Nuffield Research Placements Evaluation

Final report on waves 1 to 3 of the longitudinal survey of 2016 applicants

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CONTENTS

EXECUTIVE SUMMARY

This report has been produced by CFE Research for the Nuffield Foundation. It presents the findings from Waves 1 to 3 of the longitudinal survey of 2016 applicants conducted between July 2016 and March 2017. It explores applicants' aspirations, immediate and future education and career plans, decision-making and knowledge, skills and attributes. The findings are designed to add to the understanding developed through a series of interviews and focus groups with students, Nuffield Regional Co-ordinators, teachers and placement providers undertaken by CFE to explore perceptions and experiences of the programme and the impact analysis being undertaken by Frontier Economics.

Nuffield Research Placements

Nuffield Research Placements are delivered across the UK, managed by Co-ordinators representing 13 English regions, Scotland, Wales and Northern Ireland. The programme has been operating for 20 years and it is estimated that 16,000 students have participated to date. The programme is open to students with five GCSEs (or equivalent) at grade B or above, including Maths, English and a science, who are currently studying at least one A-level (or equivalent) in a science, technology, engineering or maths (STEM) subject. In recent years, greater emphasis has been placed on supporting students from disadvantaged backgrounds to apply to Nuffield Research Placements. As a result the proportion of successful applicants from these backgrounds has increased. Successful applicants undertake a four to six week STEM research placement between Years 12 and 13 (or equivalent) and present their research findings at a celebration event attended by students, parents, placement supervisors, and school/college staff.

Evaluation aims and objectives

The aim is to evaluate the impact of Nuffield Research Placements on the education and career outcomes of students and to identify areas where the programme might be improved. The primary objective is to understand its impact on the propensity of students, particularly those from disadvantaged backgrounds, to undertake post-18 study in STEM subjects and subsequent employment in STEM research careers.

The evaluation is being undertaken over seven years until 2022. A quantitative element, being undertaken by Frontier Economics, is analysing linked administrative datasets to identify which types of students are likely to apply for Nuffield Research Placements and to assess the impacts that placements have on choices about post-school study and career paths in STEM. A qualitative element, being undertaken by CFE Research, is examining how well the scheme operates for placement providers, participating schools and colleges, and students in order to provide a deeper understanding of the ways in which placements influence aspirations and education and career choices. The qualitative research comprises a longitudinal survey of the 2016 applicant cohort and qualitative research with applicants and key stakeholders. The longitudinal survey is addressing the key research question:

How does participation in the placement influence student decision-making, aspirations and views about STEM subjects and career plans?

In addressing this question, the survey is exploring the progress being made towards the achievement of key outcomes for young people as set out in a Theory of Change developed by the Nuffield Foundation. In particular, the research is assessing the extent to which the programme is perceived to raise students' aspirations, improve their confidence and ability to work independently, and enhance their science capital/networks.

Methodology

Applicants to Nuffield Research Placements in 2016 are being surveyed longitudinally over four waves. Three waves have been completed to date:

— **Wave 1: July 2016:** This wave comprised a pre-placement survey designed by the Nuffield Foundation and administered to successful applicants, prior to the start of their placement.

— **Wave 2: September to October 2016:** This wave comprised two surveys designed by CFE and administered to successful applicants (post-placement survey) and unsuccessful applicants (post-summer survey). The post-placement survey captured changes in successful applicants' plans, knowledge, skills and attributes. Because no counterpart to the pre-placement survey was administered to unsuccessful applicants, key questions were included in the post-summer survey along with relevant questions from the post-placement survey to ensure comparable data was collected.

— **Wave 3: February to March 2017:** This wave comprised a single survey designed by CFE and administered to all respondents to Wave 2. Respondents were routed through the survey based on whether they had completed a Nuffield Research Placement. The survey captured changes since Wave 2 and further details of their future education and career plans.

Wave 4 will be administered in late spring 2018. The surveys were administered online. A unique reference number enables individuals' responses to each survey wave to be linked to application data held by the Nuffield Foundation for the purposes of analysis.

Key findings

Aspirations and plans

Most *successful applicants* to Nuffield Research Placements knew what they wanted to do after their current qualifications before they applied to the programme – just 4% were undecided. Most (87%) aspired to progress into HE and study for a STEM degree.

The majority of *successful applicants* (90%) did not change their plans as a result of their placement experience. The placement is perceived to have helped to confirm that they had made the right decision. However, amongst the minority who changed their plans following their placement, half subsequently planned to study for a STEM degree.

A small minority of *successful applicants* (7%) changed their plans at Wave 3. For some, the main reasons for the change was that they were clearer about the options available to them, where their skills and interests lay and/or what they needed to do to achieve their future career ambitions; for others the change was forced upon them because of poorer than expected examination results and/or failure to secure a place at their preferred HE institution. A similar pattern emerges for unsuccessful applicants. Most reported that they intended to study for a STEM degree at Wave 2 (83%). Only 5% of *unsuccessful applicants* reported that they had change their mind at Wave 3.

One measure of the success of Nuffield Research Placements is the extent to which it encourages applications to 'top' higher education institutions (HEIs). For the purposes of this evaluation, institutions are measured in terms of research quality (grade point average scores derived from the Research Excellence Framework (REF) 2014). 'Top' institutions are defined as those with an aggregate score of 3* and above in STEM subjects, those with an aggregate score of 3* and above in non-STEM subjects and members of the Russell Group. The majority of all applicants to Nuffield Research Placements (94%) apply to at least one 'top' institution.

Predicted grades are the most significant predictor of whether an applicant will apply to a 'top' institution and select a 'top' institution as their first choice. Those with predicted grades of ABB+ (or equivalent) are more likely to apply to a 'top' institution than those with lower predicted grades. A greater likelihood of selecting a 'top' institution as a first-choice is also associated with certain groups, including males, Black, Asian and Minority Ethnic (BAME) students, students from less deprived neighbourhoods, and those with higher levels of science capital.

Decision-making

Irrespective of whether a student completes a Nuffield Research Placement, the most commonly used sources of help and advice with decision-making are parents (62%), university visits (60%), class teachers (56%) and university websites (53%). These sources are also perceived to be the most influential.

Comparing responses across the different waves of survey, we find that as applicants get closer to the key decision point in Year 13 (or equivalent), sources of information about HE such as university visits or Unistats become more influential. The influence of 'school/college careers advisers' appears to diminish between Years 12 and 13 (or equivalent), perhaps as a result of students becoming increasingly clear about their next steps.

Successful applicants perceive a notable change in their knowledge of what STEM researchers do on a day-to-day basis following their placement. Those who participated in the programme were, on average, more likely to agree that they knew what STEM researchers do on a day-to-day basis (mean = 5.7 on a 7-point scale where 1 is strongly disagree and 7 is strongly agree) than those who did not do a placement (mean = 4.7).

It is important to the majority of applicants to understand what STEM researchers do on a day-to-day basis (77% agreed with this statement, rating it 5 to 7 on a 7-point scale where 1 is strongly disagree and 7 is strongly agree). At this stage in the student lifecycle, however, they are more concerned with achieving their education ambitions (89% agreed with this statement) and understanding what is required to succeed in higher education (HE) (84% agreed with this statement).

Nuffield Research Placements and some other STEM-related extra-curricular activities are perceived to have an influence on students' knowledge and attitudes to STEM, because both provide an opportunity to witness what researchers do first hand, dispel myths about STEM careers and raise awareness of the range of careers available. Although for many this experience confirms that a research career is right for them, for others it demonstrates that their skills and interests lie elsewhere.

The majority of *successful applicants* to Nuffield Research Placements envisage that STEM will be important in their future careers (94% agreed with this statement after their placement rating it 5 to 7 on a 7-point scale where 1 is strongly disagree and 7 is strongly agree). Most applicants anticipate that they will be working or studying in STEM in five years' time (84% agreed with this statement) and that research will be an important part of their role (79% agreed with this statement).

Development of skills and attributes

Nuffield Research Placements specifically seek to develop students' confidence and their ability to work independently. Although improvement in both these skill areas is evident, *placement students* report most change in relation to confidence as they perceive that they were able to work well independently before the placement. Nuffield Research Placements also support the development of other skills, particularly report writing and time management.

On average, *unsuccessful applicants* report lower levels of agreement with the statements about their skills and abilities than successful applicants at the same time point. Those who took part in other STEM-related extra-curricular activities perceived that they had positively influenced their skills and attributes. Like those who completed a Nuffield Research Placement, some unsuccessful applicants perceived that they had benefited from the opportunity to apply their skills in a practical environment, develop in confidence and learn generic skills including report writing, presentation skills and teamwork skills, through other STEM-related extra-curricular activities.

A range of factors in addition to Nuffield Research Placements influence perceptions of skills and attributes. Typically male students, those from BAME groups, students from more advantaged backgrounds, those with higher levels of cultural capital and higher predicted grades are more likely to agree that they possess the stated skills.

Conclusions

Nuffield Research Placements have limited impact on students' aspirations and views about STEM but still have a positive influence on decision-making and future career plans. The opportunity to engage in a STEM research project, network with other researchers, develop skills and observe a range of roles first hand provides participants with important insights into what STEM researchers do on a day-to-day basis. Through their experience, students develop the confidence to reflect on their strengths and make informed decisions about which of the range of options available to them best fits their skills and interests.

Taking part in Nuffield Research Placements is also perceived to enhance the chances of students realising their ambitions. Although taking part in the programme does not encourage more students to apply to research-intensive institutions, and other programmes such as summer schools are perceived to provide deeper insights into HE, the placement is regarded as giving students an edge when competing for places on courses that are in high demand. Encouraging, a substantial majority of applicants see themselves working or studying in STEM in five years' time and most think it is likely that they will be involved in STEM research. This suggests that Nuffield Research Placements are helping to foster the next generation of scientific researchers and progressing towards wider goals of increasing capacity within STEM.

As to whether Nuffield Research Placements are contributing to the achievement of wider goals of widening participation and increasing diversity in STEM, the evidence is less clear. Analysis of administrative data demonstrates that students from disadvantaged background are more likely to apply and take part in the programme than those from advantaged backgrounds (see composition report by Frontier Economics). However, the qualitative evidence suggests that all participants, irrespective of their background, benefit from the experience and it is not possible to draw any firm conclusions as to whether Nuffield Research Placements offer any *additional* benefits to participants from disadvantaged backgrounds, including Nuffield Bursary recipients, in order to 'level the playing field' between advantaged and disadvantaged groups at this stage. It will be interesting to further explore the impact of the placement on disadvantaged students relative to advantaged students *and* other students from similar backgrounds who do not participate in the programme through the impact evaluation.

1. INTRODUCTION

This report has been produced by CFE Research for the Nuffield Foundation. It presents the findings from Waves 1 to 3 of the longitudinal survey of 2016 applicants to Nuffield Research Placements.

1.1   Nuffield Research Placements

Nuffield Research Placements are delivered across the UK, managed by Co-ordinators representing 13 English regions, Scotland, Wales and Northern Ireland. The programme has been operating for 20 years and it is estimated that 16,000 students have participated to date. The programme is open to students with five GCSEs (or equivalent) at grade B or above, including Maths, English and a science, who are currently studying at least one A-level (or equivalent) in a science, technology, engineering or maths (STEM) subject. Successful applicants undertake a 4 to 6 week STEM research placement between Years 12 and 13 (or equivalent). Placements are available in a range of STEM disciplines and are hosted by employers in the public and private sector. Placement students are required to submit a project report. They also have the opportunity to present their research findings at a celebration event attended by students, parents, placement supervisors, and school/college staff.

1.2   The evaluation

The Nuffield Foundation commissioned Frontier Economics and CFE Research to evaluate the impact of Nuffield Research Placements on the education and career outcomes of participants and to identify areas where the programme might be improved. The primary aim is to understand the impact on the propensity of students, particularly those from disadvantaged backgrounds, to undertake post-18 study in science, technology, engineering and mathematics (STEM) subjects and subsequent employment in STEM research careers. In addition, the research aims to explore how placements may encourage schools and colleges to engage with placement providers to develop opportunities for authentic STEM research placements. The evaluation is being undertaken over seven years until 2022.

The evaluation comprises two core strands. A quantitative element, being undertaken by Frontier Economics, is analysing linked administrative datasets to identify which types of students are likely to apply for Nuffield Research Placements and to assess the impacts that placements have on choices about post-school study and career paths in STEM. A qualitative element, being undertaken by CFE Research, is examining how well the scheme

works for placement providers, participating schools and colleges, and students in order to provide a deeper understanding of how the programme operates and the ways in which placements influence students' aspirations and education and career choices. The qualitative strand of the evaluation involves a longitudinal survey of the 2016 cohort of applicants over four waves and a series of semi-structured interviews and focus groups with applicants, teachers, placement providers, and Co-ordinators in 16 regions across the UK (reported separately). The longitudinal survey of the 2016 cohort of applicants to Nuffield Research Placements is seeking to address one of five key research questions:

How does participation in the placement influence student decision-making, aspirations and views about STEM subjects and career plans?

1.3   Report structure

This report is the third in a series of outputs produced by CFE Research for the Nuffield Foundation. The first (December 2016) provided initial topline analysis of Waves 1 and 2 of the longitudinal survey, assessed the existing data structure and provided recommendations on future data collection. The second (June 2017) presented the findings from large-scale qualitative research with Nuffield Regional Co-ordinators, teachers, placements supervisors and students which explored the effectiveness of the processes in place to support the delivery of Nuffield Research Placements and the perceived benefits of involvement in the programme. In this report we present the findings from Waves 1 to 3 of the longitudinal survey of 2016 applicants, conducted between July 2016 and March 2017.

Following this introduction, Chapter 2 describes the methodological approach and sample characteristics. Chapter 3 outlines applicants' initial plans and aspirations for after they finish their current qualification, how their plans have changed and the reasons for this change, and their aspirations in the longer-term. Chapter 4 examines how Nuffield Research Placements contribute to the development of participants' knowledge of and attitudes towards STEM subjects and careers and the perceived influence of the placement, along with wider sources of information, advice and guidance, on student decision-making. Chapter 5 explores student perceptions of the influence that Nuffield Research Placements and/or wider STEM-related extra-curricular activities had on their skills and attributes. The report concludes in Chapter 6 by drawing the key findings together identifying the issues that will be explored further in the final survey wave in spring 2018.

2. METHOD

This chapter outlines the methodological approach to the first three waves of the longitudinal survey of 2016 Nuffield Research Placement applicants, and characteristics of participants.

2.1   Introduction

This strand of the evaluation explores how students perceive they benefit from their involvement in Nuffield Research Placements and, in particular, how it is perceived to influence their aspirations, plans, decision-making, knowledge, skills and attributes. In order to begin to understand the impact of the programme on participants, the perceptions and experiences of those who took part in a placement are compared with those who unsuccessfully applied. The findings are designed to complement the analysis being undertaken by Frontier Economics which will establish the impact of the programme by analysing primary and administrative data on key outcomes for students who participated in Nuffield Research Placements (the treatment group) in the years 2014 to 2016 and two comparator groups: 'Applicants' - pupils who unsuccessfully applied to participate in Nuffield Research Placements) and 'Non-participants' - all pupils who did not participate in the programme but who would have been eligible to take part (the control groups). Frontier will undertake regression analysis which will control for differences between the treatment and control groups in order to establish the impact of Nuffield Research Placements on 'A Level' results as well as entry to Further (FE) and Higher Education (HE), STEM degree courses and research-intensive institutions.

2.2   Survey waves

Applicants to the 2016 programme are being surveyed longitudinally in order to understand their initial education and career aspirations, the factors that influence their decisions and any resulting changes in their plans, and their knowledge, skills and attributes. The survey is being conducted over four waves. Three waves have been conducted to date; Wave 4 will take place in spring 2018

Wave 1: July 2016

This wave comprised a pre-placement survey which was designed by the Nuffield Foundation and administered to successful applicants, prior to the start of their Nuffield Research Placement. Of the 1,182 successfully-placed students, 820 (69%) completed the pre-placement survey which explored:

— Applicant characteristics

— Perceptions of their knowledge of STEM, skills and attributes

— Current and future education and career plans

- Science capital, defined in terms of their level of interest and engagement in a variety of science-related activities
- Social capital, defined in terms of level of parental education and interest in STEM and access to networks of people working in STEM
- How they heard about placements, and why they applied

Wave 2: September to October 2016

Wave 2 comprised a *post-placement* survey of applicants who successfully completed a Nuffield Research Placement and a *post-summer* survey of students who unsuccessfully applied. Both surveys were developed and administered by CFE Research.

Post-placement survey of successful applicants

The *post-placement* survey was administered to successful applicants between 9th September 2016 and 7th October 2016. Of the 1,182 successfully-placed students 1,141 (97%) completed the survey. Nuffield Regional Co-ordinators helped to secure survey responses by chasing non-respondents on CFE's behalf. Receipt of outstanding payments and certificates were contingent on students completing and submitting their survey. The post-placement survey captured:

- Respondent characteristics
- Views on the placement experience
- Perceived changes in skills and attributes, knowledge of and attitudes towards STEM and the perceived influence of the placement on these changes
- Previous and current education and career plans and the range of influences on decision-making
- Experience of other recent STEM-related extra-curricular activities and how they compare to Nuffield Research Placements

Unsuccessful applicant post-summer survey

The *post-summer* survey was administered to unsuccessful applicants between 16th September 2016 and 14th October 2016. Of the 1,982 unsuccessful applicants 806 completed the post-summer survey (41%). Because no counterpart to the pre-placement survey was administered to unsuccessful applicants at Wave 1, comparable questions were included in the post-summer survey along with relevant questions from the post-placement survey. The post-placement survey captured:

- Respondent characteristics
- Current perceptions of their knowledge of STEM, skills and attributes
- Future education and career plans
- Science capital, defined in terms of their level of interest and engagement in a variety of science-related activities
- Social capital, defined in terms of level of parental education and interest in STEM and access to networks of people working in STEM

— Experience and perceived influence of STEM-related extra-curricular activities

Wave 3: February to March 2017

Wave 3 comprised a single survey that was designed and administered by CFE to all respondents to Wave 2. The survey was launched on 6th February 2017 and closed on 22nd March 2017. We gathered 1,346 responses, comprising 883 placement students and 463 non-placement students. This represents response rates of 77% and 57% respectively, calculated as a proportion of Wave 2 respondents, and 75% and 23% respectively, calculated as a proportion of the total populations. The survey captured:

— Respondent characteristics

— Changes in education and career plans, the reasons for the change and the range of influences on decision-making

— Applications to higher education, including institutional and subject choices

— Longer-term aspirations and the likelihood of undertaking STM research.

The surveys were administered online. A unique link was created for each individual and distributed via email. An individual's responses to each survey wave and their application data held by the Nuffield Foundation was linked using a unique reference number. In order to maximise the response rate, weekly email reminders were sent to non-respondents. In addition, two SMS reminders were sent in the final week of the fieldwork periods. A summary of the response rates at each wave is provided in Table 1.

Table 1: Response rate – Waves 1 to 3

	2016 applicants	Wave 1 (Successful applicants Base = 1182)		Wave 2 (All applicants Base = 3164)		Wave 3 (Wave 2 respondents Base = 1947)		Overall response rate
	N	*N*	*%*	*N*	*%*	*N*	*%*	
Successful	1182	820	69%	1141	97%	883	77%	75% of *all* successful applicants
Unsuccessful	1982	-	-	806	41%	463	57%	23% of *all* unsuccessful applicants
Total	3164	-	-	1947	62%	1346	69%	43% of *all* applicants

2.3   Sample characteristics

A detailed breakdown of the sample characteristics at each wave is provided in Appendix 2. As a result of the high response rate achieved at each wave, the sample remains consistent across the survey waves and is broadly reflective of the population as a whole. The sample at Wave 3 comprised 59% female students and 41% male students. Minority ethnic groups comprise 39% of the sample. Applicants from each of the geographical regions and

undertaking placements within each of the possible subject areas are represented in the results.

There is, however, a disparity between some of the sample characteristics when successful and unsuccessful applicants are compared, as a result of the policy to ensure that students from disadvantaged backgrounds benefit from the opportunity to take part in the programme. A higher proportion of successful applicants than unsuccessful applicants were eligible for free school meals (FSM), 16–19 Bursary and/or Educational Maintenance Allowance (EMA), were accepted for a Nuffield Bursary, and live in more deprived areas as defined by the Index of Multiple Deprivation (IMD). For this reason it is important that these characteristics are controlled for in the statistical analysis that looks for any effect of the placement on educational and career choices.

