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The path increasingly travelled: Vocational entry qualifications, socioeconomic status and university outcomes

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Abstract

Many countries have introduced flexibility in their admissions equivalents for tertiary education, allowing students to apply with vocational rather than academic qualifications at upper secondary level. However, entrants with vocational qualifications are generally less likely to succeed at university. Students from disadvantaged backgrounds are also, on average, less likely to succeed: they are more likely to drop out, or graduate with a lower class degree, even when they have the same prior attainment scores and take the same university course. Rich individual-level data in England drawn from administrative records allow us to link outcomes at university with social background and attainment and qualification routes at school, going back to lower secondary level, before academic and vocational pathways diverge. We can thus use the English example to explore whether the relative lack of success of students from low socioeconomic status (SES) backgrounds is in part because they are more likely to enter university with non-traditional qualifications that offer less effective preparation for study. Our results reveal a significant penalty associated with entering university with these vocational qualifications. Controlling for qualification type reduces the SES gradient in dropping out of university by 42%, and graduation with a lower class degree by 28%, although significant SES gradients in success still remain. There is a tension between allowing students from lower SES backgrounds to use vocational routes to enter university and these persistent gaps

in university outcomes. Countries using both vocational and academic routes as pathways to university should be aware of this potential conflict.

Key insights

Main issue that the paper addresses?

University outcomes are on average less good for students from disadvantaged backgrounds. These students are more likely to enter university with vocational qualifications than their more privileged peers. We examine the extent to which differences in entry qualifications can account for the gap in outcomes between students from different backgrounds.

Main insights that the paper provides?

Taking account of whether students enter university with vocational or academic qualifications reduces the gaps in dropout and degree class across social background, for English domiciled students. Yet even when qualifications, attainment at 16 and a large range of other factors are accounted for, an SES gradient remains.

INTRODUCTION

Across many countries the population of young people entering tertiary education has become more socially diverse in recent years. Researchers have become increasingly interested in the determinants of success at university for those from non-traditional backgrounds. The strong links between social background and achievement at school are well documented (see e.g. Hanushek et al. (2022) in the US and Crawford et al. (2017) in the UK). Yet once students enter tertiary education, studies show that social background continues to be significantly linked to educational outcomes, albeit more weakly than it is to prior attainment (see, e.g. meta-analyses by Rodríguez-Hernández et al. (2020), Schneider and Preckel (2017) and Westrick et al. (2015)), with students from lower socioeconomic status (SES) backgrounds performing less well in terms of achievement and progression than their more privileged peers. However, the reasons for this persistent SES gap have yet to be comprehensively explained (Rodríguez-Hernández et al., 2020).

One element of students' pathways to tertiary education has been relatively little studied to date. Those entering tertiary education are increasingly taking vocationally oriented rather than traditional academic qualifications at upper secondary level, as countries seek to address the needs of a diverse population (OECD, 2022a). Yet university outcomes across the Organisation for Economic Co-operation and Development (OECD) are, on average, worse for students entering bachelors' degrees with vocational, rather than academic qualifications (OECD, 2022b). For example, for the 13 OECD countries for which data on degree completion[1] by upper secondary qualification is available, those with vocational entry qualifications are on average 14 percentage points (ppt) less likely to succeed than their peers

entering with academic qualifications. In only two of the 13 countries is degree completion better (although only slightly) for those with vocational qualifications. National education context is clearly important. Not all OECD countries' systems allow entry to tertiary education with vocational qualifications, but in some countries (for example Switzerland, Austria and Finland), over a quarter of young entrants use this pathway (OECD, 2022b).

If there are systematic differences across SES background in the students using vocational rather than academic pathways to enter tertiary education, then understanding how these qualification types relate to university outcomes is important in seeking to explain the persistent gaps in outcome by SES that have been described in the literature. These systematic differences seem to be widespread across those OECD countries for which data are available (OECD, 2021).

In order to examine the interwoven relationships between SES, upper secondary qualification choice and university outcomes it is necessary to use detailed individual-level data, linked between school and university, and available over time in order to establish progression. In England such a dataset exists in the form of Higher Education Statistics Agency (HESA) data for all students at UK universities, which can be linked, for English students, to their detailed school records in the National Pupil Database (NPD) and to college records (Individual Learner Records—ILR) for additional details of qualifications taken post-16 at college rather than school. We therefore have the opportunity to examine the extent to which any gap in university outcomes by SES is accounted for by differences in the type of qualification with which they enter university.

We start by considering whether the relationships between SES, university outcomes and entering university with a vocational qualification in the UK generally and England in particular are consistent with the broad picture we have described internationally.

SES and university outcomes

Students at UK universities have largely successful outcomes, with the highest proportion of students completing their degrees in the expected time of OECD countries (OECD, 2022b), and high proportions graduating with a first or upper second class (i.e. high scoring) degree (HESA, 2022a). However, in common with findings for most OECD countries, students from lower SES backgrounds are less likely to succeed at university than their more privileged peers. Previous work (Crawford, 2014; Crawford et al., 2016; Vignoles & Powdthavee, 2009) shows that English students from disadvantaged backgrounds are more likely to drop out of their degrees, and less likely to graduate with a highly classed degree than their more privileged peers, even when they have the same prior attainment and are attending the same university course. This is important since graduating, and doing so with one of the top two degree classes, are key determinants of future labour market success (Feng & Graetz, 2017; Naylor et al., 2016; Walker & Zhu, 2013). The benefit of higher class degrees persists despite recent increases in the proportion of students achieving the top grades (Britton et al., 2022). Thus these adverse outcomes for students from disadvantaged backgrounds have a direct cost to the student and the wider economy and society in terms of lost earnings and output, as well as indirect costs through their impact on equity and social mobility.

