladeshi girls in Tower Hamlets gained a significantly higher average score than White British girls in Tower Hamlets in double award science (as did girls from other ethnic groups) (8.7 compared to 7.6).

In comparison to Bangladeshi boys in Tower Hamlets, a greater percentage of Bangladeshi girls in Tower Hamlets achieved a qualification in double science (71% of girls compared to 49% of boys) while a greater percentage of Bangladeshi boys in Tower Hamlets achieved a GCSE in applied science (19% of boys, compared to 9% of girls) (see figure 2).

In 2007, the average score in double science was similar for Bangladeshi boys and girls in Tower Hamlets (see figure 3 on page 20), and the average points score for both Bangladeshi boys and girls was higher than that for their White British peers in Tower Hamlets (8.7 for Bangladeshi pupils compared to 7.6 for White British pupils).

In conclusion, at GCSE there is no evidence of Bangladeshi girls underachieving in science or maths. While a lower proportion of Bangladeshi girls achieved A* to C grades

\(^2\)Figures for entries published by the Royal Society of Chemistry suggest that entries for single science GCSE were 6% of all science entries, double science 76%, biology/chemistry/physics 9%. However, this includes pupils in independent and maintained schools: only 6% of pupils in maintained schools were entered for three separate science GCSEs in 2007. The difference in applied science may be because a number of schools in Tower Hamlets had been involved in introducing applied science course at the time of the research than in England as a whole.

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**FIGURE 2: Percentage of pupils in Tower Hamlets achieving passes in different science exams, 2007 (N=2561)**

![Chart showing percentage of pupils achieving different science qualifications](chart.png)
Bangladeshi girls choosing science, technology, engineering and maths

It may be that the levels of socio-economic deprivation in Tower Hamlets are reflected in the slightly lower proportions achieving A* to C grades than nationally.

In maths compared to all pupils in England in 2006 and 2007, the proportions were similar to Bangladeshi boys in Tower Hamlets, and better than White British pupils. In science, Bangladeshi girls in Tower Hamlets show a similar pattern of entry to different science qualifications to that in England as a whole, and although a lower proportion of Bangladeshi girls achieve two or more science GCSEs at A* to C compared to all pupils in England, Bangladeshi girls are performing at a similar level to Bangladeshi boys in Tower Hamlets in science GCSEs, and both are outperforming White British pupils in Tower Hamlets in science. It may be that the levels of socio-economic deprivation in Tower Hamlets are reflected in the slightly lower proportions achieving A* to C grades than nationally.

A-level

After GCSEs there are a number of different qualification routes for students. For many years, A-levels have been the main academic qualification after GCSE, and the most frequently used to go on to higher education. A-levels are made up of the AS level and the A2. Each part makes up 50% of the overall A-level grade. The AS level can be either a free standing qualification, or combined with the A2 to create a full A level.

There are 773 records of pupils taking A-levels in Tower Hamlets in 2007 (766 in 2006). Of these, 61% are girls (65% in 2006). The largest group of students was at Tower Hamlets College (43% in 2007 and 38% in 2006). No ethnicity data was available for pupils at the college. Due to the lack of data, it has only been possible to analyse A-level data by gender.

In 2007, a total of 164 (21%) students achieved a pass in at least one AS or A2 in science (including biology, chemistry, physics, electronics or public understanding of science). One hundred and sixteen (15%) of students achieved a pass in AS or A2 maths. Figure 4 on page 21 shows that in both 2006 and 2007 a greater number of girls than boys entered biology and chemistry AS or A2, but fewer entered AS or A2 maths and physics. The total numbers entering physics were particularly low (43 students in 2006 and 29 in 2007).

In Tower Hamlets in 2006 and 2007, not only was the total number of male entries for maths and physics higher than the number of female entries, but a greater proportion of all male A-level candidates entered maths and physics than did female candidates. Of all boys entering A-levels in Tower Hamlets in 2007, 33% entered AS or A2 maths compared to 14% of all girls (in 2006 25% compared to 11%). Twelve per cent of boys sitting A-levels entered AS or A2 in physics, compared to 7% of girls (in 2006 12% compared to 2%). There were no significant differences between the points scores achieved by boys and girls in 2006 or 2007. This is similar to the national pattern (see Chapter 3).
Figure 5 below shows how the percentage of girls entering A-levels in science in Tower Hamlets compares to the percentage of girls entered for the different A-levels in England, suggesting that the proportion of girls studying chemistry is almost the same as in England, with a slightly lower proportion of girls studying biology, physics and maths than in England as a whole. The national A-level figures contain a disproportionate number of students studying in the independent sector (especially in science and maths where 25% of A-level entries come from the independent sectors (PMSU 2006)). It is therefore encouraging to see that the proportions of girls in Tower Hamlets studying science compares favourably to those nationally.

Figure 6 on page 22 indicates that girls in Tower Hamlets are not achieving as well in biology and chemistry as girls nationally; however these achievement patterns are likely to be influenced by social factors. Nationally, the percentage of candidates in comprehensive schools and colleges who achieve an A grade is much lower than in
Socio-economic disadvantage is also linked to lower attainment in school, and Tower Hamlets is one of the most socio-economically disadvantaged areas in England. Other settings, and the majority of pupils who achieve A-grades are in independent schools (PMSU 2006). Socio-economic disadvantage is also linked to lower attainment in school, and Tower Hamlets is one of the most socio-economically disadvantaged areas in England. However, although these lower levels of achievement are contributed to by social factors, they will restrict access to university courses and ultimately to STEM careers.

FIGURE 6: Percentage of girls in Tower Hamlets and England achieving grades A–U in A-level biology and chemistry

This summary of A-level results suggests that patterns of A-level entry among girls in Tower Hamlets are very similar to those in England as a whole, with a very small number of students studying physics, and fewer girls than boys studying physics and mathematics, suggesting that recruitment to physics and mathematics among girls presents similar challenges as nationally. However, the strength of entries among girls to chemistry is noteworthy, especially given the socio-economic profile of the borough of Tower Hamlets.
Chapter 5: Choosing science, technology, engineering and maths – the girls’ perspectives

This research set out to examine the attitudes of Bangladeshi girls towards science, maths and technology subjects, and their reasons for choosing or not choosing to study these subjects and take up careers in STEM professions. We begin with a short discussion of the girls interviewed and the significance of subject choice to them.

As the girls talked to us about their aspirations and subject choices, it was clear that career and subject choice ‘bear only a passing resemblance to the uni-dimensional, calculative, individualistic, consumer rationalism which predominates in official texts’ (Ball, Maguire and Macrae 2000, p21). For our participants, subject choice was one of many choices: whether to take GCSEs or GNVQs, how many GCSEs/vocational qualifications, whether to stay in learning post-16, where to study, what qualification to study, whether to combine work and study (full-time or part time) and so on (Morris 2006).

For many of the girls, their choices were limited in some way, by the choices and judgements of others (such as teachers or parents), by the economic capital available to them, and by the uneven social and educational opportunities they had already experienced. Some girls did not have the option of triple science at GCSE, others were entered for lower tier papers which restricted the range of grades they could achieve, and some were concerned that their family might not be able to afford for them to continue studying at A-level or degree.

But, whatever the range of options that the girls faced, they used their subject choices as statements about their identity: who they believed themselves to be, who they wanted to be, and who they thought they could be. So in talking about subject choice girls made comments like ‘I’m not a maths person’, ‘Drama’s my favourite, it’s active and I’m an active person’. Rahilah, a student in Year 12, expresses this as she agonises over choosing between her humanities and science A-levels:

I chose two humanities and two sciences so that I could have a bit of a balance. I’m a student who likes sciences and humanities but I’m getting drawn towards the humanities a bit more. I’m a person that doesn’t like memorising facts, I like expressing my opinions and stuff, I’m alright at writing, I don’t mind writing, but with sciences, I wanted to go into a science career but I keep changing my mind now and I’m not really sure. But I thought [I’d] rather take sciences, like what Farah said, they recognise you more, if you have sciences, they look at you like you’re a person who can solve problems, and do much more.

(Rahilah, Year 12, college)

Notice how Rahilah keeps coming back to the idea of what kind of person she is: one who likes both science and humanities, who likes expressing her opinions, but does not like memorising things. But she thinks that if she chooses science she will be seen as a person ‘who can solve problems, and do much more’. The kind of person she sees herself to be, and the kind of person others see her to be matters to Rahilah. Her choices about subjects and ultimate career aspirations can be understood as identity work (Snow and Anderson 1987) – bringing together personal and social identity into a coherent whole. This identity work takes place in a social context, where particular meanings are attached to different subjects, jobs and aspirations.

For many of the girls, subject choice and occupational aspirations were part of their dreams about the kind of life they wanted to have. Khela told us ‘As a person I can’t see myself in a house with four walls, I’m going to be a working person [because] even if you do have a family they’re going to be off at school or whatever and what are you going to do with the hours?’

Occupational aspirations were also part of the girls’ hopes and fears for the way they
Bangladeshi girls choosing science, technology, engineering and maths

They’ll just look away from you and they will think – Oh this is a Bengali girl doing a subject like that.

would be seen and judged by others. Although Mona, a Year 10 student, suggested that girls shouldn’t be influenced by the fact that ‘not all Bengali girls do that’ because it would make them ‘one in a million’, Husna expressed the worry that others in her community might disapprove of what she did:

Say you met somebody, and you told them what you do. They’ll just look away from you and they will think ‘Oh this is a Bengali girl doing a subject like that’.

Girls were also aware of how they might be perceived in society more generally. Encouragingly, none of the girls reported any instances of racism or discrimination against themselves, although some were aware of negative attitudes towards the Bangladeshi community. Shireen reported that ‘people say it’s not really our country’, and commented that she knew of discrimination against girls who wore the Hijab, saying ‘I would hope that people would think differently because there are a lot of clever girls who are Bangladeshi but they don’t get jobs because of the way they are [dressed]’. Similarly Aisha, a Year 11 pupil, observed that ‘You don’t want a Bengali girl being Prime Minister. I’m being realistic. As much as I’d love to see a Bengali up there, I’ve hardly seen a black person up there yet, so that’s my worry’. Girls were conscious both of how their choices would be perceived in their own community and in society more widely.

Thus the picture we get is of girls negotiating a number of different choices, including that of subject choice in order to make statements about who they are and who they want to be.

We now move on to give more details about the kinds of futures the girls envisaged, and the influences and constraints they experienced. In the first section we describe girls’ career aspirations, the meanings that the girls attached to these aspirations, and how they affected the choices they made. We then discuss how girls’ perceptions of science, technology, engineering and maths subjects affected their choices, and finally, the ways school-level factors affected their choices. Before this, we give some short background details about the girls interviewed to set their career aspirations in context.

Introduction to the girls

The girls described a wide range of family backgrounds. A quarter said that their fathers did not work (through illness/disability, unemployment or retirement). Frequently-mentioned occupations were working in restaurants or take-aways, and working in transport, mostly as a cab driver or chauffeur. Factory workers, plumbers, decorators, garage workers, teaching assistants, office workers, business managers, and property developers were also mentioned. Just below half of the girls described their mothers as housewives or at home; others described mothers who worked in childcare, schools (or were just returning to childcare, nursery or teaching assistant qualifications), social work, factory and office work. As far as we are aware, none of the girls’ parents were currently working in a STEM occupation, although a number of girls mentioned other family members who were employed in or were working towards medical careers.

As the girls were put forward by their teachers, it was the teacher who initially defined the girls as Bangladeshi. The girls’ constructions of their ethnic identity were complicated. For some girls, Bangladesh and Bengali identity were very important to how they understood themselves; for others this aspect of their identity was less significant. For example, Laila, a Year 11 girl in School 2 told us that ‘I’m not have nothing to do with Bangladesh’ and her friend agreed ‘She’s not as Bengali as everyone thinks she is.’

All girls had family origins in Bangladesh. However, the level of connection and the meaning they attached to these connections varied. A few of the girls had been born in Bangladesh and come to London as a small child; others had parents who had lived in the UK for most or all of their lives. Some of the girls had visited Bangladesh quite frequently, or spent periods of several months there, and some girls had never visited. Some girls felt an affinity with Bangladeshi girls in Bangladesh, but more argued that it was very different being a Bangladeshi girl in London:

I think Bangladeshi girls probably don’t think they can achieve all these things... because in London they give more support in school
Bangladeshi girls choosing science, technology, engineering and maths

and back in Bangladesh they don’t give that much support. That’s why we get to learn more because there are like strict teachers and back at home it’s hard.

(Year 10 girls, School 1)

The girls’ career aspirations

We asked all of the girls about their aspirations. There were some differences in the responses from interviewees of different ages (as highlighted in ETB 2005b). Girls in Year 10 often had a lot of different ideas about broad career possibilities, and did not often relate these to their GCSE options. Girls in Year 11 and 12 tended to have more defined ideas about careers, which were often linked to their post-16 choices, while girls in Year 13 generally linked career aspirations with their decisions about jobs or further study. While the range of different options narrowed for older girls, it was not uncommon to find Year 13 girls with several disparate career ideas.

Across all year groups, careers within law, medicine and teaching featured predominantly among the girls’ aspirations. These aspirations are similar to those documented among British Muslims by Basit (1996) and the predominance of medicine, law and teaching is found among girls in general by Francis (2002).

Year 10 girls also mentioned a broad range of careers in childcare, nursing, midwifery, social work, architecture, ICT, banking, business, the police force, hair and beauty, fashion and the civil service. Some did not mention any particular careers and said they were still thinking about their options.