2.4   Data analysis

The aim of the analysis is to understand how Nuffield Research Placements benefit participants. In particular, in answering the research question '*How does participation in the placement influence student decision-making, aspirations and views about STEM subjects and career plans?',* the analysis examines the progress being made towards the achievement of key outcomes as set out in the Theory of Change developed by the Nuffield Foundation (see Appendix 1), in particular the extent to which Nuffield Research Placements are perceived to achieve the following for the young people who take part:

— improved confidence, independent working, science capital/networks and informed decision-making

— propensity to engage in other STEM-related extra-curricular activities such as Gold CREST Awards

— more successful UCAS applications

— increased likelihood of applying to and attending 'top' research intensive universities to study STEM subjects, and

— increased likelihood of pursuing further study and a career in STEM subjects.

Our analysis uses a combination of approaches to identifying the perceived impact of the programme: we look at perceived changes over time in the experiences, attitudes and skills of placement participants. In addition, we compare the outcomes of placement participants with non-placement students.

The data for each survey wave was exported into SPSS and STATA for analysis. Basic descriptive statistics in this report include frequency distributions, means (averages) and cross-tabulations. The results of the cross-tabulations have been tested for statistical significance. The type of test and the level of significance are footnoted in each case.

We also undertook regression to establish the factors that predict key outcomes. Logit regression was undertaken to understand the factors that predict the likelihood that a student will apply to a 'top' institution and select a 'top' institution as their first choice.

Logistic regression on dichotomised variables was undertaken to understand the factors that predict whether a student will agree with a series of statements about their self-reported knowledge, skills and abilities.[1] The full results of the regression are provided in Appendix 3: Regression analysis. Summary tables provided in the main body of the report to illustrate the key findings.

The regression analysis compares outcomes between placement and non-placement students. In each regression, the focus is on the impact of the placement dummy on the outcome of interest. Each model has been run with and without controls. Regressions *without* controls estimate the raw difference in the outcomes between the placement and non-placement students; regressions *with* controls identify the difference in the outcomes between the two groups after we account for other relevant covariates. In each case we are interested in the statistical significance/insignificance of the placement dummy, and the overall fit of the model. The statistical significance of the individual coefficients in the regression analysis is tested using the *t*-test; and the overall fit of the model for logit model is done using the Chi-square Likelihood Ratio test.

In addition to gender, ethnicity, acceptance for a Nuffield Bursary and index of multiple deprivation (IMD), a series of variables were created to account for level of deprivation, social and cultural capital and educational attainment. Given that the selection for Nuffield Research Placements was related to the socio-economic status of applicants, it is important to identify these factors so that they can be controlled for in the analysis. In addition to incorporating measures of economic capital (e.g. IMD, eligibility for free school meals (FSM), etc.), our analysis uses measures that represent social and cultural capital. This approach is grounded in Pierre Bourdieu's sociological theory,[2] and is supported by the previous use of such measures in research relating to science education.[3] In this formulation, 'science capital' is understood as a form of cultural capital. The variables created and used in the analysis are:

— '**depri**' is a measure based on the number of sources of financial support the respondent was eligible to receive: FSM, 16-19 Bursary and EMA. Integer interval scale, 0–3.
— '**social_capital**' is a measure based on whether the respondent has at least one parent with a higher education, whether the respondent knows someone working in a STEM occupation and whether the respondent has a least one parent with an interest in science. Integer interval scale, 0–3.

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[1] Students were asked a series of statement about their knowledge, skills and abilities on a 7-pont Likert scale. Their responses were recoded to create a binary variable: those that 'agreed' with the statement (a rating of 5 to 7 on the 7-point scale) and those that 'did not agreed' with the statement (a rating of 1 to 4 on the 7-point scale. It is this binary variable that was used in the regression analysis.

[2] Bourdieu, P. (1984). *Distinction: A Social Critique of the Judgement of Taste*. Translated by Richard Nice. Cambridge, Massachusetts: Harvard University Press.

[3] Archer, L. *et al.* (2015). "Science Capital": A Conceptual, Methodological, and Empirical Argument for Extending Bourdieusian Notions of Capital Beyond the Arts. *Journal of Research in Science Teaching*, 52(7): 922–948.

— '**ucas_total**' is a measure of educational attainment based on applicants self-reported estimated grades at Key Stage 5 (KS5) or equivalent and '**ucas_ thr**' identifies respondents with predicated grades of ABB and above.

— '**cultural_capital**' is a measure based on the total number of science/cultural activities the respondent has engaged in (science_activities_no) and the total number of days engaged in science and cultural activities (science_activities_days). Integer interval scale, 0–15. Through the use of this variable we are able to take account of both the *frequency* and *intensity* of engagement in other science and cultural activities which varies considerably across the sample.

A confounding factor in this analysis is engagement in other forms of extra-curricular STEM activity (besides the Nuffield Research Placement). For this reason, there are up to four groups of participants to consider:

1. Those who did Nuffield Research Placement only (NRP only)
2. Those who did a Nuffield Research Placement and at least one other extra-curricular STEM activity (NRP + STEM)
3. Those who did at least one other extra-curricular STEM activity only (STEM only)
4. Those that do not do a Nuffield Research Placement or another extra-curricular STEM activity (none).

Figure 1 demonstrates the proportion of both placement and non-placement respondents engaging in a range of STEM-related extra-curricular activities. The number of activities each individual engaged in, as well as the level of intensity (defined in number of days) of each activity varies considerably. Analysis by whether or not a respondent engaged in STEM-related extra-curricular activities could, therefore, be misleading as those who did one day of one activity would be included in the same group as those who did several activities over a period of months. For this reason, engagement in STEM-related extra-curricular activities is incorporated into the regression analysis using the 'cultural_capital' variable which is a more sophisticated, fine-grained measure that takes account of both the number and level intensity of activities.

Figure 1: STEM-related extra-curricular activities undertaken by placement and non-placement students (Wave 2, all respondents)

Legend:
- Placement (1141)
- Non-placement (806)

Activity	Placement	Non-placement
Headstart	4.6	9.2
CREST Bronze Award	1.6	0.6
CREST Silver Award	2.0	1.5
CREST Gold Award	15.4	5.2
Young Enterprise	3.3	4.0
Engineering Education Scheme	2.6	2.0
Arkwright Engineering Scholar	0.7	0.4
Teach First Futures	1.0	0.9
National Citizens Service	8.9	9.2
NHS Student Programme	2.3	3.5
Realising Opportunities	4.3	2.6
RISE Project	0.1	0.0
Industrial Cadets	1.0	1.7
Sutton Trust Summer School	6.7	8.2
Extended Project Qualification	10.6	11.4
The Big Bang Near Me	3.2	0.5
National Science and Engineering Competition	0.8	0.1
Young Engineers	0.3	0.6
Small Piece Trust	1.1	1.1
Social Mobility Foundation Aspiring Professional Programme	3.4	3.0
None of the above	53.4	59.1

3. STUDENT ASPIRATIONS AND PLANS

This chapter examines applicants' initial aspirations, their plans for after they finish their current qualifications, and the perceived influence of Nuffield Research Placements and other STEM-related extra-curricular activities.

3.1   Introduction

A key objective of Nuffield Research Placements is to support and encourage students, particularly those from disadvantaged groups, to aspire to study STEM in HE, successfully apply to top research intensive institutions, gain a HE qualification and, in the longer term, progress into employment in STEM research. The placement is designed to achieve these objectives in a number of ways, including by exposing students to an authentic STEM research environment, often within a research intensive HEI, and by delivering an experience which can be used by students to strengthen their UCAS application.

In order to understand the perceived role and influence of Nuffield Research Placements on students' aspirations and plans for after they have finished their current qualifications, the longitudinal survey of the 2016 cohort captured applicants' plans before the placement (Wave 1)[4] and is tracking any changes at three time points (Waves 2 to 4). The extent to which Nuffield Research Placements and/or STEM-related extra-curricular activities are perceived to influence students' plans is also explored through the surveys, including students' perceptions of whether and how their experiences led them to rethink their future education and career ambitions.

3.2   Initial plans (July 2016)

At Wave 1, before the placement, most successful applicants were planning to study for a degree in a STEM subject. Only 4% were undecided at this stage. After the placement, at Wave 2, we asked successful applicants to state retrospectively what their plans were prior to their placement (Figure 2). Again, 4% of successful applicants said they were undecided before the placement about what they wanted to do after they had finished their current qualifications. Of those who had decided, the majority (92%) said that they planned to progress into further study. Most (87%) successful applicants reported that, *before* their placement, they planned to progress into HE to study for a STEM degree. These results are perhaps not surprising, because in order to be eligible for Nuffield Research Placements, students must be studying at least one STEM subject at A Level (or equivalent) and have an interest in studying STEM at HE.

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[4] Unsuccessful applicants were not surveyed at Wave 1.

Category	Value
Study for a STEM degree	87.2
Study for a non-STEM degree	3.4
Study for a HE qualification in STEM	1.6
Study for a HE qualification in non-STEM subject	0.2
STEM-related vocational qualification or training programme	0.9
Non-STEM-related vocational qualification or training programme	0.4
Employment in a STEM-related job	0.4
Employment in a non-STEM-related job	0.2
Travel	0.6
Other	1.2
Undecided	3.9
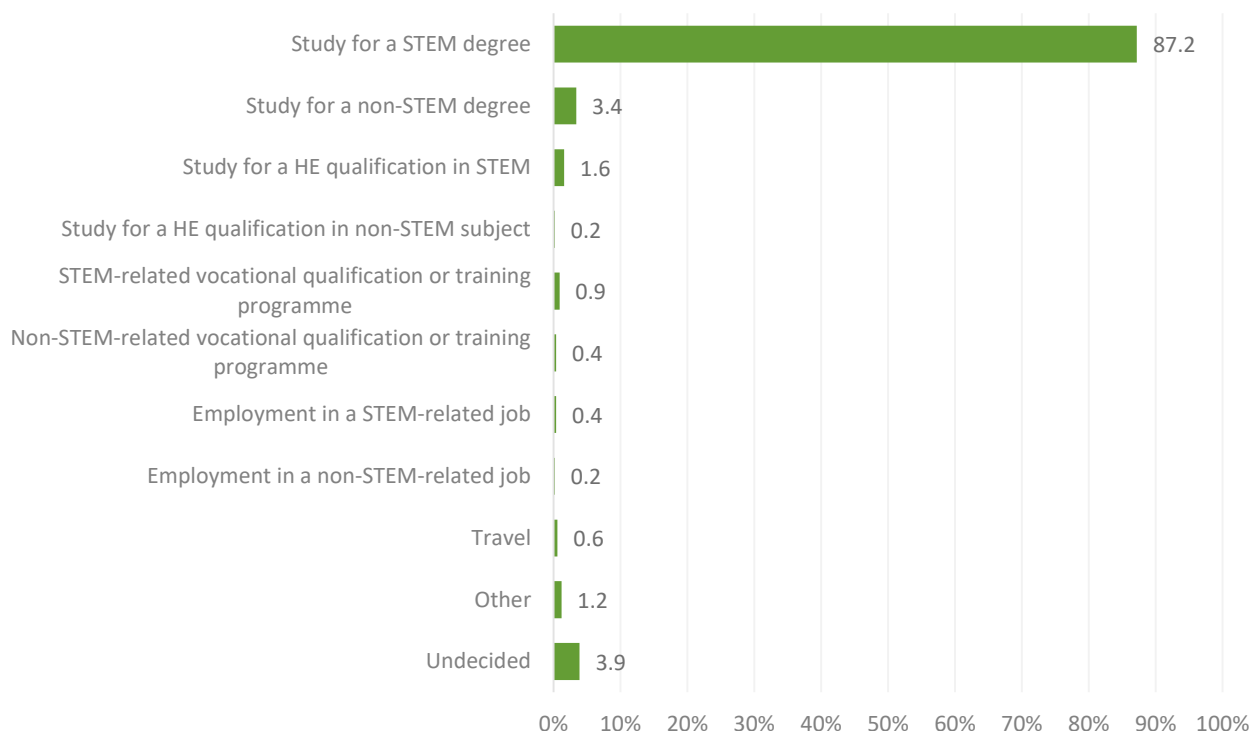
3.3   Post-summer plans (October 2016)

The majority of successful applicants who subsequently undertook a Nuffield Research Placement reported that their plans had not changed since they applied to the programme. Most students reported that their Nuffield Research Placement had confirmed that they had made the right choice (69%). A further 14% reported that the experience caused them to have second thoughts, but not enough to change their mind. For the remaining 17%, the placement made no difference to their thinking.

Just one in ten successful applicants who responded to the Wave 2 survey reported that they had changed their minds about what they wanted to do after their current qualifications since undertaking the placement. Of these, 29% were previously undecided about what they wanted to do. Following their placement, half of those who changed their plans decided to study for a degree in STEM, of the remainder around half plan to study a non-STEM degree. When successful applicants were asked whether their Nuffield Research Placement had influenced their change of plans, 26% reported that it had 'a great deal of influence', 55% 'some influence' and 19% 'no influence at all'.

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[5] As the response rate to Wave 2 is higher than Wave 1, these figures are based on students' plans before their placement reported at Wave 2 (post-placement survey).

Unsuccessful applicants' plans for after they have finished their current qualification were established at Wave 2. Figure 3 compares the plans of placement and non-placement students at this time point. The majority of both groups intend to study a degree in STEM, and although the proportion is slightly higher amongst placement students (86% compared with 83%) the difference is not statistically significant.[6] Non-placement students are more likely to be planning to study a degree in a non-STEM subject (8% compared with 5%).[7]

Figure 3: *Which of the following best describes what you are planning to do after you have finished your current qualifications? (Wave 2, per cent, bases listed. Asterisks denote statistical significance: ** p<0.05, *** p<0.01.)*
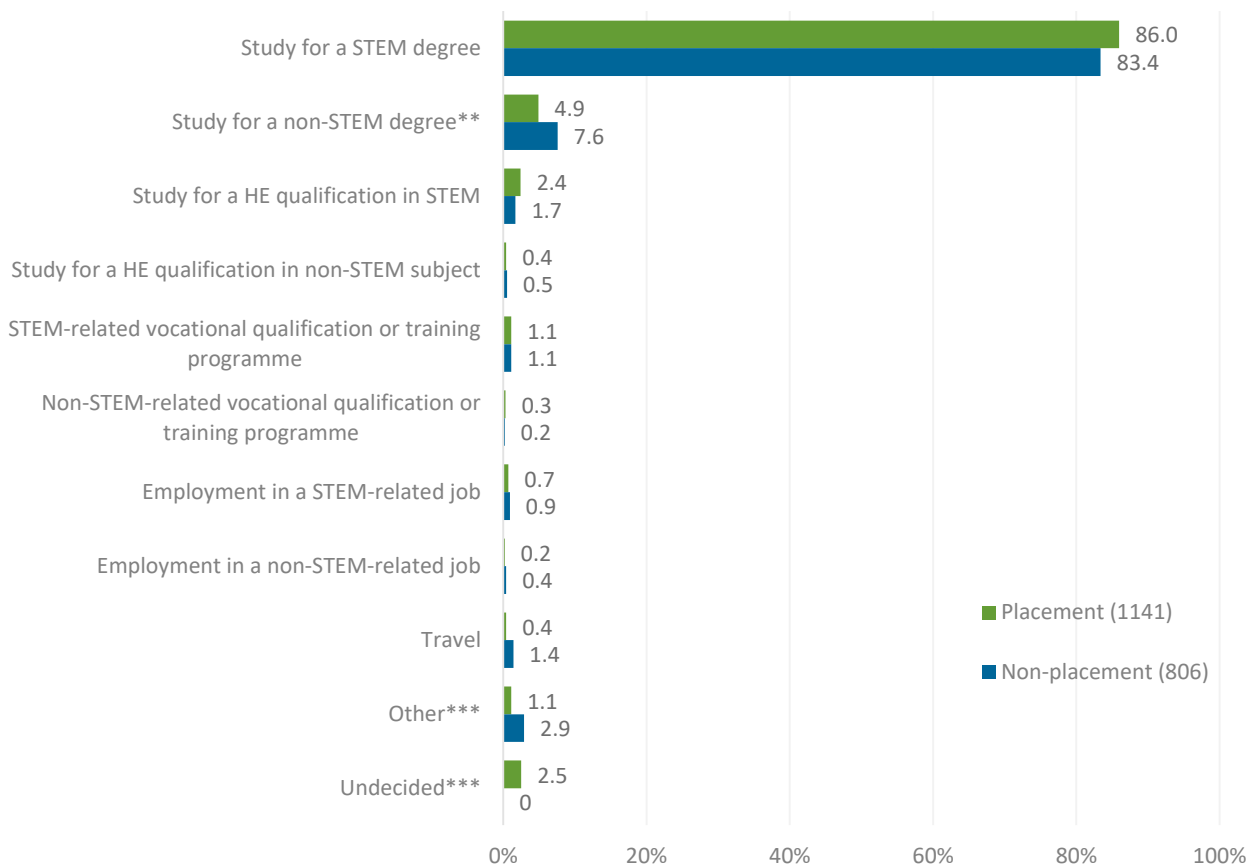
Unsuccessful applicants who had undertaken a STEM-related extra-curricular activity were asked whether the experience had impacted on their plans. For 56%, the experience had confirmed that they had made the right choice. Just 8% reported that the experience had encouraged them to change their plans.

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[6] z-test (two-tailed): z = 1.6, p = 0.8.

[7] z-test (two-tailed): z = 2.5, p = 0.01.

3.4   Current plans (March 2017)

Respondents to the Wave 2 surveys were surveyed again at Wave 3 to explore whether their plans for after their current qualifications had changed in the intervening period. The majority of both placement and non-placement students had not changed their plans, and most still planned to study a STEM degree (Figure 4). As with Wave 2, a slightly higher proportion of placement students are planning to do a STEM degree, but unlike the Wave 2 results, this difference is statistically significant.[8]

Figure 4: *Which of the following best describes what you are planning to do after you have finished your current qualifications? (Wave 3, per cent. Asterisks denote statistical significance: ** p<0.05, *** p<0.01.)*
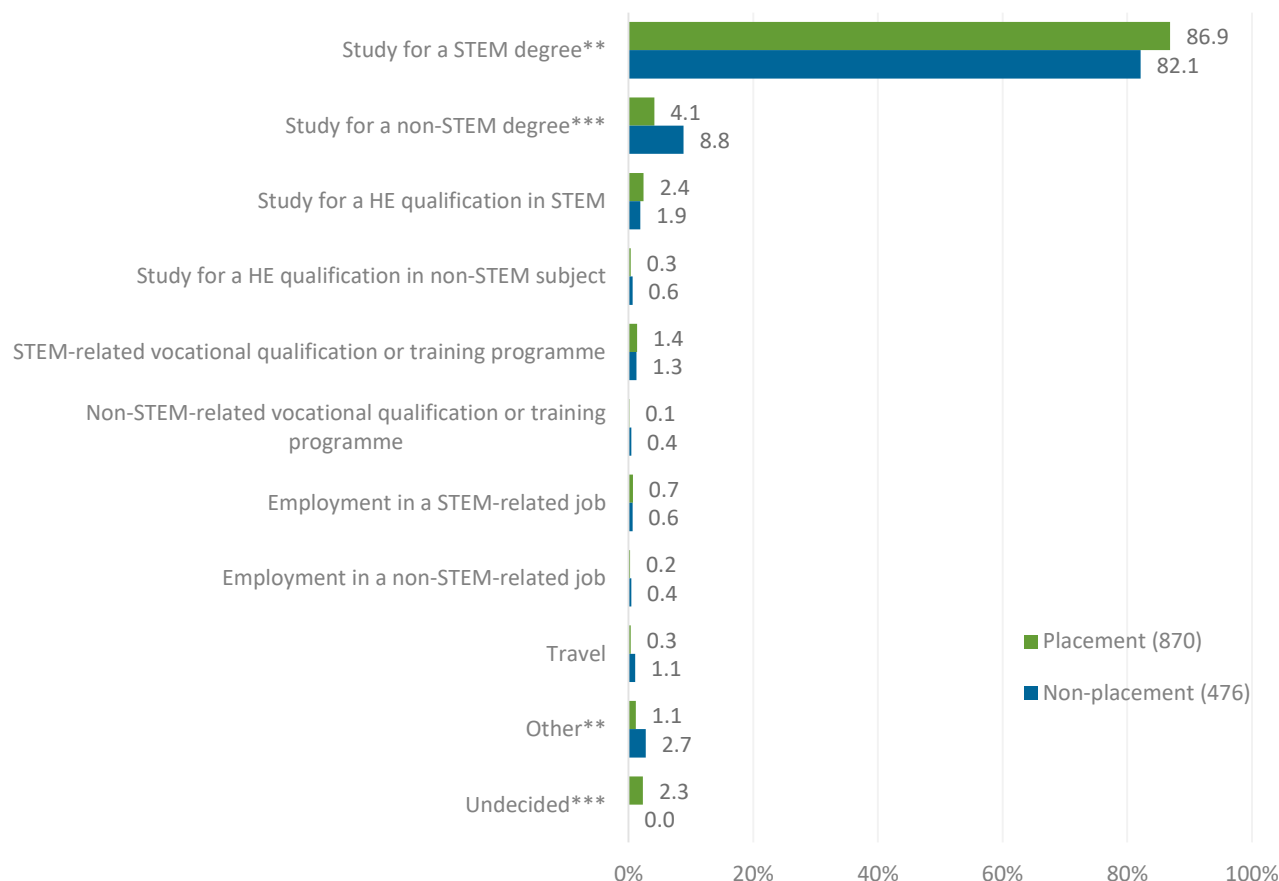
Just 7% of placement students and 5% of non-placement students reported that their plans had changed between Waves 2 and 3 of the evaluation. Of the 50 placement students who changed their mind, 28 switched their plans to study a non-STEM degree/HE qualification, 13 decided to study a STEM degree/HE qualification, and the remainder switched to a vocational training programme or employment. Of the 26 non-placement students who changed their plans, 10 report that they are now planning to study a STEM degree and 6 report that they are now planning to study for a non-STEM degree.

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[8] *z*-test (two-tailed), $z = 2.4$, $p = 0.02$.

The Wave 3 survey also gave respondents who changed their plans the opportunity to explain why in an open response question. Respondents gave a range of reasons for changing their plans, but most reflect the fact that respondents are now clearer about the options available to them, where their skills and interests lie and what they need to do to achieve their future career ambitions:

> *I changed my University course because I felt that I wanted more interaction with people rather than doing lab work. That's why I chose nursing instead of biomedical science.*
>
> — Unsuccessful applicant

> *I decided that Law was something that was of more interest and computers were more of a hobby.*
>
> — Computing placement student

> *I feel an apprenticeship suits me better than doing a degree at university*
>
> — Statistics and computer science placement student

> *I decided that the army was more suited to who I am and my aspirations in life*
>
> — Nuclear physics placement student

For some, the decision to change their plans had been forced upon them:

> *I got rejected from medical schools I wanted to go to so decided to reapply next year*
>
> — Biomedical sciences placement student

> *I got exam results and didn't have work experience to get into medicine*
>
> — Biology placement student

Others were explicit about the influence that their Nuffield Research Placement had on their plans:

> *Chose Medicine rather than Biomedical Sciences after my placement experience*
>
> — Biomedical sciences placement student

> *I love writing and drama and I didn't enjoy my placement or the subjects I was studying*
>
> — Engineering/manufacturing placement student

> *Because engineering is a lot of practical work and I am a visual and kinaesthetic learner, I decided to study towards an engineering degree through an apprenticeship.*

The placement through Nuffield helped me to confirm that an apprenticeship was the best route for me.

— Engineering placement student

3.5 Progression to HE

The Wave 3 survey was administered in February 2017, following the UCAS deadline for applications to the majority of undergraduate courses in the UK.[9] Most applicants to Nuffield Research Placements intend to progress to HE to study for a degree (85%) and almost all (99.5%) plan to study full-time. Of the respondents who plan to progress to degree level study, 90% had applied by the time they completed the Wave 3 survey. Of the remainder, half were intending to apply and half were still undecided.

Placement and non-placement students make around the same number of applications to HE. A slightly higher proportion of placement students (96%) had applied to study a STEM subject compared with non-placement students (95%) but this difference is not statistically significant.[10] Applicants to Nuffield Research Placements most commonly plan to study Engineering (14%), Medicine/Dentistry (13%), and Biology (12%).[11] Figure 5 illustrates that there are few statistically significant differences[12] between placement and non-placement students' choices of subject. Those who did a placement are more likely to have applied to study a computer science subject (6% compared with 1.5% of non-placement students), although the number of non-placement students who applied to study computer science is small (n = 6) and so this result should be treated with caution.

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[9] The UCAS application deadline for the majority of undergraduate courses was 15th January 2017. The deadline for applications for Oxford, Cambridge or most courses in medicine, dentistry and veterinary medicine/science was 15th October 2016

[10] Chi-square test.

[11] Biochemistry, Biomedical Sciences and Natural Sciences are subjects given by respondents in the 'Other' category. Due to their high frequency, these responses were 'back-coded' into categories for reporting.

[12] z-test, $p < 0.05$. Tests are adjusted for all pairwise comparisons using the Bonferroni correction.

Figure 5: *What is the main subject that you plan to study?* (Wave 3, respondents who had applied to HE, per cent). Statistically significant differences indicated with asterisks (= 0.05 level).**

Subject	Placement (787)	Non-placement (402)
Biochemistry	3.4	3.7
Biology	12.8	11.7
Biomedical science(s)	3.3	3.0
Chemistry	10.3	12.2
Computer Science/Computing**	6.0	1.5
Engineering	13.2	13.9
Environmental Science	1.4	0.7
Maths (including statistics)	7.2	6.5
Medicine/Dentistry	13.3	13.2
Natural sciences	1.8	1.2
Other health subjects**	3.2	6.0
Physics	11.1	10.7
Psychology	2.7	2.7
Veterinary Science	0.6	1.0
A different STEM subject	5.3	6.7
A non-STEM subject	4.3	5.2

Applications to 'top' institutions

As a key outcome of Nuffield Research Placements is to increase the proportion of participants applying to 'top' HEIs, the evaluation aims to understand *where* applicants to the programme apply to study HE in addition to *what* subject they intend to study. In this context, 'top' institutions are defined as those scoring an average of 3* and above in the 2014 Research Excellence Framework (REF) for Units of Assessment in Panels A and B (STEM subjects).[13] For the purposes of comparison, we also identified respondents who applied to Russell Group institutions, that is research-intensive and selective institutions which do not necessarily offer specialisms in STEM subjects[14] and the 'top' institutions for

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[13] Panels A and B correspond to STEM subjects. In order to identify the best institutions for STEM subjects we calculated the average scores for individual units of assessment (UoA) for all institutions providing submissions to Panels A and B in REF 2014. A grade point average (GPA) for each UoA in each institution was calculated using the formula: $(4\times \% \ 4^*) + (3\times \% \ 3^*) + (2\times \% \ 2^*) + (\% \ 1^*) / 100$. This gives a score of between 0 and 4 for each UoA. The average was then calculated to give an overall score for each institution. There are 42 institutions with a GPA of 3.0 or above. For the purposes of comparison the same methodology was used to identify the 'top' institutions for non-STEM subjects – this corresponds to subjects in Panels C and D. There are 28 institutions with a GPA of 3 or above for non-STEM subjects.

[14] The Russell Group is a self-selected group of 24 institutions, often used as a proxy for institutional excellence: http://russellgroup.ac.uk/about/our-universities/

non-STEM subjects defined using the same process based on REF scores for Units of Assessment in Panels C and D. This report refers to these groups as 'top STEM', 'Russell Group', and 'top non-STEM' institutions, respectively. However, it is important to note that there is a considerable amount of cross over between the three groups, with the majority of the Russell Group institutions also featuring in the 'top STEM' and 'top non-STEM' groups.

Wave 3 survey respondents were asked to state which institution(s) they had applied to or which they intended to apply to, in rank order from first choice (most preferred) to fifth choice (least preferred).[15] Based on our categorisation of 'top' universities, we were able to identify the proportion of survey respondents who had applied to one or more 'top' institution and the proportion who had selected a 'top' institution as their first choice. One quarter (26%) of all Wave 3 respondents applied to five 'top STEM' institutions. Conversely, 6% did not include any of these institutions in their applications.

Overall, there is an inverse relationship between the status of an institution applied to and the rank of that application amongst a student's choices (Figure 6). Applicants are more likely to select a 'top STEM' institution as their first choice than their fifth choice: 89% of first choices are 'top STEM' institutions, compared with 74% of fifth choices. This is perhaps unsurprising as low preference institutions are likely to be 'insurance choices' with slightly lower entry tariffs.

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[15] Respondents who had not yet applied to HE but reported that they intended to apply and that they knew which institution they intended to apply to were asked this question, along with those who reported that they had actually applied to HE for entry in 2017 or 2018.

Figure 6: *Which higher education institutions have you applied to / intend to apply to?* Institutions above/below 3* REF for panels A&B (STEM subjects), by rank order of choice (Wave 3, all respondents (placement and non-placement), per cent)
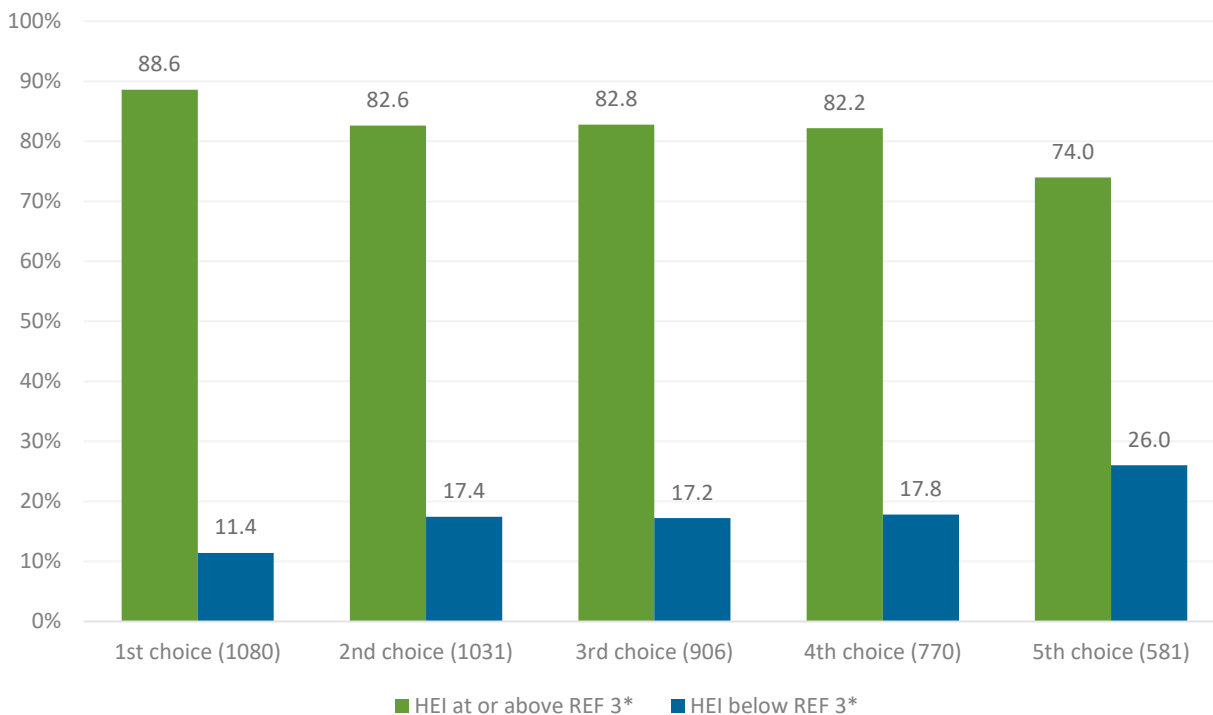
A similar proportion of proportion of placement and non-placement students apply to 'top STEM' institutions and the proportions selecting 'top STEM' institutions at each choice hardly varies (Figure 7).

Figure 7: Applications to REF 3* institutions for panels A&B (STEM subjects) by rank order of choice and by placement/non-placement (per cent within rank, bases in parentheses).
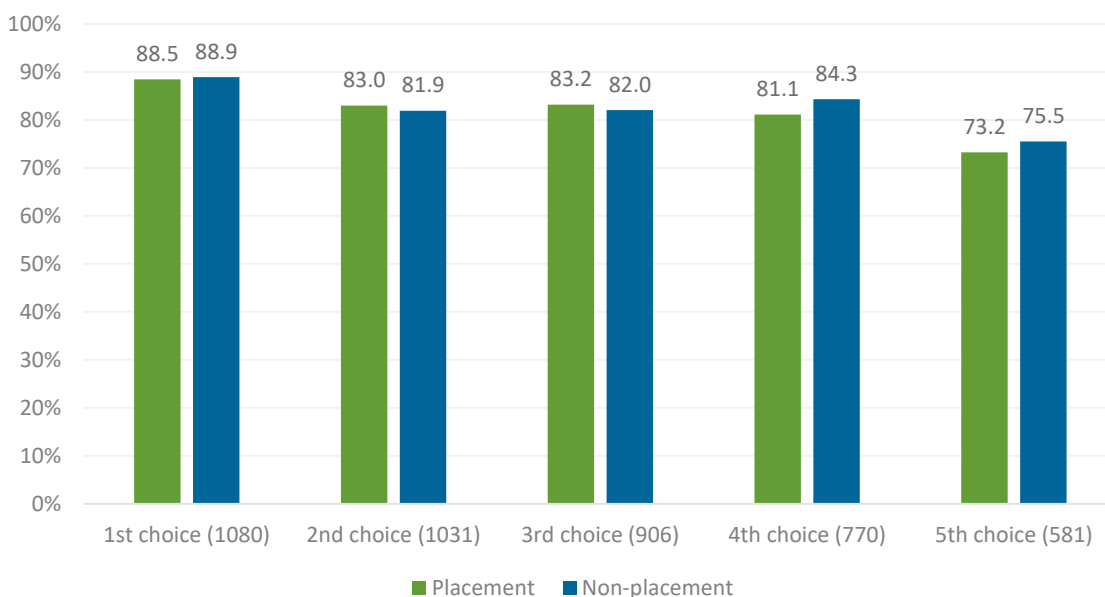
Factors influencing whether students apply to 'top' Institutions

There is an extensive literature exploring the factors that influence progression to HE. The evidence suggests that attainment at Key Stage 4 (or equivalent) is a key determinant of progression to HE.[16] However, this does not fully explain the participation gap because there remains a proportion of young people with the capability to progress to HE who do not. Individual characteristics as well as wider situational and environmental factors have been shown to intersect and influence whether an individual progresses to HE and to a 'top' institution.[17] For this reason we explored the factors, including participation in Nuffield Research Placements, which predict whether or not applicants to Nuffield Research Placements will apply to a 'top' institution or select a 'top' institution as their first choice through regression analysis (See Appendix 3: Regression analysis Tables 7 – 12).

The regression analysis reveals that participation in Nuffield Research Placements is not a statistically significant predictor of whether a student will apply to a 'top STEM', 'top non-STEM' or 'Russell Group' institution. It is interesting to note, that although not statistically significant, non-placement students are more likely to apply to a 'top STEM' institution than placement students. However, once controls for gender, ethnicity, level of deprivation, level of social and cultural capital, and predicted grades are applied, those who have done a placement are more likely to apply to a 'top STEM' institution than those who have not (Summary Table 2).

Summary Table 2: Applications to 'top' institutions (odds ratio from logit models)[18]

	STEM		Non-STEM		Russell Grp	
	(1)	(5)	(1)	(5)	(1)	(5)
nrp	0.96	1.17	1.17	1.28	1.03	1.12
	(0.25)	(0.50)	(0.22)	(0.37)	(0.23)	(0.38)
female		0.56		0.79		0.78
		(0.22)		(0.20)		(0.24)
imd		0.93		0.94		0.88**
		(0.07)		(0.05)		(0.05)
cultural_capital		1.16*		1.21***		1.09
		(0.10)		(0.08)		(0.08)
science_activities_no		1.74		1.51**		0.95
		(0.60)		(0.29)		(0.16)
ucas_thr		4.08***		3.57***		4.71***
		(1.48)		(0.94)		(1.42)
minority		2.14*		2.36***		2.19**
		(0.93)		(0.72)		(0.76)
N	1124	757	1125	759	1134	765
LRchi2	0.02	43.62	0.65	58.22	0.02	41.67
P-value	0.89	0.00	0.42	0.00	0.90	0.00

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[16] Crawford, C. and Greaves, E. (2015) *Socio-economic, ethnic and gender differences in HE participation*. BIS Research Paper No 186
[17] Gorard, S., Smith, E., May, H., Thomas, L., Adnett, N. and Slack, K. (2006) *Review of widening participation research: addressing the barriers to participation in higher education*. Bristol: HEFCE.
[18] Standard errors in parentheses; asterisks denote level of significance * p < 0.10; ** p < 0.05; *** p < 0.01;

Although the placement does not appear to a have significant influence on institutional choice, the regression analysis reveals that other factors do. Predicted grades are the strongest predictor or whether an applicant to Nuffield Research Placements will apply to a 'top' institution. Those with predicted grades of ABB and above (128 or more UCAS points or equivalent) are more likely to apply to a 'top' institution than those with lower predicted grades:

— Predicted grades are the only statistically significant predictor of whether a student will apply to a 'top STEM' institution.

— In addition to predicted grades, ethnicity and cultural capital are significant predictors of whether a student will apply to a 'top non-STEM' institution, with those with higher levels of cultural capital and BAME students more likely to apply than those with lower levels of social capital and White students

— In addition to predicted grades, IMD is a significant predictor of whether a student will apply to a 'Russell Group' institution, with those from less deprived neighbourhoods more likely to apply compared with those from more deprived neighbourhoods.

The analysis reveals that those who were not accepted for a bursary are more likely to apply to any type of 'top' institution compared with those who were accepted. However, these differences are not statistically significant.

Factors influencing whether students select a 'top' Institution as a first choice

The regression analysis reveals that participation in Nuffield Research Placements is not a statistically significant predictor of whether a student will select a 'top STEM', 'top non-STEM' or 'Russell Group' institution as their first choice. Placement students are more likely to select a 'top STEM' institution as their first choice but this trend is reversed once controls are applied and neither finding is statistically significant. The raw differences between placement and non-placement students demonstrate that placement students are more likely to apply to a 'top non-STEM' and 'Russell Group' institutions and although the difference is not statistically significant, it remains true even when the controls are applied

Predicted grades are the most significant predictor of whether an applicant to Nuffield Research Placements will select a 'top' institution as their first choice. Those with predicted grades of ABB and above (128 or more UCAS points or equivalent) are more likely to select a 'top' institution than those with lower predicted grades. In addition to predicted grades:

— gender, IMD and cultural capital are significant predictors of whether a student will select a 'top STEM' institution as their first choice;

— cultural capital and ethnicity are significant predictors of whether a student will apply to a 'top non-STEM' institution;

— level of deprivation along with cultural capital and ethnicity are significant predictors of whether a student will apply to a 'Russell Group institution.

In each case, male students, BAME students, those with higher levels of cultural capital, and/or those with lower levels of deprivation are more likely to select a 'top' institution as

their first choice than females, White students, those with lower levels of cultural capital and higher levels of deprivation.

Those who were *not accepted* for a bursary are more likely to select a 'top STEM' or a 'top non-STEM' institution as their first choice compared with those who *were accepted*. Conversely, those who *were accepted* for a bursary are more likely to select a 'Russell Group' institution as their first choice compared with those who were not. However, none of these differences are statistically significant (Summary Table 3).

Summary Table 3: First-choice applications (odds ratio from logit models)

	STEM		Non-STEM		Russell Grp	
	(1)	(5)	(1)	(5)	(1)	(5)
nrp	1.00	0.83	1.07	1.00	1.05	0.95
	(0.20)	(0.24)	(0.16)	(0.22)	(0.15)	(0.19)
female		0.56**		0.71*		0.73*
		(0.15)		(0.14)		(0.13)
depri		0.74		0.84		0.71**
		(0.14)		(0.13)		(0.10)
cultural_capital		1.20***		1.21***		1.15***
		(0.08)		(0.06)		(0.05)
social_capital		0.88		0.80**		0.89
		(0.12)		(0.08)		(0.09)
science_activities_no		1.52*		1.51***		1.12
		(0.33)		(0.20)		(0.12)
ucas_thr		2.75***		3.09***		2.02***
		(0.75)		(0.69)		(0.43)
Minority		1.90**		2.17***		1.81***
		(0.57)		(0.49)		(0.38)
N	1080	726	1086	732	1133	764
LRchi2	0.00	57.90	0.19	77.66	0.12	45.55
P-value	0.98	0.00	0.67	0.00	0.73	0.00

These findings are further reflected in the wider perceptions expressed by placement students in the survey which suggest that while most agree that the placement helps to strengthen applications to HE, it has limited influence on choice of subject and institution. Figure 8 demonstrates that over half of respondents *strongly agree* (56%) that the placement helped to strengthen their application to HE.