SES and entry with vocational qualifications

Over the last 15 years an increasing proportion of English students has entered university with vocational, rather than academic, qualifications. The most popular university entry qualification remains the 'Advanced Level' (A level)—an academic qualification: some 70% of

our sample of entrants use this pathway. Yet alternative vocational qualifications have been growing in popularity. The most popular of these is the Business and Technology Education Council (BTEC) qualification. In our first year sample 16% entered university with just BTECs and a further 7% with a mixture of A levels and BTECs. The ratio of entrants with A levels to BTECs or mixtures fell from 7:1 in 2008 to 3:1 in 2017 (UCAS, 2017). This increase in students entering with vocational qualifications has been credited with enabling greater participation of students from lower socioeconomic backgrounds, as, in common with most countries in the OECD data (OECD, 2021), they are much more likely to take a vocational route than their more privileged peers (Gicheva & Petrie, 2018; Hayward & Hoelscher, 2011; Kelly, 2017; Moulton et al., 2018).

The SES gap in qualification uptake is clear in our sample of our first year university entrants. Some 85% of the top SES quintile students enter university with just A levels, compared with just half of bottom quintile entrants. Conversely only 6% of the top quintile enter with just BTECs, compared with nearly 29% of the least privileged. Recent reforms to the provision of vocational upper secondary education in England (Department for Education, 2021) have seen the introduction of T levels and the planned removal from funding of many of the 'large' BTECs currently available. These 'large' BTECs are generally the size of three A levels and are taken as stand-alone qualifications, rather than in combination with other qualifications such as A levels, as is the case for 'small' BTECs. These reforms are likely to have disproportionate effects on the qualification choices available to the least privileged quintile of students (Department for Education, 2022), but it is anticipated that T levels will become a route into university in the same way as existing vocational qualifications.

Entry qualifications and university outcomes

There is relatively little recent quantitative work in the English context on the relationship between type of entry qualification and university outcomes, and that work does not untangle the effects of differences in SES between those taking vocational and academic qualifications from the qualification routes themselves. In common with the majority of findings for OECD countries, continuation rates are lower for those taking BTEC rather than A level qualifications (Banerjee, 2019), even taking into account grades held (Hayward & Hoelscher, 2011; Office for Students, 2022; Round et al., 2012). Similarly, the proportions gaining a first or at least a 2:1 degree are lower for BTEC than A level entrants (Gill, 2018; Gill & Vidal Rodeiro, 2014; Office for Students, 2022; Round et al., 2012).

Qualification type, university outcomes and SES

In this paper, we ask whether entering university with vocational rather than academic qualifications can explain part of the socioeconomic gap in university performance. From the data available to us we are able to focus on three important university outcomes: dropping out before the start of the second year of study; repeating the first year of study in the same subject and at the same institution; and graduating with a degree lower than 2:1.[2]

While there are many vocational qualifications available to students in England, we confine ourselves to studying the outcomes of A level vs. BTEC students, as these are by far the most popular qualifications on offer. We therefore categorise students according to their entry qualifications: (i) A levels only (or at least three A levels and any other qualifications);

(ii) BTECs only; and (iii) a mixture of A levels and BTECs. We describe these pathways as ACAD, VOC and MIXED, respectively.

We run a series of regressions exploring whether there is a socioeconomic gap in any of our three outcomes, and the extent to which this gap can be explained by qualification type. The availability of linked administrative data with fine-grained measures of attainment at a subject at age 16, before the experience of students taking ACAD, VOC and MIXED pathways diverges, allows us to compare hypothetical students doing the same course at the same university who differ only in their upper secondary pathway. We thus avoid the problem of a lack of equivalence of grades points awarded to qualifications of different types discussed in the literature (Gill, 2018; Green & Vignoles, 2012). The extensive set of variables relating to student characteristics in this linked dataset allows us to compare students from the same social background in order to disentangle the role of entering university with vocational qualifications, and the characteristics of those who take the vocational route.

Our findings make an important contribution to our understanding of the relationships between taking vocational rather than academic entry pathways and university outcomes. The importance of prior attainment in SES gaps in university participation is well established (Chowdry et al., 2013), but few studies have looked at the role of prior attainment in university outcomes in contexts where different entry pathways to university are possible. As educational systems provide increasing flexibility in pathways between upper secondary and tertiary education, it is important to understand both the benefits and challenges of encouraging students to enter university with vocational qualifications.

Our findings also advance the small literature examining the drivers of SES gaps in university performance (Crawford, 2014; Crawford et al., 2016; Murphy & Wyness, 2023; Vignoles & Powdthavee, 2009). We provide an additional explanation for the existence of these SES gaps—the importance of entry qualification type.

There are several channels through which qualification type may affect student degree performance. By virtue of the difference in their primary aim, VOC qualifications may not prepare students so well for the rigorous academic experience of undertaking a degree. VOC courses are likely to have different assessment methods, being more reliant on coursework and practical work than exams, potentially putting students at a disadvantage, given that undergraduate degrees are often assessed by a formal exam. Of course, we cannot rule out the possibility that VOC students are simply different from ACAD students in ways that make them less successful in their degrees for reasons we cannot observe. For example, they may have lower academic confidence or they may be less motivated towards university study. Our data and methods do not allow us to consider these factors, and more research is needed to understand why these gaps in performance exist. Evaluation of interventions to reduce gaps may yield useful indications of mechanisms that are important in different educational contexts, for example work in Australia on the effects of preparatory semesters for students with VOC qualifications (Chesters et al., 2018; Chesters & