ANALYSIS REPORT: Equality gaps in earnings and employment by education pathway

July 2024

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1. Summary

Background

The Centre for Transforming Access and Student Outcomes in Higher Education (TASO) commissioned State of Life and Mime to conduct research to understand the individual and societal benefits of higher education (HE) for disadvantaged young people. This included a rapid evidence review followed by a longitudinal data analysis of secure person-level datasets to track very large numbers of individuals through their educational pathways and into the labour market.

Aims

Via the rapid evidence review, two key gaps were identified in the existing literature:

1. How outcomes for disadvantaged students vary by the specific education pathway pursued
2. The role played by additional factors, such as prior attainment, in the disparity in outcomes between disadvantaged and other graduates

Therefore, four research questions and associated hypotheses were formed and tested in this analysis:

1. Does attending HE narrow the gap in labour market outcomes between men and women?
2. Does attending HE narrow the gaps in labour market outcomes by ethnicity?
3. Does attending HE narrow the gaps in labour market outcomes between people who were eligible for free school meals at school versus their peers?
4. What are the gaps in labour market outcomes by the intersection of our markers of gender, ethnicity and disadvantage?

Method

- A large, person-level longitudinal dataset was constructed from National Pupil Database (NPD), Individualised Learner Record (ILR), Higher Education Statistics Agency (HESA) and Longitudinal Education Outcomes (LEO) data, to track individuals from Key Stage 4 (KS4) to 16 years after KS4
- Summary statistics tables were produced to see average earnings and the proportion in employment by subgroup
- Pooled cross-sectional regression analysis was carried out to understand the drivers of earnings and employment status at nine and 16 years after KS4
- The multiple linear regression analysis used the outcomes above as the dependent variable, and educational pathway as the key explanatory variable, as well as a range of demographic controls

Results and conclusions

Even when controlling for demographic factors and KS4 attainment, by 16 years post-KS4, higher levels of education are associated with higher earnings and a higher likelihood of being in employment. This is true for disadvantaged students as well as for their peers. Moreover, disadvantaged students see a greater benefit than their peers from HE in terms of their chance of being in employment.

While there is a clear earnings premium from HE for disadvantaged students, disadvantage gaps in earnings do persist. Similarly, while the earnings premium from HE is large for female graduates, the average earnings gap compared to male graduates substantially widens over time.

Overall, the highest earnings observed were for graduates from the top-third HE providers (defined as the 52 most selective providers), with Asian graduates seeing the largest earnings premium within this group.

Glossary of Terms

Ethnic minority	Any ethnicity other than White British
FE	Further education
FSM	Free School Meals
Full Level 2	Achieving passes in at least five GCSEs at A*-C (or equivalent)
Full Level 3	Achieving passes in two A levels (or equivalent)
HE	Higher education
HESA	Higher Education Statistics Agency
ILR	Individualised Learner Record
KS	Key Stage
LEO	Longitudinal Education Outcomes
Level 3	A level or equivalent vocational and technical qualifications
Level 4	Advanced vocational qualification, such as a CertHE or a HNC, which usually takes one year to complete
Level 5	Advanced vocational qualification, such as a DipHE, HND or a foundation degree, which usually takes two years to compete
Level 6	Undergraduate degree (or equivalent vocational qualification)
NPD	National Pupil Database
ONS Secure Research Service	A secure research service, operated by the Office for National Statistics (ONS), that allows accredited researchers access to de-identified, unpublished data for research
PAYE	Pay as you earn (HMRC's system for collecting income tax from most employees in the UK)
SEND	Special Educational Needs and Disabilities
Top third providers	The 52 most selective HE providers in the UK (based on the A level UCAS tariff score of entrants)

2. Introduction

2.1. Background

The Centre for Transforming Access and Student Outcomes in Higher Education (TASO) commissioned State of Life and Mime to conduct research to understand the individual and societal benefits of higher education (HE) for disadvantaged young people. This research focused on the role of HE in addressing equality gaps in labour market outcomes between disadvantaged students and their peers, and understanding other factors that affect outcomes alongside economic disadvantage. Following a rapid evidence review to identify important gaps in the existing evidence, research was undertaken using the Longitudinal Educational Outcomes (LEO) dataset. This dataset allows researchers to track young people from school, through post-16 and post-18 education and into the labour market, and is therefore invaluable in showing the long-term earnings and employment effects of HE for disadvantaged students. The results of this analysis are presented in this report.

Table 1: Research team details

Organisation	Name	Role and responsibilities
Mime	Steve Preston	Project co-lead
Mime	Phil Rossiter	Technical lead and ONS project owner
Mime	Joe Miller	Senior researcher
Mime	Laura Jones	Researcher
State of Life	Will Watt	Project co-lead
State of Life	Iulian Gramatki	Lead statistician
State of Life	Lizzie Trotter	Senior researcher
Department for Education	Alan Little	Quality assurance of the research protocol

2.2. Aims

As shown in Figure 1, previous research into the topic of labour market outcomes after HE has shown that, on average, disadvantaged graduates go on to earn more than their disadvantaged peers who did not graduate from HE.[1] However,

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[1] DfE Post 16 education and labour market activities, pathways and outcomes (LEO) Research report https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1122775/Research_report_-_Post_16_education_and_labour_market_activities_pathways_and_outcomes_LEO.pdf

disadvantaged graduates have worse labour market outcomes than non-disadvantaged graduates. This research used LEO data, taking Free School Meal (FSM) eligibility at Key Stage 4 (KS4) as the measure of disadvantage.

Figure 1: Average earnings of FSM eligible and non-FSM eligible individuals with and without a degree (KS4 cohorts 2001/02 to 2006/07)[2]

Source: Longitudinal Education Outcomes dataset
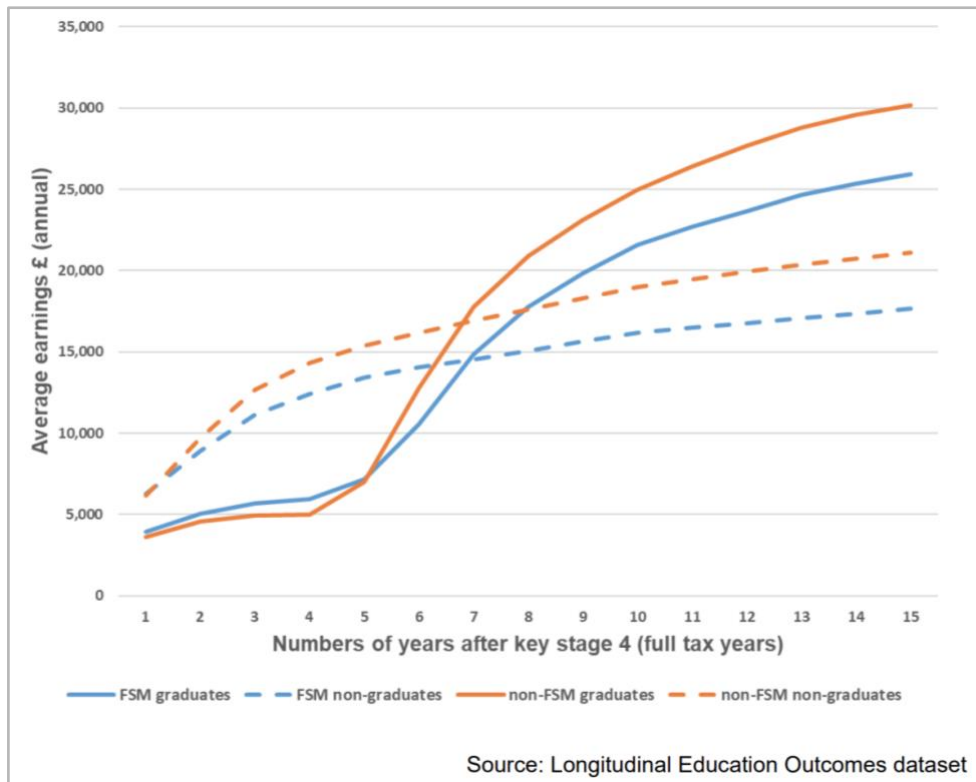
The research found that, for the first five years after KS4, the FSM graduate group was earning, on average, slightly more than the non-FSM graduate group. In this time period, earnings are more likely to be from part-time work while studying. This could explain higher earnings for the economically disadvantaged students due to a greater need to financially support themselves through HE.

From seven years after KS4, disadvantaged graduates earn more than disadvantaged non-graduates, with the gap widening over time. By 15 years after KS4, disadvantaged graduates were found to earn £8,300 more than disadvantaged non-graduates, but, importantly, £4,200 less than non-disadvantaged graduates. Both gaps were found to widen over time.

However, this does not control for important factors, such as gender, ethnic group, region, special educational needs and disabilities (SEND), or prior attainment. When many of these additional factors were investigated separately in the same paper,

[2] DfE Post 16 education and labour market activities, pathways and outcomes (LEO) Research report (Figure 19) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1122775/Research_report_-_Post_16_education_and_labour_market_activities_pathways_and_outcomes_LEO.pdf

they were shown to influence labour market outcomes. For example, it was found that the male graduate group was earning around £8,000 more than the female graduate group at 15 years after KS4.

This project therefore aimed to fill the key knowledge gaps identified in the existing literature, to support TASO to better understand the value of HE for different groups of students. Specifically, the key gaps identified by the rapid evidence review that were explored in this analysis are:

1. How outcomes for disadvantaged graduates **vary by the specific education pathway** pursued. In particular, how the effect of HE differs to that of alternative educational pathways such as further education (FE) qualifications or apprenticeships
2. The **role played by additional factors**, such as prior attainment, in the disparity in outcomes between disadvantaged and other graduates

Therefore, the following four research questions were explored:

1. Does attending HE narrow the gap in labour market outcomes between men and women?
2. Does attending HE narrow the gaps in labour market outcomes by ethnicity?
3. Does attending HE narrow the gap in labour market outcomes between people who were eligible for free school meals at school versus their peers?
4. What are the gaps in labour market outcomes by the intersection of our markers of gender, ethnicity and disadvantage?

The first three research questions resulted in the following hypotheses:

H1: The gap in labour market outcomes between men and women is smaller for those individuals who went to HE versus other pathways.

H2: The gaps in labour market outcomes by ethnicity are smaller for those individuals who went to HE versus other pathways.

H3: The gap in labour market outcomes between people who were eligible for free school meals at school versus their peers is smaller for those individuals who went to HE versus other pathways.

As it is more exploratory, there was no initial hypothesis relating to the fourth research question.

3. Methods

The research design and method was pre-registered to prevent bias and ensure the research was best able to address the initial research questions.

3.1. Data

Four secure and extensive person-level datasets were linked to create a single longitudinal view of each individual's educational pathways and labour market outcomes over time. These datasets were:

- **National Pupil Database** (NPD) - A pupil-level Department for Education (DfE) dataset with records for all pupils who have been in state-funded schools in England. This links data on pupil characteristics from the school census to their qualification and attainment records throughout their time in school.
- **Individualised Learner Record** (ILR) - A student-level dataset with records on qualifications entered and achieved at Further Education (FE) and adult skills (including apprenticeships) providers in England.
- **Higher Education Statistics Agency** (HESA) - A student-level dataset with records for all students who have studied at HE providers in the UK. This includes information on the course studies, HE provider, and their achievement.
- **Longitudinal Education Outcomes** (LEO) - A person-level dataset used to link individuals' NPD/ILR/HESA records to earnings, employment and benefits data from HMRC and DWP. This includes data on all individuals regardless of education pathway, meaning outcomes for graduates can be compared to non-graduates. The data covers tax years from 2003/04 to 2019/20.

3.2. Sample selection

In order to ensure a large enough sample for the regression analysis, including for split-sample regression models, two KS4 cohorts were combined to form a total sample of over a million individuals. These cohorts were those who completed KS4 in 2002 and 2003 respectively. These are the two earliest cohorts available and were therefore chosen to allow tracking earnings and employment outcomes for the longest period of time possible with this dataset.

In total, a sample of 1,125,035 individuals across the 2002 and 2003 cohorts was identified in the NPD dataset. These individuals were then matched to their records across all four linked datasets. While not all individuals could be matched across the board, there was a large degree of success with well over 95% matched to their individual characteristics, such as gender and prior attainment. As discussed in Section 5, there are some limitations to matching these individuals to their labour market outcomes due to the coverage of the LEO dataset. For example, it does not include earnings from outside of the UK.