Figure 8: Extent to which respondents agree with a series of statements about the influence of their placement experience on their future study plans. (Wave 3, placement students who had applied/knew which institution they wanted to apply to, per cent, 7-point scale, base = 809)]

Statement	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
Influenced choice of degree subject	10.3	8.9	12.4	18.8	25.2	14.3	10.1
Applied/considering applying to study a degree subject not previously considered	36.3	21.8	13.3	12.6	5.7	4.6	5.7
Influenced choice of HEI	23.4	13	12.2	18.7	16.2	8.9	7.7
Applied/considering applying to study at an HEI not previously considered	37.9	18.5	12.2	11.9	7.9	5.8	5.7
Helped to strengthen application to HE		3.8	9.8		23.2		56.1

This was reflected in some placement students' responses when they were asked to compare Nuffield Research Placements with the other STEM-related extra-curricular activities they had undertaken. Although other programmes were recognised for offering insights to HE and practical assistance with the application, Nuffield Research Placements was recognised for providing students with tangible experience which they could refer to in the application:

> *Social Mobility's programme helped me more with university applications as I could attend workshops by university professors and lecturers whereas the Nuffield placement allowed me to conduct a project that I can write about in my university application*
>
> — Biology placement student

> *They each have their own benefits of course, but not one of them have been able to provide me with the experience that the Nuffield placement gave me. This experience will help with University applications immensely.*
>
> — Microscopy placement student

Furthermore, 70% of placement students reported that they intend to submit the project they completed as part of their Nuffield Research Placement for a CREST Award. The opportunity to reference a CREST Award as part of their application to HE is also perceived to help strengthen the application.

In contrast, over a third of respondents *strongly disagree* that the placement had encouraged them to apply or consider applying to study a degree subject (36%) and/or at

an HEI (38%) they had not previously considered. Respondents are more equivocal about the influence of the placement on their choice of degree subject and their choice of HEI; half tended to *agree* (rating of 5 to 7 on the 7-point scale) that the placement influenced their choice of subject (50%) compared with just under a third that tended to *disagree* (32%) (rating of 1 to 3 on the 7-point scale); conversely, just under half tended to *disagree* (49%) that the placement influenced their choice of HEI compared with a third who tended to *agree* (33%) (Figure 8).

3.6   Progression to non-HE routes

By Wave 3, just 13 respondents (8 placement and 5 non-placement; 1%) reported that they plan to go into permanent employment after they have finished their current qualifications. Of these, nine (6 placement and 3 non-placement) intend to go into a STEM-related job. The most common reason why respondents have decided to go into work is that they 'are keen to start earning a salary as soon as possible'.

A further seven respondents (5 placement and 2 non-placement) plan to take a gap year, most commonly to gain work experience and/or because they have not *fully* decided what they want to do as this survey respondent explains:

> *I do not think a STEM-based career will be suited to me and so I am undecided about what to after leaving college. So I will take a gap year to figure out what I want to do with my life.*
>
> — Non-placement student

However, four of the seven plan to subsequently progress to study for a degree, of whom, three intend to study a STEM subject.

3.7   Longer-term plans

At Wave 2, successful applicants were asked whether they agreed or disagreed with the statement 'I know that STEM will be important in my future career'. Before the placement, 88% of respondents agreed (rating of 5 to 7 on a 7-point scale) with this statement; after the placement the proportion increased to 94% (Figure 9).
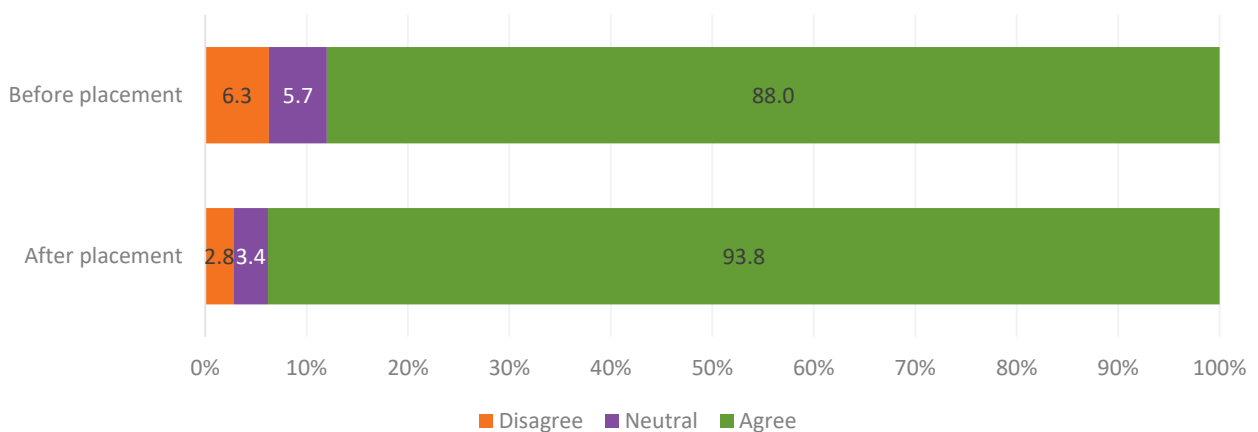
All respondents to the Wave 3 survey were asked to state which of a series of statements best described what they would be doing in five years' time (Figure 10). Overall, 84% of respondents expect to be doing something STEM-related. Almost half (47%) expect to be studying a postgraduate qualification in STEM, and 37% expect to be in STEM-related employment. These proportions are similar[19] irrespective of whether the respondents completed a Nuffield Research Placement.

Figure 10: *What do you see yourself doing in five years' time?* (Wave 3, per cent)

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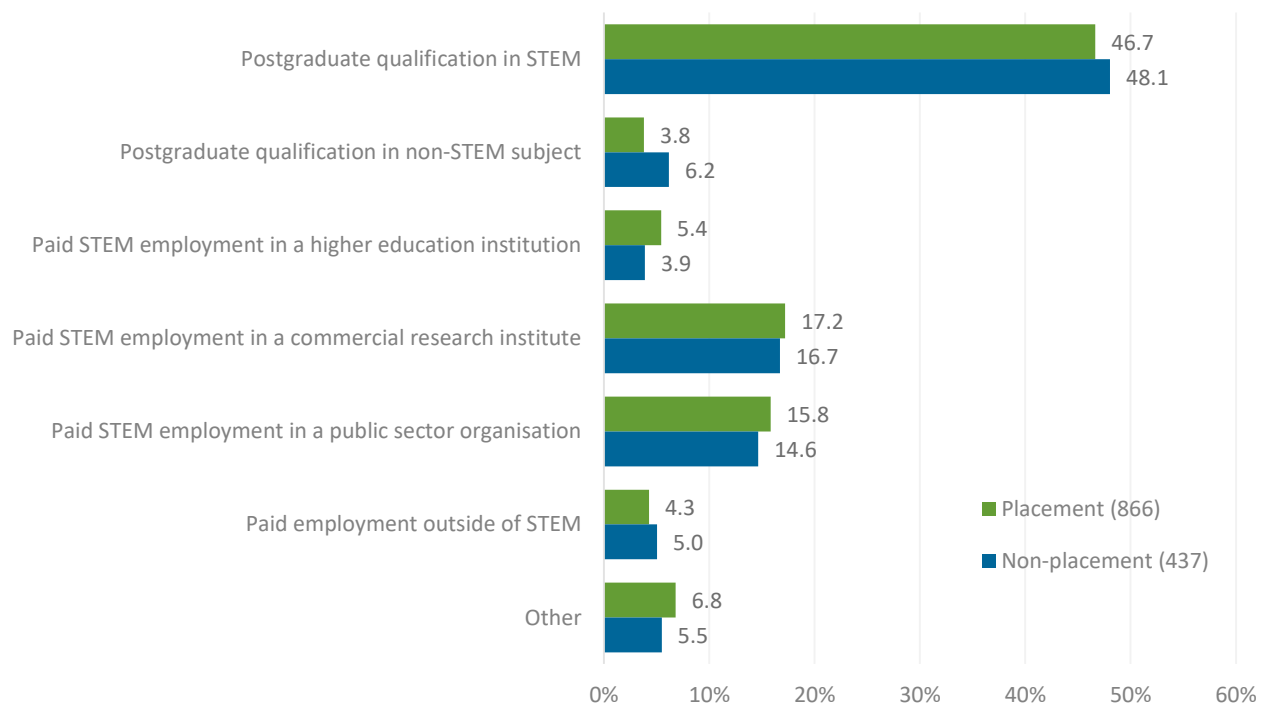
[19] No statistically significant differences between placement/non-placement. z-test, $p < 0.05$. Tests are adjusted for all pairwise comparisons using the Bonferroni correction.

Respondents were also asked how likely they would be to be undertaking research in STEM as part of a job role or further study in five years' time. Four-fifths (79%) reported that they are likely to be involved in STEM research (rating of 5–7 on a 7-point scale), compared with 13.1% who think it unlikely (rating of 1–3 on a 7-point scale). There is a small but statistically significant difference between placement and non-placement students: Placement students are slightly more likely to think they will be doing STEM research in future.[20] Compared with non-placement students, placement students are slightly less likely to report that they intend to progress to further study in STEM subjects, but are slightly more likely to be planning to work in STEM research. There are no statistically significant differences between ethnic groups or levels of deprivation.

3.8   Summary

- The majority of *all applicants* to Nuffield Research Placements were confident they knew what they wanted to do after their current qualifications before they applied to the programme. Most aspired to progress into HE and study for a STEM degree.

- The majority of *successful applicants* did not change their plans as a result of their placement experience. However, the placement is perceived to have helped confirm that they had made the right decision. Half of those who changed their plans following their placement subsequently planned to study for a STEM degree.

- A small minority of *successful applicants* changed their plans at Wave 3. For some, the main reasons for the change was that they were clearer about the options available to them, where their skills and interests lay and/or what they needed to do to achieve their future career ambitions; for others the change was forced upon them because of poorer than expected examination results and/or failure to secure a place at their preferred HE institution.

- A similar pattern emerged for *unsuccessful applicants*. Most reported that they intended to study for a STEM degree at Wave 2 and the majority did not change their mind at Wave 3.

- The majority of *all applicants* to Nuffield Research Placements apply to at least one 'top' institution. Participation in Nuffield Research Placements and acceptance for a Nuffield bursary do not significantly predict whether an applicant to the programme will apply to a 'top' institution or select a 'top' institution as their first choice.

- Predicted grades are the most significant predictor of whether an applicant will apply to a 'top' institution and also whether they will select a 'top' institution as their first choice.

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[20] Placement mean = 5.78, non-placement = 5.48. Independent samples *t*-test, p = 0.025.

- Those with higher levels of cultural capital are significantly more likely to select a 'top' institution as their first choice. Male students and BAME students are more likely to select a top institution as their first choice compared with female and White students.

- The majority of *all applicants* to Nuffield Research Placements envisage that STEM will be important in their future careers. Most anticipate that they will be working or studying in STEM in five years' time and that research will be an important part of their role.

4. STUDENT DECISION-MAKING

This chapter considers how Nuffield Research Placements contribute to the development of participants' knowledge of and attitudes towards STEM subjects and careers, and the perceived influence of the placement and sources of information, advice and guidance on decision-making.

4.1   Introduction

A further objective of Nuffield Research Placements is to help students' make well-informed decisions about their future education and career options. The placement is designed to achieve this by supporting participants to develop their networks, their understanding of STEM subjects and their knowledge of what STEM researchers do on a day-to-day basis.

4.2   Knowledge of and attitudes towards STEM and HE

In order to understand the role and influence of Nuffield Research Placements on students' knowledge of and attitudes towards STEM, the Wave 2 longitudinal survey of the 2016 cohort captured placement students' perceived knowledge of and attitudes towards STEM before and after the placement. For the purposes of comparison, unsuccessful applicants' perceptions were also captured at Wave 2. Respondents rated their level of agreement with a series of statements about STEM study and work on a 7-point scale.

Figure 11 shows that, on average, successful and unsuccessful applicants to Nuffield Research Placements agree that 'STEM industries offer many interesting job opportunities' and that they 'enjoy STEM subjects'. There is a small increase in placement students' level of agreement with both these statements after the placement. In contrast, there is a large difference in levels of agreement with the statement 'I know what STEM researchers do on a day-to-day basis'. Average agreement with this statement is higher amongst placement students (5.7) compared with non-placement students (4.7) at the same time point.[21] Furthermore, the proportion of respondents agreeing that they know what STEM researchers do on a day-to-day basis increased from 32% of successful applicants before their placement to 88% afterwards. This is reflected in an increase in average agreement with this statement amongst placement students of 1.8 points.

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[21] Independent-samples *t*-test, *p*<0.01.

Figure 11: Extent to which respondents agree with statements about their knowledge of and attitude to STEM (Wave 2, mean scores on 7-point scale. Asterisks denote statistical significance: *** p<0.01).
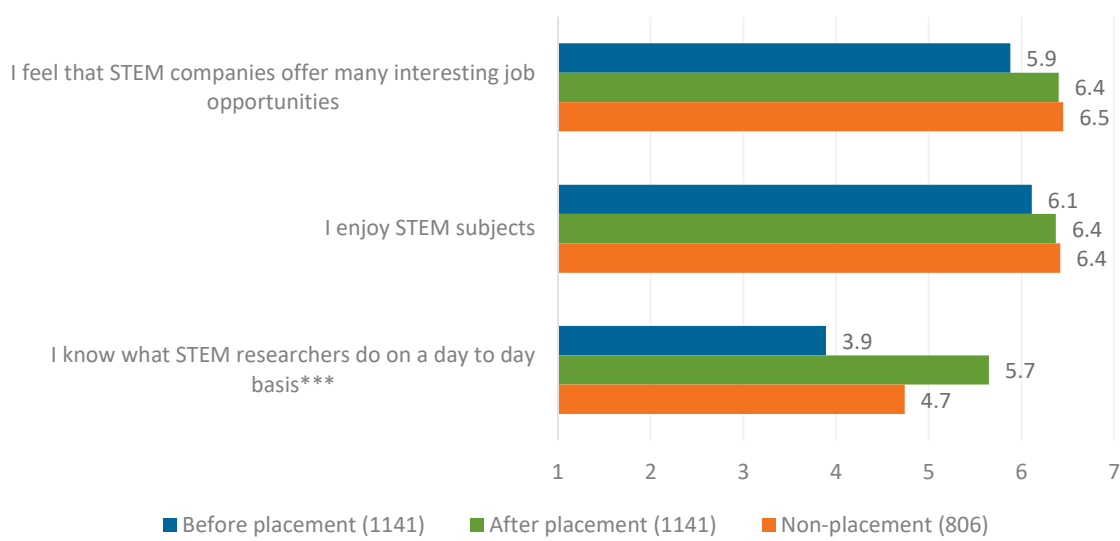
The substantial increase in level of agreement with the statement 'I know what STEM researchers do on a day-to-day basis' suggests that the placement experience has an impact on participants' knowledge and understanding. To explore this proposition further, survey respondents were asked to what extent they attributed any change in their perceptions to their experiences on the placement. Figure 12 demonstrates that almost all successful applicants attribute at least some of the change in their knowledge of 'what STEM researchers do on a day-to-day basis' to their placement experience (97%) with less than 3% of reporting that the placement had no effect at all. Those that did not undertake a placement but participated in other STEM-related extra-curricular activities were asked if the experience had influenced their knowledge and attitudes towards STEM. Almost a third of non-placement students (31%) reported that the extra-curricular activities they took part in had *no impact* on their knowledge of what STEM researchers do on a day-to-day basis. Although a number of factors could account for this difference, the survey findings suggests that Nuffield Research Placements could be more effective at developing participants' knowledge of what STEM researchers do on a day-to-day basis that other STEM-related extra-curricular activities.

Figure 12: Extent to which Nuffield Research Placement is perceived to have influenced changes in students' knowledge and attitudes towards STEM (top, blue); Extent to which other STEM-related extra-curricular activities are perceived to have impacted on non-placement students' knowledge and attitudes to STEM (bottom, orange) (per cent, bases in parentheses).

Statement	Not at all	Somewhat	A great deal	Don't know
I feel that STEM companies offered many interesting job opportunities (330)	27.6%	26.1%	41.5%	
I enjoy STEM subjects (330)	25.8%	24.8%	45.8%	
I know what STEM researchers do on a day-to-day basis (330)	30.6%	34.5%	27.3%	
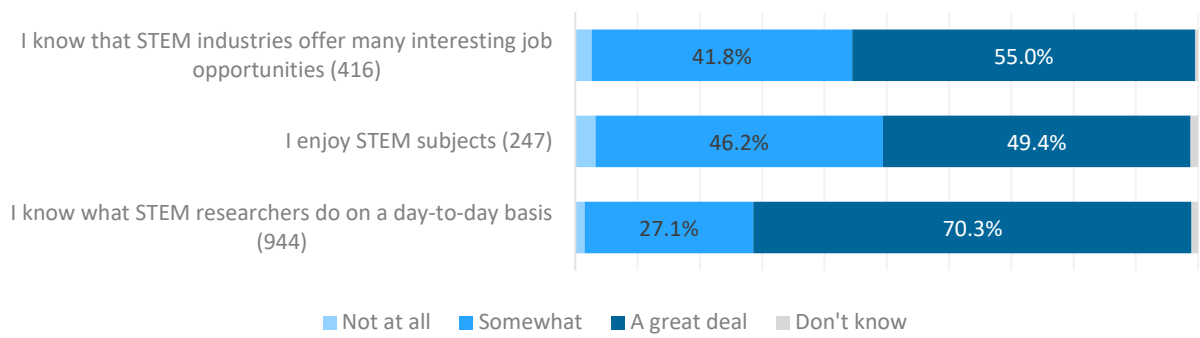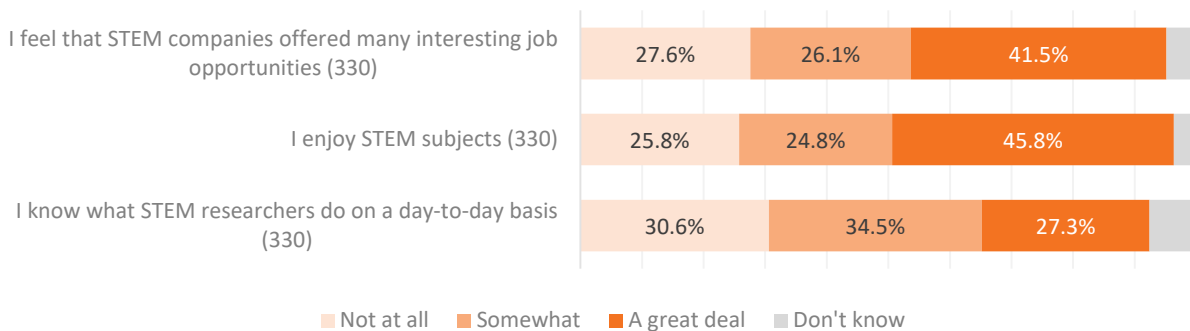
The survey asked placement participants to explain why their levels of agreement with statements about STEM had increased.[22] The open responses suggest that the Nuffield Research Placement enhances participants' knowledge of and attitudes towards STEM by providing an opportunity to witness STEM-related jobs first-hand and the kind of tasks that are involved in different job roles – some of which the students were unaware of previously. Often they found this insight encouraged them to pursue a career in the field.

Experiencing research first hand at the placement is what has improved my knowledge of what researchers actually do.

— Chemistry placement student

I have always found science and maths extremely interesting and my placement did not really influence this, however before I had very little idea of what being a researcher meant, but now after the placement I have a fairly good idea of what it means to be a researcher and find myself more enticed by that career path than ever.

— Biology placement student

Having never before seen what goes on in a research lab, this placement has allowed me to see for myself what it is that researchers do on a day-to-day basis. I'd often heard other people's experiences of research but nothing really compares when you get to find out first-hand about an area of science that you're interested in.

— Biomedical science subject placement student

When asked to explain how their experience of other STEM-related extra-curricular activities compared with their Nuffield Research Placement, placement students often remarked that it was the opportunity to gain exposure to the realities of the role of a STEM researcher which distinguished Nuffield Research Placements from other programmes and initiatives.

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[22] "Please tell us why you are more likely to agree with the statement(s) about your knowledge of and attitudes towards science, technology, engineering and maths and how the Nuffield Research Placement influenced this change."

They were both good experiences but the purpose behind them was different. The Nuffield placement was good in its own way as it was to gain an insight into medical research

— Physics placement student

The Sutton Trust Summer School convinced me that I would like to study physics at university and I learnt a lot about what university will be like. From my Nuffield placement on the other hand, I learnt a lot more about career opportunities and research which has influenced my decision to work towards a career in research.

— Engineering placement student

They [other activities] were interesting as they informed me of what university life was like with residentials and by giving support and information about higher education. NCS was fun and challenging and I took part in weird and wonderful activities. However, with my Nuffield Research Placement, I got to experience what life as a researcher was like and learnt about the science behind the project I undertook. I got to develop more as a person and further my knowledge compared to the other schemes I was a part of.