Year 11 girls also displayed a wide range of aspirations; these included law, medicine, and teaching, but also engineering, childcare, social work, ICT, writing, art therapy, psychology, office work, hairdressing and beauty therapy.

Most of the Year 12 girls we interviewed were studying STEM-related AS Levels and were considering applying for science-related courses at university and pursuing careers in nursing, pharmacy or as a paramedic. None of the girls interviewed in this year group mentioned being a doctor or lawyer although one was quite keen to become a teacher in the long-term. Several had not enjoyed science AS levels as much as they had hoped and were talked about moving to other A2 subjects, or not continuing their studies.

All of the Year 13 girls interviewed were studying for at least one A2 in the sciences or maths. Around half hoped to study chemistry or biomedical science at university and branch out to teaching, research, or pharmacy. Two girls had hoped to study medicine but been unsuccessful in their applications/AS levels and were considering other subjects to keep their options open (in one case chemistry, in another, biology or English). The others hoped to do law or English, and were considering law and teaching as career options.

Thus we see that girls in this study had high aspirations for their careers, which became increasingly sophisticated as they moved through school.

Given the focus of this study on careers in science, technology, engineering and maths, we were particularly interested in girls’ aspirations in these areas. Other research has suggested that awareness of science careers among pupils is limited (Osborne and Collins 2000; ETB 2005b; Lord, Harland and Gulliver 2006), and that careers in science have little appeal (Jenkins and Nelson 2005; Peters et al. 2006). In our study a number of girls were considering medical careers, only two girls expressed an interest in engineering, none in technology, and one in scientific research work. We asked girls specifically about the kinds of careers they thought were open to people who studied science and maths. The girls’ answers generally focused on medical careers. Two girls described computer science as needing maths (this attracted one, and deterred the other); the only other career the girls discussed in relation to maths was accounting, although one Year 11 girl commented that employers liked maths qualifications ‘with maths they seem to love you’. In relation to science, the same girl commented that the careers open if you had studied science were narrow: ‘with science qualifications, it’s a really specific field [of careers that are open to you], it has to be to do with science’. A few girls mentioned
Bangladeshi girls choosing science, technology, engineering and maths

“Men do engineering, and stuff that you need technology for. It’s only for men, you get me, and ladies they don’t get no jobs out of it.”

Bangladeshi girls choosing science, technology, engineering and maths

engineering, focusing particularly on cars and mechanical engineering, and with an acknowledgement that they knew very little about what the job of an engineer entailed:

I wouldn’t mind [engineering] if I knew…
i don’t know anything about it, that’s the thing.

(Year 10 girls, School 3)

Studies have also suggested that there are a number of stereotypes associated with STEM careers. For example, many secondary pupils see scientists as very brainy and having to work very hard (Peters et al 2006). There is also a strong association between science careers and masculinity. A survey of secondary pupils found that 50% of pupils saw scientists as middle-aged men in white coats, compared to only a third who thought they could be normal and attractive men or women (ibid). Mathematicians are usually imagined as middle-aged white men (Mendick 2007) while engineering is described by Foskett and Hemsley-Brown as an ‘invisible’ career, which when imagined at all is seen as dirty, physical work (see also ETB 2005a).

We found that with the exception of medicine, girls associated STEM careers with men. Girls gave examples of male accountants they knew, and argued strongly that engineering was a profession dominated by men. Fareeha, in Year 10 at School 3, argued:

Men do engineering, and stuff that you need technology for. It’s only for men, you get me, and ladies they don’t get no jobs out of it.

Another girl in her group suggested that ‘Girls should have a choice [about whether they do engineering]’, but Fareeha responded:

Technology is for like engineering stuff isn’t it? And have you ever heard of a lady who’s an engineer? I have never in my life met an engineer who is a lady yet. I know there is, but I haven’t seen it yet. I’ve mostly seen men but that means there are more men than women who are engineers and if there are ladies who I know who are engineers, it’s not going to be Bengali, it’s going to be White or something else.

Fareeha is drawing a clearly gendered and racialised picture of an engineer – most of them are male, and any that are female are White or ‘something else’, not Bangladeshi.

Girls saw careers in engineering, technology or mathematics both as dominated by men, and as ‘manly jobs’ (Khadijah, Year 10, School 2 about engineering), requiring traits that they did not see themselves to have. Thus engineering was described as a career for ‘active’, ‘practical’ people, and girls who were interested in it were described (or described themselves) as tomboys. In response to a question about what careers are open if you study STEM subjects, Aisha gave the example of a brother-in-law who had done a maths degree and worked in computer science. Although she thought he had made a lot of money, she described him as annoying, and ‘unsociable, really unsociable’. She seemed to associate these characteristics with his study of maths and computing. Thus we see that girls saw the kind of person who could pursue a career in STEM (excluding medicine) as someone different from them, generally with masculine characteristics.

This process of gendering of occupations was not unique to STEM occupations. Shakirah told us that she wanted to be a police officer because she wanted to be ‘on my feet, active and stuff’, but that her family had told her this was ‘not a lady’s job’. This prompted the girls to discuss what jobs were lady’s jobs, a list which included receptionist, teacher, nurse, housewife, and doctors – ‘but never a policewoman’.

Most of the girls suggested that they would be free to choose engineering as a career if they wished. The reason they did not was that they did not see themselves as the kind of person who became an engineer, and this was usually because of the gendered characteristics they perceived to be necessary. Girls were more likely to describe themselves as ‘a caring person’, and look for occupations where they could help others, particularly medical professions, teaching, social work and childcare. For example, Parveen, a Year 11 student in school 3 talked about how enjoyable working in a primary school is: ‘All you do is just interact with the kids, make them laugh, make them smile and then you sit down and read a book to them and it was
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Some girls wished to follow another family member into a particular career, and others were determined to succeed in a career because another family member had been unable to do so.

We asked all of the girls interviewed about the under-representation of Bangladeshi girls in STEM careers. Many girls were surprised that Bangladeshi girls were under-represented and some girls answered this question in very broad terms, rather than focusing on STEM careers. Girls did not see the under-representation as something that would last, and were keen that Bangladeshi girls should have the chance to prove themselves. However, very few of the girls saw themselves entering STEM occupations (other than medicine), so while the optimism of these girls is encouraging, and their ambitions in other career areas considerable, it seem that there is a need to challenge gender stereotypes and the stereotypes of STEM occupations before these girls begin to aspire to STEM careers.

Factors affecting career aspirations

Parents and family
Parents and family play an important role in career aspirations and career decisions for many young people, although Lord et al (2006) suggest that their role is often not immediately visible. There is some evidence that family is particularly important for young people from minority ethnic groups, as these young people are more likely to refer to a relative in a particular career when talking about the decision making process leading to their career choice (Cassidy, O'Connor and Dorrer, 2006). However, while acknowledging the support, advice and encouragement of family, young people tend to stress that career decisions are their individual choice (ibid).

Most girls described talking to their parents and family about career aspirations. Some girls indicated their parents were open to their ideas about careers, and they ‘gossiped’ about them. Other girls suggested that their parents had quite fixed ideas of what careers they wanted for their daughters. For example, Parveen (Year 11 student, School 3) wanted to become a family solicitor because her father, a restaurant manager, has always wanted her to become a lawyer. Nasmah (also in Year 11) said her father wanted her to become a doctor and did not approve of her ambitions to go into drama or beauty. Henna, a Year 10 student in School 2 wanted to study religious education (RE) at a higher level and become an RE teacher, but her father wanted her to become an accountant or work in a bank because he thinks it is a ‘good’ occupation. In all of these cases there was evidence of negotiation taking place between the girls and their parents, with the girls choosing to listen to some of their parents’ ideas, and contesting others.

A couple of the younger girls in the focus groups who said that they did not have any ideas of what they wanted to do in the future revealed that no one in their family worked or as one girl put it ‘No one in my family has a good job’ (Insha, Year 10, School 3). These girls were less confident about discussing career options in the group, and seemed to feel unable to discuss career options with parents.

Some girls wished to follow another family member into a particular career, and others were determined to succeed in a career because another family member had been unable to do so. A few girls referred to other family members, including siblings, cousins and younger aunts and uncles, who positively influenced them in their career aspirations. Afsana, for example, described an approachable female cousin whose footsteps she wished to follow because her family were proud of her achievements:

Yeah, my cousin sister, she’s a lawyer and I think I will follow her because she’s confident and you can talk to her… Yes she’s done science, she was A* at that, and she has become a lawyer and she does good, and her family is really proud of her.

(Afsana, Year 10, School 1)

Some girls referred to not only relatives in the UK, but also positive role models in Bangladesh. Mona, who aspired to be a general practitioner, mentioned a female relative in connection to a question asking the girls if they knew anyone in STEM-related careers:

I’ve got through my Nan’s family someone in Bangladesh, she’s a doctor, so yeah, she’s very highly valued there and I kind of rate her.

(Mona, Year 10, School 2)

Conversely, there were girls who were determined to succeed in their chosen career
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because they had observed relatives who had stopped their studies or dropped out of courses for various reasons, for instance, Kaleemah who wanted to be a doctor:

‘I want to follow in my uncle’s footsteps like going into medicine, but ‘cos he gave up, I don’t want to give up now.’

(Kaleemah, Year 11, School 2)

As well as the influence of the family, girls talked about other factors in their aspirations. These included the media, work experience and careers guidance, and social factors (such as religion and culture). We examine these in turn.

The media and popular culture

Images of scientists/science and mathematicians/mathematics in the media and popular culture influence young people’s ideas about who can do science/maths, and the kinds of people who become scientists/mathematicians (Lord et al 2006; Mendick 2007). Research into the impact of the TV drama on career choice suggests that young people use TV drama as a way to visualise other lives, and it is one factor in developing their ideas about different careers, and therefore plays a role in shaping their aspirations, although mediated in complex ways by social class, age, gender and race (Mendick and Williams 2008).

Only a few girls mentioned the influence of the media on their career choices. For example, Bilqis (Year 10, School 1) was interested in studying psychology in the future, which she attributed in part to television hypnotist, Derren Brown; and Munna (Year 10, School 3) said she wanted to be a criminal defence lawyer after watching television dramas such as Murder She Wrote and Diagnosis Murder. However, there was some evidence that race was a factor in the girls’ interpretations of the images they saw, as Munna said she had reservations about entering the field because she felt that, ‘I don’t really see an Asian woman getting into the business of law.’

Careers advice

There have been a number of changes to the way in which careers advice is provided through schools, moving from a partnership model between schools and the Connexions service to a model where schools have the right to provide or commission careers guidance. A 2006 survey suggested that careers advisers and websites are the most commonly used source of careers advice among young people, but that the advice of subject teachers remains important (Lord et al 2006). Students particularly value one-to-one advice, information from ‘people in the know’ and direct experience of post-16 destinations (ibid). However, there is evidence that careers advice may be influenced by race and gender (e.g. Gilborn and Youdell, 2000), and pupils themselves feel that careers advice is often limited and filtered to assumed need (Foskett and Hemsley-Brown 1997; Lord et al 2006).

Careers-related activities mentioned by the girls included talks in school from the designated school careers adviser, Connexions Adviser, and/or other external speakers; career fairs; interview practice; visits to universities which included lectures and also more hands-on exposure to practical courses; and links with business mentors.

Careers talks usually took place during PSHE (Personal, Social and Health Education) sessions in schools and in students’ own time in the college. Some girls mentioned the careers staff in their school and how they gave ‘a lot of advice’ about ‘what you want to do in future life’ (Year 10 girls, School 3) and ‘with interviewing’ and ‘applying to colleges’ (Year 11 girl, School 2). The advice might be career focused (e.g. what subjects were needed for a particular occupation), or subject-focused (what careers might arise from studying different subjects).

And like what subjects, like if you want to be for example a doctor, they’ll [careers adviser] tell you, they’ll show a book where the subjects that you need are in it and other stuff so they’re useful, I think.

(Laila, Year 11, School 2)

We tell her [Connections adviser] what A-level courses we’d like to do and what we want to pursue as a career and she goes through a massive book – they have this thing, your personality, your courses and she gives us information and we read on and say, ‘okay, this could be something I’m interested in’, so she gives us lots of advice.

(Maya, Year 11, School 3)
Some girls had external mentors who provided them with one-to-one support and often organised additional work experience placements for them based on their interests.

We had a Connexions person come in and then she was asking me what subjects am I taking, and then she gave this whole action plan based on the subjects I’m taking, what areas of jobs I can do in those subjects.

(Zahra, Year 11, School 1)

Some girls in School 3 claimed that the careers department did not give any talks in school, even though other girls in the same school referred to them. On further thought one Year 10 girl asserted, ‘I think we did but I can’t remember what they were.’ This suggests that the careers guidance these girls received so far had made little impression on them.

Other girls spoke enthusiastically about university visits. For example, Tazneem described a day trip to a university in London organised by the college for students interested in studying medicine.

I have been for science, well actually it was more medicine, like last year to King’s College[…] and we did like, it was like we was going to uni[versity] and so they gave us lectures and courses and I think we did First Aid and stuff like that, which was really fun.

(Tazneem, Year 13, college)

Some girls found out about career options through university visits. Hirah, who studied maths at the college, mentioned a talk given about computer science, which she previously knew nothing about.

We did have one sort of lecture from Queen Mary[…] about computer science. I never knew what computer science was actually and so when they came in and I was like ‘Oh, that’s one thing linked to [as] maths’ sort of thing because I always just thought maths, accounting and accounting, but that was cool, that was interesting.