While large, this sample is also not entirely representative of the broader population. For example, it does not include data for those who were in independent schools or otherwise educated outside of state-funded schools at KS4. That is because these

pupils do not appear in the school census.[3] Additionally, individuals who arrived in the UK after KS4 are not included.

3.3. Analysis

This data manipulation and analysis can be split into three distinct phases:

Creating a linked dataset

Relevant records from the four datasets outlined above were linked based on anonymous person identifiers. This process generated a dataset that included the variables identifying labour market outcomes, the *treatment* variable (educational pathway), and demographic controls. This provided the person-level dataset required to produce descriptive statistics and regression analysis. Each of these sets of variables are described in Section 3.4.

Producing aggregate summary statistics

Initial analysis of the dataset involved producing a set of descriptive summary statistics, consisting of sets of tables showing the key labour market outcomes (earnings and employment rates nine and 16 years after KS4) split by pupil characteristics. Specifically, outcomes were explored by educational pathway and KS4 prior attainment, as well as gender, ethnic group, region and a marker of disadvantage (free school meals eligibility). More details are provided in Subsection 3.5.1.

Developing regression analysis models

Finally, ordinary least squares (OLS) regression models were built to analyse the labour market outcomes by educational pathway, with a set of key demographic control variables (gender, ethnic group, disadvantage, SEND status, KS4 attainment, region). Additionally, split-sample and interaction regression models were produced, splitting the sample by gender, ethnic group, disadvantage status, and combinations thereof, to reveal how outcomes differ across these subgroups, while controlling for other demographic characteristics available in the data. In particular, this was intended to expose any different effect of HE across groups. More details are in Subsection 3.5.2.

3.4. Variables

Below is a categorisation of the variables considered in this study, with information on how they were defined and produced.

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[3] For more information on the school census, see https://educationhub.blog.gov.uk/2022/10/07/the-school-census-what-you-need-to-know/

3.4.1. Outcome measures

Two labour market outcomes - employment earnings and employment status - were used as the outcome measures for this research, as shown in Table 2 below. The two data collection points were set at nine and 16 years post-KS4 for the following reasons:

A. Nine years after KS4 was chosen as the earliest time point in which a large majority of those who had attended HE or FE will have subsequently entered the labour market. Those in the sample will be around 25 years old at this time point.
B. When the application for access to this data was made, 2018/19 was the latest year of available LEO data. This meant that 16 years after KS4 is the latest possible time point to observe the labour market outcomes of the half of the cohort who completed KS4 in 2003.[4] Those in the sample will be around 32 years old at this time point.

Table 2: Outcome measure details

Outcome measure	Data collected	Point of collection
1. Earnings	Reported total PAYE UK earnings in relevant tax year, from the LEO dataset. This includes everyone with any PAYE earnings reported, and therefore will include both part-time and full-time employees. However, this does not include any earnings from self-employment or outside the UK.	A. Nine years after KS4 - tax years 2010/11 and 2011/12 for the two cohorts respectively B. 16 years after KS4 - corresponding to tax years 2017/18 and 2018/19 for the two cohorts respectively.
2. Employment	Person recorded as being employed in the UK at any point in the relevant tax year, from the LEO dataset. This includes any record of employment regardless of length or nature of employment.	A. Nine years after KS4 - tax years 2010/11 and 2011/12 for the two cohorts respectively B. 16 years after KS4 - corresponding to tax years 2017/18 and 2018/19 for the two cohorts respectively.

3.4.2. The treatment variable

The treatment variable used in this study is the individual's education pathway. Educational pathways have been defined as the highest level and type of qualification obtained by the individual by nine years post-KS4. Figure 2 below outlines the qualification levels included. Qualifications at Level 2 or below, for example GCSEs, were not included, with those who did not achieve a Level 3 or higher all grouped as having no qualification above KS4. Similarly, qualifications at

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[4] Note that the operationalisation of 'years after KS4' for labour market outcomes is different in this study from that used in the DfE Post 16 education and labour market activities report cited in Section 1. In this study, the tax year running from 7 April 2018 to 6 April 2019 is considered 16 years after KS4 for the cohort who graduated from KS4 in July 2003, whereas in the DfE report this would be considered 15 years after KS4.

Level 7 or above, for example a postgraduate degree, were not considered, with those individuals grouped into one of the Level 6 qualification groups.

Figure 2: Explanation of UK qualification levels

The treatment variable was produced by assigning a hierarchical categorical variable with the following categories:

- **Nothing above KS4 (Level 2 or below)** - No record of achieving a Level 3 or higher qualification found in the NPD, ILR or HESA datasets

- **Level 3 in FE institution** - Recorded in the ILR dataset as having achieved Level 3 at a further education institution

- **Level 3 at KS5** - Recorded in the NPD dataset as having achieved Level 3 at KS5 (usually means having passed two A levels)

- **Level 3 apprenticeship** - Recorded in the ILR dataset as having completed a Level 3 apprenticeship. While higher level apprenticeships are now more common, they were not a widespread option during the time period analysed in this research. Therefore only Level 3 apprenticeships are considered.

- **Level 4 in FE institution** - Recorded in the ILR dataset as having achieved a Level 4 (and no higher) qualification from a further education institution

- **Level 5 in FE institution** - Recorded in the ILR dataset as having achieved a Level 5 (and no higher) qualification from a further education institution

- **Level 6 in FE institution** - Recorded in the ILR dataset as having achieved a Level 6 qualification from a further education institution

- **Level 4 or 5 in a HE provider**- Recorded in the HESA dataset as having achieved a lower level (below Level 6) qualification from a HE provider

- **Other HE graduate (Level 6)** - Recorded in the HESA dataset as having achieved a Level 6 qualification (undergraduate degree) or above from any HE provider that is not a top-third HE provider
- **Top-third HE provider graduate (Level 6) -** Recorded in the HESA dataset as having achieved a Level 6 qualification (undergraduate degree) or above from a top-third HE provider

For the regression analysis below, the category representing the lowest educational attainment - nothing above KS4 - serves as the base (reference) level. This means that the regression coefficients of all other categories represent the difference in the outcome between that category and the reference level.

3.4.3. Control variables

The following variables have been included as control variables in the analysis. Each of these variables was defined based on the individual's data at KS4 and does not allow for any changes between KS4 and the two outcomes time points. For example, someone who completes KS4 in a school in London is categorised as London, regardless of whether they live in London nine and 16 years after KS4.

- **Cohort** (2 categories) - 2002 KS4 finishers, 2003 KS4 finishers
- **Gender** (2 categories[5]) - Male, Female
- **Disadvantage** (3 categories) - Eligible for FSM, Not eligible for FSM, Unknown
- **Ethnic Group** (6 categories[6]) - Asian, Black, Mixed, White, Other, Unknown
- **Region of England** (9 categories) - North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, London, South East, South West
- **Special Educational Needs and Disabilities** (SEND) (3 categories) - Known to have special educational needs, Not known to have special educational needs, Unknown
- **KS4 capped average point score** (recoded into 5 categories) - Very low, Low, Medium, High, Unknown/no records found

Individuals with a known KS4 attainment were banded into four groups, based on their capped average point scores at KS4, as shown in Figure 3 below.[7] These bands were defined through exploration of the distribution of average point scores across the full cohort, and in combination with other relevant data points. For

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[5] The available data has just two categories and no 'unknowns'

[6] These ethnic groups were chosen in line with government guidance: https://www.ethnicity-facts-figures.service.gov.uk/style-guide/ethnic-groups

[7] These groups were defined by the following points bands: Very low (under 7 points), Low (7 to 37 points), Medium (37 to 53 points), High (over 53 points). Frequency analysis was carried out to evaluate these cut-off points and assess their applicability for both KS4 cohorts.

example, the medium prior attainment band has been defined as greater than the average point score (37) found to be associated with having achieved a full Level 2 (A*-C in at least 5 GCSEs or equivalent). KS4 attainment records could not be found for around 4% of the sample, so these pupils were grouped into a separate 'unknown' KS4 attainment group.

Figure 3: KS4 prior attainment distribution of combined cohort
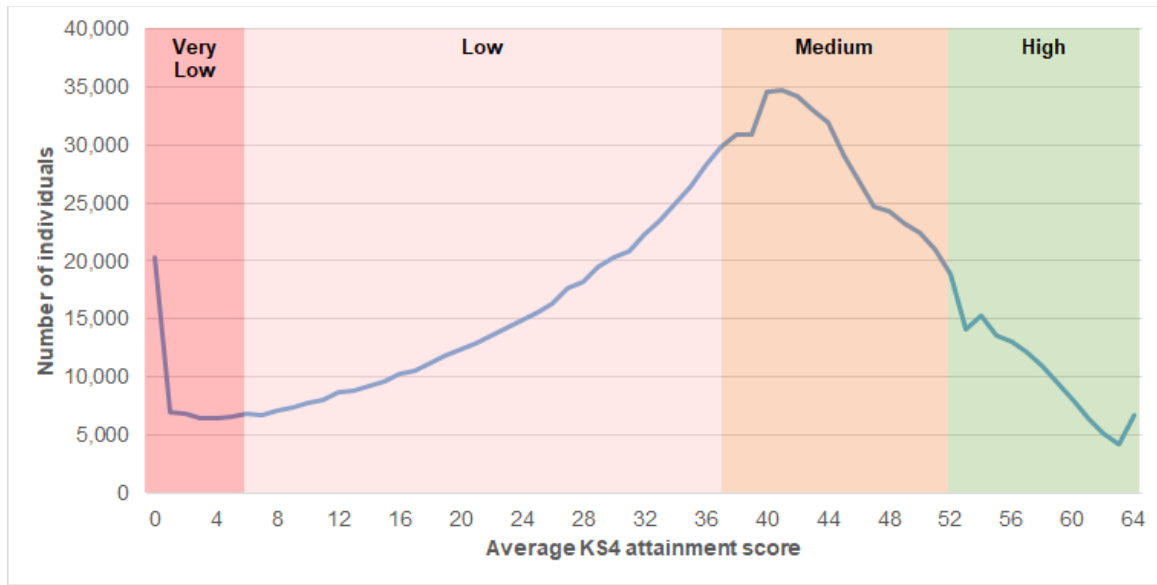
Each of the individual characteristics used as control variables were taken from the relevant school census NPD data for the year that each pupil finished KS4 (Year 11).

3.4.4. Subgroup analysis

In order to help answer the fourth research question about intersectional effects, split-sample regression analysis was performed on the following subgroups:

By gender:
● Females
● Males

By FSM eligibility:
● FSM eligible
● Not FSM eligible

By ethnic group:
● White
● Asian
● Black
● Mixed
● Other ethnic group

By gender for FSM eligible pupils

- FSM eligible, Male
- FSM eligible, Female

By ethnic group for FSM eligible pupils
- FSM eligible, White
- FSM eligible, Asian
- FSM eligible, Black
- FSM eligible, Mixed
- FSM eligible, Other ethnic group

By ethnic group and gender for FSM eligible pupils
- FSM eligible, White, Male
- FSM eligible, White, Female
- FSM eligible, Asian, Male
- FSM eligible, Asian, Female
- FSM eligible, Black, Male
- FSM eligible, Black, Female
- FSM eligible, Mixed, Male
- FSM eligible, Mixed, Female
- FSM eligible, Other ethnic group, Male
- FSM eligible, Other ethnic group, Female

Regression was also performed with interaction terms generated between the educational pathway and each of: gender, ethnic group, and FSM eligibility. More details are available in Subsection 3.5.2.

Descriptive statistics were produced for a range of subgroups defined by combinations of the following variables:

- KS4 attainment and educational pathway
- KS4 attainment and educational pathway and FSM eligibility
- KS4 attainment and educational pathway and gender
- KS4 attainment and educational pathway and ethnic group

3.5. Analytical strategy

3.5.1. Descriptive statistics

Aggregations were generated from the person-level analysis dataset. Aggregate tables were produced to show cohort size, mean annual earnings and the percentage of the cohort recorded as being in employment for each subgroup as listed in Subsection 3.4.4.

Any group with a cohort size of 20 or fewer individuals was suppressed. Additionally, due to specific rules around the clearance of HESA data from the ONS Secure Research Service, all groups are rounded to the nearest five people. Results from different subgroups were aggregated up to different levels to provide headline figures for comparison.

3.5.2. Regression analysis

The regression analysis was carried out according to model equations of the following type:

$$E_i = \alpha + \beta_1 Uni_i + \beta_2 FE6_i + \beta_3 FE5_i + \ldots + x_i\gamma + \varepsilon_i$$

Multiple linear regression analysis using OLS was conducted for the full available sample, as well as split-sample regressions for the subgroups listed in Subsection 3.4.4 and regressions with interaction terms (explained below), to highlight differential effects of HE/FE for subcategories of the population.

The terms in the equation above can be explained as follows:

- E_i is the outcome (dependent) variable for person *i*, and represents one of the four measures: earnings and being in employment, both nine and 16 years after KS4. The outcome variables are used one by one in a separate model estimation each and considered independently of each other.
- α is the constant (intercept) term of the regression equation, representing the predicted level of the outcome variable in the hypothetical situation when all other variables are equal to 0.
- The treatment variable is the respondent's highest educational qualification achieved and is a categorical variable. Categorical variables are represented in a regression by a set of dummy (indicator) variables, each of which takes the value 1 if that is the highest qualification achieved by respondent *i*, and 0 otherwise: Uni_i=1 if it is a degree, $FE6_i$=1 if it is Level 6 Further Education and so on. The full list of categories can be seen in Subsection 3.4.2. All the variables in the list are included at the same time in every regression model and only one of them will be equal to 1 for any respondent. 'Nothing above KS4' is designated a reference category and excluded from all models to avoid multicollinearity.
- β_1, β_2, β_3, etc are the regression coefficients of the different categories of the treatment variable and will provide an estimate of the earnings premium (or the extra likelihood of being in employment) associated with having the respective highest qualification as opposed to the reference category (nothing above KS4).
- x_i is a vector of control variables, included in the regression because they are known to have a considerable influence on earnings and employment, and because they are available within the LEO data. We used vector notation to conserve space. All our control variables are categorical, meaning that they are represented by several 0/1 indicators for each category except the reference category, as described above. γ is therefore a vector of regression coefficients of all control variables, each coefficient representing the change in the outcome associated with being in this category compared to the reference category of the same variable. There will be a separate coefficient for each category except the reference. The full list of control variables is shown in Subsection 3.4.3.

- ε_i is the error term, representing the difference between the actual outcome (earnings/employment) of respondent i and the outcome predicted by the regression model.

Regressions with interaction variables are an alternative to split-sample regressions for looking at how the relationship between the outcome and explanatory variable differs across subgroups. An interaction variable is a product of the explanatory variable and another variable which defines the subgroups.[8] Instead of splitting the sample and performing the regression separately for each subgroup, the model is run for the full sample. The coefficients of the interaction variables will then represent the differences in the earnings and employment premiums associated with HE/FE across the subgroups considered.

We use the following interactions (each in a separate model) of variables, whose categories are defined in subsections 3.4.2 and 3.4.3:

- Educational pathway and gender
- Educational pathway and broad ethnic group
- Educational pathway and disadvantage (FSM)

When the outcome variable is employment, it is a binary outcome, and the model in equation (1) essentially becomes a linear probability model. Alternative models exist, such as logit and probit models, which apply a transformation to the regression equation to better fit binary outcomes. However, we prefer the linear probability model because its coefficients are considerably easier and more straightforward to interpret (each coefficient can be directly interpreted as the difference in the probability of being in employment associated with the respective variable). Furthermore, the main disadvantage of a linear probability model - predicting a probability that falls outside the [0; 1] interval - is unlikely to be a major problem because all our right-hand side variables are categorical. Unlike numeric variables, categorical variables cannot go to infinity and therefore the amount they can contribute to the outcome variable is limited by the coefficient size.

When the outcome variable is earnings, a logarithmic transformation is often applied in economic modelling, such as in the Mincer earnings function.[9] However, this again complicates the interpretation of the regression coefficients - as they would then need to be exponentiated to represent the ratio (rather than the difference) in earnings outcomes across categories. While this may be a more accurate description of the relationship between earnings and a numeric explanatory variable such as years of education or years of experience, it brings no added benefit when the explanatory variables are categorical, as in our study. A categorical variable is represented in the regression as multiple binary variables, each of which describes

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[8] Given that both these variables are categorical in our situation, the interaction variable will actually be a multitude of indicator (dummy) variables for each possible combination of categories for the two categorical variables involved in the interaction.

[9] https://en.wikipedia.org/wiki/Mincer_earnings_function

the relationship between the outcome (earnings) in two possible states. Whether that relationship is described as a difference (when earnings is the outcome) or as a ratio (when log earnings is the outcome), both cases provide the full possible information about the relationship between earnings in the respective two states. We cannot speak of 'the true relationship being logarithmic or linear' unless the explanatory variable is also numeric.

Therefore we do not use any of these transformations and proceed with the standard linear regression model to facilitate more useful interpretation of the coefficients. The traditional disadvantages of doing so are nullified by the nature of our explanatory variables, which are all categorical.

4. Results and Discussion

4.1. Description of data

The tables in this section present data on the average outcomes observed for different subgroups in the sample. For earnings, this means the average earnings across all individuals with some earnings at each time point, whereas for employment, this means the proportion of the subgroup with a record of a period of employment at each time point. For every subgroup, the cohort size column gives a count of the number of people in the group that were identified in the KS4 dataset. Subtotal rows (labelled as 'All') do not always equal the sum of the other categories shown because some rows have been suppressed due to small numbers, and some categories (such as 'unknown') are not shown. The outcome columns are coloured where the values are higher than the overall cohort average value (across all prior attainment bands and educational pathways). A darker colour of shading indicates that the value is much higher than the overall cohort average value.

Table 3 shows the aggregate outcomes at the two time points split by prior attainment band and the educational pathway. As might be expected, those with higher levels of educational pathway, such as top-third HE graduates, were generally observed to be earning more, on average, than groups with lower educational pathways at both time points. However, there are some notable exceptions, for example those with a Level 5 qualification from a FE institution earned more on average than graduates (Level 6) from non-top-third HE providers at both time points.

Within each educational pathway, subgroups with higher prior attainment are generally observed to earn more than those with lower prior attainment. There are some instances where the earnings of groups with high prior attainment are notably higher than groups with low prior attainment, but who have achieved a higher level of educational pathway. For example, on average, the high prior attainers who achieved a Level 3 at KS5, but no higher, were earning more than the group of low

prior attainers who attended a non-top-third HE provider at both nine and 16 years after KS4.

The pattern is less clear for the percentage of each group that was observed as being in employment at each time point. While employment rates were higher among those that had graduated from HE compared to those with no known qualification after KS4 (more than 20 percentage points higher for graduates compared to those who did not achieve a post-KS4 qualification nine years after KS4), some of the highest employment rates were for those who had taken an apprenticeship or pursued qualifications in FE institutions. For example, those with Level 5 or Level 6 qualifications from FE institutions have a higher employment rate than graduates at both time points. This might suggest that the more vocational courses provide a better route to employment than even degrees from top-third HE providers, albeit with lower earnings in the long term.

The percentages in employment do not include those who are self-employed, or who are pursuing further study, which may partly explain why the employment rates are not always higher for the groups with high prior attainment, or those with a higher level educational pathway. Additionally, the exclusion of self-employment may help to explain why employment rates tend to be lower at the second time period.

It is also worth noting the lower rates of employment among the group who undertook Level 4 or 5 qualifications in an HE provider. Some of these courses are preludes to further study, such as a foundation degree. Therefore, this group is more likely to be studying in HE providers for a longer period of time than others, and therefore less likely to be in employment.

Some of the gaps in average outcomes between graduates and those who took other pathways were large. The average earnings nine years after KS4 for those with no post-KS4 qualification was £12,752, compared to £19,455 for the group that graduated from a top-third HE provider; an earnings gap of £6,703. Notably, this gap increased to more than £21,000 by 16 years after KS4.

There were also large differences in outcomes between graduates who attended top-third HE providers and those who attended other HE providers. Among those with high prior attainment, the cohort who attended a top-third HE provider earnt an average of £43,394 16 years after KS4, which was more than £10,000 above the average earnings of the group with high prior attainment who attended other HE providers.

Table 3: Summary of outcomes by KS4 prior attainment and educational path

Pathway (highest qualification)	Prior attainment band (KS4)	Cohort Size	Average earnings		% in employment	
			9 years after KS4	16 years after KS4	9 years after KS4	16 years after KS4
0. Nothing beyond KS4	0. Very Low	58,745	£8,301	£14,398	44.6%	48.4%
	1. Low	359,080	£12,576	£18,772	68.1%	67.5%
	2. Medium	108,810	£15,665	£23,595	73.4%	70.6%
	3. High	2,875	£19,895	£32,069	59.8%	57.7%
	All	570,780	£12,752	£19,446	64.9%	64.6%
1. Level 3 in FE	0. Very Low	1,290	£10,472	£17,839	71.7%	70.9%
	1. Low	55,960	£14,095	£20,755	84.1%	80.3%
	2. Medium	43,095	£16,071	£24,042	86.6%	82.6%
	3. High	1,510	£16,551	£27,753	85.1%	82.5%
	All	103,805	£14,906	£22,220	84.9%	81.1%
2. KS5 Level 3	0. Very Low	140	£12,170	£19,987	85.7%	85.7%
	1. Low	12,835	£13,955	£22,179	77.5%	75.5%
	2. Medium	70,645	£16,291	£26,183	80.3%	77.6%
	3. High	12,130	£16,696	£30,977	75.2%	74.2%
	All	97,410	£16,015	£26,261	79.2%	76.8%
3. Level 3 Apprenticeship	0. Very Low	180	£15,413	£19,404	86.1%	80.6%
	1. Low	9,005	£16,658	£23,590	90.4%	81.7%
	2. Medium	8,345	£19,480	£27,728	91.1%	83.9%
	3. High	305	£19,267	£27,971	91.8%	88.5%
	All	18,100	£18,014	£25,572	90.7%	82.8%
4. Level 4 in FE	1. Low	220	£15,388	£23,978	81.8%	79.5%
	2. Medium	445	£16,972	£25,584	91.0%	85.4%
	3. High	60	£17,031	£29,871	91.7%	83.3%
	All	740	£16,501	£25,396	87.2%	83.1%
5. Level 5 in FE	1. Low	980	£15,725	£26,767	88.3%	85.2%
	2. Medium	2,080	£20,503	£32,910	91.8%	88.2%
	3. High	115	£19,148	£31,972	87.0%	82.6%
	All	3,245	£18,999	£30,993	90.4%	86.9%
6. Level 6 in FE	0. Very Low	40	£6,053	£17,822	62.5%	62.5%
	1. Low	2,350	£13,509	£21,866	88.7%	85.7%
	2. Medium	6,735	£17,468	£28,071	91.8%	87.5%
	3. High	830	£19,950	£32,581	92.8%	88.6%
	All	10,145	£16,722	£27,011	90.8%	86.9%
7. Level 4 or 5 in HE institution	0. Very Low	120	£8,832	£12,089	45.8%	50.0%
	1. Low	1,780	£13,126	£19,430	78.4%	76.4%
	2. Medium	2,055	£13,614	£23,535	81.5%	76.2%
	3. High	325	£13,789	£29,486	78.5%	73.8%
	All	4,430	£13,234	£21,909	78.1%	74.6%
8. Degree from a non-top-third HE provider	0. Very Low	445	£11,140	£21,457	75.3%	75.3%
	1. Low	26,490	£12,590	£23,628	82.6%	80.2%
	2. Medium	149,310	£16,200	£29,085	89.1%	84.6%
	3. High	32,825	£17,633	£31,245	89.6%	84.4%
	All	211,805	£15,994	£28,759	88.3%	83.9%
9. Degree from top-third provider	0. Very Low	90	£16,932	£36,091	66.7%	72.2%
	1. Low	1,475	£14,437	£25,276	80.3%	77.3%
	2. Medium	32,950	£17,854	£35,194	87.7%	83.9%
	3. High	68,265	£20,315	£43,394	87.7%	83.9%
	All	104,580	£19,455	£40,567	87.5%	83.7%
All	All	1,125,035	£14,890	£24,937	75.3%	73.2%

Note: See Glossary of Terms for explanation of Levels 1–6.

The role of gender

The earnings and rates of employment at nine and 16 years after KS4 by gender are shown in Table 4 below, split by educational pathway and KS4 attainment band. This table includes the three educational pathways of most interest to this research, namely the two HE pathways, and the baseline comparison pathway of individuals with no Level 3 or higher qualification. The full versions of this table and the other tables in this section are in Appendix 1.

Across both male and female cohorts, those who attended HE had substantially higher earnings 16 years after KS4, compared to the groups with lower qualification levels. However, gender gaps grew between the two time points, and many were very large 16 years post-KS4. In fact, these gender earnings gaps were much larger than the equivalent disadvantage or ethnicity gaps explored below. Interestingly, despite the widening of the graduate gender gap over time, female graduates were more likely to be in some form of employment at both time points. By 16 years after KS4, a very high proportion of female graduates are employed in jobs that pay much less than the male graduates they studied with. As discussed in Section 5, these large earnings gaps, combined with the high female graduate employment rates, may be explained by differences in employment sectors/types, working patterns and hours, which cannot be controlled for in this analysis.

Across all prior attainment bands, there were relatively small earnings gaps nine years after KS4 between men and women who graduated from HE. At this point in time, the gap in earnings between the male and female cohorts was generally larger among the groups with no known qualification after KS4 – with men earning around an average of £3,000 more than women. However, by 16 years after KS4 the gender earnings gap had widened among graduates, up to around £13,500 for those who attended a top-third HE provider. This gap is bigger than the equivalent gender earnings gap among those with no known post-KS4 qualifications of £8,800.

Similarly, among those who attended a top-third HE provider with medium prior attainment, men were earning around £650 more than women at nine years after KS4, rising up to £11,500 at 16 years after KS4. The earnings gap was even larger for the group with high prior attainment, with women earning around £15,000 less.

There were also very large gender earnings gaps for those with medium prior attainment who completed a Level 3 apprenticeship, at £15,300 16 years after KS4 (not shown in the table below but available in Appendix 1). This is much larger than the gap among comparable cohorts who attended a non-top-third HE provider.

Table 4: Summary of outcomes by KS4 prior attainment, educational pathway and gender[10]

Female

Pathway (highest qualification)	Prior attainment band (KS4)	Cohort Size	Average earnings		% in employment	
			9 years after KS4	16 years after KS4	9 years after KS4	16 years after KS4
0. Nothing beyond KS4	0. Very Low	22,420	£6,114	£9,295	34.5%	41.5%
	1. Low	155,280	£10,243	£12,979	61.0%	62.9%
	2. Medium	59,090	£13,843	£18,626	69.5%	67.2%
	3. High	1,950	£15,269	£23,316	58.2%	55.6%
	All	255,935	£10,932	£14,329	59.1%	60.7%
8. Degree from a non-top-third HE provider	0. Very Low	240	£12,580	£21,191	79.2%	79.2%
	1. Low	12,380	£12,578	£19,968	83.4%	79.7%
	2. Medium	83,145	£16,073	£25,099	89.6%	84.6%
	3. High	22,455	£17,454	£27,985	90.3%	84.6%
	All	119,740	£15,994	£25,143	89.0%	84.0%
9. Degree from top-third provider	0. Very Low	40	£20,898	£36,631	75.0%	87.5%
	1. Low	725	£15,863	£22,248	81.4%	77.2%
	2. Medium	16,075	£17,530	£29,294	88.7%	84.3%
	3. High	38,865	£19,294	£36,706	88.7%	84.4%
	All	56,655	£18,754	£34,424	88.5%	84.2%

Male

Pathway (highest qualification)	Prior attainment band (KS4)	Cohort Size	Average earnings		% in employment	
			9 years after KS4	16 years after KS4	9 years after KS4	16 years after KS4
0. Nothing beyond KS4	0. Very Low	36,330	£9,256	£16,842	50.8%	52.6%
	1. Low	203,800	£14,025	£22,623	73.4%	71.0%
	2. Medium	49,720	£17,591	£28,873	78.0%	74.7%
	3. High	925	£28,816	£48,320	63.2%	62.2%
	All	314,845	£13,991	£23,135	69.6%	67.8%
8. Degree from a non-top-third HE provider	0. Very Low	200	£9,195	£21,824	72.5%	72.5%
	1. Low	14,105	£12,601	£26,785	82.0%	80.8%
	2. Medium	66,165	£16,363	£34,118	88.5%	84.5%
	3. High	10,375	£18,036	£38,372	88.2%	83.9%
	All	92,060	£15,993	£33,491	87.3%	83.8%
9. Degree from top-third provider	0. Very Low	45	£12,967	£35,461	55.6%	66.7%
	1. Low	750	£12,960	£28,272	79.3%	77.3%
	2. Medium	16,875	£18,173	£40,865	86.7%	83.4%
	3. High	29,400	£21,710	£52,335	86.3%	83.2%
	All	47,920	£20,311	£47,908	86.2%	83.1%

Note: See Glossary of Terms for explanation of Levels 1–6.

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[10] For brevity, this table includes just three educational pathways. Small cohorts of less than 50 have been hidden. The full version of this table can be found in Appendix 1.

Disadvantage gaps

Table 5 shows the average earnings and proportions of the cohort in employment at nine and 16 years after KS4, for both the FSM eligible and non-FSM eligible groups, split by prior attainment and educational pathway. Again, this table focusses on just the two HE and the baseline education pathways.

Within both the FSM eligible and not eligible cohorts, those who attended HE tended to have higher earnings and higher rates of employment, compared to those who did not achieve post-KS4 qualification. For example, among the FSM eligible cohort with medium prior attainment, those who did not achieve any Level 3 or higher qualification earnt, on average, £20,333 16 years after KS4, compared to £26,412 for those who attended a non-top-third HE provider. The proportion in employment was also higher among the group that attended a non-top-third HE provider, at 81%, compared to only 65.8% for the group that did not achieve post-KS4 qualification.

A clear disadvantage earnings gap was observed, with earnings at both time points higher among the non-FSM eligible cohorts compared to their FSM eligible equivalent cohorts. For example, the average earnings for those who attended a non-top-third HE provider was more than £2,000 lower for the FSM eligible cohort at nine years after KS4 and had risen to more than £3,700 by 16 years post-KS4. Similarly, of those who graduated from a top-third HE provider, the FSM eligible group was earning around £1,500 less than the non-FSM eligible group at nine years after KS4, with the gap increasing to £5,000 by 16 years after KS4.

The disadvantage gap in earnings for those who had no qualification after KS4 was £4,000 at 16 years post-KS4. This suggests that while all education qualifications boost earnings overall, they do little to close the gap and may actually widen it in the case of top-third HE providers. Looking at the full results in Appendix 1, only Level 3 FE and HE at a non-top-third HE provider appear to be associated with a marginally smaller disadvantage gap than the gap in the group with no post-KS4 qualifications. One way to interpret these findings is that education alone cannot address disadvantage; that inequalities in Britain are more extensive or 'systemic' and so will need a wider range of policy responses across many different institutions and sectors (from schools to employers).

One notable exception was the small disadvantage earnings gap at nine years post-KS4 among high prior attainers who graduated from a non-top-third HE provider, of just £236. However, by 16 years after KS4, this gap had widened to over £2,000.

Finally, it is worth noting the relative sizes of the FSM and non-FSM eligible graduate cohorts. There were just over 20,000 FSM eligible graduates compared with almost 300,000 non-FSM eligible graduates. Even accounting for the differences in cohort

size, this reflects a much larger proportion of the non-FSM eligible cohort entering HE, likely driven by the higher average prior attainment among this group.

Table 5: Summary of outcomes by KS4 prior attainment, educational pathway and disadvantage status[11]

FSM eligible

Pathway (highest qualification)	Prior attainment band (KS4)	Cohort Size	Average earnings		% in employment	
			9 years after KS4	16 years after KS4	9 years after KS4	16 years after KS4
0. Nothing beyond KS4	0. Very Low	21,230	£7,259	£12,968	39.4%	44.7%
	1. Low	72,305	£10,671	£16,386	59.5%	61.7%
	2. Medium	10,960	£13,948	£20,333	66.9%	65.8%
	3. High	170	£15,891	£28,611	58.8%	55.9%
	All	116,605	£10,257	£16,167	54.2%	56.8%
8. Degree from a non-top-third HE provider	0. Very Low	105	£10,788	£21,182	76.2%	66.7%
	1. Low	5,145	£11,528	£22,106	77.7%	76.2%
	2. Medium	10,220	£14,926	£26,412	84.5%	81.0%
	3. High	1,035	£17,407	£29,197	86.5%	81.2%
	All	16,755	£14,061	£25,276	82.3%	79.2%
9. Degree from top-third provider	0. Very Low	*	*	*	*	*
	1. Low	240	£12,932	£26,002	79.2%	70.8%
	2. Medium	1,935	£16,637	£32,767	83.5%	79.1%
	3. High	1,605	£19,790	£40,312	86.0%	81.6%
	All	3,840	£17,815	£35,681	84.1%	79.6%

Non FSM eligible

Pathway (highest qualification)	Prior attainment band (KS4)	Cohort Size	Average earnings		% in employment	
			9 years after KS4	16 years after KS4	9 years after KS4	16 years after KS4
0. Nothing beyond KS4	0. Very Low	37,325	£8,814	£15,120	47.6%	50.6%
	1. Low	286,590	£12,982	£19,302	70.2%	69.0%
	2. Medium	97,800	£15,839	£23,930	74.2%	71.2%
	3. High	2,705	£20,143	£32,322	59.9%	57.9%
	All	453,520	£13,280	£20,149	67.7%	66.6%
8. Degree from a non-top-third HE provider	0. Very Low	340	£11,242	£21,529	75.0%	77.9%
	1. Low	21,330	£12,828	£23,966	83.8%	81.2%
	2. Medium	139,005	£16,288	£29,270	89.5%	84.8%
	3. High	31,770	£17,643	£31,306	89.7%	84.5%
	All	194,925	£16,147	£29,036	88.8%	84.3%
9. Degree from top-third provider	0. Very Low	65	£21,281	£44,198	69.2%	76.9%
	1. Low	1,230	£14,712	£25,154	80.9%	78.9%
	2. Medium	30,975	£17,923	£35,325	87.9%	84.1%
	3. High	66,590	£20,325	£43,446	87.7%	83.9%
	All	100,585	£19,516	£40,733	87.6%	83.8%

Note: See Glossary of Terms for explanation of Levels 1–6.

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[11] For brevity, this table includes just three educational pathways - the two HE pathways and the baseline comparison pathway. The full version of this table can be found in Appendix 1.

Ethnicity gaps

Similarly to the tables above, Table 6 shows outcomes for ethnic minorities versus the White British sample subgroup, by prior attainment and educational pathway, focussing on just the two HE and the baseline education pathways.

This shows that the gaps between those who graduated from HE and those with no known qualification post-KS4 are similar for the ethnic minority and White British subgroups.[12] In fact, unlike the gender and disadvantage gaps above, there is no clear pattern in the gaps between ethnic minority and White British groups. For example, among non-top-third HE provider graduates, the White British cohort with medium prior attainment earned more at 16 years after KS4 than the ethnic minority group, while the opposite was true for the high prior attaining groups.

Among the groups with low prior attainment, ethnic minority students who graduated from a non-top-third HE provider were earning £1,000 less than their White British peers at 16 years after KS4. In addition, just 77.6% were in employment, compared with 82.4% of their peers. Conversely, among high prior attainers who attended a top-third HE provider, the ethnic minority cohort was found to be earning around £2,400 more than their peers nine years after KS4 and around £5,500 more than their peers 16 years after KS4. It should be noted that analysis at this level does not account for the ethnic minority group being composed of students from a wide range of ethnic backgrounds, whose labour market outcomes are likely to vary substantially. For example, in many instances Asian graduates were observed to earn more than Black graduates.[13]

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[12] In line with government guidance, ethnic minority was defined as anyone with an ethnicity recorded at KS4 that was not White British: https://www.ethnicity-facts-figures.service.gov.uk/style-guide/writing-about-ethnicity

[13] For more detailed analysis of earnings differences among ethnic minorities, comparing graduates and non-graduates as well as women and men, see Kathleen Henehan & Helena Rose (2018) *Opportunities Knocked? Exploring pay penalties among the UK's ethnic minorities*. London: Resolution Foundation.

Table 6: Summary of outcomes by KS4 prior attainment, educational pathway and ethnic group[14]

Ethnic Minority

Pathway (highest qualification)	Prior attainment band (KS4)	Cohort Size	Average earnings 9 years after KS4	Average earnings 16 years after KS4	% in employment 9 years after KS4	% in employment 16 years after KS4
0. Nothing beyond KS4	0. Very Low	8,085	£7,588	£13,326	38.8%	43.8%
	1. Low	45,565	£11,288	£17,464	57.8%	59.7%
	2. Medium	9,980	£14,588	£22,416	61.6%	60.8%
	3. High	400	£18,235	£32,659	37.5%	38.8%
	All	70,010	£11,382	£17,901	54.4%	56.3%
8. Degree from a non-top-third HE provider	0. Very Low	210	£11,124	£20,803	78.6%	76.2%
	1. Low	11,300	£11,645	£22,950	78.9%	77.6%
	2. Medium	27,910	£15,235	£28,608	85.0%	81.0%
	3. High	3,625	£17,644	£33,159	85.8%	80.4%
	All	43,870	£14,540	£27,534	83.3%	79.9%
9. Degree from top-third provider	0. Very Low	45	£18,824	£41,072	77.8%	77.8%
	1. Low	535	£14,094	£27,471	77.6%	72.0%
	2. Medium	7,255	£17,929	£36,573	83.9%	80.9%
	3. High	10,810	£22,344	£48,036	84.7%	79.9%
	All	19,075	£20,417	£42,981	84.0%	79.8%

White British

Pathway (highest qualification)	Prior attainment band (KS4)	Cohort Size	Average earnings 9 years after KS4	Average earnings 16 years after KS4	% in employment 9 years after KS4	% in employment 16 years after KS4
0. Nothing beyond KS4	0. Very Low	47,665	£8,433	£14,567	45.5%	49.3%
	1. Low	297,540	£12,729	£18,937	69.7%	68.8%
	2. Medium	94,205	£15,734	£23,674	74.7%	71.7%
	3. High	2,340	£20,285	£32,104	63.7%	61.1%
	All	474,620	£12,914	£19,640	66.5%	65.9%
8. Degree from a non-top-third HE provider	0. Very Low	215	£11,058	£21,749	69.8%	74.4%
	1. Low	14,195	£13,229	£24,010	85.5%	82.4%
	2. Medium	115,530	£16,426	£29,171	90.1%	85.4%
	3. High	27,960	£17,643	£31,025	90.2%	85.0%
	All	159,695	£16,365	£29,047	89.6%	85.0%
9. Degree from top-third provider	0. Very Low	40	£12,737	£21,970	50.0%	75.0%
	1. Low	880	£14,661	£24,048	81.8%	80.1%
	2. Medium	24,295	£17,823	£34,737	88.9%	84.9%
	3. High	54,850	£19,945	£42,507	88.3%	84.7%
	All	81,345	£19,253	£40,000	88.3%	84.7%

Note: See Glossary of Terms for explanation of Levels 1–6.

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[14] For brevity, this table includes just three educational pathways. Small cohorts of less than 50 have been hidden. The full version of this table can be found in Appendix 1.

4.2. Regression analysis results

4.2.1. Headline results (full-sample regression)

While aggregate statistical analysis can identify gaps between groups, and highlight high-level patterns, regression analysis is needed in order to estimate the size of the effect of HE on earnings and employment among different groups, while controlling for multiple potentially confounding factors at the same time.

Table R1 below presents the regression results for the full sample. The numbers in the table are the regression coefficients of our treatment variable - the educational pathway categorical variable. Each coefficient therefore represents the difference in earnings (columns 2 and 3) or the difference in the probability of being in employment (columns 4 and 5) between the educational pathway in each row and the baseline educational pathway category - nothing beyond KS4. These regression models included controls for gender, disadvantage, ethnicity, region, SEND status and KS4 prior attainment. Full regression results tables can be found in Appendix 2.

Results shown earlier in Section 4.1 looked at one demographic factor alongside prior attainment and education pathway, so did not control for all demographic factors and prior attainment together. Now we see that even after controlling for them, higher levels of education are associated with higher earnings and a higher likelihood of being in employment later in life for all educational pathways analysed in this study, compared to those who had no known qualifications beyond KS4. The exception to this finding is that undergoing a Level 4 or Level 5 course at an HE provider is associated with lower earnings nine years after finishing KS4, compared to those who had no known qualifications beyond KS4.

At the earlier time point (nine years after KS4), when individuals may have more recently graduated from FE or HE, apprenticeships and higher level (5 or 6) FE qualifications from FE institutions are associated with the highest earnings. Some of these even have a higher earnings premium than a degree from a top-third HE provider.

However, by 16 years post-KS4, graduates from top-third HE providers earn the most by a large margin: £6,500 more than those with a Level 5 qualification from an FE provider, and almost £14,000 more than those with no qualification beyond KS4. The financial premium of attending a non-top-third HE provider is less clear, with higher earnings attached to some Level 5 pathways.

In terms of improving employment chances, however, Level 5 and 6 qualifications in FE institutions and a degree from a non-top-third HE provider appear to be the most effective pathways at both time points. It is notable that, while a degree from a top-third HE provider is the strongest predictor of higher earnings, its effect on employment is smaller than the effect of a degree from another provider outside the top-third.

Another important pattern to be noted is that the effect of each education pathway on an individual's chance of being in employment appears stronger at the first time point, nine years after KS4, than the second, 16 years after KS4. The reverse is observed for earnings - larger effects for all pathways at the later time point.

Table R1: Regression results - full sample[15]

Pathway / Outcome	Earnings 9 years post-KS4	Earnings 16 years post-KS4	In employment 9 years post-KS4	In employment 16 years post-KS4
Nothing beyond KS4	*0 - reference group*			
Level 3 in FE	1296** (61)	1991** (116)	0.069** (0.001)	0.045** (0.001)
KS5 Level 3	765** (63)	2837** (177)	0.064** (0.001)	0.059** (0.001)
Level 3 Apprenticeship	4009** (79)	4127** (155)	0.115** (0.002)	0.053** (0.003)
Level 4 in FE	2086** (321)	4099** (659)	0.081** (0.012)	0.053** (0.014)
Level 5 in FE	4066** (201)	7244** (385)	0.104** (0.005)	0.089** (0.006)
Level 6 in FE	2282** (105)	5352** (236)	0.111** (0.003)	0.089** (0.003)
Level 4 or 5 in HE	-765** (154)	990** (318)	0.060** (0.006)	0.035** (0.006)
Level 6 (degree) from a non-top-third HE provider	950** (57)	5879** (169)	0.113** (0.001)	0.086** (0.001)
Level 6 (degree) from a top-third HE provider	2959** (95)	13738** (240)	0.098** (0.001)	0.080** (0.002)
Observations	*837605*	*804820*	*1022705*	*1022705*
Adjusted R-squared	*0.035*	*0.062*	*0.061*	*0.029*

4.2.2. Disaggregated regression results

This section explores the results of split-sample regressions, which help to identify whether there are any differences in the patterns identified above for specific subgroups of the sample. Of particular interest for this research are key groups which are underrepresented or disadvantaged in HE.

The split sample regressions are presented in Tables R2-R5 below, with the corresponding results described in the following subsections. These findings are supported by reference to the results from regressions with interaction terms, which are not shown directly in this section but can be consulted in Appendix 2.

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[15] Note: in this and all subsequent regression tables, stars indicate significance levels: +p<0.1, *p<0.05, **p<0.01. Standard errors are shown in parentheses below the respective coefficient. Heteroskedasticity-robust standard errors used. The coefficients of other variables included in the regression are omitted here for brevity, but can be consulted in Appendix 2.

Note that some subgroups, particularly those which are the intersection of a less common education pathway and several demographic criteria, have small sample sizes. The corresponding regression coefficients therefore tend to be highly volatile. That means that they are prone to being large and can vary a lot (including changing from positive to negative) across subgroups, without good reason. In this case, conclusions should not be based solely on these coefficients, because the small samples they are based on may well not be representative of the respective population, and the unusually high or low coefficients are more likely to be a product of individual anomalies within the small sample. This limits some of the conclusions that can be drawn based on these results.

Earnings

Table R2 presents the earnings premiums at 16 years after KS4. It shows that FE and apprenticeships are associated with higher earnings for men than women. The same is true for top-third HE providers, but the benefits of attending non-top-third institutions are larger for women.

This finding may be indicative of the gender gap in wages and illustrates the importance of looking at longer term labour market outcomes, because later on (in Table R3) we can see females have a much higher earnings premium from both top-third and non-top-third HE than men at nine years after KS4. These patterns are supported by the regressions with interaction terms. For men, graduating from a non-top-third HE provider is actually associated with lower earnings nine years after KS4, compared to those who had no known qualifications beyond KS4, though this does reverse at 16 years. This may be partly due to graduates pursuing further study, such as postgraduate degrees, at the earlier time point. However, the findings on employment do not directly support this, with male non-top-third HE provider graduates seeing a relatively large and positive employment effect even at nine years after KS4. An alternative hypothesis is non-top-third degrees are more associated with better progression into mid-level roles with higher earnings, even where their entry-level roles do not have higher earnings.

The long-term earnings premium of HE is higher for Asian, Mixed and Other graduates than the White subgroup, but lower for Black graduates. On the other hand, the earnings premium of FE for the White subgroup remains considerably higher, as it was nine years after KS4, than all other ethnic groups except the Other subgroup.

Interaction regressions also show that the earnings premium for top-third HE providers is higher for all ethnic minority subgroups than for White people 16 years after KS4, whereas nine years after KS4 it is only higher for the Black and Asian subgroups. Non-top-third providers only have a higher earnings premium for Asian graduates at both time points.

For the FSM eligible group, the premium is slightly higher (compared to the non-FSM group) for those with Level 3 qualifications and apprenticeships, somewhat lower for Levels 4-6 in FE and comparable for Level 6 in HE (slightly lower for top-third and higher for the non-top-third providers). This pattern is also observed in the regression models with interaction terms.

Level 4 qualifications earned in FE institutions have an insignificant, sometimes negative, and generally volatile coefficient across the board, and so do Level 4 and 5 courses in HE providers for most FSM eligible subgroups. This may be influenced by the small sample size of the respective subgroups. We therefore do not make any conclusions for the relationship of these two educational pathways with disadvantage in terms of earnings effects.

The higher premium of apprenticeships for males on FSM (more so than for males in general) is noticeable 16 years after KS4 as it was nine years after KS4, and so is the higher premium of non-top-third HE for females on FSM (more so than for females in general).

HE seems to have the highest earnings premiums for FSM eligible women from Mixed and Other ethnic backgrounds, as well as Asian men on FSM. Apprenticeships also bear a high premium for FSM eligible Asian men (though this may be a small sample artefact) and FSM eligible White men.

Table R2: Regression results - split-sample, Earnings 16 years post-KS4

Pathway / Subsample	Gender		Free School Meals		Ethnic Group				
	Female	Male	Non-FSM	FSM	White	Asian	Black	Mixed	Other
Nothing beyond KS4	0 - reference group								
Level 3 in FE	922** (175)	2969** (149)	1903** (131)	2499** (155)	1970** (131)	2145** (263)	2407** (825)	1164 (918)	2082+ (1157)
KS5 Level 3	3571** (281)	2015** (217)	2747** (196)	3121** (264)	2819** (205)	2994** (301)	3590** (654)	3254** (1028)	2842* (1245)
Level 3 Apprenticeship	1441** (213)	5921** (209)	4011** (170)	4771** (341)	4009** (169)	5116** (787)	3243** (1038)	3711* (1710)	3349+ (1898)
Level 4 in FE	3581** (736)	4725** (1239)	4417** (693)	52 (2050)	4280** (677)	-1851 (2458)	-6814* (3112)	-3225 (4158)	1536 (4358)
Level 5 in FE	3322** (505)	8664** (485)	7285** (408)	5840** (1074)	7542** (417)	3720* (1462)	1143 (2408)	-667 (3764)	7742** (2805)
Level 6 in FE	5121** (359)	5528** (320)	5394** (258)	4462** (483)	5555** (265)	3783** (621)	5325** (1413)	3934+ (2292)	5610** (2086)
Level 4 or 5 in HE	1876** (444)	-337 (457)	983** (345)	904 (712)	1078** (376)	-583 (876)	459 (1081)	453 (2043)	-810 (1915)
Level 6 (degree) from a non-top-third HE provider	6610** (272)	4908** (199)	5784** (190)	6583** (204)	5902** (202)	7069** (209)	5295** (535)	6263** (739)	6203** (1081)
Level 6 (degree) from top-third HE provider	12985** (297)	14359** (408)	13665** (260)	13150** (510)	13329** (281)	16885** (483)	13183** (907)	15044** (1315)	14021** (1473)
Observations	*388630*	*416190*	*709095*	*95205*	*679970*	*49885*	*24580*	*7460*	*9150*