— Biology placement student

At Wave 3, respondents were asked to rate how important it was for them to understand 'what STEM researchers do on a day-to-day basis' when making decisions about what to do when they finish their current qualifications. Although 77% of respondents overall rated this as important (5 to 7 on a 7-point scale, where 1 was 'not important at all. and 7 was 'very important'), the findings suggest that at this stage in their educational and career journey, it is more important for students to have 'confidence in their ability to achieve their education' (89%) and 'career ambitions' (86%) and to understand 'what will be required of them to succeed in HE' (84%). This is perhaps not surprising as for most the transition to HE rather than employment is the next step in the student lifecycle. It will be interesting to monitor whether the career-related issues become more important to respondents as they progress through HE and move closer to the labour market.

Further analysis reveals small but statistically significant differences[23] between placement and non-placement students in the perceived importance of all the statements except for 'confidence in ability to achieve education ambitions' (Figure 13). In each case, placement students attach slightly more importance to the statements than non-placement students. It is particularly important for placement students to understand 'what STEM researchers do on a day-to-day basis', the skills that are needed to succeed in a STEM career' and 'the range of STEM career opportunities that are open to me'. As Nuffield Research Placements

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[23] Independent samples *t*-test, $p < 0.05$.

are recognised for providing participants with these insights, it is possible that this, at least in part, is what motivated these students to apply to the programme.

Figure 13: *When making your decisions about what to do when you finish your current qualifications, how important was it to understand...* (Wave 3; All respondents: total base = 1314, mean ratings. Asterisks denote statistical significance: 88 p<0.05, *** p<0.01)
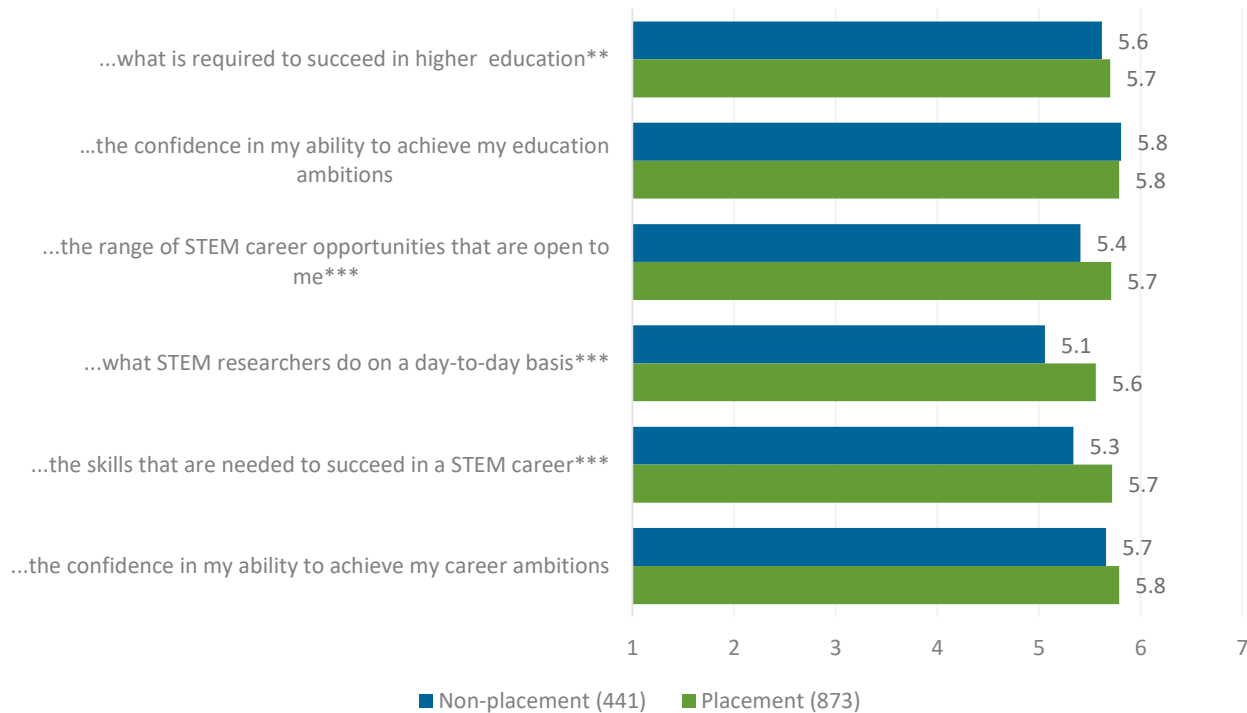
4.3   Sources of support with decision-making

Young people have access to range of sources of information, advice and guidance (IAG) to support them with their education and career decision-making. This includes 'formal' sources such as school/college careers advisers and careers fairs and 'informal' sources such as parents, peers and class teachers. Survey respondents were asked at Waves 2 and 3 which sources of IAG they had used to inform their decision-making and which had most influenced their thinking at that time. Included in the list of sources for placement students was the Nuffield Research Placement itself.

At Wave 2, respondents overall most commonly sought information from their parents (62%). Over half sought information during a visit to a university (60%), from their teachers at their school or college (56%) and/or from a university website (53%). These were also regarded as the most influential sources of IAG. This pattern was the same for successful and unsuccessful applicants to Nuffield Research Placements and accords with existing research findings, including previous work by CFE for the former Department for

Business, Innovation and Skills[24] and the UK HE Funding Bodies[25] and with forthcoming research by CFE for the Department for Education.[26]

The influence of Nuffield Research Placements and other STEM-related extra-curricular activities

At Wave 2, approximately one in eight successful applicants reported that the Nuffield Research Placement, as a source of IAG, had the greatest influence on their thinking about their future education and/or career (13%). Placement students were asked to explain how the Nuffield Research Placement had influenced their plans. In this section we present some representative excerpts from these open responses.

Successful applicants commonly reported that the placement experience gave them insight into the different jobs and career paths that are available within STEM. For some, this knowledge and insight encouraged them to aspire to a career in STEM research:

> *The Nuffield placement and celebration event increased my awareness of the range of scientific jobs available, as well as the wide range of scientific fields. It made me even more certain I want a job in a science-based subject and encouraged me to explore other areas of science.*
>
> — Biology placement student

> *As I spent 4 weeks at my placement I was able to observe all members of the lab and their day-to-day jobs. I had many conversations with the members who explained their journeys to their career and what I should expect out of a career in science.*
>
> — Biomedical sciences placement student

> *...My teams' Engineering Education Scheme project didn't have a practical element to it and mainly compromised of internet research - it didn't provide me with experience of the variety of different roles and careers there are in engineering. During my Nuffield research placement I had the opportunity to meet scientists from across departments which highlighted the variety of roles and careers available...*
>
> — Biology placement student

For others, it confirmed that a research career was not for them:

> *The work I experienced during my placement was not what I had imagined research scientists did on a daily basis. I found much of the work tedious and repetitive and I*

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[24] Bowes, L., Evans, J., Nathwani, T., Birkin, G., Boyd, A., Holmes, C., Thomas, L., and Jones, S. (2015) *Understanding progression to higher education for disadvantaged and under-represented groups.* BIS Research Report No 229.

[25] See the series of reports produced for the *Review of the Provision of Information about HE*: http://www.hefce.ac.uk/lt/roiconsult/ra/

[26] Lamb, H., Bowes, L. and Hughes, D.M. (forthcoming) *User insight research into post-16 choices.* A report for CFE Research for the Department for Education.

struggled with the idea of completing my placement at some points. I realised that my ideas about careers in science had perhaps been influenced by the media, and that careers in science were not as engaging as I had once expected.

— Biology placement student

Importantly, the experience challenged some misconceptions about STEM research careers held by students, ensuring successful applicants developed a more realistic and informed view:

During my placement, I talked to PhD students, researchers etc., they explained how it is not always possible to get the job you want due to funding and political decisions.

— Astronomy/astrophysics placement student

Before, I believed there was a very clear cut career path for someone in a STEM field to follow. After mixing with many others I now know that is not the case. Just because someone says they have a degree in chemistry does not mean they will be a chemist (or a teacher).

— Chemistry placement student

There is also anecdotal evidence from the survey to suggest that by providing the opportunity for other under-represented groups, not just those from lower socio-economic groups, to engage in the programme, wider objectives such as increasing diversity in science, could be addressed:

Conforming to the stereotype that girls can't do physics, I have many times been challenged about why I want to study physics at university. This placement helped me figure out what I am most interested in and introduced me to accomplished physicists, both male and female, who enjoy what they do, and this is the most important thing.

— Physics placement student

Also at Wave 2, just over one in ten (11%) unsuccessful applicants reported that their experience of other STEM-related extra-curricular activities, as a sources of IAG, had the greatest influence on their thinking about their future education and career plans. When asked to explain why, respondents commonly reported that these experiences had confirmed their plans by providing insights into career areas they were interested in:

The work experience with industrial cadets led to me understanding what is required in an aeronautical engineering field.

— Unsuccessful applicant

After doing work experience in a lab I got to see how different people in the STEM industry work.

— Unsuccessful applicant

Some suggested that they had engaged in STEM-related extra-curricular activities specifically to develop their knowledge and understanding of different careers in STEM in order to inform their decision-making:

> *I tried to choose contrasting experiences in differing STEM careers and attending these confirmed that I had made the right choice. I had hoped to develop my science research skills and knowledge to a higher level prior to deciding but not being selected for a research opportunity meant that my decision was made on the information I had available. So it determined the course of my future in many respects.*
>
> — Unsuccessful applicant

At Wave 3, survey respondents were asked which sources of IAG they had used since September 2016 to help them with their decision-making and which had most influenced their thinking about their future education and/or career. Students overall most commonly reported that they had accessed the same key sources of IAG they had accessed previously; however, at this stage in the student lifecycle when decisions about HE start coming into sharp focus for the majority planning to progress to higher level study, is it more common for students to access IAG from a visit to a university (79%) and a university website (72%) than parents (69%) and teachers at school or college (63%).

Figure 14 highlights that once again similar proportions of placement and non-placement students use each of the sources of IAG. A higher proportion of placement students used parents, friends, careers advisers and/or teachers at school/college; in contrast higher proportions of non-placement students accessed IAG from a visit to a university, university website, HE statistics, a STEM-related activity, someone working in STEM and/or a careers fair. However, with the exception of 'careers fair' none of these differences are statistically significant.[27]

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[27] *z*-test, $p < 0.05$. Tests are adjusted for all pairwise comparisons using the Bonferroni correction.

Figure 14: Sources of information used to aid decisions about future education and/or career (Wave 3, per cent, statistically significant differences (*t*-test, p < 0.05) marked with asterisks: ** p<0.05)
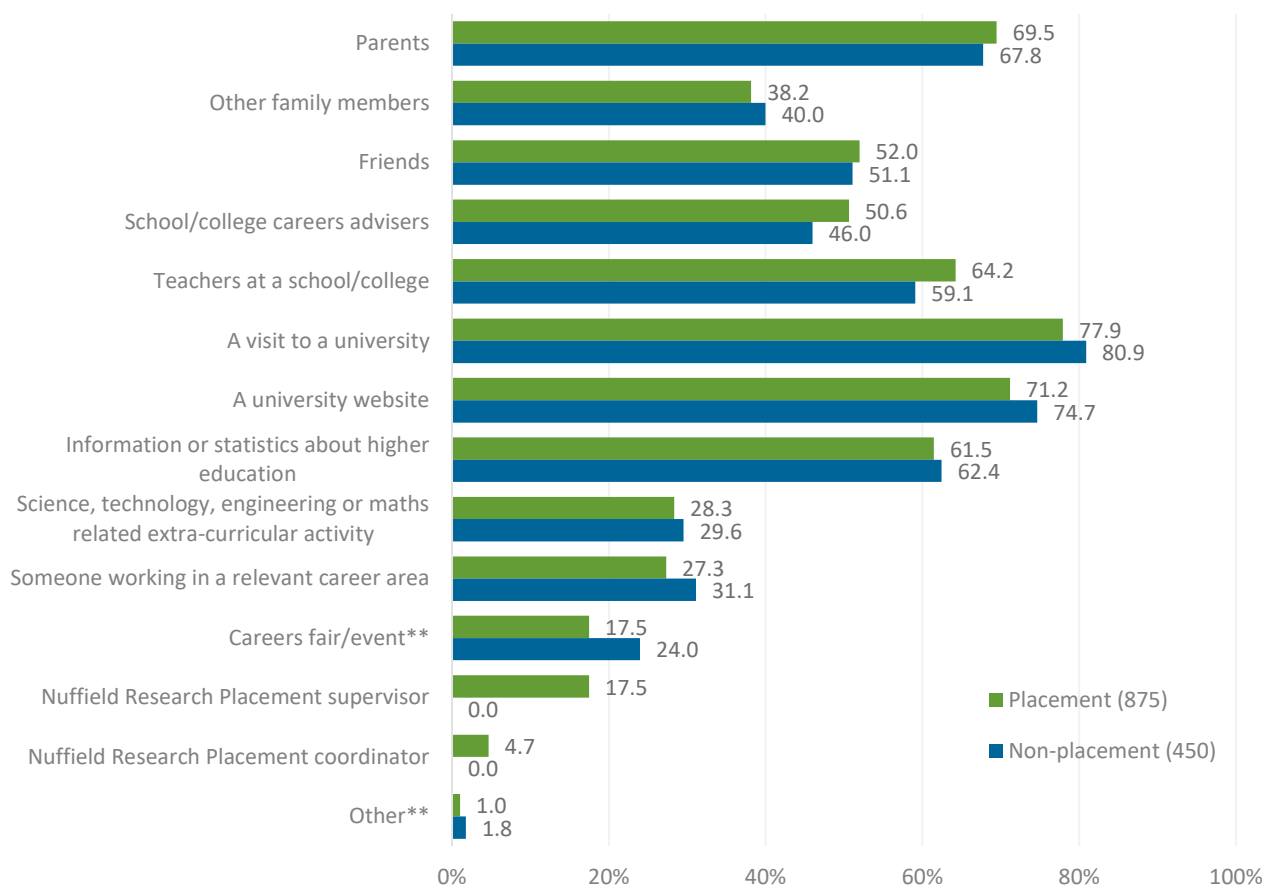
Influence of sources of IAG

Although parents are still perceived to be influential, by Wave 3 a visit to a university is by far the most influential of source of IAG for both placement and non-placement students. At this stage, information from sources such as UCAS and Unistats is perceived to influence students' thinking more than university websites (Figure 15). Interestingly, the influence of school/college careers advisers appears to diminish between Years 12 and 13 (or equivalent), perhaps as a result of students becoming increasingly clear about their next steps: 13% of respondents overall reported at that a school/college careers adviser had most influenced their decision-making at Wave 2 compared with just 4% overall at Wave 3.

Analysis by participation in Nuffield Research Placements reveals some statistically significant differences.[28] Non-placement students are more likely to report that the greatest influence on their thinking about their future education and/or career is 'friends' and 'someone working in a related area' (Figure 15).

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[28] *z*-test, *p* < 0.05. Tests are adjusted for all pairwise comparisons using the Bonferroni correction.

Source	Placement (838)	Non-placement (419)
Parents	12.3	12.2
Other family member(s)	2.0	2.4
Friends**	1.2	3.1
School/college careers advisers	4.8	3.6
Teachers at a school/college	8.7	7.2
A visit to a university	36.3	37.0
A university website	9.7	6.9
Information or statistics about HE	11.2	11.7
STEM-related extra-curricular activity	6.4	7.9
Someone working in a related area**	3.8	6.7
Careers fair/event	0.5	0.5
Nuffield Research Placement supervisor***	2.4	0.0
Other	0.7	1.0

4.4   Summary

- *Successful applicants* perceive a notable change in their knowledge of what STEM researchers do on a day-to-day basis following their placement.

- Those who had been on a Nuffield Research Placement were, on average, more likely to agree that they knew what STEM researchers do on a day-to-day basis than those who did not do a placement.

- Nuffield Research Placements and some STEM-related extra-curricular activities are perceived to have an influence on students' knowledge and attitudes to STEM as both provide an opportunity to witness what researchers do first hand, dispel myths about STEM careers and raise awareness of the range of careers available. Although for many this experience confirms that a research career is right for them, for others, it demonstrates that their skills and interest lay elsewhere.

- Although it is important to the majority of *all applicants* to understand what STEM researchers do on a day-to-day basis, at this stage in the student lifecycle, they are more concerned to develop confidence in their ability to achieve their education and career ambitions and to understand what will be required of them to succeed in HE

- Key sources of help and advice with decision-making, irrespective of whether a student completes a Nuffield Research Placement are parents, university visits, class teachers and university websites; these sources are also perceived to be the most influential.

- The closer applicants get to the key decision point in Year 13 (or equivalent) the more influential sources such as university visits and information or statistics about HE such as Unistats become. The influence of 'school / college careers advisers' appears to diminish between Years 12 and 13 (or equivalent), perhaps as a result of students becoming increasingly clear about their next steps for *all applicants*.

5. DEVELOPMENT OF SKILLS AND ATTRIBUTES

This chapter considers how Nuffield Research Placements are perceived to contribute to the development of participants' skills and attributes.

5.1 Introduction

A final objective of Nuffield Research Placements is to support students to develop their skills and attributes, in particular their confidence and ability to work independently. The placement is designed to achieve these objectives by providing participants with an opportunity to engage in a 'live' research project in an authentic STEM environment, and with the support of a placement supervisor and early career researchers, develop a range of research and generic work skills.

5.2 Skills and attributes

In order to understand the role and influence of Nuffield Research Placements on students' skills and attributes, the longitudinal survey of the 2016 cohort explored placement students' perceived skills and attributes before and after the placement at Wave 2 and the extent to which any change is attributed to the placement experience and/or other STEM-related extra-curricular activities. Unsuccessful applicants' perceived skills and attributes were also captured at Wave 2 for comparative purposes.

As noted above, Nuffield Research Placements specifically seek to influence students' confidence and their ability to work independently. Figure 16 shows average ratings of skills and attributes before and after placement. On average, successful applicants perceived that their each of the skills and attributes improved in the period between Waves 1 and 2 of the longitudinal survey. Although improvements in both independent working skills and confidence are evident, respondents, on average, report greater change in relation to confidence. This is in part explained by the relatively high ratings of independence before the placement (mean = 5.6). However, there is also evidence that applicants to Nuffield Research Placements who also undertook other STEM-related extra-curricular activities perceive that some of these other activities provide better opportunities to develop their independent working skills. When asked how their experience on the Nuffield Research Placement compared with other STEM-related extra-curricular activities, a number of respondents who had undertaken the Extended Project Qualification (EPQ) commented that this programme provided more opportunities to work independently than the Nuffield Research Placement:

> *They both involve a lot of writing and researching but the EPQ is more independent.*
> — Data science placement student

Completely different - EPQ is much more independent work at home whereas Nuffield is more about team work

— Biochemistry placement student

The EPQ is more independent as you think of the question yourself. The project manager picked out the placement for me.

— Biology placement student

Successful applicants' average level of agreement with the statement 'I am confident in my own abilities' increased from 4.6 before the placement to 5.6 after the placement. Although average agreement with the statement 'I am a confident presenter' is the lowest of all the skills areas, even after the placement (mean = 4.8), the level of change (+0.8) is the second highest and there is a substantial shift in the proportion of respondents agreeing with the statement: before the placement, 41% disagreed that they were a confident presenter; after the placement just 19% disagreed and 62% agreed.

Figure 16: Extent to which respondents agree with statements about their skills and attributes (Wave 2; Successful applicants: base 1,141, mean scores on 7-point scale with differences shown)
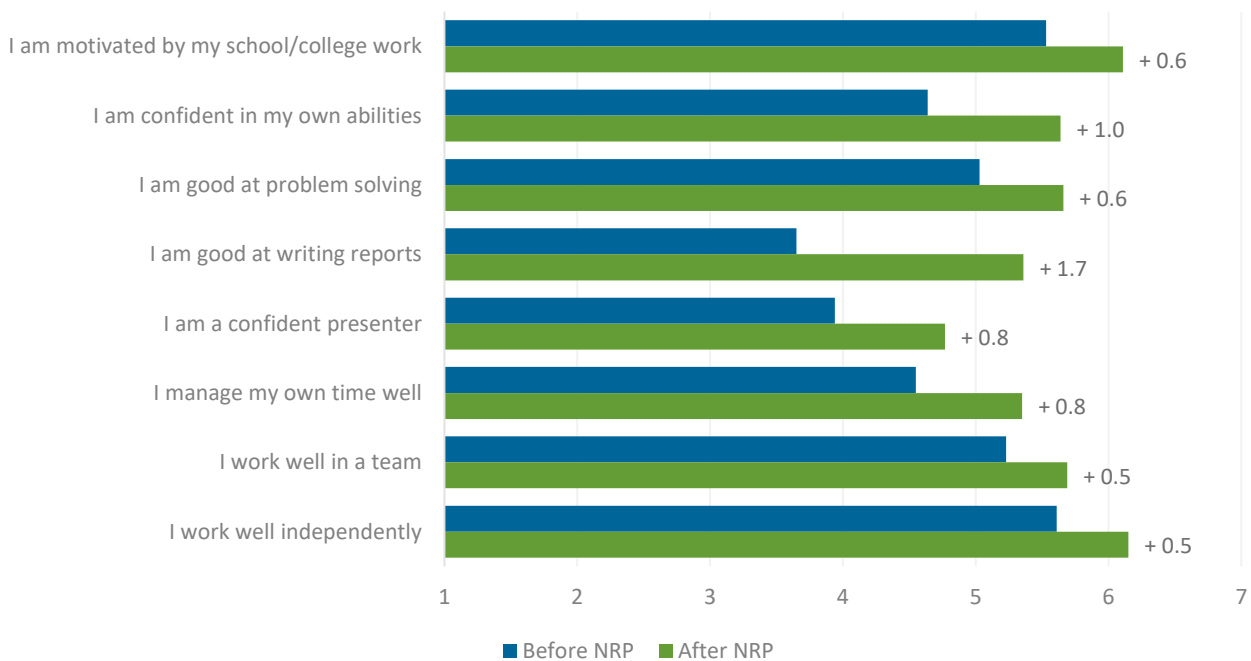
Although the objective of Nuffield Research Placements is to influence confidence and independent working skills in particular, the survey findings suggest that the programme potentially has more impact on other skill areas. On average, successful applicants report an increase in their level of time-management skills (+0.8) but the greatest change after placement is in perceived report writing skills, which increased from an average of 3.7 to 5.4 (+1.7).