(Hirah, Year 13, College)

Access to these talks and visits was limited: at the college it was up to students to take the initiative to sign up and in schools these visits did not take place very often. Visits were more often about university in general than about specific careers. Furthermore, one Year 10 girl commented that university visits were not enough on their own:

Yeah, if [university visit in London] was just a one off, just to give us a bit of a taster that’s it but afterwards, I think we need someone to talk to who’s more experienced.

(Mona, Year 10, School 2)

Some girls had external mentors who provided them with one-to-one support and often organised additional work experience placements for them based on their interests. A Year 10 girl in School 2 described enthusiastically her involvement in a mentoring project, which was nurturing her interest in law. However, she revealed that not everyone in the year group was able to take part in the project, and not everyone in the project had access to a mentor.

I’m joined to this project, it’s called Each Life and it’s about our life and 25 people are joined from the year group but from different classes and half the people in that group they have life coaches and those coaches are from like the city. My life coach’s name is [x] and she works in the Bank of Scotland and she’s management over there. She comes to me once a fortnight to visit me and talk about what I want to do and what I want to be and she took me to the Royal Courts of Justice.

(Imani, Year 10, School 2)

On hearing this, another Year 10 girl in the same focus group argued for the importance of one-to-one mentoring.

Teachers are just there to teach, innit? If we all had a specialised person individually to speak about our careers I think that would have made us more certain of what we’re doing. Obviously we can’t make a choice now, but it would make us more confident and we would know what we’re doing. Like now college yeah, I just go blank, I don’t have a clue what I’m doing.

(Mona, Year 10, School 2)

Mona mentioned another mentoring service, but explained she had been deterred from applying due to its focus on business. Samaira, another girl in Mona’s focus group, argued that Mona could have benefited from a business mentor, even though she hoped to be a general practitioner.
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My business mentor, the first thing she said to me was about my career. We talked through about what I’d like to do. There was like a couple of choices that I had. Then she taught me how to do CVs for those careers, which work I’d choose and everything so basically it ain’t all about business. [...] She has no ideas about doctors or science or anything, she’s more like a business woman, but she has actually given her time to go to her friend and ask her, and other people, and asked them about choices in science and then becoming a doctor. And then she’s given me feedback on them so I think that’s really helped me.

(Samaira, Year 10, School 2)

Not all the girls had access to a mentor. At the college, it was up to the students to sign up for one-to-one mentoring, and one girl mentioned she had forgotten to sign up. Another girl was under the impression that mentoring would cut into lesson time and would be too much of a time commitment, although during the focus group another participant told her that meeting times with the mentor were flexible and could be for just a few minutes and even during the weekend.

Not all mentoring experiences had been positive. Parveen, a Year 11 student at School 3 who was thinking about becoming a lawyer said, ‘I had a business mentor but I think she disappeared’, while her friend, Nasmah, who considered herself less academic, complained that ‘I’ve chosen to take careers advice but they didn’t get back to me’.

Work experience

The government claim that work-related learning is an increasingly important part of the curriculum undertaken and enjoyed by the majority of pupils at Key Stage 4 (DCSF 2007). It is designed to help young people to clarify their ideas about careers and relate what they learn to their future working lives (ibid). Although there is limited evidence on the role of work experience in career choice, with Cassidy et al (2006) suggesting that work experience did not stand out in participants’ memories of career choice, Rolfe (1999) argues that work experience represents an opportunity to interest young people in non-gender-stereotypical occupations. However, despite the interest of some pupils in non-traditional placements, work experience placements tend to reflect occupational gender stereotyping (Francis et al 2005). Work experience placements also frequently result in the reproduction of social class inequalities, because of the role given to parents in obtaining placements (Osgood, Francis and Archer 2006).

In our study, access to work experience placements varied between schools, with School 2 not offering its students any such placements at all. Instead it offered students mini induction days so that they could learn about a sector they were interested in. A paired interview with Year 11 students at School 2 revealed that students tended to choose the seminar that their friends were attending rather than following their personal preference. They felt that this exacerbated gender stereotypes related to careers, which they argued the school should prevent.

I think like in those seminars and stuff, you know how you get to choose what you want to do so they should make sure that there’s enough girls in each of the groups and not just in a particular like girly thing like ‘cos most of the girls did, what did they do? Healthcare and teaching and stuff and most of the boys did business.

(Kaleemah, Year 11, School 2)

Although all the pupils in School 2 had the option of organising their own work experience in their own time, motivation between the girls appeared to vary. The girls who did organise work experience, tended go to placements that the school already had links with. There was a similar situation in other schools, where girls’ choices of work experience were restricted by the links the school had, unless girls were assisted by the career connections their mentors or family members had. Girls in schools 1 and 3 described choosing placements from a list. As Khela commented when reflecting back on her own work experience placement in Year 11: ‘I didn’t have any links so I ended up doing it in an office.’

Of the girls who had undertaken work experience organised by their school or college, placements predominantly included working
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in an educational setting such as a nursery or primary school, followed by hospital-related work and retail. Other placements and sectors included banks, law firms, childcare, media, office work including a charity and recruitment agency, and a few girls mentioned working in the high street store, Boots which had the potential of exposing them to both retail and pharmacy. Zahra (Year 11, School 1) mentioned however, that she applied for work experience in Boots with the hope that it would lead to a part-time job, fulfilling a short-term need rather than reflecting any long-term career goals.

Because of the limitations on work experience placements, many girls did not aspire to work in the sector where they had done work experience. For example, Parveen (Year 11 School 3) chose to work in a school and on the whole had a good experience, but talked about becoming a lawyer or psychologist. However, some girls were inspired or deterred by the work experience placement. For example, one girl enjoyed her work experience in a bank because it broke down the image that she had that banking was just for those who studied maths.

I really find it interesting that people who [did] completely different things apart from maths, they still go into banking. It seems interesting and so that might be something.

(Maha, Year 10, School 1)

Another girl said she might consider HR after having a ‘great’ experience at a recruitment agency. Dilshana (Year 11, School 1) found her experience in the accounts section of a media company helpful as she was considering a career in accountancy (as well as engineering), whereas Farah (Year 12, college) was deterred from a career in law following the amount of paperwork she observed during her work experience in a criminal defence law firm.

Girls tended to enjoy their work experience if they were able to use their skills or do something; for example, Fahima (Year 11, School 1) enjoyed her work experience at the Newspaper Education Trust as she was able to help the children use computers. In contrast girls who were given no tasks or very routine tasks during their placement, felt that they had a ‘bad’ experience, which they found off-putting. This was often the case in retail, and, for Kaleemah, in a primary school:

With my business mentor I set up work experience at primary schools. I went in only two days because for some reason they thought I came to observe or something so I was just sitting there[...] so I thought I might as well just forget it.

(Year 11, School 2)

Economic and social factors

In one study of career choice, the most frequently mentioned constraints were financial barriers (Lent et al 2002). One example of a financial barrier is the cost of higher education (Hutchings 2003), which limits access to many degree-level careers. However, only a few girls talked about economic factors that might affect their ability to pursue careers, usually referring to the time and money required to pursue higher education. A few knew someone who had cut their education short for financial reasons. However, almost all anticipated that they would be able to pursue their chosen education and career without financial barriers.

A study of career choice found that the most frequently mentioned support factor was encouragement from friends and family (Lent et al 2002). Cassidy et al (2006) suggest that family and community expectations played a greater role in career choice among minority ethnic young people than among White young people.

In this study, girls mentioned the limitations that social factors (such as tradition, religion, and cultural expectations) might have on their future aspirations, but many envisaged resisting stereotypes and challenging perceived boundaries in order to fulfil their ambitions:

But now I’m thinking, because this thing about religion, you should do stuff that doesn’t involve men, but I’m kind of against that. It’s not like I’m going to do anything bad, it’s just my profession. And so now I’m starting to think I should do childcare but I hope I become a lawyer earning loads.

(Munna, Year 10, School 3)
A common theme among girls in the study was the potential difficulties of balancing work with family expectations, given that they anticipated marrying and having children:

I still have, a part of me still wants to go into medicine, like it’s been a part of me ever since I was little… and so I’m still considering that but I know there will be obstacles such as marriage and Bengali culture as well, like you’re expected to get married and people always say that if you’re a doctor then how… because doctors, their life is based around being a doctor and if you have a family and you’re going to have to quit being a doctor or not do the job as much as is asked of you to do. So, I’m not sure.

(Tazmeen, Year 13, college)

While Tazmeen is still considering medicine, despite the perceived difficulties of combining it with family, Rania indicates that she has written off certain possibilities:

Us Bengali girls, by tradition you have to get married and so you have to choose your career path wisely. Like now, how can you get to a career in the minimum amount of years needed? And so I think we all tend to look for career options… like a short amount of things you can do, like a year or two of work, and then settle down.

(Rania, Year 13, School 1)

However, despite this expectation of marriage and family, all of the girls anticipated continuing their education and/or working before getting married, even some who were very anxious to have a family. Thus Sabrina told us that:

I’ve always seen ladies being ladies and at the end of the day I’m an Asian girl and I will just stay at home and look after my family, I’ve always seen that and I don’t want to stay in education for the rest of my life, I actually want to, maybe work but you know, I want to have a family and I’ve always been like that… I really, really want a family, I’m actually going through a phase where I want kids, I really, really – ‘cos I see the way my cousins with the kids and it’s so nice and yeah.

(Sabrina, Year 12, college)

But even Sabrina didn’t want to get married too early, and explained that she wanted to ‘go to Uni, get my degree and do something with my life, and then probably get married and work’.

Khela, who wanted to study biology at degree and postgraduate level, commented on the changes that had taken place in her community with regards to girls pursuing further education and careers:

I think with our culture, when I was younger it was very limited the way I was thinking because I was always [thinking about] our culture and how a woman’s role is. As you get older society has opened its mind up… I’m going to be a working person so why not go to the career that I want instead of just going to a job for the sake of [it].

(Khela, Year 12, college)

Other girls suggested that the rising age of marriage gave girls the chance to develop a career, and the prospect of a good salary coming into the family could be enough to persuade a mother-in-law that her daughter-in-law should continue to work, as in this example:

It depends on your in-laws… my sister, she was still working in her pharmacy job, and her in-laws weren’t too happy with her working, but she said that ‘I’ve been working here for 7 years, I can’t really let go of my job or anything and if you think about it your son needs me to support him financially as well.’ Because my brother-in-law, he went to uni, and he had a student loan and he needed help with that as well so my sister carried on working.

(Rahila, Year 12, college)

We suggested to all of the girls that some people are unable to pursue the career they want because they have to take care of the family or feel they can’t afford to study for a degree. We then asked them if they knew anyone who had made a choice like this, or if they expected they might have to make a choice like this. Many of the girls answered this question in general terms and talked about girls in the past and girls in Bangladesh who were denied careers because of traditional expectations of women. However, they did not expect this to be true of their generation, and they expected to pursue careers and challenge traditions and restrictions. Archer
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(2002) reports Muslim girls explaining their expectations of higher education as a cultural change, and in this study, girls seemed to be explaining their career aspirations as a cultural change. In many ways this has parallels with the radical change in the aspirations of all British girls that has taken place in the space of thirty years. In contrast to early feminist studies, secondary girls in England are more ambitious and do not see work simply as a stopgap between school and marriage (Francis 2002). Many of the Bangladeshi girls we spoke to saw themselves engaged in a similar process of cultural change.

Thus the girls saw social factors such as tradition, cultural expectations and religion as dynamic, fluid and open to change. While some saw potential restrictions, others planned to challenge expectations. Perhaps the biggest impact of social factors on the girls’ career aspirations was the active consideration of whether a career could be combined with a family.

Career aspirations summary

This section has shown that career aspirations are a part of girls’ identity work – the kind of person they believe themselves to be, the kind of person they want to be seen as, and the bringing together of these aspects of identity in a coherent whole to create the kind of life they hope to have.

We have seen that Bangladeshi girls have a wide range of career aspirations in a number of sectors, although, like other girls, aspirations in law, medicine and teaching dominate. With the exception of medicine, aspirations in STEM careers were very limited, and knowledge about careers in this sector was patchy. Two girls said they aspired to a career in engineering, and none were considering a career in technology. Girls told us that they would be free to pursue a STEM career, and were hopeful that the under-representation of Bangladeshi girls in this area would be challenged; however because they tended to associate these careers with boys, and with masculine characteristics, they did not see themselves as the kind of person who would have a STEM career.

Girls identified family members (parents, siblings and extended family) as important in helping them develop their career aspirations. In some cases girls told us they were encouraged to take opportunities that other family members had been denied. Girls described a process of negotiation between themselves and their families about their aspirations.

Girls reported different experiences of career guidance. In the best cases, girls had heard talks about careers, met with a careers adviser and mentor, and were well informed about a variety of options. However, some girls claimed they had received no careers advice. Individual guidance, especially mentoring from someone in a relevant occupation, was seen by the girls as the most valuable form of careers advice. Most of the girls had some work experience, but for many this was not in the area of work to which they aspired because they or the school did not have access to the relevant workplace, and the girls often felt it had little impact on their aspirations. Girls thought that work experience where they could contribute and complete tasks was the most useful, and a few girls felt that their work experience had helped shape their career aspirations.

Girls were aware of some economic factors (such as the cost of a university education) that might impact on career aspirations and some could give examples of family members or friends whose plans had been curtailed by economic factors. However, they did not anticipate such difficulties for themselves. More significant in their decisions were social factors, such as tradition and religion. Girls acknowledged that there were ‘traditional’ careers that were associated with Bangladeshi girls. However, almost all of the girls told us that cultural traditions were changing, and many girls felt that their career aspirations should not be limited by tradition. Girls saw social factors such as tradition, cultural expectations and religion as dynamic, fluid and open to change. While some saw potential restrictions, others saw themselves as engaged in a process of social change and planned to challenge expectations.