Pathway / Subsample	Full sample	FSM and Gender		FSM and Ethnic Group				
		FSM Female	FSM Male	FSM White	FSM Asian	FSM Black	FSM Mixed	FSM Other
Nothing beyond KS4	*0 - reference group*							
Level 3 in FE	1991** (116)	1994** (155)	3221** (285)	2742** (163)	2414** (394)	1563* (693)	-331 (2348)	3939** (1080)
KS5 Level 3	2837** (177)	3964** (283)	2097** (461)	3272** (319)	2494** (471)	3772** (1269)	77 (2730)	4790** (1519)
Level 3 Apprenticeship	4127** (155)	2393** (342)	7391** (601)	4849** (373)	5044** (1166)	4614** (1662)	-1881 (5642)	1403 (4143)
Level 4 in FE	4099** (659)	-483 (1940)	1844 (6329)	2784 (2525)	-3400 (3870)	-13250** (1755)		
Level 5 in FE	7244** (385)	4360** (1299)	6404** (1468)	6688** (1265)	3766 (2619)	-714 (4792)	-16889 (24429)	4335 (3570)
Level 6 in FE	5352** (236)	5238** (562)	3333** (831)	4820** (603)	3721** (860)	6221* (2459)	3625 (6357)	5021+ (2680)
Level 4 or 5 in HE	990** (318)	2523** (828)	-1745 (1238)	1506 (975)	-723 (1453)	-1266 (1850)	5951 (4717)	-1641 (3050)
Level 6 (degree) from a non-top-third HE provider	5879** (169)	7118** (198)	5830** (364)	6608** (249)	6977** (314)	5425** (945)	5994** (2101)	8272** (925)
Level 6 (degree) from top-third HE provider	13738** (240)	12555** (567)	13514** (877)	12832** (720)	14123** (857)	11341** (1921)	12638** (3252)	13354** (2389)
Observations	*804820*	*44875*	*50335*	*66420*	*14115*	*7230*	*1670*	*2465*

Note: See Glossary of Terms for explanation of Levels 1–6.

Pathway / Subsample	FSM Female White	FSM Female Asian	FSM Female Black	FSM Female Mixed	FSM Female Other	FSM Male White	FSM Male Asian	FSM Male Black	FSM Male Mixed	FSM Male Other
	FSM, Gender and Ethnic Group									
Nothing beyond KS4	*0 - reference group*									
Level 3 in FE	2002** (179)	1150* (457)	1779** (560)	3376** (1201)	4056** (1403)	3797** (294)	3286** (644)	1304 (1336)	-3460 (3469)	4168** (1580)
KS5 Level 3	4114** (344)	2274** (622)	4961** (951)	4423* (2138)	4817* (2099)	2244** (563)	2389** (708)	2053 (2610)	-7946 (7004)	5286* (2143)
Level 3 Apprenticeship	2389** (383)	1915* (932)	1067 (1501)	-5235** (1712)	-1242 (1991)	7527** (642)	10161** (2967)	7669* (3700)	-966 (11016)	2736 (4939)
Level 4 in FE	1045 (2529)	1279 (2983)	-12401** (1374)			8057 (6092)	-24932** (3222)			
Level 5 in FE	6268** (1568)	4772 (3718)	-5077 (3547)		6587 (4163)	6732** (1691)	3802 (3302)	4869 (7989)	-39503 (46496)	6082** (2110)
Level 6 in FE	5405** (708)	3436** (1074)	7465* (3086)	5723 (4842)	9151** (2624)	3916** (1057)	3326* (1375)	4788 (4169)	-2450 (19977)	276 (3888)
Level 4 or 5 in HE.	3618** (1037)	1134 (1944)	-1215 (1855)	10593+ (6418)	-646 (3636)	-1046 (1730)	-3953* (1802)	-931 (4721)	-1657 (5694)	-8992** (2867)
Level 6 (degree) from a non-top-third HE provider	7332** (264)	6572** (403)	6567** (544)	7756** (1485)	8193** (1169)	5653** (458)	7087** (474)	3982* (1965)	5293 (3821)	8533** (1429)
Level 6 (degree) from a top-third HE provider	12441** (753)	11375** (1016)	13165** (1960)	15958** (3239)	16087** (2996)	13057** (1276)	16618** (1386)	8296* (3741)	2632 (7959)	10897** (3618)
Observations	*31075*	*6395*	*3840*	*880*	*1135*	*35345*	*7720*	*3390*	*790*	*1330*

Note: See Glossary of Terms for explanation of Levels 1–6.

The effect sizes of the different educational pathways on earnings nine years after KS4 can be seen in Table R3 below. We see that women benefit much more from degrees (both top-third and other HE providers) than men, who tend to benefit much more from apprenticeships and qualifications in FE institutions. In fact, men have a negative effect size for degrees from non-top-third HE providers and below-degree-level HE.

Ethnic minorities benefit more from both apprenticeships and degrees from top-third HE providers, but not from any of the other qualifications analysed, most of which show a negative or an insignificant earnings premium with respect to the baseline category of those with no qualifications beyond KS4. The earnings premium from HE (both from a top-third provider and elsewhere) is markedly higher for the Asian ethnic minority group than for any other ethnic group.

FSM students also benefit somewhat more from degrees (Level 6 in HE providers) but less from qualifications in FE institutions, although the premium for apprenticeships is also slightly higher. Unlike 16 years after KS4, the earnings premium from HE for FSM students is greater nine years after KS4 regardless of whether the provider is in the top-third.

Apprenticeships tend to be a particularly lucrative endeavour for men from low socioeconomic backgrounds (that is, on FSM). For women from low socioeconomic backgrounds, degrees fromfrom HE providers are associated with a higher premium than the full sample average, even if the provider is not in the top-third, where the increase with respect to the full sample average is actually the most notable.

There are some other striking differences in the earnings effects at the intersection of gender, ethnicity and FSM. For example, FSM Black females have much higher earnings premiumspremiums for Level 6 (degrees) in HE providers (both top-third and other), which is not the case for FSM Black males.

Table R3:: Regression results - split-sample, Earnings nine years post-KS4

Pathway / Subsample	Gender		Free School Meals		Ethnic Group				
	Female	Male	Non-FSM	FSM	White	Asian	Black	Mixed	Other
Nothing beyond KS4	*0 - reference group*								
Level 3 in FE	519** (49)	2249** (108)	1299** (66)	1114** (143)	1472** (64)	5 (168)	-881 (565)	164 (1212)	-836 (564)
KS5 Level 3	1869** (57)	-247* (112)	727** (67)	931** (181)	910** (67)	-110 (163)	-592 (584)	329 (767)	1280 (1324)
Level 3 Apprenticeship	1913** (75)	5510** (123)	3935** (84)	4497** (227)	3961** (82)	4122** (502)	3628** (779)	3795** (1218)	5580** (1358)
Level 4 in FE	2331** (367)	2163** (593)	2173** (332)	641 (1252)	2360** (336)	-2230 (1563)	-3011 (2238)	-2693 (3353)	2676* (1235)
Level 5 in FE	778** (258)	5117** (259)	4225** (210)	1619* (665)	4329** (214)	482 (882)	-497 (1445)	129 (1597)	-448 (1501)
Level 6 in FE	2672** (109)	2059** (180)	2335** (111)	1419** (321)	2445** (112)	1328** (372)	664 (965)	593 (1553)	51 (1274)
Level 4 or 5 in HE	-501** (180)	-799** (261)	-845** (163)	-78 (453)	-705** (173)	-1269* (568)	-1290+ (754)	1555 (1483)	-2977** (1087)
Level 6 (degree) from a non-top-third HE provider	2716** (40)	-1062** (106)	881** (61)	1616** (171)	1041** (62)	1559** (112)	476 (545)	11 (616)	792 (484)
Level 6 (degree) from top-third HE provider	4451** (65)	1512** (194)	2910** (101)	3428** (272)	2709** (109)	5549** (196)	3268** (674)	2266** (735)	3299** (609)
Observations	*402205*	*435400*	*739415*	*97515*	*710300*	*50960*	*23770*	*7775*	*9325*

Note: See Glossary of Terms for explanation of Levels 1–6.

Pathway / Subsample	Full sample	FSM and Gender		FSM and Ethnic Group				
		FSM Female	FSM Male	FSM White	FSM Asian	FSM Black	FSM Mixed	FSM Other
Nothing beyond KS4	*0 - reference group*							
Level 3 in FE	1296** (61)	841** (102)	1686** (290)	1732** (149)	53 (262)	-1296+ (744)	-1610 (2505)	-757 (871)
KS5 Level 3	765** (63)	1921** (162)	-166 (341)	1393** (183)	57 (271)	56 (1282)	-902 (2820)	352 (993)
Level 3 Apprenticeship	4009** (79)	2516** (213)	6959** (405)	4533** (238)	3849** (756)	4041** (1161)	2986 (3750)	8004+ (4206)
Level 4 in FE	2086** (321)	1809 (1341)	-2499 (2991)	1532 (1374)	-1302 (3178)	1633 (5251)	-12261** (1286)	
Level 5 in FE	4066** (201)	125 (770)	2389* (947)	2516** (816)	-692 (1395)	-3146 (2050)	-13003 (24126)	4431* (2133)
Level 6 in FE	2282** (105)	2504** (346)	34 (580)	1788** (378)	1079+ (613)	-743 (1447)	-1040 (6207)	453 (1685)
Level 4 or 5 in HE	-765** (154)	-279 (501)	428 (825)	1186* (595)	-2092* (1034)	-2746** (748)	149 (2787)	-1423 (2643)
Level 6 (degree) from a non-top-third HE provider	950** (57)	2874** (120)	25 (324)	1830** (160)	1564** (184)	931 (1075)	-40 (1660)	2403** (649)
Level 6 (degree) from a top-third HE provider	2959** (95)	4438** (283)	2299** (481)	2374** (334)	4430** (405)	3420* (1511)	2486 (1932)	3741** (1103)
Observations	*837605*	*44955*	*52560*	*68495*	*14475*	*6910*	*1705*	*2470*

Note: See Glossary of Terms for explanation of Levels 1–6.

Pathway / Subsample	FSM, Gender and Ethnic Group									
	FSM Female White	FSM Female Asian	FSM Female Black	FSM Female Mixed	FSM Female Other	FSM Male White	FSM Male Asian	FSM Male Black	FSM Male Mixed	FSM Male Other
Nothing beyond KS4	*0 - reference group*									
Level 3 in FE	1087** (117)	-58 (298)	-645+ (379)	1027 (850)	778 (806)	2760** (305)	144 (462)	-1798 (1479)	-1588 (3095)	-1704 (1134)
KS5 Level 3	2213** (195)	436 (340)	2655** (688)	2844+ (1457)	970 (1121)	475 (328)	-313 (430)	-2968 (2662)	-4561 (6480)	-283 (1765)
Level 3 Apprenticeship	2418** (237)	1493* (696)	4300** (731)	5240** (1285)	-2592 (1973)	7023** (407)	10317** (1520)	2472 (3679)	3159 (6747)	8038 (5646)
Level 4 in FE	2639+ (1502)	801 (3241)	2846 (5754)	-13261** (913)		-1135 (2992)	-12542** (347)			
Level 5 in FE	543 (989)	-2607 (1619)	390 (2350)		6079** (1976)	3452** (1125)	875 (2019)	-5931+ (3338)	-33632 (46042)	-321 (1278)
Level 6 in FE	2763** (431)	1377+ (755)	1477 (1192)	4222 (3108)	162 (1827)	470 (681)	392 (1040)	-3848 (3067)	-11351 (18637)	1197 (2548)
Level 4 or 5 in HE	1278+ (706)	-2870* (1179)	-2062** (717)	-1327 (3908)	-710 (1989)	1193 (999)	-186 (1895)	-2989+ (1807)	2829 (3462)	965 (8495)
Level 6 (degree) from a non-top-third HE provider	3195** (162)	2039** (246)	2991** (371)	2242** (849)	2853** (676)	-37 (292)	1102** (275)	-1685 (2351)	-902 (2043)	2130+ (1116)
Level 6 (degree) from top-third HE provider	4131** (390)	4233** (501)	5725** (1005)	4395* (1871)	4618** (1361)	384 (572)	4713** (649)	262 (3264)	1461 (3397)	2985+ (1683)
Observations	*30635*	*6985*	*3725*	*885*	*1180*	*37860*	*7495*	*3190*	*820*	*1290*

Note: See Glossary of Terms for explanation of Levels 1–6.