Further analysis was undertaken to explore whether the Nuffield Research Placement has a differential impact on those from disadvantaged groups, defined in terms of whether they

were eligible for financial support including FSM, 16-19 Bursary and/or the EMA. The analysis demonstrates that placement students from more advantaged backgrounds express higher levels of agreement with the statements about their skills and attributes than those from disadvantaged backgrounds before and after the placement. Although average ratings for both groups increase, they increase by the same proportion which indicates that the placement is benefitting all participants equally.

In the Wave 2 survey of placement students, any respondent who reported a change in perceived skills and attitudes (whether negative or positive) was then asked the extent to which they attributed that change to their experience of the placement on a three point scale where 1 was not at all, 2 was somewhat and 3 was a great deal. Figure 17 demonstrates that the majority of successful applicants perceive that their placement experience had at least some influence on the changes in their skill levels. Over half of respondents reported that the placement had 'a great deal of impact' on their confidence in their own abilities (52%) and almost three-quarters indicated that it had a great deal of impact on their report writing skills (71%). Even though the change in respondents' level of agreement with the statement 'I work well independently' was relatively small, almost three-fifths of successful applicants (57%) reported that their placement had a great deal of impact on their skills in this area.

Figure 17: Attribution of development of skills to Nuffield Research Placements (Placement students who increased agreement; variable bases = 387 to 955)
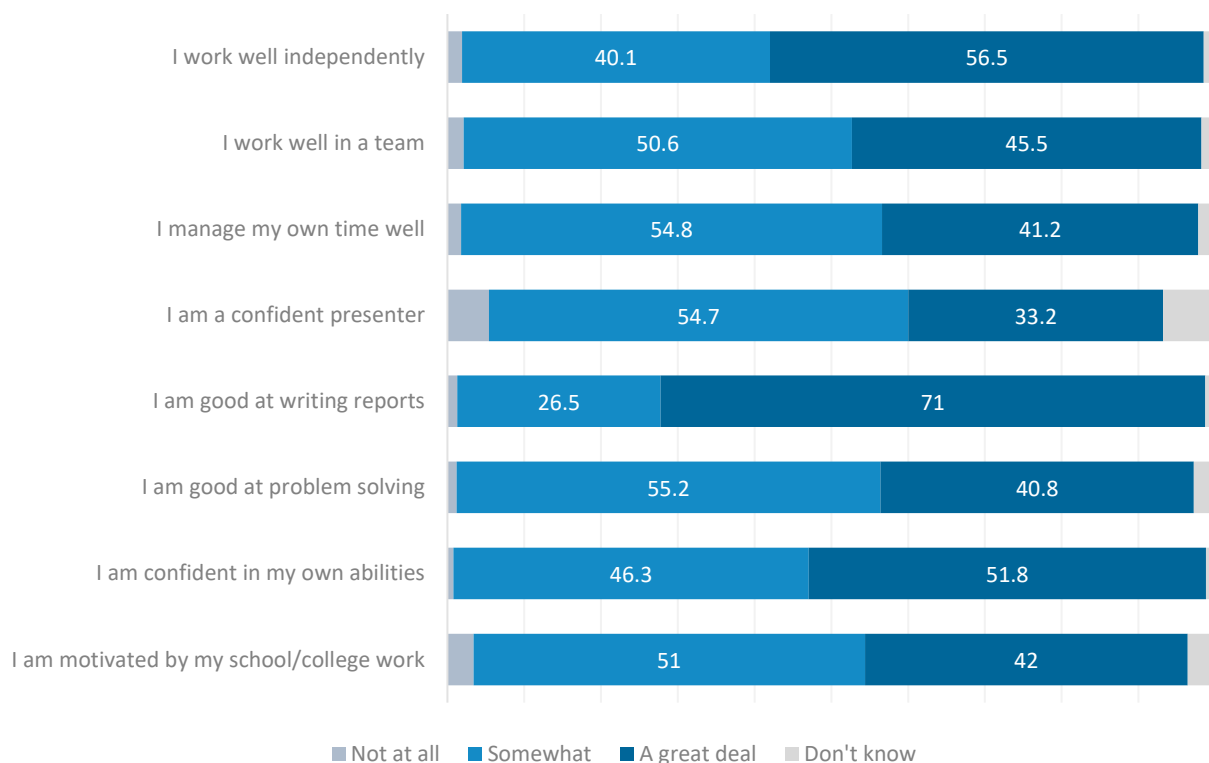
The ways in which the placement influenced participants' skills and attributes was further explored through the qualitative interviews with students (reported separately) and in responses to an open question in the survey. Of the 1030 successful applicants who responded to the open response question in the survey, many reported that the placement had increased their confidence in general and increased their ability to use particular science-related skills. It was common for successful applicants to report that the placement was an opportunity for them to use the skills and techniques they had learned in the classroom in a more practical, applied context.

> *I was given an opportunity to stretch my knowledge beyond the A level syllabus and by doing so I'm more confident in my ability to understand more difficult concepts and apply them to practical situations.*
>
> — Chemistry placement student

The majority of successful applicants also reported that through the placement they had developed a range of generic, work-related skills including time management, team-working, independent working, presentation and communication skills, and in particular, report-writing skills which around half of all respondents cited as a key area of improvement.

> *By completing this placement, I had to work with another Nuffield student which improved my teamwork skills. Before this placement I had never had the need to write a professional scientific report and this placement has given me the opportunity to do this. My time management has improved due the fact the placement meant I had strict time frames in which to complete certain tasks. I believe I have become a more efficient individual as a result of this placement.*
>
> — Biomedical sciences placement student

However, when asked to compare their experience on the Nuffield Research Placement with the other STEM-related extra-curricular activities they had undertaken, a number of placement students perceived that other activities, particularly the National Citizenship Service (NCS) provided better opportunities to develop skills such as teamwork:

> *A lot more team work and team based, really enjoyed NCS.*
>
> — Biology placement student

> *NCS was more active, it really helped my Social Skills, presentation skills, and lifted me out of a dark area in my life. The Nuffield Research Placement was very anti-social compared to the NCS scheme, we mostly worked in silence. Although the placement was indeed brilliant, and provided much experience, not much could best the times I had in the NCS scheme.*
>
> — Astrophysics placement student

> *The report writing in both activities is similar, however the Nuffield research placement was individual rather than a team project...The Nuffield research*

placement was 4 weeks while the Engineering Education Scheme was for a period of 6 months.

— Computing placement student

A small minority of successful applicants did not perceive that the placement had supported their skills development. For some, this was not a fundamental issue with the placement, but rather a reflection of their perceived skill levels before the placement. These respondents reported that they were confident and well-organised before the placement and so the experience had little impact. Although the placement was not perceived to improve their skills, others reported that it helped them to understand their strengths as well as the skills areas they needed to improve in order to succeed at work:

I think while doing this placement I have learned just how much my skills need to be improved with social events and keeping on top of what needs to be done.

— Computing placement student

I could not write my report as well as I wanted as the deadline came a lot quicker than I had noticed...I did not manage my time well after the placement, but I think I did during the placement. This has made me realise what change is needed for the future for my time management.

— Computing placement student

For a small minority of successful applicants, however, the lack of opportunity to develop their skills was attributed to specific issues with the placement experience.

I felt my Nuffield placement was awfully organised and rather than give me confidence stressed me out more than anything.

— Chemistry placement student

When in the placement, I did not get the opportunity to present or work in a team, thus my ability of working in a team and presenting not changing after the placement.

— Biochemistry placement student

Impact of other STEM-related extra-curricular activities

Unsuccessful applicants were asked to rate their level of agreement with the same set of statements about their skills and attributes. Figure 18 compares perceptions of skills and attributes for placement students and non-placement students at the equivalent time point (post-placement / post-summer). On average, unsuccessful applicants rate their skills and abilities lower than successful applicants. The only exceptions are 'I work well in a team' (mean = 5.7 for both groups) and 'I work well independently' (mean = 6.2 for both groups).

Figure 18: Mean ratings of perceived skills and attitudes (Wave 2; Successful applicants: base 1,141, unsuccessful applicants: base = 806. ** p<0.05, ***p<0.01)
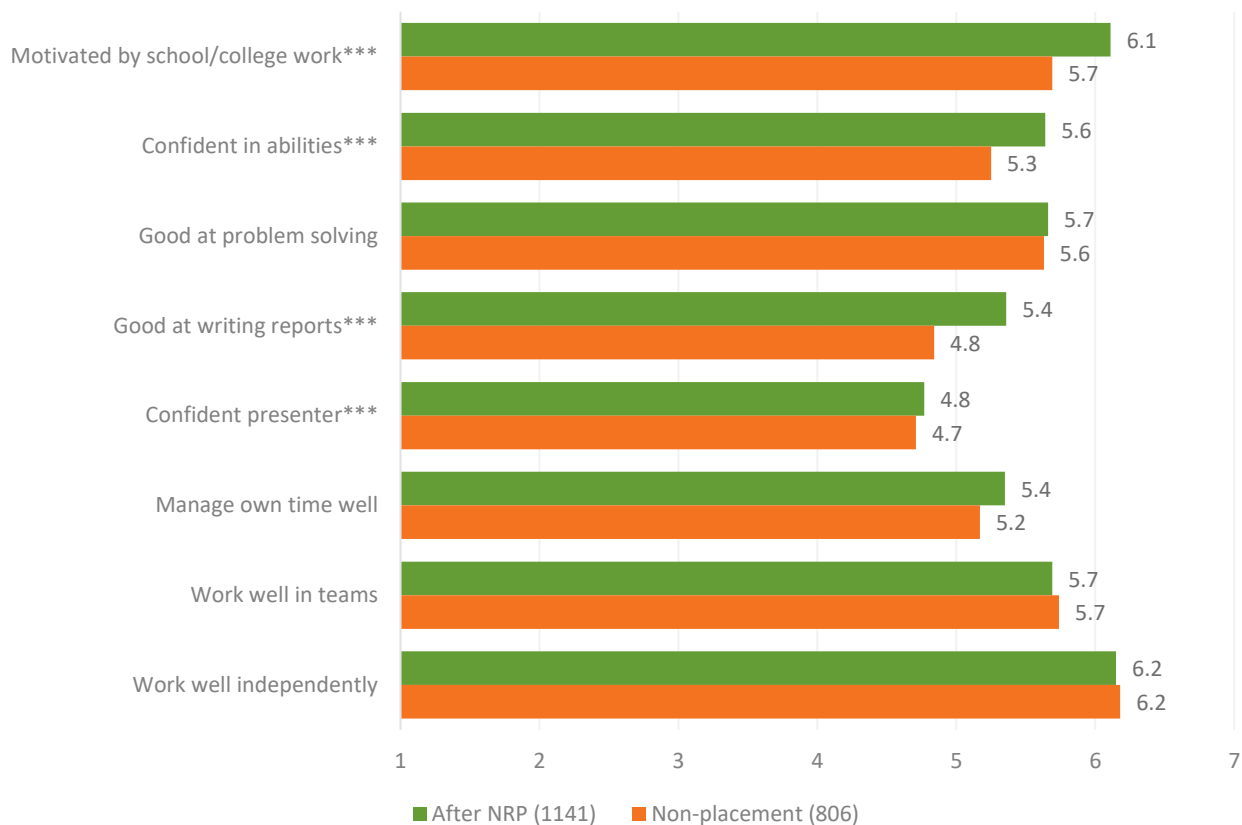
Figure 19 shows the extent to which unsuccessful applicants perceived that that the STEM-related extra-curricular activities they took part in impacted on how they rated their skills and attributes. Respondents attribute the greatest level of impact to team-working and independent working skills: over half of respondents reported that the activities they had taken part in had 'a great deal' of impact on how they rated these skills. In contrast with placement students, the majority of whom reported that the Nuffield Research Placement had a great deal of impact on their report writing skills, 28% of non-placement students reported that the activities they had taken part in had no impact at all on this skill area.

Figure 19: Extent to which STEM-related extra-curricular activities are perceived to have impacted on how they rated their skills and abilities. (Wave 2; Unsuccessful applicants who took part in STEM-related extra-curricular activities, per cent, base 330)
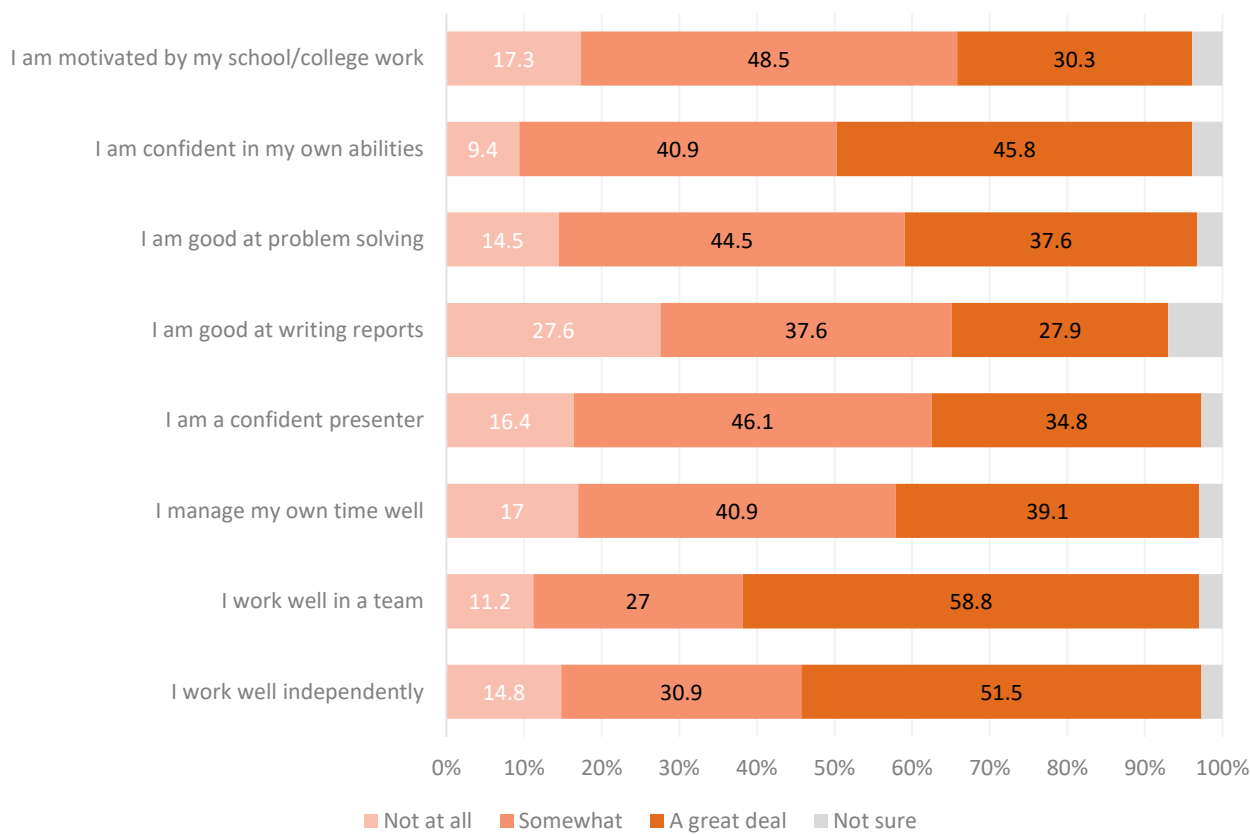
Unsuccessful applicants who perceived that the STEM-related extra-curricular activities they had taken part in had influenced their skills and attributes, commonly reported that they had benefited from the opportunity to apply their skills in a practical environment. There is evidence that other STEM-related extra-curricular activities also boost participants' confidence and equip them with generic skills including report writing, presentation skills and teamwork skills. For example:

> *Working as part of a team on a Smallpeice course really helped me to improve my teamworking skills as much of that course involved team projects.*
>
> — Unsuccessful applicant

> *At the Sutton Trust Physics Day, I was fully immersed in a variety of different disciplines within science such as Earth Sciences, the Physics of Fluids and Biochemistry. Within each of these lectures I was able to develop my problem solving abilities and gained new insight in how to tackle difficult questions.*
>
> — Unsuccessful applicant

5.3 Influences on perceived skills and attributes

Just as a range of factors can influence *whether* a young person applies to HE, in addition to *what* and *where* they choose to study, there are a range of factors that can influence

skills development. For this reason, we explored the factors that predict applicants' agreement with the series of statements about their skills and abilities.

Regression analysis (see Appendix 3: Regression analysis, Tables 13 to 20) reveals that participation in Nuffield Research Placements *does* significantly predict whether a respondent will agree with the following statements about their skills and abilities:[29]

— I am confident in my own abilities

— I am a confident presenter

— I am motivated by my school work

— I am good at writing reports

— I manage my time well

Confidence

Participation in Nuffield Research Placements is the most significant predictor of whether a student will agree with the statement 'I am confident in my own abilities', with those who took part in the programme more likely to agree compared with those that did not. The placement remains significant once controls for gender, ethnicity, level of deprivation, level of social and cultural capital, and predicted grades are applied. Other significant predictors of the likelihood that a respondent will agree with this statement include gender, ethnicity, deprivation (defined in terms of eligibility for FMS, 16-19 Bursary and/or EMA), acceptance for a Nuffield Bursary and predicted grades. Males, students from less deprived backgrounds, and those with higher predicted grades (ABB+ or equivalent) are more likely to report that they are confident in their own abilities than females, those from more deprived backgrounds and with lower predicted grades. Once background is controlled for, those who were accepted for a Nuffield Bursary are more likely to report confidence in their own abilities than those who were not accepted for a Nuffield Bursary.[30]

Although participation in Nuffield Research Placements predict the likelihood that a respondent will agree with the statement 'I am a confident presenter', the effects are reduced once predicted grades are taken into account. Respondents with higher levels of social capital, higher predicted grades and BAME students are significantly more likely to report that they are a confident presenter than those with lower levels of cultural capital, lower predicted grades and White students (Summary Table 4).

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[29] Dichotomised logistic regression – see Appendix 3 for detailed results of regression analysis.

[30] Since Nuffield bursaries were awarded to disadvantaged students, it may seem contradictory that the bursary has a positive effect on confidence levels whilst the deprivation measure has a negative effect. However, these effects are calculated by taking into account all other variables. The effect of the bursary is slightly stronger than deprivation but also slightly less significant statistically (due to relatively smaller sample size).

Summary Table 4: Confidence (Odds ratio from logit model)[31]

	Confident in own abilities		Confident presenter	
	(1)	(5)	(1)	(5)
nrp	2.36***	2.07***	1.21**	1.30*
	(0.29)	(0.38)	(0.11)	(0.17)
female		0.39***		0.81*
		(0.07)		(0.10)
depri		0.73***		0.84*
		(0.09)		(0.08)
cultural_capital		1.04		1.10***
		(0.04)		(0.03)
nuff_bursary		1.61**		0.85
		(0.39)		(0.15)
ucas_thr		1.71***		1.35**
		(0.31)		(0.20)
minority		1.67***		1.49***
		(0.30)		(0.20)
N	1947	1316	1947	1316
LRchi2	48.52	93.17	4.30	46.19
P-value	0.00	0.00	0.04	0.00

Motivation

Participation in Nuffield Research Placements along with predicted grades are the most significant predictors of whether a respondent agrees with the statement 'I am motivated by my school work'. Those who take part in the programme are more likely to agree, as are those with the highest predicted grades (ABB+ or equivalent) (Summary Table 5).