For the girls, a particularly significant factor in career choice was whether they believed...
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I think more or less you have to do it and you have to learn to enjoy it, I think you have to adapt to it yourself.

a career could be combined with family responsibilities. This was often seen to be more important than media or tradition, and some girls indicated that they had ruled out career options on the basis of their observations that the career would not combine well with family life.

The girls’ subject choices

We now move on to look at the subject choice made by the girls in the study. Morris (2006) suggests that, ‘There is no simple equation between views on subject difficulty and subject enjoyment nor between interest in a subject and a desire to continue or abandon its study.’ Rather, subject choice is influenced by a complex mix of students’ interest and enjoyment, potential role in the future, self-perceived ability, subject appropriateness (e.g. by gender or ability) and awareness of other options. This was illustrated for us by an exchange in a Year 10 focus group in School 2. Samaira suggested in relation to subject choice: ‘You’ve got to enjoy it if you want to like do it. You can’t just like go on and not enjoy the subject.’ Mona replied, ‘No, I disagree. I think more or less you have to do it and you have to learn to enjoy it, I think you have to adapt to it yourself.’ The other girls in the group agreed with Mona. It is interesting to see here how Mona is linking the issue of enjoying a subject to the issue of identity, arguing that you have to adapt yourself to the subject.

At the time of the research the Year 10 and 11 girls had chosen their GCSE subjects. All were doing core maths, English and science (some had chosen triple science) and had chosen other options from among French, Spanish, Bengali, history, religious education, geography, business studies, media studies, sociology, citizenship, music, drama, physical education, art, textiles, resistant materials and food technology. Generally girls were keen to tell us that they had made their own subject choices, although they had often asked friends, family, siblings and teachers, and almost all assured us that their parents were happy with their choices, and that they supported their choices. Girls also described taking into account whether they enjoyed subjects, whether they were good at subjects, whether they found subjects easy or hard, how much writing or calculation was required, what options they would have after taking certain subjects, who they might be taught by and so on.

There were a few ways in which school-level factors constrained the girls’ GCSE choices. Several of the girls talked about the GCSE options available in their school – one had wanted to take two languages, but this was not possible in her school. Others had agonised over whether to take triple science because of the limitations this imposed on their other options – and the triple science option was only open to girls in higher attaining sets in some of the schools. Samaira was aware that ‘triple science award will help us with A-levels when we leave’. Kaleemah, a Year 11 student in School 2, was aware that her entry for foundation tier in maths (meaning she was only likely to get a C at highest, see glossary) might mean she had less chance to study maths in the future, explaining ‘I think my weakness is in maths, ‘cos I’m in foundation, and I was predicted a C, but everything else is like As, A’s and Bs’. As highlighted in other studies, decisions about entry for tiered papers can be affected by setting at a much earlier point in the school, and by classed, raced and gendered perceptions of ability (Gilborn and Youdell, 2000).

The Year 12 girls had made choices about GCSE subjects, and then about their AS levels. We spoke to one group of girls studying applied science, and one where the girls were studying biology and chemistry (some with the addition of maths and computing). These girls were considering what A2 options they might choose. These girls talked most about their AS and A2 choices, and saw their GCSE choices as much less significant. They described choosing subjects they were good at, but also thinking about career aspirations. The group of girls studying AS applied science explained they had taken the subject because there were fewer exams and more coursework, and their teachers had encouraged them to take this option because they disliked exams. They talked at some length about the consequences of their choice of applied science for their options after A-level. They had become aware while studying the course that not all universities accepted applied science, a
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The Year 13 girls had made choices at GCSE, AS level and A2 level. Some had already made or were making university applications and talked about their choice of degree subject. These decisions particularly took into account the subjects they had enjoyed and done best in at AS level (for example, one girl had found chemistry very hard and was intending to choose English instead). The girls also considered their career options in relation to their degree, and their successes in university applications. One girl had been awarded a bursary for law, and was therefore more likely to study this than maths (although she preferred maths, she was nervous about how well she might do in it). Another had been turned down for medicine, and was reassessing her options.

Factors affecting girls’ subject choices

Perceptions of STEM subjects

We now move on to look at the factors that had affected girls’ subject choices, beginning with the girls’ perceptions of STEM subjects. These perceptions were of STEM subjects as valuable mainly for their use in careers or sometimes as ‘solid’; as difficult, suitable only for clever students, and somehow risky; and as masculine or feminine.

Morris (2006) suggests that at GCSE and A-level most pupils study maths and physical sciences for their value for future careers (generally in science or mathematics), rather than because of their enjoyment of these subjects. We have seen earlier that girls associated only a limited number of careers with science and maths. Although several girls described taking chemistry or biology because they found it interesting, they all also related it to their career aspirations. Mirah’s comment that ‘I don’t understand why we need to take science because we are not going to want to become scientists are we?’ indicates that the only reason she could see for taking science was to become a scientist, and this perception limited the likelihood of girls studying STEM subjects. However, there is also evidence that some parents believe science subjects to be ‘solid’ or particularly valuable (Lord et al 2006), and therefore encourage their children to take them. There was also some evidence of this, with some of the girls telling us that their parents ‘boasted’ about their daughter having chosen science A-levels.

Others have reported perceptions that science and maths are studied only by ‘brainy people’ (Lord and Jones, 2006; Lord et al 2006; Morris, 2006). Science and maths were considered by almost all of the girls we interviewed to be difficult and only suitable for clever students. When we asked Jusna if she would consider studying science after GCSE she responded ‘No, not me, I’m not the brainy one in the house’.

Mendick (2006) writes about the way mathematics is seen to be rational and mathematical ability as ‘natural’ and associated with boys because of the connections perceived between masculinity, rationality and natural ability. Some of the girls seemed to hold this view, and saw little point in working at maths, because they did not believe they were likely to improve. Nasmah, a Year 11 student in School 3 explained ‘I can’t do maths, because I’m really bad at it. That’s why I don’t bother in maths at all, so I just leave it. I give up, ‘cos I find maths too hard’. Mendick shows how this view of mathematics as ‘natural’ and rational makes it difficult for pupils, especially girls to describe themselves as ‘good at maths’. So Hirah, a Year 13 student studying A-level maths explains that she enjoys maths, but is not good at it, saying, ‘I find it so challenging and I’ve always been into algebra and it’s so logical and breaking things down and I don’t know why but I really like maths. I did maths GCSE earlier as well, it’s something I’ve always liked but unfortunately not that good at’. Her friend, Tazmeen, interjects. ‘I disagree with her, she’s really good at maths. I’m not just being biased she is’. Although Hirah thinks maths would open up many career options to her, and although she enjoys maths, she will not take it at university, explaining ‘maths is my passion but my career wise I would go law and the reason I wouldn’t choose maths is ‘cos I’m just so scared of that subject, doing maths in uni, it just sounds scary is the main reason’. The interviewer prompts her, ‘Even though you’re good at it?’ but she replies quickly ‘I don’t think I’m good at it’. Thus we see that Bangladeshi girls face a similar difficulty to the one described...
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This perception of maths and science as suitable only for clever or ‘brainy’ people, resulted in some of the girls seeing STEM subjects as risky choices.

Experiences of studying STEM in school

We now move on to look at the school level factors that affected girls’ choices of STEM subjects. These factors include experiences of lessons, curriculum, examinations, and teachers, and have been found to be highly significant in subject choice (e.g. Lord et al 2006).

The GCSE pupils interviewed included some doing triple science at GCSE, some doing double science, some working on the new core and additional science, and some taking applied science. The girls had very different experiences of studying science.

The girls’ views on science lessons were varied. Reasons for enjoying science lessons included enjoying experiments and being interested in particular topics. Reasons for disliking science included finding the topics boring, finding science too hard or not enjoying experiments. These aspects of science combined to give some complex attitudes towards science:

I hate science because its really hard doing all the experiments and its sometimes hard and I lose concentration.

(Afsana, Year 10, School 1)

I enjoy doing experiments but I don’t like the science words because I can’t really understand them.

(Mysha, Year 10, School 1)

I hate practicals. I don’t know what I’m doing I always end up breaking half the stuff.

(Erina, Year 10, School 3)

Research evidence suggests that not all pupils enjoy practical work equally. It has been suggested that boys often dominate practical situations, and that while girls receive more teacher contact during practical work, this often results in reinforcing girls’ dependence on the teacher. It has also been suggested that girls are more nervous of making mistakes in practical work and have fewer opportunities to familiarise themselves with equipment and are therefore less confident about practical work (Murphy 1993, Biggs 2006).

Most girls described enjoying interactive lessons where ‘We don’t have to just sit around...”
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and do our work’. As Nasmah, a student in Year 10 explained ‘I hate maths and science. I just hate it. Science, the teacher just gives you a book and she asks us just to read from it and learn. With me I can’t just read from a book and learn, it doesn’t stick in my head’.

A number of the girls in Year 10 and 11 had strong feelings about the pace at which they had to study science, especially those who were studying for three science GCSEs. They described ‘changing different topics all day’ and ‘getting too much information’ and feeling ‘rushed’ and confused by this. One group of girls who had been very successful in Year 9 attributed their poor grades in science in Year 10 to this pace and pressure. Kaleemah in School 2 explained that ‘I think I like sitting down actually going through stuff thoroughly and not just briskly going over it’.

One of the aims of recent changes to the science curriculum at Key Stage 4 was to address this pressure on the curriculum. Aisha, a Year 11 student at School 1, commented that ‘We’re trying the new science called 21st century science. So all our siblings did learning, memorising stuff and we’re not doing none of that’. This positive experience was not reproduced for her peers who were taking triple science where the pace and pressure were remarked upon. Teachers also noted these difficulties (see Chapter 7).

Other studies suggest pupils are more positive about science when they can see how it related to everyday life and is relevant (Osborne, Simon and Collins 2003, Jenkins 2006). Although teachers were optimistic that recent curriculum changes were making the science curriculum more relevant (see Chapter 7), this was not evident in the responses of most pupils who tended to see science as relevant only to those who were going to be scientists.

Of the Year 12 and 13 girls interviewed four were studying applied science (double award), five AS biology, eight A2 biology, four AS chemistry and ten A2 chemistry. The applied science group were particularly concerned about the quantity and pace of the coursework they had to do, and the fact that they had not been able to do as much experimenting and other activities as they had hoped at the beginning of the course.

The course has two thirds course work and we have only two exams and I guess that’s why a lot of people choose it, because they’re probably a little weak at exams and that’s why it appeals to me, although saying that now that I’m doing the course it’s constant course work, it’s one deadline after another, they’ve not finished our previous remit and they already started the new one, they are very hectic.

(Khela, Year 12, college)

Attitudes to maths lessons were similarly complex. All of the school-age pupils were studying maths, and of the Year 12 and 13 girls we interviewed, four were studying AS maths and three A2 maths. Although there seemed to be less variety of activity in maths lessons than in science, most girls accepted this as inevitable for maths as they did not think that other activities, visits or trips would fit into maths. However, girls did want teachers to explain mathematics clearly and make it more interesting.

What I like about maths is I learn how to do like more stuff but maths is quite boring because the teacher is boring and it makes it boring.

(Jusna, Year 10, School 2)

Sometimes how they explain doesn’t really help us digest what we are learning. The way they teach us could be improved. Sometimes it’s really boring and you don’t know what you’re doing and you’re put off science or you’re put off maths because you don’t know what you’re doing.

(Maya, Year 11, School 3)

The girls were studying a number of different technology options, including information and communication technology (ICT), resistant materials, textiles and food technology. There was much less discussion of these subjects in focus groups, because the girls often took different options and had fewer shared experiences. In a discussion about the difficulties of having mainly boys in a class, Mirah (School 3) commented ‘I don’t like resistant materials because I’m the only
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It’s partly to do with the teacher that I’ve got and he’s really good, like the way he explains things and it sticks in, you just enjoy it more and that’s why I chose it.

As found in other studies (e.g. Osborne, Simon and Collins, 2003; Francis et al 2003) teachers were very significant in both positive and negative experiences of studying a subject. So Khadijah (Year 10, School 2) explained that ‘I hate maths, not because of the work but because of the teacher’. But teachers could also be the reason for enjoying a lesson:

It’s partly to do with the teacher that I’ve got and he’s really good, like the way he explains things and it sticks in, you just enjoy it more and that’s why I chose it.

(Parveen, Year 11, School 3)

Yeah, maths I enjoy it because the teacher is really encouraging and he pretends he doesn’t like it, but he actually loves maths, you can tell! He’s very encouraging and he helps us out a lot. And science, again they love their subject, this school like you can tell, the teachers love what they are doing and that helps us out a lot, because if they are not enjoying it, obviously, we’re not.

(Dilshana, Year 11, School 1)

The issue of teaching outside the science subject specialism has been widely written about. There is evidence that non-specialist teachers feel less able to inspire pupils and teach outside their specialism with less enthusiasm (Hutchings and Smart 2005), and some attribute this kind of teaching to lower levels of engagement among pupils in physics and chemistry in particular (Donnelly and Jenkins 1999, Lord et al 2006). In our study Aisha commented that she could tell when her teachers were specialists: ‘A-levels you’d normally have a specific teacher but this school never used to have the teachers, like the chemistry teacher would take biology. They know biology but they don’t specialise in it… it’s just the way the teacher teaches it and she doesn’t know the subject herself.’