Employment

The patterns for each subgroup's chance of being in employment 16 years post-KS4 are closer to the patterns for the full sample than nine years post-KS4, as was the case for earnings. These are presented in Tables R4 and R5 respectively.

Degrees from an HE provider seem to have the highest earnings premiums premiums for FSM eligible women from Mixed and Other ethnic backgrounds, as well as Asian men on FSM. Apprenticeships also bear a high premium for FSM eligible Asian men (though this may be a small sample artefact) and FSM eligible White men.

Regressions with interaction terms confirm that nine years after KS4,, women have a considerably higher employment premium than men for all educational qualifications analysed in this study. 16 years after KS4 this is still true for all qualifications except Level 4 and 5 studied in an FE institution, but the magnitude of the difference is reduced.

Of the broad ethnic subgroups investigated, individuals from Asian backgrounds have the largest increase in their likelihood of being in employment for nearly all educational qualifications. Black individuals also experience higher differentials than White people for HE and apprenticeships.

Regressions with interaction terms do not show a consistent pattern in how ethnicity affects the relationship between education and employment 16 years after KS4, but nine years after KS4 they do show that the effects of both HE and apprenticeships are stronger for ethnic minorities.

Subgroups incorporating several categories - FSM eligible females, FSM eligible ethnic minorities (particularly the Asian and Black subgroups), FSM eligible ethnic minority females - also experience higher employment effects than the full sample average effect for HE and apprenticeships.

Table R4:: Regression results - split-sample, Employment 16 years post-KS4

Pathway / Subsample	Gender		Free School Meals		Ethnic Group				
	Female	Male	Non-FSM	FSM	White	Asian	Black	Mixed	Other
Nothing beyond KS4	0 - reference group								
Level 3 in FE	0.055** (0.002)	0.037** (0.002)	0.041** (0.001)	0.069** (0.004)	0.041** (0.001)	0.077** (0.007)	0.059** (0.008)	0.083* (0.014)	0.011 (0.016)
KS5 Level 3	0.064** (0.002)	0.056** (0.002)	0.058** (0.002)	0.062** (0.005)	0.060** (0.002)	0.068** (0.007)	0.053** (0.009)	0.051** (0.018)	0.004 (0.015)
Level 3 Apprenticeship	0.078** (0.004)	0.037** (0.004)	0.047** (0.003)	0.102** (0.009)	0.050** (0.003)	0.122** (0.021)	0.108** (0.023)	0.04 (0.036)	0.101* (0.05)
Level 4 in FE	0.038* (0.018)	0.080** (0.02)	0.051** (0.014)	0.066 (0.05)	0.059** (0.014)	-0.023 (0.092)	-0.167 (0.119)	-0.012 (0.152)	0.228** (0.015)
Level 5 in FE	0.082** (0.011)	0.093** (0.007)	0.090** (0.006)	0.078** (0.025)	0.089** (0.006)	0.126** (0.034)	-0.002 (0.057)	0.137* (0.069)	0.066 (0.073)
Level 6 in FE	0.090** (0.005)	0.089** (0.005)	0.086** (0.004)	0.106** (0.013)	0.086** (0.004)	0.145** (0.016)	0.05 (0.031)	0.106* (0.043)	0.033 (0.046)
Level 4 or 5 in HE	0.040** (0.008)	0.032** (0.009)	0.033** (0.006)	0.047* (0.021)	0.025** (0.007)	0.096** (0.023)	0.100** (0.023)	0.083+ (0.047)	0 (0.045)
Level 6 (degree) from a non-top-third HE provider	0.095** (0.002)	0.076** (0.002)	0.083** (0.001)	0.107** (0.004)	0.082** (0.001)	0.131** (0.005)	0.097** (0.006)	0.095** (0.012)	0.060** (0.011)
Level 6 (degree) from top-third HE provider	0.091** (0.002)	0.071** (0.002)	0.079** (0.002)	0.095** (0.007)	0.078** (0.002)	0.113** (0.006)	0.094** (0.011)	0.081** (0.018)	0.052** (0.015)
Observations	*490825*	*531880*	*886220*	*135705*	*860910*	*63860*	*31915*	*9895*	*12285*

Note: See [Glossary of Terms](#) for explanation of Levels 1–6.

Pathway / Subsample	Full sample	FSM and Gender		FSM and Ethnic Group				
		FSM Female	FSM Male	FSM White	FSM Asian	FSM Black	FSM Mixed	FSM Other
Nothing beyond KS4				*0 - reference group*				
Level 3 in FE	0.045** (0.001)	0.083** (0.006)	0.052** (0.006)	0.069** (0.005)	0.079** (0.012)	0.051** (0.014)	0.025 (0.032)	0.015 (0.027)
KS5 Level 3	0.059** (0.001)	0.070** (0.008)	0.057** (0.008)	0.069** (0.007)	0.071** (0.012)	0.045* (0.019)	-0.003 (0.043)	0.009 (0.031)
Level 3 Apprenticeship	0.053** (0.003)	0.140** (0.012)	0.065** (0.014)	0.093** (0.01)	0.141** (0.034)	0.119** (0.04)	-0.012 (0.086)	-0.087 (0.158)
Level 4 in FE	0.053** (0.014)	0.115* (0.054)	-0.053 (0.109)	0.075 (0.059)	0.210* (0.089)	-0.073 (0.155)	-0.780** (0.03)	
Level 5 in FE	0.089** (0.006)	0.039 (0.045)	0.103** (0.028)	0.085** (0.028)	0.048 (0.076)	0.048 (0.098)	0.211** (0.041)	0.327** (0.03)
Level 6 in FE	0.089** (0.003)	0.128** (0.017)	0.079** (0.02)	0.098** (0.015)	0.175** (0.027)	0.015 (0.069)	-0.068 (0.125)	0.038 (0.097)
Level 4 or 5 in HE	0.035** (0.006)	0.062* (0.027)	0.026 (0.033)	0.058* (0.028)	0.042 (0.05)	-0.001 (0.057)	-0.018 (0.112)	-0.052 (0.095)
Level 6 (degree) from a non-top-third HE provider	0.086** (0.001)	0.126** (0.005)	0.084** (0.006)	0.098** (0.005)	0.142** (0.008)	0.094** (0.011)	0.135** (0.026)	0.059** (0.021)
Level 6 (degree) from a top-third HE provider	0.080** (0.002)	0.121** (0.01)	0.072** (0.011)	0.084** (0.011)	0.137** (0.013)	0.101** (0.024)	0.061 (0.051)	0.052 (0.033)
Observations	*1022705*	*65365*	*70340*	*95950*	*19110*	*9945*	*2365*	*3545*

Note: See [Glossary of Terms](#) for explanation of Levels 1–6.

Pathway / Subsample	FSM, Gender and Ethnic Group									
	FSM Female White	FSM Female Asian	FSM Female Black	FSM Female Mixed	FSM Female Other	FSM Male White	FSM Male Asian	FSM Male Black	FSM Male Mixed	FSM Male Other
Nothing beyond KS4	*0 - reference group*									
Level 3 in FE	0.085** (0.007)	0.102** (0.018)	0.036+ (0.019)	0.073+ (0.041)	0 (0.039)	0.048** (0.007)	0.066** (0.017)	0.069** (0.02)	-0.04 (0.05)	0.029 (0.037)
KS5 Level 3	0.075** (0.009)	0.095** (0.018)	0.021 (0.026)	0.05 (0.06)	0.001 (0.045)	0.065** (0.01)	0.057** (0.016)	0.078** (0.028)	-0.071 (0.07)	0.018 (0.044)
Level 3 Apprenticeship	0.136** (0.014)	0.156** (0.043)	0.150** (0.047)	-0.091 (0.134)	0.272** (0.077)	0.049** (0.016)	0.142** (0.05)	0.083 (0.066)	0.06 (0.106)	-0.128 (0.159)
Level 4 in FE	0.114+ (0.065)	0.230* (0.112)	0.076 (0.15)	-0.741** (0.039)		-0.019 (0.123)	0.230** (0.022)	-0.395 (0.272)		
Level 5 in FE	0.051 (0.054)	0.05 (0.128)	-0.042 (0.139)		0.289** (0.039)	0.107** (0.031)	0.037 (0.094)	0.162 (0.121)	0.163** (0.056)	0.300** (0.047)
Level 6 in FE	0.134** (0.019)	0.200** (0.037)	-0.089 (0.1)	-0.089 (0.153)	-0.06 (0.137)	0.048+ (0.025)	0.149** (0.039)	0.154+ (0.079)	-0.03 (0.213)	0.155 (0.11)
Level 4 or 5 in HE	0.059 (0.039)	0.119* (0.061)	-0.005 (0.064)	0.064 (0.145)	-0.038 (0.112)	0.06 (0.041)	-0.06 (0.084)	0.006 (0.121)	-0.099 (0.175)	-0.074 (0.192)
Level 6 (degree) from a non-top-third HE provider	0.114** (0.007)	0.185** (0.012)	0.081** (0.015)	0.168** (0.035)	0.068* (0.03)	0.077** (0.008)	0.105** (0.011)	0.109** (0.017)	0.094* (0.039)	0.047 (0.029)
Level 6 (degree) from top-third HE provider	0.112** (0.014)	0.175** (0.019)	0.118** (0.028)	0.084 (0.057)	0.06 (0.049)	0.061** (0.017)	0.111** (0.019)	0.069 (0.042)	0.055 (0.123)	0.043 (0.043)
Observations	*45895*	*9115*	*5170*	*1250*	*1665*	*50055*	*9995*	*4770*	*1115*	*1885*

Note: See [Glossary of Terms](#) for explanation of Levels 1–6.

The relationship between being in employment and one's educational pathway at nine years after KS4 is presented in Table R5 for comparison.

Even more so than 16 years after KS4, the positive effect on employment is higher for women than for men for all educational qualifications considered - this is a particularly salient finding. Similar conclusions hold for FSM individuals in comparison with non-FSM individuals (except for one qualification - Level 4 in an FE institution) and for all ethnic minority subgroups in comparison with the WWhite subgroup when we consider HE, Level 6 in an FE institution, and apprenticeships. This is confirmed by regression analysis with interaction variables.

This suggests that education (at all levels, in both HE and FE institutions) is a good means for disadvantaged groups to increase their chance of entering employment and therefore help them close the gap with their more advantaged peers.

The pattern - of a higher positive relationship with being in employment for all Level 4 and above qualifications - continues to be observed for combinations of several factors representing disadvantage.

Women who were FSM eligible, FSM eligible ethnic minorities, and women who were FSM eligible and from ethnic minorities, tend to experience considerably higher

correlations between being in employment across most educational pathways. These effects often exceed 15 percentage points (likelihood of being in employment) and sometimes even exceed 20 percentage points. We can see that the effect size is stronger at nine years than 16 years after KS4 - thus the employment effect fades with time. This is in contrast to the earnings effect, which strengthens over time.