Report Writing

Participation in Nuffield Research Placements is the most significant predictor of whether a respondent agrees with the statement 'I am good at report writing' with placement students three times more likely to express agreement than non-placement students. Level of cultural capital and level of deprivation also have a significant effect, with those with higher levels of cultural capital and from more advantaged backgrounds more likely to agree (Summary Table 5).

Time Management

Gender and participation in Nuffield Research Placements are the most significant predictors of whether a respondent agrees with the statement 'I manage my time well'. Those that take part in the programme and females are more likely to agree with the statement than those who do not take part and males. In addition, those from more advantaged backgrounds are more likely to agree than those from less advantaged backgrounds (Summary Table 5).

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[31] Standard errors in parentheses; asterisks denote level of significance * p < 0.10; ** p < 0.05; *** p < 0.01;

Summary Table 5: Generic skills and attributes (Odds ratio from logit model)

	Motivated by school work		Report writing		Time management	
	(1)	(5)	(1)	(5)	(1)	(5)
nrp	2.12***	1.97***	2.80***	3.05***	1.47***	1.41**
	(0.32)	(0.45)	(0.30)	(0.49)	(0.16)	(0.22)
female		0.77		1.06		1.44***
		(0.15)		(0.14)		(0.19)
depri		0.77*		0.79**		0.67***
		(0.10)		(0.08)		(0.07)
cultural_capital		1.02		1.08**		1.01
		(0.04)		(0.03)		(0.03)
ucas_thr		1.76***		1.28		1.27
		(0.37)		(0.21)		(0.21)
N	1947	1316	1947	1316	1947	1316
LRchi2	24.85	43.32	94.50	88.43	12.54	35.54
P-value	0.00	0.00	0.00	0.00	0.00	0.00

Conversely, participation in Nuffield Research Placements *does not* predict whether a respondent will agree with the following statements about their skills and abilities:

— I work well independently

— I am good at problem solving

— I work well in a team

Independent Working

Predicted grades are the most significant predictor of whether a respondent will agree with the statement 'I work well independently' with those with predicted grades of ABB+ (or equivalent) twice as likely as those with lower predicated grades to agree with the statement. Those from more advantaged backgrounds are also more likely to agree that they work well independently than those from less advantaged backgrounds (Summary Table 6).

Problem Solving

Gender and predicted grades are the most significant predictors of whether a respondent will agree with the statement 'I am good at problem solving' with males and those with predicted grades of ABB+ (or equivalent) more likely to agree with the statement than females and those with lower predicated grades (Summary Table 6).

Teamwork

Black respondents are significantly more likely to agree with the statement 'I work well in a team' than White respondents. Those with higher predicted grades are more likely to agree than those with low predicted grades and when predicted grades are controlled for, those with higher levels of social capital are more likely to agree that they work well in a team compared with those with lower levels of social capital (Summary Table 6).

Summary Table 6: Generic skills and attributes (Odds ratio from logit model)

	Independent working		Problem solving		Team working	
	(1)	(5)	(1)	(5)	(1)	(5)
nrp	0.97	0.69	0.93	1.06	0.86	0.78
	(0.23)	(0.24)	(0.14)	(0.23)	(0.12)	(0.15)
female		0.81		0.34***		1.05
		(0.25)		(0.08)		(0.18)
depri		0.66**		0.98		0.83
		(0.14)		(0.15)		(0.11)
social_capital		1.09		1.18		1.21**
		(0.19)		(0.13)		(0.11)
ucas_thr		2.03**		2.02***		1.56**
		(0.67)		(0.42)		(0.31)
N	1947	1316	1947	1316	1947	1316
LRchi2	0.01	16.23	0.23	48.56	1.25	19.13
P-value	0.91	0.13	0.64	0.00	0.26	0.06

5.4 Summary

- Nuffield Research Placements specifically seek to influence students' confidence and their ability to work independently. Although improvement in both these skill areas is evident, *placement students* report most change in relation to confidence as they perceive that they were able to work well independently before the placement.

- Nuffield Research Placements are perceived to support the development of a range of other skills, particularly report writing and time management.

- On average, *unsuccessful applicants* report lower levels of agreement with the statements about their skills and abilities than successful applicants at the same time point.

- Most u*nsuccessful applicants* who took part in other STEM-related extra-curricular activities perceived that they had positively influenced their skills and attributes.

- Like those who completed a Nuffield Research Placement, some *unsuccessful applicants* benefited from the opportunity to apply their skills in a practical environment, develop in confidence and learn generic skills including report writing, presentation skills and teamwork skills, through other STEM-related extra-curricular activities.

- A range of factors in addition to Nuffield Research Placements influence perceptions of skills and attributes. Typically male students, those from minority ethnic groups, students from more advantaged backgrounds, those with higher levels of cultural capital and higher predicted grades are more likely to agree that they possess the stated skills.

6. CONCLUSIONS

Summary of evidence for the progress towards achievement of the key outcomes for students, and how the final wave of the survey will examine these further.

6.1   Introduction

The longitudinal survey of the 2016 cohort of applicants to Nuffield Research Placements is seeking to address the key research question:

> *How does participation in the placement influence student decision-making, aspirations and views about STEM subjects and career plans?*

The evidence suggests that, for the majority of participants, Nuffield Research Placements have limited impact on aspirations, as most know what they want to do when they finish their current qualifications before they apply for the programme. The majority of applicants to the programme also had a positive view about STEM and the career opportunities available to people who study STEM subjects before they applied and, as a result, many were already aspiring to HE to study STEM subjects. However, the evidence also suggests that the placement experience still has a positive influence on the decision-making process and future career plans. The opportunity to engage in a STEM research project in an authentic environment, network with other researchers, and observe a range of roles first hand provides students with important insights into what STEM researchers do on a day-to-day basis which helps to dispel prevailing misconceptions about STEM careers and ensures students have a realistic and well-informed view of what is involved in a range of careers available to them.

The opportunity to engage in STEM research over a four to six week period provides students with a sustained opportunity to apply their theoretical knowledge and develop practical research and generic work skills, including team work, time management and scientific report writing. Indeed, the opportunity to gain work experience is perceived by placement students to set Nuffield Research Placements apart from other programmes. Through their experience, most students grow in confidence. Having confidence in their own abilities allows students to reflect on their strengths and this in turn, enables them to decide which, of the range of options available, best fits their skills and interests. Although in some cases, this results in students deciding that a STEM research career is not for them, this is still regarded as a positive outcome by students (also see report of the qualitative research findings, June 2017). While there is also evidence that some wider STEM-related extra-curricular activities are a valuable source of information and help with decision-making, a substantial minority of students who took part in these activities did not perceive that they had any influence over their aspirations and plans. In contrast, almost all of those who participated in Nuffield Research Placements perceived that the experience had influenced their thinking.

Taking part in Nuffield Research Placements is also perceived to enhance the chances of student realising their ambitions. Most intend to submit their placement research for a Gold CREST Award and this, along with the placement, are perceived to strengthen students' applications to HE. Although taking part in the programme does not appear to encourage more students to apply to study at research-intensive institutions and other programmes such as summer schools are perceived to provide deeper insights into HE, the placement experience is regarded as giving students an edge when competing for places on courses that are in high demand.

Encouraging, a substantial majority of applicants to Nuffield Research Placements see themselves working or studying in STEM in five years' time and most think it is likely that they will be involved in STEM research. This suggests that Nuffield Research Placements are helping to foster the next generation of scientific researchers. As to whether Nuffield Research Placements are contributing to the achievement of wider goals of widening participation and increased diversity in STEM, the evidence is less clear. Analysis of administrative data demonstrates that students from disadvantaged background are more likely to apply and take part in the programme than those from advantaged backgrounds (see composition report by Frontier Economics). However, the qualitative evidence suggests that all participants, irrespective of their background, benefit from the experience and it is not possible to draw any firm conclusions as to whether Nuffield Research Placements offer any *additional* benefits to participants from disadvantaged backgrounds, including Nuffield Bursary recipients, in order to 'level the playing field' between advantaged and disadvantaged groups at this stage (although it was recognised by teachers as having the potential to do this - see report of the qualitative research findings, June 2017). It will be interesting to further explore the impact of the placement on disadvantaged students relative to advantaged students *and* other students from similar backgrounds who do not participate in the programme through the impact evaluation.

6.4   Next Steps: Wave 4 Survey

The Wave 4 survey will be administered in late spring 2018 in order to track the 2016 cohort as they progress into and through their chosen post-Year 13 (or equivalent) routes. The aim of the survey will be to establish whether students acted on their intentions and followed their original plan, or changed route and the reasons why. For those progressing to HE, the survey will track where students progress to and their subject choice, noting the proportion that progress to STEM, achieve their 'first choice' and/or progress to top research intensive institutions. Any changes in planned progression to HE will be explored, including the reasons, beyond educational attainment, that lead students to change institution and/or subject. The survey will continue to monitor the key influences on student decision-making and the type of information that was important to them when making their final decisions. Finally, the survey will track any changes in their longer-term aspirations and plans.

Appendix 1: Nuffield Research Placements Theory of Change

Nuffield Research Placements (NRP) Theory of Change
Rationale: Foundation aims to build capacity in STEM, support transitions from secondary to higher education, particularly for young people from disadvantaged backgrounds.
Aim: Addressing the lack of opportunities young people have to do authentic STEM research in real life settings

Inputs	Activities	Outputs (evidence of service delivery)	Outcomes Short-term (~18mnths)	Outcomes Long-term (18 mnths-5yrs)	Impacts
Regional co-ordinators NRP central team Placements Funding	4-6 week authentic STEM research placements (inc report writing, celebration event attendance, competitions e.g. NSEC)	Number of: • Students completing placements • Bursary students completing placements • Organisations offered placements • ECRs supervising placement students*	**Young people:** Improved confidence, independent working, science capital/networks, informed decision making Gold CREST awards, NSEC competition finalist More successful UCAS applications, use NRP experience at HEI/job interviews Attend research intensive/'top' 30 HEI	**Young people:** Complete HE study in STEM subject Further study (Msc, PhD) in STEM Employment in research	More diverse profile of students doing STEM at HE (gender, disadvantaged backgrounds) Contributing to social mobility via STEM
			Providers/supervisors: Greater understanding of STEM education in schools Greater understanding of challenges faced by less well represented groups in STEM (gender, SES disadvantage) Develop management/supervision skills Opportunities to engage public in research	**Providers/supervisors:** Offer more placement opportunities, particularly in industry Top 30 HEIs focusing on authentic research placements with independent study work (not just NRPs)^ ECRs with established links to local schools and colleges*	Improved capacity in STEM research More organisations offering authentic placements as part of widening participation agenda^
			Schools & colleges: More students from target schools & colleges applying More FSM eligible students applying	Providers and the Foundation have sustainable relationships with target schools & colleges More informed KS4/Scottish Highers (or equivalent) subject choices by other students*	More school & colleges supporting students to do authentic STEM research projects

External context/influences:
Changes in HE funding/fees (general and STEM specific subjects), apprenticeship take up, take up/offer of STEM A levels/Scottish Highers (or equivalent), opportunities to do practical science and independent research in schools. Availability of other STEM/research intensive and widening participating schemes;
Providers: Competition for placements vs. research papers, funding for research
Available data and ability to identify students and schools that would benefit from the programme.

Key: ECR= Early Career Researcher
* Related to plans for future roll out rather than current practice
^ Achieving outcome depends on whether placements are shown to have better outcomes for young people

Appendix 2: Sample characteristics

	Placement students				Non-placement students			
	Overall	**W1** (820)	**W2** (1141)	**W3** (883)	**Overall**	**W1** (-)	**W2** (806)	**W3** (463)
Ethnicity								
Asian	28.6	27.6	28.0	27.0	27.9	N/A	26.7	22.7
Black	7.5	6.0	7.4	6.0	6.8	N/A	7.2	6.3
White	57.1	59.8	57.6	60.4	56.7	N/A	58.4	63.3
Mixed	3.7	4.0	3.9	4.0	4.9	N/A	5.1	5.2
Other	3.0	2.6	3.2	2.7	3.7	N/A	2.6	2.6
Gender								
Female	56.4	57.2	56.9	59.6	55.4	N/A	58.2	59.2
Male	43.6	42.8	43.1	40.4	44.6	N/A	41.8	40.8
IMD								
Missing	1.6	1.5	1.7	1.7	0.7	N/A	0.6	0.4
1	9.9	9.3	9.7	10.9	14.5	N/A	15.9	16.0
2	8.8	9.3	8.9	9.6	12.1	N/A	12.9	13.2
3	8.3	8.7	8.3	8.4	10.4	N/A	9.9	9.4
4	7.7	8.0	7.5	8.1	8.9	N/A	9.6	11.0
5	10.1	10.3	10.3	10.1	8.8	N/A	8.8	8.6
6	11.5	12.5	11.9	12.3	9.2	N/A	8.1	8.3
7	10.1	9.9	10.3	9.8	7.4	N/A	7.6	6.6
8	9.1	8.8	8.7	7.8	8.6	N/A	7.0	5.7
9	10.5	9.6	10.3	10.2	9.6	N/A	10.7	10.1
10	12.3	12.1	12.4	11.1	9.8	N/A	8.8	10.7
Nuffield bursary								
Accepted	48.3	48.0	49.2	47.0	6.9	N/A	7.3	8.0
Not accepted	51.7	52.0	50.8	53.0	93.1	N/A	92.7	92.0
School FSM								
No FSM	7.4	7.5	7.4	8.2	10.7	N/A	10.5	8.2
Lowest FSM (1)	9.3	9.4	8.9	9.6	20.7	N/A	20.5	22.9
Low FSM (2)	12.6	14.0	12.8	13.9	17.0	N/A	19.2	19.0
Mid FSM (3)	21.8	22.2	22.5	22.1	15.5	N/A	15.4	15.3
High FSM (4)	26.1	25.7	25.8	23.4	14.4	N/A	14.6	14.5
FE college	6.4	5.7	6.4	6.2	6.0	N/A	6.3	7.6
6th form	16.4	15.6	16.1	16.5	15.8	N/A	13.4	12.5
Parental education								
With HE	45.4	45.9	45.5	48.4	52.8	N/A	53.8	52.7
Without HE	54.6	54.1	54.5	51.6	47.2	N/A	46.2	47.3

Financial support: Receipt of FSM, 16-19 Bursary and/or EMA								
None	73.2	62.4	72.7	72.9	99.2	N/A	99.3	98.3
1 source	17.6	24.5	17.9	17.8	0.5	N/A	0.4	1.1
2 sources	9.1	12.8	9.3	9.1	0.3	N/A	0.4	0.6
3 sources	0.1	0.2	0.2	0.2	0.1	N/A	0	0
Region								
East Anglia	5.0	6.1	4.7	4.6	5.2	N/A	5.5	6.0
Devon, Dorset, Cornwall	4.0	4.2	4.3	4.3	3.6	N/A	2.9	2.6
Wessex	4.0	4.1	4.0	4.8	2.0	N/A	2.9	3.0
Greater London	13.5	10.6	13.3	13.1	17.6	N/A	17.0	15.1
Hampshire	1.9	1.8	1.8	2.2	2.0	N/A	2.0	2.4
Herts, Beds, Berks, Bucks & Oxon	8.1	8.6	8.0	7.4	10.5	N/A	11.2	11.2
Kent	3.2	3.3	3.0	3.1	3.4	N/A	3.3	3.5
East Midlands	5.3	5.9	5.6	5.8	4.9	N/A	4.6	3.9
Lincolnshire	0.5	0.3	0.4	0.5	0.8	N/A	0.6	0.9
North West	8.0	7.4	8.1	7.9	9.9	N/A	9.7	9.7
Merseyside	6.4	6	6.6	7.0	6.8	N/A	5.7	5.6
Northern Ireland	3.8	3.7	3.8	3.7	3.4	N/A	3.3	3.7
Northumbria	3.0	4	3.2	3.6	2.3	N/A	2.2	3.2
Scotland	7.9	9.4	8.1	8.8	10.4	N/A	11.9	11.0
Sussex	2.9	2.8	3.0	2.6	2.3	N/A	2.5	2.8
Wales	7.2	8	6.8	6.8	3.6	N/A	3.7	3.7
West Midlands	8.8	8.4	8.7	7.5	6.9	N/A	6.3	7.1
Yorkshire	6.5	5.4	6.6	6.3	4.4	N/A	4.7	4.5

Appendix 3: Regression analysis

The tables in this appendix show the results of regression analysis, as follows:

- *Exponentiated coefficients*
- *Standard errors in parentheses*
- *Asterisks denote significance levels: * p < 0.10; ** p < 0.05; *** p < 0.01*

In the tables that follow,

- N is the frequency count.
- *LRchi2 is the likelihood ratio (LR) chi-square test statistics which compares the null model (i.e., a model with no predictors) with the estimated model (with predictors).*
- *P-value is the probability associated with the LRchi2 test statistic. This p-value is compared with a critical value (0.05 or 0.01) to determine whether the overall model is statistically significant. Assuming critical value of 0.05: if the reported p-value is greater than 0.05 the model is overall not statistically significant (i.e. the independent variables do not explain the dependent variable); and if the reported p-value is less than 0.05 then the model is statistically significant (i.e. the independent variables jointly explain the dependent variable).*

Tables 7–11 cover applications to HEIs.

Tables 12–14 relate to soft skills developed through STEM-related extra-curricular activities, including Nuffield Research Placement.

Table 7: Applications to institutions rated 3* and above in REF 2014 for panels A & B (STEM subjects) (odds ratio from logit models)

	(1)	(2)	(3)	(4)	(5)
W3_q13_whether_AB_3star_app					
nrp	0.96	1.28	1.21	1.25	1.17
	(0.25)	(0.55)	(0.52)	(0.53)	(0.50)
female		0.60	0.59	0.57	0.56
		(0.23)	(0.24)	(0.22)	(0.22)
asian		1.76	1.67		
		(0.82)	(0.80)		
black		2.18	2.25		
		(1.75)	(1.83)		
mixedother		5.46	5.95*		
		(5.86)	(6.43)		
depri		0.66*	0.67	0.66	0.68
		(0.17)	(0.17)	(0.17)	(0.18)
imd		0.93	0.93	0.92	0.93
		(0.06)	(0.07)	(0.06)	(0.07)
cultural_capital		1.17*	1.17*	1.17*	1.16*
		(0.10)	(0.10)	(0.10)	(0.10)
social_capital		0.97	0.96	0.97	0.97
		(0.19)	(0.19)	(0.18)	(0.19)
science_activities_no		1.83*	1.76	1.81*	1.74
		(0.62)	(0.61)	(0.62)	(0.60)
science_activities_days		1.00	1.00	1.00	1.00
		(0.01)	(0.01)	(0.01)	(0.01)
nuff_bursary		0.66	0.73	0.68	0.74
		(0.33)	(0.37)	(0.33)	(0.37)
ucas_total		1.01**		1.01*	
		(0.00)		(0.00)	
ucas_thr			4.23***		4.08***
			(1.54)		(1.48)
minority				2.16*	2.14*
				(0.92)	(0.93)
N	1124	757	757	757	757
LRchi2	0.02	34.68	45.34	33.32	43.62
P-value	0.89	0.00	0.00	0.00	0.00

N.B. For ethnicity analysis, to avoid data suppression due to low numbers, 'mixed' ethnicity group has been combined with 'other' group ('mixedother').