This section has examined the influence of girls’ experiences of studying STEM subjects in school on their subject choice. We see that when they enjoy lessons in STEM subjects, and view teachers of STEM subjects in a positive way they are more likely to consider choosing STEM subjects at A-level.

Science and maths enrichment activities

The four case study settings provided a number of different opportunities for science, maths and technology enrichment activities. We look first at those available for GCSE students, and then those for Year 12 and 13 students.

The Year 10 and 11 pupils’ experiences of enrichment activities varied according to school.

Samaira, a Year 10 pupil in School 2, described a visit to Cambridge University and a professor who talked about science. She said, ‘He was quite old fashioned but a lot of people there were quite good at science and stuff like that. I think he gives quite good opportunities and then maybe if I was to go to university I’d proper think about which university I’d want to go to, which one I think would best suit me and stuff like that’. Fahima and Aisha from Year 11 in School 1 talked about a club to encourage girls to do engineering. While they thought this was a good idea they told us that ‘we just don’t have time to go. A few girls did go and they won competitions and stuff.’ These Year 10 pupils also described taking part in Ocean maths (see glossary) the previous year:

You work with your parents or sisters and brothers and you do the worksheet and you give it to them and you have to write a comment whether you liked the homework you enjoyed doing it.

(Isha, Year 10, School 1)

Girls thought this had been good for their parents, but were not so sure about the benefits for them. A Year 11 pupil at School 1 had taken part in the SHINE NRICH project (see glossary), and although she said she had not been part of it for long remembered it as ‘good’ and ‘interesting’.

Teachers and pupils at School 2 talked at length about trips to universities. These included trips focusing on science (for example, one looking at Saturn and its moons)
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and on careers options (for example, a trip where girls got to ‘see how people work and what they do in their everyday life’ and learn to take blood). This school had also organised a competition for three students to go on a science-related visit to America.

In School 3, Year 10 students described having the opportunity to make a robot, and attending a science and maths careers fair. A girl from the lower attaining group also described, ‘in science, not me, but some students went to this thing like the scientific museum workshop thing. They were doing some experiments with other kids from other schools and so they went there and so they did that.’ Nasmah, a Year 11 pupil at School 3 described a practical maths trip she had taken in Year 10. She contrasted this favourably with school lessons:

*In class you just sit down, he gives you the work, you work out of a textbook and write the answers whereas on the trip they explained to you, they do experiments, drama role plays and everything kind of included in one thing so that’s why [it was different].*

She described this trip as ‘actually really fun and I enjoyed it and I learnt some things for the first time’, but back in the classroom ‘it helped me for like a week or so and then I forgot about it’. This suggests that even more could have been gained from the project had it been followed up in school.

Particularly in School 2, there was evidence that science enrichment activities were not evenly distributed. So when Husna said of a trip she had been on, ‘Everybody who chose to do it enjoys science more, especially physics.’ Mona responded ‘I think they could get more people involved. I never get picked for anything’. The interviewer asked about ‘not being picked’. Husna admitted that not everyone had been able to go, ‘they went over by three people. I can’t remember.’ Mona then re-emphasised her desire to go: ‘Oh I would die for an opportunity to go to Queen Mary and see that man’.

These girls were in the Year 10 focus group of higher achievers. In the focus group of lower achievers, the girls said that they hadn’t been on any trips, and in response to the question ‘Which students get chosen?’ responded ‘The really clever ones’ adding, ‘The same people get chosen to go on trips’, and ‘They try and randomly mix us up but it doesn’t work.’ It seemed that students with considerable enthusiasm and interest in science were not accessing science enrichment activities because they were in lower attaining groups. This raises the possibility that they might have been disadvantaged twice, as these groups are more likely to receive some teaching from non-specialists, particularly in physics (Hutchings and Smart 2005, Moor et al 2006).

The Year 12 students at the college were aware of some opportunities for enrichment activities, but felt they could not get involved with too many things, because they were worried about completing all of their applied science coursework. Khela argued, ‘It’s just so much course work that I need all the spare time that I can get’.

The Year 13 pupils at the college talked about events promoting careers – Tazmeen had been to a taster university day for those interested in medicine, which she had enjoyed, and Hirah had been to lectures at universities about university and careers.

Year 13 pupils at School 1 described trips to revision conferences. They also described having completed bronze and silver CREST awards (see glossary), and now working towards the gold award. Monera commented, ‘It’s bringing together all the technology and science and for people who are really interested in technology and science. If someone likes the practical side to it and the theory and what you are working out then you really enjoy it’.

For Year 12 and 13 students there again appears to be some differences in opportunities for and uptake of enrichment activities. The structure of the school seemed to make it easier to involve girls in enrichment, particularly as the girls were more likely to know the science staff, and could continue activities such as the CREST award. At the college, girls seemed to be less aware of the provision available. In both settings, girls were...
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Concerned about taking on too much in case they did not have time to complete work. This was particularly the case for the applied science students where assessment was continuous through coursework.

Subject choices summary

The girls in the research were at different stages in making the subject choices. They described taking into account a number of different factors when choosing. These included their enjoyment of a subject, their perceived ability in a subject, and what further subject choices and career choices would be available. Girls told us that the final decision about subject choice was theirs, but they consulted friends, family, siblings and teachers. However, there were some ways in which school and college factors restrict the choices open to girls, especially where they are entered for lower tier papers or the significance of particular subject choices (triple science, applied science) is not clear.

The decision to choose STEM subjects was influenced by girls’ perceptions of STEM subjects, in particular perceptions of science and maths as linked only to careers in restricted fields, as difficult, and as male subjects (especially technology). Several girls referred to the choice of physics or maths as ‘risky’. Girls often perceived biology and chemistry more positively than physics or technology, because of the links between biology, chemistry and medical careers. Some were positive towards maths because of its links with accountancy and finance, but many girls described themselves as not good at maths, and wanted to avoid subjects and careers that involved it.

Girls’ experiences of studying science and maths were sometimes negatively affected by the fast pace at which the content was taught (especially at GCSE), by poor relationship with teachers, and teachers who were perceived to have poor subject knowledge.

Girls’ experiences of studying science and maths at school were sometimes negatively affected by the fast pace at which the content was taught (especially at GCSE), by poor relationships with teachers, and teachers who were perceived to have poor subject knowledge. Girls were more positive towards science and maths when they perceived the content to be relevant, and when they received clear explanations and a variety of learning activities.

Girls (especially those in lower attaining sets) seemed to have uneven access to maths and science enrichment activities. A-level students at the school were more likely to access activities, perhaps because they knew the system and teachers, but all A-level students were wary of spending too much time on enrichment activities because of the amount of study they needed to do. Most were positive about the activities they were able to attend, but sometimes did not see connections between the activities and their lessons.

Overall, the interviews with the girls give a positive picture of girls who are ambitious and positive, who are forming their identity through using and challenging the gendered and racialised ideas around them. While they have high aspirations, and are often positive towards science, many are unaware of the range of careers open to them in science, and maths, technology, physics and engineering are often seen as male subjects and careers.

While this is a very positive picture, research suggests there are a number of other factors that will impact on the girls’ ability to fulfil their aspirations. These include the inequalities that exist between different Bangladeshi girls and their families in terms of their class position and access to economic resources (Aston et al 2007, Platt 2007); and the extent to which others support or resist their aspirations (Mac an Ghaill and Heywood 2005). Archer (2002) shows that while girls tried to counter stereotypes of passive/oppressed Muslim women, boys’ talk sometimes asserted these same stereotypes. Although we did not interview Bangladeshi boys, it is possible that these girls will encounter powerful individuals who assert the stereotypes that they aspire to challenge.
Chapter 6: Choosing science, technology, engineering and maths – the parents’ perspectives

We were therefore more likely to speak with parents who had a positive relationship with education, and who were willing to come into an educational setting.

Introduction to the parents

We interviewed Bangladeshi parents whose daughters were currently studying for GCSEs, AS or A2 levels. Some of the daughters attended the schools and college within our study while others attended schools and colleges in the wider London East Thames Gateway area. The parents were recruited through School 2 and the college, and through a saturday school. We were therefore more likely to speak with parents who had a positive relationship with education, and who were willing to come into an educational setting. This is a limitation of the sample.

Mr Ahmad was a teaching assistant in School 2 and was also studying part-time for a degree in mathematics. He came to the UK when he was 14 and had lived in East London for the past 26 years. He had previously worked in the catering industry. He had twin boys aged 4 and girls aged 11, 14 and 16. His eldest daughter, was in Year 12, studying AS English, ICT, law and religious education.

Mr Bashir had been an arts student at college in Sylhet, Bangladesh. He had been a teacher in Bangladesh for a few years but had never taught in the UK, and described himself as physically unable to work at the time of the interview. His daughter was in Year 12 studying AS English, ICT, law and religious education.

Mr Farid was born in Bangladesh but came to the UK when he was very young. He left school in his fifth year in order to work (and help support his family). At the time of the study, he was a parent governor at a primary and a secondary school in the East London area, and said he spent a lot of time doing voluntary work. He had two sons (aged 19 and 10) and two daughters (aged 17 and 13). His elder daughter was in Year 12 at college and was doing GCSE re-takes in single sciences, maths and English.

Mrs Khatun was a housewife with four children. Her eldest daughter was a mother and housewife herself and was present during the interview. Her eldest son was 28 years old and worked in the job centre. Her second daughter was 18 and worked in a hospital in London in the neuroscience department. Her youngest daughter, Sheza, was in Year 12 at college studying AS art, English, maths and media. She was also present during the interview. Mrs Khatun was interviewed in Bengali.

Mr Qadir described himself as a community worker and has been involved in education in Bangladesh and the UK. Mr Qadir and his wife were both trained in secondary education in Bangladesh and both have done access courses in the UK to continue with teaching. Mr Quadir has spent the past 30 years in East London where he was formerly an elected councillor. He had two sons and two daughters. His elder son was 23 years old and was studying a management course part-time and working part-time; his elder daughter was studying law at university; his younger daughter was in her first year at college studying AS ICT, maths and sociology; and his younger son was in primary school.

Mr Rahim was a bilingual instructor in Tower Hamlets and had been teaching in the area for the past 16 years. He was interviewed at a saturday school where he taught, but was hoping to pursue a primary PGCE course. Mr Rahim had a degree in History from Dhaka University and had lived in the UK for the past 20 years. His wife was also a support teacher in the UK and they had five children. His eldest son was doing a plumbing course; his second son had just finished his first year of AS levels; and his youngest son was eight months old. His eldest daughter was 14 studying GCSE English, maths, double science, Bengali, history, DT food, ICT and religious education, and his younger daughter was in her final year of primary schooling.
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Parents have a right to think, imagine, because at the end of the day parents think about their children and they want to see their children do something [that they] can feel proud of.

Educational aspirations

All the parents interviewed had high aspirations for their daughters’ education, something that Mr Ahmad saw reflected in much of the Bangladeshi community:

Parents have a right to think, imagine, because at the end of the day parents think about their children and they want to see their children do something [that they] can feel proud of.

For many of these parents, attaining a degree was far more important than discussing their daughter’s career plans in any depth. The parents wanted their daughters to gain a degree as ‘a sort of passport’ (Mr Ahmed) and said that they would support their daughters if they had the interest and ability to pursue a degree course. As Mrs Khatun asked, “Doesn’t every mother want her daughter to study further and have a career?”

However, while parents had high aspirations, they did not indicate any particular subject preferences. They told us that although they spoke with their daughters about subjects, their daughters chose their own subjects. Although parents were engaged in their daughters’ schooling (discussing options with them, and attending parents evenings) they had little to say about the role of lessons, curriculum, examinations, teachers and science or maths initiatives on their daughters’ subject choice. When probed about his daughter’s GCSE science and maths curriculum, Mr Rahim, who was planning on becoming a full-time primary school teacher, said that while he was familiar with the primary curriculum, he was unclear about the secondary curriculum and did not always know what his daughter was doing in these subjects.

Parents were asked about what they thought of their daughters’ subject choices, and on the whole they were happy with the choices so long as their daughter was achieving a good grade in those subjects. On this note, Mr Bashir was concerned with his daughter’s decision to study AS-level biology, which compared to her other AS-levels in chemistry, maths and sociology, she had been predicted a lower grade in. Based on his own experience in Bangladesh as an arts student, he had warned his daughter that sciences were ‘hard’ subjects and was now suggesting she drop biology at A-level. However, his daughter Farah, who was present during the interview and was part of a focus group at the college, emphasised again how she enjoyed the sciences and was determined to do well in them. We see here the process of negotiation that girls in focus groups had described.

Career aspirations

The parents interviewed told us their daughters were considering careers in teaching, law, health studies, fashion design, media, politics, and medicine, although their career plans were not fixed. Mr Rahim joked that his 14-year-old daughter had a ‘different plan’ at ‘different times’; and Mr Ahmad mentioned that, having studied AS law, his daughter was toying with the idea of becoming a lawyer rather than a teacher as she had originally planned.

When asked what career he wanted his daughter to pursue, Mr Ahmad expressed that he did not feel that he, as a parent, had the ‘right’ to direct his daughter’s decisions about her career and was there instead to support her aspirations. All of the parents suggested that their daughters’ abilities and interests would be the most important factor in decisions about her future. For example, Mr Farid was pleased his daughter wanted a career in health, because he felt it suited her personality and ability:

I wouldn't pressure her to do anything. If it was up to me and she was good at it, I'd like her to do health studies in the medical department. She is doing health studies I think, but it’s up to her, whatever she’s good at… I’d like her to do it ‘cos she’s kind and she’s intelligent and my mother died of a lot of illness and my dad’s not well, he’s in hospital – it’s not because of that, that’s what I like but it’s not because I like it, it has to be what she’s good at so let’s see, whatever she decides I’m willing to help her.