Table R5:: Regression results - split-sample, Employment nine years post-KS4

Pathway / Subsample	Gender		Free School Meals		Ethnic Group				
	Female	Male	Non-FSM	FSM	White	Asian	Black	Mixed	Other
Nothing beyond KS4	0 - reference group								
Level 3 in FE	0.104** (0.002)	0.040** (0.002)	0.063** (0.001)	0.111** (0.004)	0.067** (0.001)	0.067** (0.007)	0.084** (0.008)	0.094** (0.014)	0.071** (0.015)
KS5 Level 3	0.089** (0.002)	0.044** (0.002)	0.060** (0.001)	0.093** (0.005)	0.065** (0.001)	0.050** (0.007)	0.087** (0.01)	0.085** (0.017)	0.009 (0.015)
Level 3 Apprenticeship	0.170** (0.003)	0.078** (0.003)	0.104** (0.002)	0.213** (0.007)	0.110** (0.002)	0.188** (0.016)	0.226** (0.018)	0.180** (0.025)	0.198** (0.037)
Level 4 in FE	0.088** (0.015)	0.077** (0.018)	0.085** (0.012)	0.014 (0.057)	0.083** (0.012)	-0.004 (0.086)	-0.172 (0.12)	0.122 (0.115)	0.206** (0.019)
Level 5 in FE	0.130** (0.009)	0.092** (0.006)	0.101** (0.005)	0.128** (0.022)	0.102** (0.005)	0.110** (0.035)	0.032 (0.058)	0.09 (0.084)	0.221** (0.037)
Level 6 in FE	0.136** (0.004)	0.088** (0.004)	0.104** (0.003)	0.158** (0.012)	0.107** (0.003)	0.161** (0.015)	0.136** (0.028)	0.134** (0.041)	0.076+ (0.045)
Level 4 and 5 in HE	0.082** (0.007)	0.037** (0.009)	0.056** (0.006)	0.079** (0.021)	0.051** (0.006)	0.081** (0.023)	0.117** (0.025)	0.115* (0.047)	0.081* (0.039)
Level 6 (degree) from a non-top-third HE provider	0.140** (0.001)	0.085** (0.002)	0.107** (0.001)	0.156** (0.004)	0.105** (0.001)	0.155** (0.005)	0.166** (0.006)	0.157** (0.011)	0.118** (0.011)
Level 6 (degree) from top-third HE provider	0.126** (0.002)	0.077** (0.002)	0.094** (0.002)	0.151** (0.007)	0.090** (0.002)	0.143** (0.006)	0.176** (0.01)	0.152** (0.016)	0.097** (0.014)
Observations	*490825*	*531880*	*886220*	*135705*	*860910*	*63860*	*31915*	*9895*	*12285*

Note: See Glossary of Terms for explanation of Levels 1–6.

Pathway / Subsample	Full sample	FSM and Gender		FSM and Ethnic Group				
		FSM Female	FSM Male	FSM White	FSM Asian	FSM Black	FSM Mixed	FSM Other
Nothing beyond KS4				0 - reference group				
Level 3 in FE	0.069** (0.001)	0.157** (0.005)	0.057** (0.006)	0.120** (0.005)	0.071** (0.012)	0.092** (0.015)	0.093** (0.03)	0.087** (0.027)
KS5 Level 3	0.064** (0.001)	0.135** (0.007)	0.050** (0.008)	0.110** (0.006)	0.062** (0.012)	0.093** (0.019)	0.049 (0.043)	0.045 (0.031)
Level 3 Apprenticeship	0.115** (0.002)	0.284** (0.009)	0.138** (0.011)	0.209** (0.008)	0.204** (0.027)	0.234** (0.034)	0.200** (0.059)	0.234* (0.098)
Level 4 in FE	0.081** (0.012)	0.046 (0.067)	-0.048 (0.016)	0.102+ (0.06)	-0.014 (0.145)	-0.341* (0.16)	-0.750** (0.028)	
Level 5 in FE	0.104** (0.005)	0.189** (0.037)	0.088** (0.028)	0.130** (0.025)	0.084 (0.073)	0.01 (0.109)	0.202** (0.04)	0.386** (0.027)
Level 6 in FE	0.111** (0.003)	0.209** (0.014)	0.092** (0.019)	0.149** (0.014)	0.199** (0.024)	0.128* (0.061)	0.013 (0.117)	0.172* (0.081)
Level 4 or 5 in HE	0.060** (0.006)	0.095** (0.027)	0.055+ (0.032)	0.070* (0.028)	0.095* (0.045)	0.017 (0.061)	0.141 (0.092)	0.026 (0.088)
Level 6 (degree) from a non-top-third HE provider	0.113** (0.001)	0.200** (0.005)	0.101** (0.006)	0.149** (0.005)	0.163** (0.008)	0.179** (0.011)	0.173** (0.025)	0.136** (0.021)
Level 6 (degree) from top-third HE provider	0.098** (0.001)	0.192** (0.008)	0.114** (0.01)	0.148** (0.009)	0.156** (0.012)	0.218** (0.019)	0.084 (0.049)	0.145** (0.03)
Observations	*1022705*	*65365*	*70340*	*95950*	*19110*	*9945*	*2365*	*3545*

Note: See Glossary of Terms for explanation of Levels 1–6.

Pathway / Subsample	FSM Female White	FSM Female Asian	FSM Female Black	FSM Female Mixed	FSM Female Other	FSM Male White	FSM Male Asian	FSM Male Black	FSM Male Mixed	FSM Male Other
	FSM, Gender and Ethnic Group									
Nothing beyond KS4	*0 - reference group*									
Level 3 in FE	0.167** (0.006)	0.135** (0.017)	0.095** (0.02)	0.160** (0.039)	0.090* (0.039)	0.060** (0.007)	0.008 (0.019)	0.095** (0.021)	0.008 (0.048)	0.090* (0.037)
KS5 Level 3	0.146** (0.008)	0.111** (0.017)	0.144** (0.024)	0.107+ (0.055)	0.056 (0.045)	0.072** (0.009)	0.02 (0.017)	0.031 (0.031)	-0.024 (0.067)	0.041 (0.044)
Level 3 Apprenticeship	0.290** (0.009)	0.240** (0.032)	0.250** (0.043)	0.273** (0.084)	0.431** (0.085)	0.127** (0.012)	0.159** (0.05)	0.213** (0.054)	0.137+ (0.083)	0.225* (0.105)
Level 4 in FE	0.127+ (0.073)	0.077 (0.152)	-0.338+ (0.195)	-0.734** (0.035)		0.056 (0.103)	-0.244 (0.329)	-0.323 (0.281)		
Level 5 in FE	0.228** (0.037)	0.190+ (0.104)	-0.153 (0.157)		0.398** (0.043)	0.082** (0.031)	0.016 (0.097)	0.229* (0.095)	0.204** (0.057)	0.378** (0.047)
Level 6 in FE	0.219** (0.016)	0.231** (0.032)	0.117 (0.084)	-0.063 (0.153)	0.09 (0.121)	0.054** (0.024)	0.166** (0.039)	0.143 (0.09)	0.235** (0.032)	0.323** (0.034)L
Level 4 or 5 in HE	0.082* (0.039)	0.196** (0.048)	-0.012 (0.071)	0.1 (0.153)	0.058 (0.102)	0.06 (0.04)	-0.04 (0.085)	0.13 (0.116)	0.175+ (0.097)	-0.042 (0.188)
Level 6 (degree) from a non-top-third HE provider	0.194** (0.006)	0.214** (0.011)	0.211** (0.015)	0.217** (0.031)	0.183** (0.029)	0.088** (0.007)	0.118** (0.011)	0.137** (0.018)	0.105** (0.04)	0.088** (0.03)
Level 6 (degree) from a top-third HE provider	0.204** (0.011)	0.200** (0.017)	0.251** (0.024)	0.09 (0.056)	0.184** (0.042)	0.101** (0.015)	0.124** (0.019)	0.177** (0.033)	0.11 (0.109)	0.108* (0.044)
Observations	*45895*	*9115*	*5170*	*1250*	*1665*	*50055*	*9995*	*4770*	*1115*	*1885*

Note: See Glossary of Terms for explanation of Levels 1–6.

5. Limitations

Data limitations

There are a number of important limitations inherent to the linked dataset produced for this analysis:

- The cohort was defined from NPD data and therefore does not include those who were educated outside of the England state-funded schools.
- Educational pathways below Level 3 were banded together. This means that the 'nothing beyond KS4' group includes those with Level 2, Level 1, and no qualifications.
- Similarly, qualifications above Level 6 were not considered. This means that the Level 6 groups will include people who have gone on to achieve a Level 7 or higher qualification, for example a postgraduate degree.
- Due to limitations with the LEO data, the earnings data reports PAYE earnings only, not earnings declared by those who are self-employed. This may skew the results as certain professions are more likely to be associated with self-employment.
- The LEO data does not allow researchers to identify whether employment is full-time or part-time. This means that the employment variable is a combination of both, and also means that the average earnings are skewed against certain groups where part-time employment is more likely, such as females.
- The LEO data does not allow us to distinguish between individuals who are not in employment and those who have left the UK and may be in employment elsewhere. This may skew the results for groups who are more likely to have emigrated following KS4.
- There are additional factors, such as sector of employment or subject of degree, that have not been included in this analysis but are likely to influence labour market outcomes.
- The study is limited to the time periods for which data is available, meaning, for example, that this research cannot tell us about labour market outcomes beyond 16 years post-KS4. This may miss important long-term patterns.

The methods used, as well as the very large cohort size, help to mitigate against some of the potential biases created by these data limitations. However caution should still be taken, in particular when drawing conclusions from the data on smaller subgroups.

Method limitations

As well as issues with the underlying dataset, there are limitations in the analysis methods used. Regression analysis reveals the correlation between an outcome (also known as a dependent variable) and one or more explanatory (independent)

variables, but it does not by itself provide evidence in favour of a causal impact of an explanatory variable on the outcome. Other potentialOther potential reasons for the correlation may be that:

- There is a third factor influencing both the outcome and the explanatory variable (omitted variable bias) - for example, coming from a wealthier family may make one more likely to attend HE, but also makes it easier to get a higher-paid job in the future (for example through the parents' connections). Note that this can be mitigated if the third factor is observed in the data and included as a control variable in the regression - as we did with prior attainment.
- People with potentially higher outcomes self-select into the explanatory variable, which in our case is attending HE/FE (selection bias) - this could mean that, for example, people who are more motivated to succeed in the world of work (and thus have the potential to earn more and more easily find a job) also have more motivation to enrol and complete a HE or vocational course.

Furthermore, statistical significance of the regression coefficient does not necessarily mean that there is a true effect of HE on earnings or employment across the population. Even if there were no relationship, there is a chance that the sample of this study may have captured an unusual part of the population, for which the outcome and treatment variables are actually correlated. Statistical significance does show that observing the respective coefficient in the absence of a true effect in the population is highly unlikely, but it is still possible.

Conversely, the absence of statistical significance does not mean there is no effect across the population. For the same reasons as above, it is possible that an effect that actually does exist will not show up as statistically significant in this regression analysis (due to chance).

These two risks decrease as sample size increases, and are therefore largely mitigated by the very large cohort explored in this research. The exception to this is analysis of the coefficients of the smaller subgroups, presented in the split-sample regressions.

6. Conclusions

Firstly, all educational qualifications are clearly and unambiguously associated with both increased earnings and likelihood of being in employment, compared to people with no qualifications beyond KS4. While the earnings premium grows over time, the employment effect is stronger just after graduation. All post Level 4 qualifications, whether earned in HE providers or FE institutions, are equally associated with higher chances of being employed, but the increase in earnings at later stages of life is highest by a wide margin for those graduating from top-third HE providers. By 16

years after KS4, graduates of top-third HE providers were found to be earning more than £10,000 more than other graduates. Even when controlling for KS4 attainment and demographics, a large gap of around £8,000 persists.

Furthermore, this study reveals good evidence that education contributes significantly to reducing the gap in employment between different groups. Women, ethnic minorities, disadvantaged individuals, and combinations thereof all have a substantially increased likelihood of being in employment nine years after KS4 with most or all educational qualifications analysed, more so than men, non-FSM or White people. This pattern persists 16 years after KS4 for Level 6 and some Level 4 and 5 qualifications, though it is somewhat reduced in intensity.

In terms of earnings premiums, the evidence is more nuanced. Shortly after graduation (nine years after KS4), undergraduate degrees (Level 6 in HE providers) are associated with higher earnings premiums for the traditionally more disadvantaged groups (women, ethnic minorities, FSM and combinations thereof). Apprenticeships and Level 5 and 6 in FE institutions, however, exhibit higher increases in earnings for men, White people and non-FSM students ((groups that may be considered less disadvantaged)).

However, 16 years after KS4 the earnings premiums for top-third HE providers for less disadvantaged groups catch up with the earnings premiums for HE for more disadvantaged groups (with the exception of some ethnic minorities). This is not the case for non-top-third providers, where the increases in earnings for FSM, females and most ethnic minorities remain slightly higher. Earnings increases for apprenticeships remain noticeably higher for men (ethnic group and FSM being less of a consideration), whereas Level 5 and 6 qualifications in FE institutions continue generally being more advantageous for most traditionally less disadvantaged groups considered in this study.

If we try to look at which groups experience the highest earnings premiums from top-third HE providers, then it is people from Asian backgrounds in general, but also Asian men who were previously eligible for FSM in particular, as well as women who were FSM eligible from Mixed and Other ethnic groups. If we look at non-top-third HE providers, then these are associated with higher long-term earnings premiums for previously FSM eligible graduates, females, and FSM eligible females from all ethnic groups.

Appendix 1 - Full Summary Statistics Tables

Appendix 2 - Full Regression Results Tables