Table 8: First-choice applications to REF 3* institutions for panels A and B (STEM subjects) (odds ratio from logit models)

W3_q13_REF_GPA_AB_3star_1	(1)	(2)	(3)	(4)	(5)
nrp	1.00	0.87	0.86	0.83	0.83
	(0.20)	(0.26)	(0.26)	(0.24)	(0.24)
female		0.61*	0.58**	0.59**	0.56**
		(0.16)	(0.16)	(0.16)	(0.15)
asian		1.35	1.30		
		(0.43)	(0.42)		
black		2.39	2.48		
		(1.41)	(1.47)		
mixedother		12.38**	13.48**		
		(12.98)	(14.17)		
depri		0.71*	0.71*	0.73	0.74
		(0.14)	(0.14)	(0.14)	(0.14)
imd		0.91**	0.91*	0.90**	0.90**
		(0.04)	(0.04)	(0.04)	(0.04)
cultural_capital		1.20***	1.21***	1.19***	1.20***
		(0.08)	(0.08)	(0.08)	(0.08)
social_capital		0.86	0.86	0.87	0.88
		(0.12)	(0.12)	(0.12)	(0.12)
science_activities_no		1.58**	1.57**	1.54**	1.52*
		(0.34)	(0.34)	(0.33)	(0.33)
science_activities_days		1.00	1.00	1.00	1.00
		(0.01)	(0.01)	(0.01)	(0.01)
nuff_bursary		0.91	0.97	0.92	0.96
		(0.33)	(0.35)	(0.33)	(0.35)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			2.93***		2.75***
			(0.81)		(0.75)
minority				1.90**	1.90**
				(0.56)	(0.57)
N	1080	726	726	726	726
LRchi2	0.00	60.50	67.00	52.41	57.90
P-value	0.98	0.00	0.00	0.00	0.00

Table 9: Applications to REF 3* institutions for panels C & D (non-STEM subjects) (odds ratio from logit models)

	(1)	(2)	(3)	(4)	(5)
W3_q13_REF_GPA_CD_whether_3star0					
nrp	1.17	1.30	1.31	1.27	1.28
	(0.22)	(0.37)	(0.38)	(0.36)	(0.37)
female		0.85	0.81	0.83	0.79
		(0.22)	(0.21)	(0.21)	(0.20)
asian		1.93**	1.83*		
		(0.64)	(0.62)		
black		2.39	2.49		
		(1.40)	(1.47)		
mixedother		6.80**	6.98**		
		(5.32)	(5.45)		
depri		0.88	0.89	0.89	0.90
		(0.18)	(0.18)	(0.18)	(0.18)
imd		0.94	0.94	0.93	0.94
		(0.05)	(0.05)	(0.05)	(0.05)
cultural_capital		1.20***	1.21***	1.20***	1.21***
		(0.08)	(0.08)	(0.08)	(0.08)
social_capital		0.83	0.83	0.84	0.84
		(0.12)	(0.12)	(0.11)	(0.12)
science_activities_no		1.51**	1.54**	1.50**	1.51**
		(0.29)	(0.29)	(0.28)	(0.29)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		0.66	0.68	0.67	0.69
		(0.24)	(0.25)	(0.24)	(0.25)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			3.70***		3.57***
			(0.98)		(0.94)
minority				2.40***	2.36***
				(0.73)	(0.72)
N	1125	759	759	759	759
LRchi2	0.65	54.02	61.84	50.86	58.22
P-value	0.42	0.00	0.00	0.00	0.00

Table 10: First choice applications to REF 3* institutions for panels C & D (non-STEM subjects) (odds ratio from logit models)

	(1)	(2)	(3)	(4)	(5)
W3_q13_REF_GPA_CD_3star_1					
nrp	1.07	1.00	1.03	0.97	1.00
	(0.16)	(0.22)	(0.22)	(0.21)	(0.22)
female		0.76	0.70*	0.77	0.71*
		(0.15)	(0.14)	(0.15)	(0.14)
asian		1.68**	1.60*		
		(0.42)	(0.40)		
black		2.93**	3.08**		
		(1.38)	(1.45)		
mixedother		5.51***	5.76***		
		(2.87)	(3.01)		
depri		0.83	0.82	0.85	0.84
		(0.13)	(0.13)	(0.13)	(0.13)
imd		0.94	0.94	0.94*	0.94*
		(0.03)	(0.04)	(0.03)	(0.03)
cultural_capital		1.20***	1.22***	1.19***	1.21***
		(0.06)	(0.06)	(0.06)	(0.06)
social_capital		0.79**	0.78**	0.80**	0.80**
		(0.08)	(0.08)	(0.08)	(0.08)
science_activities_no		1.49***	1.53***	1.47***	1.51***
		(0.20)	(0.21)	(0.20)	(0.20)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		0.88	0.89	0.89	0.90
		(0.25)	(0.25)	(0.25)	(0.25)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			3.25***		3.09***
			(0.73)		(0.69)
minority				2.21***	2.17***
				(0.50)	(0.49)
N	1086	732	732	732	732
LRchi2	0.19	83.98	85.29	77.56	77.66
P-value	0.67	0.00	0.00	0.00	0.00

Table 11: Applications to Russell Group institutions (odds ratio from logit models)

	(1)	(2)	(3)	(4)	(5)
W3_q13_Any_Russell					
nrp	1.03	1.13	1.15	1.10	1.12
	(0.23)	(0.39)	(0.39)	(0.37)	(0.38)
female		0.83	0.80	0.80	0.78
		(0.25)	(0.25)	(0.24)	(0.24)
asian		1.94*	1.86		
		(0.74)	(0.72)		
black		1.59	1.63		
		(0.97)	(1.00)		
mixedother		8.73**	8.39**		
		(9.22)	(8.82)		
depri		0.95	0.97	0.97	0.99
		(0.22)	(0.22)	(0.22)	(0.23)
imd		0.89**	0.89**	0.88**	0.88**
		(0.05)	(0.05)	(0.05)	(0.05)
cultural_capital		1.08	1.09	1.08	1.09
		(0.08)	(0.08)	(0.08)	(0.08)
social_capital		0.97	0.99	0.96	0.98
		(0.15)	(0.16)	(0.15)	(0.16)
science_activities_no		0.94	0.96	0.94	0.95
		(0.16)	(0.16)	(0.16)	(0.16)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		0.75	0.77	0.75	0.77
		(0.31)	(0.32)	(0.30)	(0.31)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			4.76***		4.71***
			(1.44)		(1.42)
minority				2.24**	2.19**
				(0.78)	(0.76)
N	1134	765	765	765	765
LRchi2	0.02	37.90	44.86	34.62	41.67
P-value	0.90	0.00	0.00	0.00	0.00

Table 12: First-choice applications to Russell Group institutions (odds ratio from logit models)

	(1)	(2)	(3)	(4)	(5)
W3_q13_Russell_1					
nrp	1.05	0.97	0.97	0.95	0.95
	(0.15)	(0.20)	(0.20)	(0.20)	(0.19)
female		0.77	0.74*	0.75	0.73*
		(0.14)	(0.14)	(0.14)	(0.13)
asian		1.61**	1.57*		
		(0.37)	(0.36)		
black		1.32	1.37		
		(0.52)	(0.54)		
mixedother		4.34***	4.44***		
		(2.03)	(2.08)		
depri		0.70**	0.70**	0.71**	0.71**
		(0.10)	(0.10)	(0.10)	(0.10)
imd		0.95	0.95	0.94*	0.94*
		(0.03)	(0.03)	(0.03)	(0.03)
cultural_capital		1.15***	1.16***	1.14***	1.15***
		(0.05)	(0.05)	(0.05)	(0.05)
social_capital		0.90	0.90	0.89	0.89
		(0.09)	(0.09)	(0.09)	(0.09)
science_activities_no		1.12	1.13	1.11	1.12
		(0.12)	(0.12)	(0.12)	(0.12)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		1.06	1.07	1.06	1.07
		(0.28)	(0.28)	(0.28)	(0.28)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			2.05***		2.02***
			(0.44)		(0.43)
minority				1.83***	1.81***
				(0.38)	(0.38)
N	1133	764	764	764	764
LRchi2	0.12	50.00	51.75	44.09	45.55
P-value	0.73	0.00	0.00	0.00	0.00

Table 13: "I am confident in my own abilities", *dconfi_abil* **= binary ('agree somewhat', 'agree', 'strongly agree') = 1; otherwise =0). Odds ratio from logit model**

	(1)	(2)	(3)	(4)	(5)
dconfi_abil					
nrp	2.36***	2.13***	2.09***	2.12***	2.07***
	(0.29)	(0.39)	(0.38)	(0.39)	(0.38)
female		0.41***	0.40***	0.41***	0.39***
		(0.07)	(0.07)	(0.07)	(0.07)
asian		1.81***	1.80***		
		(0.37)	(0.36)		
black		1.22	1.21		
		(0.38)	(0.38)		
mixedother		1.72	1.73*		
		(0.57)	(0.58)		
depri		0.74**	0.74***	0.74***	0.73***
		(0.09)	(0.09)	(0.09)	(0.09)
imd		1.00	1.00	1.00	1.00
		(0.03)	(0.03)	(0.03)	(0.03)
cultural_capital		1.03	1.04	1.03	1.04
		(0.04)	(0.04)	(0.04)	(0.04)
social_capital		1.17*	1.17*	1.15	1.15
		(0.10)	(0.11)	(0.10)	(0.10)
science_activities_no		0.83**	0.86*	0.83**	0.86*
		(0.07)	(0.07)	(0.07)	(0.07)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		1.58*	1.61**	1.58*	1.61**
		(0.39)	(0.39)	(0.39)	(0.39)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			1.69***		1.71***
			(0.30)		(0.31)
minority				1.67***	1.67***
				(0.30)	(0.30)
N	1947	1316	1316	1316	1316
LRchi2	48.52	103.06	94.65	101.64	93.17
P-value	0.00	0.00	0.00	0.00	0.00

Table 14: "I am a confident presenter", *dconfi_pres* = binary ('agree somewhat', 'agree', 'strongly agree' =1; otherwise =0). Odds ratio from logit model

	(1)	(2)	(3)	(4)	(5)
dconfi_pres					
nrp	1.21**	1.31**	1.30*	1.31**	1.30*
	(0.11)	(0.18)	(0.17)	(0.18)	(0.17)
female		0.84	0.82*	0.84	0.81*
		(0.10)	(0.10)	(0.10)	(0.10)
asian		1.61***	1.61***		
		(0.24)	(0.24)		
black		1.40	1.39		
		(0.36)	(0.35)		
mixedother		1.17	1.19		
		(0.28)	(0.28)		
depri		0.86	0.85*	0.86*	0.84*
		(0.08)	(0.08)	(0.08)	(0.08)
imd		1.01	1.01	1.01	1.01
		(0.02)	(0.02)	(0.02)	(0.02)
cultural_capital		1.09***	1.10***	1.09***	1.10***
		(0.03)	(0.03)	(0.03)	(0.03)
social_capital		1.09	1.09	1.08	1.08
		(0.07)	(0.07)	(0.07)	(0.07)
science_activities_no		0.99	1.01	0.99	1.01
		(0.07)	(0.07)	(0.07)	(0.07)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		0.83	0.84	0.83	0.85
		(0.15)	(0.15)	(0.15)	(0.15)
ucas_total		1.00***		1.00***	
		(0.00)		(0.00)	
ucas_thr			1.35**		1.35**
			(0.20)		(0.20)
minority				1.49***	1.49***
				(0.20)	(0.20)
N	1947	1316	1316	1316	1316
LRchi2	4.30	54.34	47.79	52.68	46.19
P-value	0.04	0.00	0.00	0.00	0.00

Table 15: "I work well independently", *dindependent* **= binary ('agree somewhat', 'agree', 'strongly agree' =1; otherwise =0). Odds ratio from logit model**

	(1)	(2)	(3)	(4)	(5)
dindependent					
nrp	0.97	0.69	0.69	0.69	0.69
	(0.23)	(0.24)	(0.24)	(0.24)	(0.24)
female		0.81	0.80	0.82	0.81
		(0.25)	(0.25)	(0.25)	(0.25)
asian		0.82	0.82		
		(0.31)	(0.30)		
black		1.03	1.04		
		(0.68)	(0.68)		
mixedother		0.57	0.58		
		(0.30)	(0.31)		
depri		0.66^*	0.66^{**}	0.66^*	0.66^{**}
		(0.14)	(0.14)	(0.14)	(0.14)
imd		1.09	1.09	1.09	1.09
		(0.06)	(0.06)	(0.06)	(0.06)
cultural_capital		1.12	1.13^*	1.12	1.13^*
		(0.08)	(0.08)	(0.08)	(0.08)
social_capital		1.08	1.08	1.09	1.09
		(0.19)	(0.19)	(0.19)	(0.19)
science_activities_no		0.82	0.83	0.83	0.83
		(0.17)	(0.17)	(0.17)	(0.17)
science_activities_days		1.01	1.01	1.01	1.01
		(0.01)	(0.01)	(0.01)	(0.01)
nuff_bursary		1.80	1.82	1.84	1.85
		(0.82)	(0.82)	(0.83)	(0.84)
ucas_total		1.01^*		1.01^*	
		(0.00)		(0.00)	
ucas_thr			2.03^{**}		2.03^{**}
			(0.67)		(0.67)
minority				0.79	0.79
				(0.26)	(0.26)
N	1947	1316	1316	1316	1316
LRchi2	0.01	15.65	16.86	14.98	16.23
P-value	0.91	0.27	0.21	0.18	0.13

Table 16: "I am motivated by my school/college work", *dmotivated* = binary ('agree somewhat', 'agree', 'strongly agree' =1; otherwise =0). Odds ratio from logit model

	(1)	(2)	(3)	(4)	(5)
dmotivated					
nrp	2.12***	1.99***	1.96***	2.00***	1.97***
	(0.32)	(0.45)	(0.45)	(0.46)	(0.45)
female		0.78	0.76	0.79	0.77
		(0.15)	(0.15)	(0.15)	(0.15)
asian		0.71	0.71		
		(0.16)	(0.16)		
black		0.86	0.85		
		(0.32)	(0.32)		
mixedother		0.65	0.65		
		(0.22)	(0.22)		
depri		0.78*	0.77*	0.78*	0.77*
		(0.11)	(0.10)	(0.11)	(0.10)
imd		0.99	0.99	0.99	0.99
		(0.03)	(0.03)	(0.03)	(0.03)
cultural_capital		1.01	1.02	1.01	1.02
		(0.04)	(0.04)	(0.04)	(0.04)
social_capital		1.02	1.02	1.03	1.03
		(0.11)	(0.11)	(0.11)	(0.11)
science_activities_no		0.98	1.00	0.98	1.00
		(0.13)	(0.13)	(0.13)	(0.13)
science_activities_days		1.01	1.01	1.01	1.01
		(0.01)	(0.01)	(0.01)	(0.01)
nuff_bursary		1.15	1.18	1.15	1.18
		(0.33)	(0.33)	(0.33)	(0.33)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			1.77***		1.76***
			(0.37)		(0.37)
minority				0.72	0.72
				(0.15)	(0.15)
N	1947	1316	1316	1316	1316
LRchi2	24.85	45.61	43.68	45.21	43.32
P-value	0.00	0.00	0.00	0.00	0.00

Table 17: "I am good at problem solving", *dprob_solv* **= binary ('agree somewhat', 'agree', 'strongly agree' =1; otherwise =0). Odds ratio from logit model**

	(1)	(2)	(3)	(4)	(5)
dprob_solv					
nrp	0.93	1.08	1.06	1.08	1.06
	(0.14)	(0.24)	(0.23)	(0.24)	(0.23)
female		0.35***	0.34***	0.35***	0.34***
		(0.08)	(0.08)	(0.08)	(0.08)
asian		0.94	0.94		
		(0.22)	(0.22)		
black		0.83	0.83		
		(0.31)	(0.31)		
mixedother		0.66	0.66		
		(0.23)	(0.23)		
depri		1.00	0.99	0.99	0.98
		(0.15)	(0.15)	(0.15)	(0.15)
imd		1.02	1.02	1.02	1.02
		(0.04)	(0.04)	(0.04)	(0.04)
cultural_capital		1.06	1.07	1.06	1.07
		(0.05)	(0.05)	(0.05)	(0.05)
social_capital		1.18	1.19	1.18	1.18
		(0.13)	(0.13)	(0.13)	(0.13)
science_activities_no		1.03	1.05	1.03	1.05
		(0.12)	(0.12)	(0.12)	(0.12)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		0.98	1.01	1.00	1.02
		(0.27)	(0.28)	(0.28)	(0.28)
ucas_total		1.01***		1.01***	
		(0.00)		(0.00)	
ucas_thr			2.02***		2.02***
			(0.42)		(0.42)
minority				0.86	0.86
				(0.18)	(0.18)
N	1947	1316	1316	1316	1316
LRchi2	0.23	50.19	49.45	49.29	48.56
P-value	0.64	0.00	0.00	0.00	0.00

Table 18: "I am good at writing reports", *dwriting* = binary ('agree somewhat', 'agree', 'strongly agree' =1; otherwise =0). Odds ratio from logit model

	(1)	(2)	(3)	(4)	(5)
dwriting					
nrp	2.80***	3.03***	3.03***	3.04***	3.05***
	(0.30)	(0.48)	(0.48)	(0.49)	(0.49)
female		1.04	1.05	1.05	1.06
		(0.14)	(0.14)	(0.14)	(0.14)
asian		1.17	1.18		
		(0.19)	(0.19)		
black		1.53	1.55		
		(0.45)	(0.46)		
mixedother		1.09	1.10		
		(0.29)	(0.29)		
depri		0.79**	0.79**	0.79**	0.79**
		(0.08)	(0.08)	(0.08)	(0.08)
imd		1.03	1.03	1.03	1.04
		(0.03)	(0.03)	(0.03)	(0.03)
cultural_capital		1.08**	1.08**	1.08**	1.08**
		(0.03)	(0.03)	(0.03)	(0.03)
social_capital		1.02	1.02	1.03	1.03
		(0.08)	(0.08)	(0.08)	(0.08)
science_activities_no		0.98	0.97	0.98	0.97
		(0.08)	(0.08)	(0.08)	(0.08)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		0.84	0.84	0.84	0.84
		(0.17)	(0.17)	(0.17)	(0.17)
ucas_total		1.00		1.00	
		(0.00)		(0.00)	
ucas_thr			1.29		1.28
			(0.21)		(0.21)
minority				1.20	1.21
				(0.18)	(0.18)
N	1947	1316	1316	1316	1316
LRchi2	94.50	87.51	89.51	86.50	88.43
P-value	0.00	0.00	0.00	0.00	0.00

Table 19: "I manage my time well", *dman_time* = binary ('agree somewhat', 'agree', 'strongly agree' = 1; otherwise =0). Odds ratio from logit model

	(1)	(2)	(3)	(4)	(5)
dman_time					
nrp	1.47***	1.41**	1.42**	1.41**	1.41**
	(0.16)	(0.22)	(0.22)	(0.22)	(0.22)
female		1.44***	1.45***	1.43***	1.44***
		(0.19)	(0.20)	(0.19)	(0.19)
asian		1.18	1.18		
		(0.20)	(0.20)		
black		0.94	0.95		
		(0.27)	(0.27)		
mixedother		1.09	1.09		
		(0.30)	(0.30)		
depri		0.68***	0.68***	0.67***	0.67***
		(0.07)	(0.07)	(0.07)	(0.07)
imd		1.01	1.01	1.01	1.01
		(0.03)	(0.03)	(0.03)	(0.03)
cultural_capital		1.01	1.01	1.01	1.01
		(0.03)	(0.03)	(0.03)	(0.03)
social_capital		1.00	1.00	0.99	0.99
		(0.08)	(0.08)	(0.08)	(0.08)
science_activities_no		0.91	0.91	0.92	0.91
		(0.08)	(0.08)	(0.08)	(0.08)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		1.08	1.09	1.08	1.09
		(0.22)	(0.22)	(0.22)	(0.22)
ucas_total		1.00		1.00	
		(0.00)		(0.00)	
ucas_thr			1.26		1.27
			(0.21)		(0.21)
minority				1.13	1.13
				(0.17)	(0.17)
N	1947	1316	1316	1316	1316
LRchi2	12.54	34.46	36.09	33.85	35.54
P-value	0.00	0.00	0.00	0.00	0.00

Table 20: "I work well in a team", *dteam* = binary ('agree somewhat', 'agree', 'strongly agree' = 1; otherwise =0). Odds ratio from logit model

	(1)	(2)	(3)	(4)	(5)
dteam					
nrp	0.86	0.77	0.77	0.77	0.78
	(0.12)	(0.15)	(0.15)	(0.15)	(0.15)
female		1.01	1.02	1.03	1.05
		(0.17)	(0.17)	(0.17)	(0.18)
asian		1.18	1.18		
		(0.24)	(0.24)		
black		3.35**	3.45**		
		(1.80)	(1.86)		
mixedother		0.97	0.97		
		(0.32)	(0.32)		
depri		0.82	0.82	0.83	0.83
		(0.11)	(0.11)	(0.11)	(0.11)
imd		1.02	1.03	1.02	1.03
		(0.03)	(0.03)	(0.03)	(0.03)
cultural_capital		1.06	1.06	1.06	1.06
		(0.04)	(0.04)	(0.04)	(0.04)
social_capital		1.17*	1.18*	1.20*	1.21**
		(0.11)	(0.11)	(0.11)	(0.11)
science_activities_no		0.92	0.90	0.92	0.90
		(0.09)	(0.09)	(0.09)	(0.09)
science_activities_days		1.00	1.00	1.00	1.00
		(0.00)	(0.00)	(0.00)	(0.00)
nuff_bursary		1.21	1.21	1.22	1.22
		(0.30)	(0.30)	(0.30)	(0.30)
ucas_total		1.00		1.00	
		(0.00)		(0.00)	
ucas_thr			1.58**		1.56**
			(0.31)		(0.31)
minority				1.25	1.26
				(0.24)	(0.24)
N	1947	1316	1316	1316	1316
LRchi2	1.25	20.14	25.11	14.46	19.13
P-value	0.26	0.09	0.02	0.21	0.06