(Mr Farid)

Parents also talked about the importance of a ‘decent’ career that would not have people talking behind their backs, and one that would provide financial security (a concern that has been found in other studies, e.g. Cassidy et al 2006).
In some cases, parents’ experiences influenced their views about their daughter’s career aspirations. Mr Qadir had been an elected councillor, and explained that his daughter was considering a career in politics or journalism. He felt from his own experience that both were difficult careers, and his preference was for his daughter to study law.

> I think it's a good profession, you can be self-employed. They don't have to be employed all the time, they can set their own career, don't have to be dependent on anyone else.

(Mr Qadir)

As his elder daughter was studying law, he thought this might influence his younger daughter.

Parents were also conscious of the importance of realistic ambitions for their children, as Mr Ahmad explains:

> Say if I want my daughter to be a doctor, well is that your choice or her choice, and obviously we have to consider the workload, it's not something you can buy, this is something they have to achieve, they have to work hard. And if they don't do it and they find it hard, then obviously it will be too hard for them. And later on in life, I don't want to see my child upset because they are not successful in this particular career.

There was no evidence of this kind of over-ambition among these parents. Mr Rahim, for example, explained how his 14-year-old daughter wanted to study a degree in medicine. Even though she was predicted ‘A’ grades in maths and science in her first year of GCSEs, Mr Rahim did not feel that she would be chosen for a medical degree because her English and science grades were, according to him, ‘not very strong’. He felt she would be better suited to pharmacology or teaching, but added that his daughter’s preference would be given priority when it came to making decisions for university.

Aspirations in STEM

A study for the Engineering and Technology Board (ETB 2005a) suggested that parents of pupils in Year 9 and Year 11 did not feel informed about science, engineering and technology careers, that they had limited knowledge about them, and that ‘overall, parents were not sure about SET (science, engineering and technology) being an appropriate or desirable long-term career option for their children’. Although parents felt non-gender traditional careers were open to girls, they still expressed a strong feeling that SET jobs were male careers. However, parents also said they would try to support their children in careers where their skills and interests lay.

In our study, the parents interviewed were asked how they would respond if their daughter told them she wanted to be a scientist or an engineer. With the exception of Mr Rahim, all the parents said they would be happy if their daughter had the ability and ambition to pursue those careers, although Mr Qadir commented that he had yet to meet a female Bangladeshi engineer.

Mr Rahim observed that not many Bangladeshi girls were employed in engineering and that he would have to consider his daughter’s ‘personal security as a girl’ in this sector. When asked if he would reconsider if more Bangladeshi girls entered the field, he added that he did not wish to be negative about this issue, but equated it to Bangladeshi girls entering the army or construction work, which he was opposed to due to the physical differences between men and women. This suggests that while on the whole, Bangladeshi parents from a variety of backgrounds are open to their daughters becoming scientists and engineers, there are still a minority who have their reservations about their daughters pursuing careers where women are under-represented.

All parents were asked about the under-representation of Bangladeshi girls in STEM careers. A few of parents said they were disappointed to hear this. In his eight years as a Teaching Assistant Mr Ahmed said he had seen many girls get good grades in maths and go on to work in hospitals and asked a lot of questions about how this conclusion was drawn. Mrs Khatun could not explain why girls were under-represented in STEM and did not think that it was right. She said that if girls wanted to study and pursue a career in STEM, she did not see why they should not.

Mr Qadir, however, was optimistic about the future of Bangladeshi girls in STEM, and commented on the changes that had taken
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Many of the parents were disappointed to hear that Bangladeshi girls were under-represented in STEM subjects and careers and a few could not understand how this could be.

On the whole, the parents interviewed were familiar with what careers their daughters aspired to, and appeared to discuss career options with their children. All the parents interviewed held ambitions for their daughter to attend university, and for many parents, obtaining a degree was more a more important consideration than career aspirations.

All parents said the final decision about a career rested with their daughter, and depended on their daughters’ interests and abilities. They were concerned to have realistic ambitions that matched their daughters’ abilities. Some parents expressed personal preferences for particular careers, based on their own experiences, their perceptions of their daughters’ strengths and weaknesses, and their understanding of the flexibility and independence offered by different careers. They hoped that their daughters would have ‘decent’ jobs, which lead to financial security, personal development, and did not have people talking behind their backs of the family or the daughter.

The majority of parents said they would support their daughter if she wanted to be a scientist or engineer, especially if her interests and abilities were suited to these careers. A few commented that it was rare for a Bangladeshi girl to be an engineer. One parent expressed concern about his daughter entering a career where women are under-represented, explaining that he would be concerned about his daughter’s personal security as a girl in a male-dominated profession and her physical safety as a woman attempting to undertake ‘male’ tasks.

Many of the parents were disappointed to hear that Bangladeshi girls were under-represented in STEM subjects and careers and a few could not understand how this could be. Some parents were aware of the situation and were optimistic about the future of Bangladeshi girls in these careers given their achievements in education in the UK over the past ten years. Others felt that Bangladeshi boys were as equally under-represented as the girls in STEM careers and that Bangladeshis in general were under-represented in all sectors in addition to STEM. Parents stressed the need for all Bangladeshi parents to support children in their studies, and inform themselves about career options.

Somewhat similarly, Mr Farid emphasised that parents should be made aware of the importance of science, maths (and English) in the school curriculum and in turn encourage their children. When asked how this could be achieved, he recommended meetings for parents, bilingual leaflets, and home visits, and felt that parents, not only in the Bangladeshi community but in others where this was not being achieved, should make an effort and try and understand the educational system and the skills the job market demands.

Summary

The parents interviewed had high aspirations for their daughters’ education, with all hoping that their daughters would have the interest and ability to get a degree. They did not indicate a preference for STEM subjects over other subjects, although some commented on the importance of studying maths, science and ICT in order to get good jobs. A few were concerned that science and maths were more difficult subjects, but when it came to their daughters’ subject choice, parents told us that the most important factors were their daughters’ interest and abilities.
Introduction to the teachers

We interviewed teachers of science or maths who taught girls at GCSE or A-level, and who had some interest in the research. We also interviewed a careers teacher. Brief biographical details of the interviews are given below:

Mrs Mangat was a maths teacher approaching retirement. She described herself as Asian, ‘my background is Indian via East Africa’. She had done her teacher training, and then taken a degree in philosophy, and a subsequent degree in maths. She described a close relationship with her students where she would often challenge them about their beliefs or attitudes.

Ms Miah was a maths teacher with approximately five years’ experience. Her family were from Bangladesh. She had been educated in the UK, studied maths and computer science in London. She hoped that her example might be an inspiration to her pupils.

Mr Mothin was a maths and physics teacher with less than five years’ experience. He taught sixth formers.

Mr Smith was a senior science teacher with more than twenty years of experience. He had studied chemistry, and spent all of his teaching career in London. He was from a white background.

Mr Solanki was in his first year of teaching. His degree was in astro-physics. He had grown up in North London, and came from an Indian background.

Ms Samad was teaching science at the school she had attended as a pupil. She had studied pharmaceutical science and was in the early years of her teaching career. She was from a Bangladeshi family, and felt that this gave her an insight into the pressures on Asian young people to study science.

Mr Shahid was a science teacher with a degree in physics, with between five and ten years’ experience. Originally from outside London, he described himself as of Bangladeshi background. He chose to teach in East End in order ‘to give something back to that community really’. However, Mr Shahid did not always feel that he had the impact he hoped for, because of disaffection and disinterest among his students.

Mrs Childs was a careers adviser who worked with teachers and some students. She described herself as White and middle aged. She talked at length about the difficulties for girls within the Bangladeshi community, drawing on her experience as a primary school teacher. She worked in an environment where girls were in the minority.

Teachers’ observations about the career aspirations of Bangladeshi girls

Our final question to all interviewees was ‘Bangladeshi girls have been identified as an under-represented group in STEM subjects. How do you feel about this and why do you think this is?’

Several of the teachers explained that they had not realised Bangladeshi girls were underrepresented in STEM professions, although some commented that they were aware that girls generally were under-represented. In particular, the two female Bangladeshi teachers interviewed were surprised. One reflected that with hindsight she could see that Bangladeshi girls had been in a minority on her course, but that she hadn’t thought about this at the time. The other responded:

See, I’m surprised you’ve said that because when I went to college most of the people were Bengali girls. All my friends went to university and we all studied, all my friends, we had all done either sciences or maths.

3 We approached careers teachers in all locations, but our requests for an interview were declined.
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So I find that quite funny that you’re saying that Bangladeshi girls are not represented enough with science.

(Ms Samad)

Several teachers went on to suggest that the under-representation of Bangladeshi girls in STEM careers was wrong: ‘there should be more Bangladeshi girls in industry’ (Mr Smith). Teachers suggested that under-representation meant that Bangladeshi girls were missing out on well-paid, rewarding careers. However, the two female Bangladeshi teachers were more cautious about these conclusions, arguing, ‘We don’t want to be under-represented’ but that:

There’s a part of me that thinks if our youngsters prefer not to study maths it’s totally their call. Because I think we perhaps underestimate that young people do know what they want and if their heart steers them towards the humanities, let’s say, let it be. I think you’d be more successful if you go in the direction you want to and there’s nothing wrong with that.

(Ms Miah)

Teachers suggested a variety of reasons for the under-representation of Bangladeshi girls. Mr Smith argued that these subjects were ‘still male dominated and parents aren’t going to be happy about having their daughters in to that’. However, he predicted cultural change: ‘the next generation of parents will be much more used to living in a multi-cultural society and hopefully they’ll be much more flexible about it and a bit more open to sort of letting their daughter do things like science’. Mrs Childs identified similar reasons for under-representation: ‘out-of-date cultural norms’ and parents who are trying ‘to protect their identity, cultural identity’, but who in doing so provide ‘a very negative environment for their children’, especially girls who were denied the chance of a career.

Mr Shahid also identified family and cultural practices within the Bangladeshi community as a problem, but suggested that that there are stereotypes outside the Bangladeshi community as to who is perceived to be suitable for certain careers, and that these stereotypes might restrict the options for Bangladeshi pupils.

In their own context, teachers were generally positive about aspirations of pupils, although there were some differences according to the setting in which they worked. One teacher was very positive about the high aspirations of the Bangladeshi girls she taught at A-level, suggesting that the main factor holding them back was not aspiration, but achievement at GCSE and A-level:

I don’t hear any Bangladeshi girl say I want to go out to work [instead of going to university]. In the White English comprehensives [Aimhigher need] to persuade working class kids to go to university, rather than getting jobs, go to university. You never need to persuade our kids, Asian kids to go to university. Their problem, a lot of them, is they don’t have the qualifications to go.

(Mrs Mangat)

However, a teacher in a less highly achieving school with no sixth form described a different pattern:

Quite a few drop out as well and end up being married at an early age but that’s another issue… You can have a sense about some students. Like [girl] I expect will leave. She is an EMAG student actually, she is not special needs and she will leave and she will attempt college and then she will drop out and then she will stay at home and do the housework with her mum and get married and have kids.

(Mrs Childs)

Several teachers in the 11–16 schools highlighted how fluid and uncertain the career aspirations of their students were, and that pupils often make subject choices based more on ideas about what they were good at than the careers they wished to have.

Almost all of the teachers talked about pupils having an interest in science because of the link to medicine and medical careers:

I mean loads come and say I want to do medicine. Actually they’re embarrassed to say that. They say things like I want to work in a medical-related field so we turn to them and say you mean you want to be a doctor. Well if I can. And then of course they find that it’s such a lot of damned hard work that they usually by AS realise they’re not going to make it.

(Mrs Childs)
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Very few go into medicine. They all start off wanting to do medicine and some of them are unrealistic because they need their As and Bs so we mainly get one or two that get to medical school. Some go into pharmacy and quite a lot go off the sciences, they don’t do medical and others will just go off and do business.

(Mr Smith)

These teachers often talked about a lack of awareness of careers other than those in medicine or law.

One of the sixth form teachers gave examples of girls who had gone on to study engineering at degree level, and those interested in teaching mathematics. However, teachers (and the career adviser) had little information about the subjects pupils went on to study, or what careers they pursued.

These teachers also explained that they did not tend to have conversations with girls about their career ideas because this kind of guidance was provided separately by careers advisers, and they did not feel that they had the time to discuss these issues in their lessons, as they needed to concentrate on getting through the syllabus. The careers adviser highlighted the difficulties in creating enough time for providing careers advice and getting to know pupils.

Observations about pupils doing STEM

Some teachers made observations about the gendered balance among students who studied STEM subjects at A-level, observing that there were often more boys than girls in maths or physics classes. Two of the maths teachers described an increase in the number of girls studying maths since they had been in teaching. However, teachers generally played down the significance of gender in pupils’ choice of subject, and talked about career aspirations, ability or enjoyment of the subject.

Mr Solanki attributed the popularity of biology and chemistry to pupils’ aspirations to medical careers:

"I think at degree level, I think the sciences are very heavily over subscribed subjects, biology and chemistry, a lot of students here, anecdotally really want to go into medicine and stuff like that or some sort of medical career. So that’s what I’ve observed so far.

(Mr Solanki)

Similarly Mr Mothin suggested that girls might think ‘there is a very certain career path they wanted from the maths and if those career paths aren’t open then they decide “you know what forget that I’m going to go and do something else”’.

Several teachers mentioned a link between attainment or ability and choosing science:

"Okay, probably the higher attainers they enjoy the subject and a number of them obviously can see that there are careers that they might want to get into like you know medicine and other types of careers, engineering etc, they can see some progression there. (And then do many pupils go on and study the subject at A Level or at degree?) I would probably say your kind of low achievers less so I don’t know maybe 5% or 10%. High achievers probably more maybe 40% or 50% will have some kind of involvement in a science subject.

(Mr Shahid)

And Mr Mothin reflected that while girls did choose maths at A-level, they might find other subjects easier and therefore drop maths:

"A lot of girls what they do is they take subjects like maths but also they take subjects like sociology or English and whatever else and maybe they find the English or the sociology slightly easier and therefore they decide to drop off maths because maths is a difficult subject, maybe that’s happening. Personally, my wife actually she did physics, maths and English and she ended up doing a degree in English and so that maybe one of the factors.

(Mr Mothin)

However, several teachers contested the idea that it was only higher attainers who were interested in science or maths. These teachers implied that personality was more important:

"You can’t put it in to high attainers and low attainers because there are low attainers who do science and like science[...] and then you’ve got really bright, more able ones that don’t really like science so you can’t put it
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“I don’t think I can actually pinpoint any students who would want to go on to do maths.”

Mr Smith

In my experience the unlikeliest people have gone on to study maths so the people who I would consider where maths isn’t their strongest subject have actually decided that they want to study maths because they’ve enjoyed it and not necessarily the other way round so the stronger students may not necessarily go for a maths degree but may go for the finance or the business related degrees. I don’t think I can actually pinpoint any students who would want to go on to do maths.

Ms Miah

Some of the answers indicated that teachers, even Asian females, had not consciously noticed the gender balance in the uptake of maths or physics at a higher level, had not thought about the reasons for this, or were wary of talking about it:

“I’ve never actually sat and thought about why that might be. It’s interesting I mean I’m as Bengali as you get and I absolutely adore maths and in my family actually I’m perhaps the only person that does out of all the girls, the females so yeah.”

Ms Miah

Factors influencing career aspirations and subject choice in STEM

Teachers talked about a number of factors that they saw as significant in the choices of their pupils.

The first factor mentioned by many teachers was the influence of family attitudes towards STEM careers. Teachers believed that the families of Bangladeshi girls often regarded science as important because of the links between science and prestigious careers such as medicine. Therefore family influence on the choice of science subjects was often seen as positive. Teachers also described families as positive towards mathematics, especially as they became aware of the options associated with the subject:

“When I was growing up it was like you had to become a doctor or a dentist or a pharmacist or something like that and just doing a maths degree didn’t seem worthy enough, I think. But I think over time it changes. I think if they went home and said ‘I want to do a maths or science related subject’ I think the parents would be happy with that and I think it’s just a change of times actually. I think parents are perhaps a bit more educated themselves so they realise that if their child is to be successful, you know earning a good salary, they don’t have to go into those narrow fields that we all associate with being prestigious.”

Ms Miah

However, some teachers were concerned that parents might not have such a positive attitude towards engineering:

[Parents] see [medical careers] as educated, respected and it’s a career that women can do but – engineering is a dirty, disgusting, filthy world that men do. It’s your car mechanic, your plumber and that’s the image we have to break down.

Mr Smith

Two teachers commented that this positive attitude towards maths and science often led to parents denigrating other subjects, and that pupils might find themselves pushed into subjects they did not enjoy.

Teachers also commented that STEM subjects were seen as high status by parents because they were perceived to be difficult. A maths teacher contrasted this with the attitudes towards maths that she saw in the White community:

[Maths is] very highly thought of within any Asian community. Science and maths is just the top. It’s very highly regarded. And I also think as opposed to the host [White] community, Asian students go for the hard subjects, i.e. the maths, the sciences, medicine, law, the traditional professions [...] I think the problem with the host community is that it’s almost a matter of pride for White parents to say ‘oh I was never very good at maths’ and that’s a stupid attitude to have. They do say it. They’re not embarrassed by...
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You don’t have to be super clever to do well or to get somewhere in science, you just need to have an interest, you need to try and that’s it.

(Mrs Mangat)

However, this perception of science as a hard subject was also identified as discouraging some students from studying science. One teacher explained how she tried to counter this perception of science:

You know it’s really sad hearing the students say that ‘Oh we’re really dumb; we’re never going to make it, oh you’ve got this [science degree] Miss because you’re really clever’. And it’s like ‘No I’m not clever, I’m just hardworking’. There’s a difference, you know. You don’t have to be super clever to do well or to get somewhere in science, you just need to have an interest, you need to try and that’s it.

(Ms Samad)

Teachers also talked about family attitudes towards careers for women. As illustrated in the previous quotation, teachers believed that parents saw some careers as more suitable for women than others. Mr Solanki explained: ‘I think sometimes maybe cultural factors may play a role, [stereotypes] of the role of women or the vision of the role of women in the community may play a role as well and I think that might eventually cause specific issues that people think as under representation of Bangladeshi women in science’. However, Mr Solanki highlighted the differences within the Bangladeshi community in relation to STEM subjects and careers for women, particularly between those of different classes or levels of income:

A lot of the girls in the school seem to be on free school meals. So there’s a lot of poverty in the area, so in terms of like social classes, I think a lot of the community here are not in professional classes. There are some parents of kids who are in big professional careers and stuff like that but I don’t think there’s a big majority. So I’m just sort of taking a punt there and saying maybe they just don’t know about [STEM careers] given the cultural factors or there’s just not a history of higher education in the family. Again there are sometimes quite a few girls that do come here from well-educated families so the parents are aware of other options but some cases I think, the majority might not be.

(Mr Solanki)

Some other teachers seemed aware of differences with the Bangladeshi community – for example, some were very aware of financial pressures on Bangladeshi pupils to get jobs instead of going to university, or to get jobs to fund university study. However, some teachers seemed not to see social difference between Bangladeshi pupils.

Teachers were divided over the influence of the media. Several felt that teachers and family were more significant influences; however, programmes such as CSI were identified as popularising forensic science, while other images of scientists and science in the media were seen to be dull and boring and likely to discourage students from scientific careers.

Family and culture were generally presented by teachers as the most significant influences on Bangladeshi girls’ career aspirations and subject choices. We also asked them about the role of school factors, including the curriculum, school initiatives and pupils’ experiences of studying science and mathematics.

The schools and college were involved in a range of initiatives including visits to universities, London Engineering Project, STEM projects days, bringing in students and role models in STEM occupations and so on. Teachers were positive about these kinds of initiatives, although all felt that they could do more. Teachers often commented about the difficulty of fitting these kinds of initiatives into a crowded curriculum and timetable. However, they also identified limitations to these kinds of initiatives: ‘Sometimes you’re not sure what impact it has had on the students’ and ‘I don’t know if that one thing is going to make them want to do science or anything but what I’m saying is it created a lot of interest’.

Several teachers felt that because of the amount of subject matter they had to teach, it was difficult to make science interesting. One teacher was positive about the Twenty First Century Science curriculum that she was using ‘because a lot of new subjects that we
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“I can only really talk about myself in comparison to my sister actually, I had a wonderful experience when I was at secondary school and I think that had a lot to do with my teachers whereas she didn’t.

...do now are to do with diseases and cancers and things like that and mobile phones, how do they work? So they can relate to that and I think that’s made a change’. However, she still felt that ‘It’s not always very interesting because we’ve got so much content to cover, sometimes we can’t make it really interesting, really exciting and I think maybe if we could make it more interesting, maybe that would have an impact’. A sixth form teacher described how important she believed previous experiences of learning maths were in students’ choices of maths:

So what effect does college have on their decision [to study maths]? I think it probably has quite a bit actually and their education back at school. I think if they’ve had a good experience and they get delivered the maths in a way that they can understand and can relate it to everyday life, I think they’ve got a good chance of making the decision[...] I think that Year 9 is where they’re going to tilt either way. It’s a fine balance you know and I think it does determine which direction they’re going to go and I think we at FE either consolidate that belief or we don’t. I can only really talk about myself in comparison to my sister actually, I had a wonderful experience when I was at secondary school and I think that had a lot to do with my teachers whereas she didn’t. We were both working at the same levels and I kind of steered towards the maths and the science and she went towards the history and stuff and it just naturally grew from there. So I think it does have a lot to do with what they’ve experienced earlier on.

(Ms Miah)

Teachers talked about school factors in very broad terms and did not link these factors specifically to Bangladeshi girls, seeing them as factors that affected all pupils equally.

Summary

Teachers did not have a strong focus on the career aspirations of their pupils. Teachers talked both about those with high aspirations, and those with more limited aspirations. However, due to the pressures of the curriculum and the academic focus of their role, teachers were often not aware of the details of the career aspirations of their pupils, and did not often discuss careers with their pupils. Very few were aware of the career destinations of previous pupils, and did not seem to have reflected much on the implications of gender and ethnicity for career choice. For several of the teachers, the research interview was the first time they had discussed the under-representation of Bangladeshi girls in STEM careers.

The teachers tended to focus on cultural norms within the Bangladeshi community to account for their interest in science leading to a medical career, and the lack of interest in engineering or technology. Several agreed that these norms had changed in recent years, and were likely to continue to change. Some argued that they should be challenged by schools and careers advisers. Many suggested that Bangladeshi girls who had gone into STEM careers could act as role models.

Some teachers seemed to be more aware of variations and differences between Bangladeshi families than others, in particular the different economic situations of families, and the different exposure of girls to information about careers.

There was some discussion about the role of ability and subject preference. Some teachers suggesting that higher attainers were more likely to go on and study STEM subjects, with other teachers arguing that pupils of all abilities might be interested in them. Linked to this was the perception that teachers identified among parents and pupils of STEM subjects as higher status and more difficult. There were some teachers who seemed to agree with this perception, and others keen to stress the role played by hard work in success in STEM subjects.

School factors were discussed less than cultural and social factors in career aspirations and subject choice. Teachers did highlight the pressure on the curriculum that prevented them from engaging in more enrichment activities, and from making the lessons as interesting as they would like. However, it seemed that teachers had not often had the opportunity to discuss issues around gender or ethnicity in relation to their subject, and the subject choices and career aspirations of their pupils. While the stereotypes held by those within the Bangladeshi community were discussed by teachers, only one teacher suggested the need to challenge the stereotypes of those outside the community as well.
Chapter 8: Girls, parents and teachers

Girls in the study had high career aspirations, most frequently hoping to work in law, medicine and teaching, but also including the diplomatic service, childcare, social work, office work, art therapy and hairdressing.

In the final chapter we will draw together the different perspectives of girls, parents and teachers, and begin to consider the implications of the findings for teachers, careers advisers and those promoting STEM careers. We consider first what the study showed us about Bangladeshi identities, and then move on to consider the findings about career aspirations and subject choices.

Bangladeshi identities and cultural change

The study focused on Bangladeshi girls, because they have been identified as an under-represented group in STEM careers (Jones 2005). However, Bangladeshi identities were thought of and lived by the participants in diverse ways. Their relationships with Bangladesh were complex. Some girls and parents referred to Bangladesh as ’home’, visited regularly, had close links with family there, and felt that attitudes in Bangladesh played an important part in their decisions about life in London. In contrast other interviewees saw British or London Bangladeshi identities as quite different from the identities of girls in Bangladesh. The girls identified some things about themselves or their families as typically Bengali or typically Asian, but some as specific to their area of London, or their particular family traditions. There were also differences between girls from different socio-economic groups. Teachers did not always reflect the full extent of this diversity when talking about the girls, sometimes talking about the Bangladeshi girls in their school/college setting as though they reflected all Bangladeshi girls or all Asian girls in London. Among the girls there was a strong focus on the ways in which Bangladeshi identities were changing. Many of them talked about the way in which certain traditional ideas were being challenged (such as the age of marriage, the career possibilities for girls and so on). Parents also reflected that girls were achieving better in education, and this meant they could aspire to STEM careers, and a Bangladeshi teacher suggested that Bangladeshi parents now saw a wider range of careers as prestigious.

However, neither the parents nor the teachers discussed cultural change to the same extent as the girls.

Career aspirations

Girls in the study had high career aspirations, most frequently hoping to work in law, medicine and teaching, but also including the diplomatic service, childcare, social work, office work, art therapy and hairdressing. The parents we interviewed were generally aware of the details of their daughters’ aspirations, and one commented how very frequently her 14-year old daughter’s aspirations changed. Teachers seemed to have little knowledge of the aspirations of the girls they taught, often because they found the pressure of a crowded curriculum gave few opportunities for talking with girls about their career ideas. They were usually unaware of the destinations of previous pupils, and this may have contributed to some of their stereotyped ideas about the aspirations of Bangladeshi girls, which focused on law, medicine and teaching. While these were the most frequent aspirations among the girls we spoke to, the girls discussed a wide range of different careers and teachers did not seem to have appreciated this diversity.

The girls told us that their parents were mainly supportive of their aspirations, and this was certainly true of the parents interviewed, who talked about having high, realistic and achievable ambitions for their daughters. Most girls indicated that they discussed their career ideas with their parents, and there was evidence of a process of negotiation between parents and their daughters. While these were the most frequent aspirations among the girls we spoke to, the girls discussed a wide range of different careers and teachers did not seem to have appreciated this diversity.

Parents indicated that their main priority was for their daughters to be academically successful, to gain a degree if they had the interest and ability, and to find a ‘decent’ job, which led to financial security and personal development. Some parents had personal preferences for particular careers, based on their own experiences, their perceptions of their daughters’ strengths and weaknesses, and their understanding of the flexibility and
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In relation to STEM careers, a number of the girls mentioned aspirations in medical careers but far fewer expressed interest in careers in other sciences, engineering or technology, partly because girls and their parents knew relatively little about jobs in these sectors.

In relation to STEM careers, a number of the girls mentioned aspirations in medical careers but far fewer expressed interest in careers in other sciences, engineering or technology, partly because girls and their parents knew relatively little about jobs in these sectors. Several teachers believed that parents and pupils had relatively little knowledge about these careers. However, there was little evidence that teachers had engaged in sustained discussion with girls and their parents about possible career pathways in STEM. Although most of the girls and parents believed that technology, engineering or mathematics could provide “decent” careers for women, both girls and parents commented that Bangladeshi women were rare in these sectors. Most girls and parents did not express interest in technology or engineering careers for themselves or their daughters. These careers were frequently associated with men and masculine traits. Girls tended not to see themselves as having the right interests and aptitudes for STEM careers in these areas, and this view was supported by their parents. Those girls who were seen as suitable for STEM careers were often seen as tomboys. A small number of girls and parents believed STEM careers (with the exception of medicine) might be unsuitable for girls because of the male-dominated working environment, and the physical demands that some associated with engineering.

A number of factors were mentioned that shaped career aspirations. Girls and parents stressed the importance of pursuing careers linked to subjects that the girls enjoyed. Girls and teachers agreed that the media could sometimes inspire people to think about a career, and teachers felt that the media did not often present scientists in a positive way although overall girls and teachers felt the influence of the media was limited. Career guidance had helped some girls to be very well informed about their career options, but some claimed they had received no advice at all. Individual guidance, especially mentoring from someone in a relevant occupation, was seen by the girls as the most valuable form of careers advice, and several spoke eloquently about their positive experience of mentoring (however, as mentors came from business and law, they had not encouraged the girls towards STEM careers). The careers adviser highlighted some of the difficulties of liaising with schools and getting to know pupils when providing careers advice.

Most of the girls had some work experience, but for many this was not in the area of work to which they aspired because they or the school did not have access to the relevant workplace, and the girls often felt it had little impact on their aspirations. Participants told us that work experience where they could contribute and complete tasks was the most useful, and a few girls felt that work experience of this kind had helped shape their career aspirations. Work experience was not a factor referred to by teachers or parents when discussing the career aspirations of girls.

Girls were aware of some economic factors (such as the cost of a university education) that might impact on career aspirations and some could give examples of family members or friends whose plans had been curtailed by economic factors. However, they did not anticipate such difficulties for themselves. Teachers and parents were also aware of these factors, but saw them as only rarely significant.
Several teachers mentioned a cultural bias towards careers in medicine among Bangladeshi families. While one or two of the girls talked about medicine being ‘an Asian thing to do’, and cited a number of family members in medical careers, there was little evidence that interviewees felt pressured into these kinds of careers, and both girls and parents were positive towards careers outside the medical profession. Participants acknowledged that there were ‘traditional’ careers that were associated with Bangladeshi girls. However, almost all of the girls told us that cultural traditions were changing, and many felt that their career aspirations should not be limited by tradition. Girls saw social factors such as tradition, cultural expectations and religion as dynamic, fluid and open to change. While some saw potential restrictions, others saw themselves as engaged in a process of social change and planned to challenge expectations. Parents also spoke about the cultural changes in their community. In contrast, teachers placed a great deal of emphasis on cultural norms and family attitudes to STEM careers and careers for women, and much less on the possibility of cultural change.

For the girls, a particularly significant factor in career choice was whether they believed a career could be combined with family responsibilities. This was often seen to be more important than media or tradition, and some girls indicated that they had ruled out career options on the basis of their observations that the career would not combine well with family life. Several female teachers commented that the ‘family-friendly’ nature of teaching would make it a very suitable career for the girls.

Choosing to study STEM

There is no evidence that Bangladeshi girls in Tower Hamlets are under-achieving in science or maths relative to Bangladeshi boys, or other girls in Tower Hamlets. In Tower Hamlets in 2007, Bangladeshi girls entered and attained similar science and maths GCSEs to other girls and to Bangladeshi boys in Tower Hamlets. A slightly smaller proportion of girls in Tower Hamlets attained two science GCSEs, and a maths GCSE, than girls nationally in 2007, although this is likely to be explained by the levels of deprivation in Tower Hamlets. Reflecting the national patterns, girls in Tower Hamlets are under-represented in physics and maths at A-level, where more boys than girls choose to study maths and physics. However, more girls than boys choose to study biology and chemistry. The proportion of girls taking A-levels who are studying for biology and chemistry A-levels in Tower Hamlets is similar to the national patterns (unfortunately this data was not available by ethnicity).

We found that the girls’ subject choice at GCSE and A-level was influenced by a wide range of factors including career ambitions; interest in and enjoyment of the subject; self-perceived ability; perceived difficulty of the subject; the options on offer in the school/college; previous experience of studying the subject; the assessment method; and others. Girls described weighing up these factors before making decisions. Some consulted their parents, siblings or teachers, but participants agreed that the final decision rested with the girls themselves.

Science and maths were sometimes perceived as necessary only for careers in restricted fields. Biology and chemistry were considered good subjects by girls and parents because of their link to medical careers, and maths because of the link to accountancy and finance; however, this also had the effect of narrowing their appeal. Girls and teachers indicated that girls might choose not to study STEM subjects because they had no interest in medicine, accountancy or finance.

Science and maths were often described as difficult subjects. In some cases girls and parents felt that higher grades would be possible in other subjects and chose not to study science and maths. Girls described parents who boasted about their daughter’s studies in science because of the status of science and maths as ‘difficult subjects’. Teachers were aware of the perceptions of science and maths as ‘difficult subjects’. Teachers were aware of the perceptions of science and maths as ‘difficult subjects’. Teachers were aware of the perceptions of science and maths as ‘difficult subjects’. Teachers were aware of the perceptions of science and maths as ‘difficult subjects’.

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Girls also tended to regard STEM subjects as male subjects (especially physics and technology), both because the classes were male dominated, and because they felt there was more encouragement for boys to study them. Neither parents nor teachers made any reference to this perception, although some college teachers observed that maths classes they had taught in the past had been male-dominated.

The experience of studying science and maths at school influenced later choices. Subject choices were constrained by a number of school/college level factors, including whether there was an option to study three sciences, whether other subjects had to be given up to study triple science, and the tier of exam paper entered. For some girls, the significance of these factors only became clear after their ‘choices’ had been made. Although very significant to the girls, these were not factors that teachers commented on at all, and the parents interviewed gave no indication of being aware of these decisions. A number of the girls commented negatively about the fast pace at which science content was taught at GCSE. Girls said they did not enjoy studying science and maths when they had bad relationships with their teachers, and when they felt their teachers had poor subject knowledge. In contrast, participants said they enjoyed science and maths when they had time to think about it, when they perceived the content to be relevant, and when they received clear explanations and a variety of learning activities. Teachers also talked about the crowded curriculum and the difficulties they faced in making time for science/maths enrichment activities. Especially at GCSE they often felt that their teaching was so constrained by these factors that it made little difference in the subject choices of their pupils, although the girls’ comments suggest this was not the case. Parents did not comment on their daughters’ experiences of science or maths lessons, except to mention that they often did not understand the content their daughters were studying.

Some STEM enrichment activities (such as maths clubs or science activity days at universities) are intended to influence girls’ choices of STEM subjects. Access to these activities was uneven, with some lower attaining girls who were interested in science feeling they had not had the opportunity to participate in enrichment activities. Girls who had experienced enrichment activities generally spoke positively about them, although there was no evidence that the activities had influenced their subject choice, as the activities were often described as rather divorced from the classroom. Teachers were unsure about the value of these activities, and found them difficult to combine with their teaching responsibilities and the crowded curriculum, although all felt that in an ideal world, the school would offer more.

Conclusions for recruitment of Bangladeshi girls to STEM subjects and careers in Tower Hamlets

Cultures are not uniform or static. Bangladeshi identities mean different things to girls and parents within the Bangladeshi community, and girls and parents are engaged in an active process of reproducing some traditions, creating new traditions and forging new cultural identities. Researchers and teachers need to be open to these changes, and not make assumptions based on fixed notions of Bangladeshi culture and identity.

Girls and their parents had limited access to information about careers in non-medical sciences, technology, engineering and mathematics. Provision of information about these careers, and mentors with experience in STEM could help girls make informed choices. Information about other careers related to biology and chemistry might be particularly useful for girls and parents, given the relative strength of recruitment to these subjects among girls. This information should challenge the perceptions that non-medical science, technology, engineering and maths as careers require masculine characteristics.

Teachers have very little time to discuss careers ideas with pupils, and are often unaware of the aspirations of pupils, meaning they may rely on stereotypical ideas about the aspirations of their pupils. Providing teachers with more information about the destinations of their pupils might help them encourage and support their pupils in their career choices. Professional development might also
Bangladeshi girls choosing science, technology, engineering and maths

Girls who do choose technology, physics or maths and are put in a very male-dominated class may find the experience uncomfortable.

Girls who do choose technology, physics or maths tend to regard STEM subjects (particularly maths and physics) as male-dominated and masculine. Perceptions of STEM subjects as masculine and success in STEM subjects as due to ‘natural ability’ need to be challenged in order for more girls to consider studying them. Opportunities to reflect on gendered perceptions of STEM subjects could be built into professional development for teachers and careers advisers, and schools could develop plans to challenge images of subjects as masculine and feminine.

Girls saw individual advice and guidance as important; especially when it came from someone they had got to know through a mentoring relationship. Mentors from STEM occupations in these schools could help to break down some of the stereotypes around STEM and support them in challenging perceived barriers to STEM careers.

For some girls, work experience was a factor in shaping their aspirations, but many had undertaken gender-traditional work experience. Monitoring of the gender balance of work experience placements, and consideration of ways to challenge gender stereotypical placements would be helpful.

Girls placed a great deal of emphasis on finding a career that could be combined with marriage and family. However, girls and teachers had relatively little information on which to base judgements about the compatibility of different career options and family responsibilities. Careers advice could incorporate information about ways in which STEM employers are creating family-friendly careers to encourage more applicants.

Some teachers, parents and girls believed that STEM subjects were suitable only for high achievers and those aiming for certain kinds of career. However, there was evidence that lower attaining pupils enjoyed science. Schools, teachers and careers advisers can challenge perceptions that STEM careers and subjects are only for high achievers.

Access to STEM enrichment activities can be uneven, and some lower attaining girls who were interested in science felt they had not had the opportunity to participate in enrichment activities. Targeting of STEM activities should be coordinated in ways that include and encourage all those with an interest in or enjoyment of the subject.

Further research and suggested reading

This study raises a number of questions; most immediately about the career outcomes of the girls in the study and the extent to which they are able to fulfil their ambitions. This could usefully be the subject of longitudinal work. A study of Bangladeshi girls currently in Higher Education or STEM careers would also provide useful information about how they can best be supported.

There are a number of guides to tackling some of the issues raised in this report, some of which are listed on page 56:

Help challenge stereotypes among teachers about which careers are suitable for which kinds of students.

Teachers seem to have very little opportunity to reflect on the gendered and racialised images of STEM subjects in society (although they are frustrated by the negative portrayal of science and scientists in the media). They therefore find it difficult to challenge gendered and racialised assumptions among pupils about the masculine nature of maths and physics (or the feminine nature of biology). Opportunities to reflect on the gendered nature of choices in STEM could be built into professional development, and would help teachers encourage less stereotyped choices.

Girls tended to regard STEM subjects (particularly maths and physics) as male-dominated and masculine. Perceptions of STEM subjects as masculine and success in STEM subjects as due to ‘natural ability’ need to be challenged in order for more girls to consider studying them. Opportunities to reflect on gendered perceptions of STEM subjects could be built into professional development for teachers and careers advisers, and schools could develop plans to challenge images of subjects as masculine and feminine.

Girls who do choose technology, physics or maths and are put in a very male-dominated class may find the experience uncomfortable. As far as possible, girls who choose these subjects should be timetabled together.

Both teachers and pupils are concerned about the crowded science curriculum at GCSE, especially for girls who continue to study three sciences at GCSE, and in some cases girls think this makes science lessons less enjoyable. Curriculum developers and teachers need to be open to changes in content and quantity at GCSE.
• Guides for career advisers, teachers and work experience coordinators on breaking down gender segregation in career aspirations are available from the Equal Opportunities Commission website: http://83.137.212.42/sitearchive/eoc/Defaultebd0.html?page=17333

There are also a number of useful research summaries on this website.

• A guide to engaging girls in physics is available from the Institute of Physics (www.iop.org): Girls in the Physics Classroom: a Teacher’s Guide for Action

• A short introduction to issues gender and ethnic minority achievement in school science and some suggestions for action are found in an article by Suzie Frost, Michael Reiss and Jenny Frost in the School Science Review, March 2005, 86(316).

• The report ‘Muslim Women in Higher Education’ by David Tyrer and Fauzia Ahmad is designed to challenge dominant stereotyped assumptions about Muslim women and education. A summary can be found on the Prospects website (www.prospects.ac.uk).

• Other useful reports are ‘Pakistani and Bangladeshi women’s attitudes to work and family’ published by DWP (www.dwp.gov.uk) and ‘The role of higher education in providing opportunities for South Asian women’ published by Joseph Rowntree Foundation (www.jrf.org.uk).
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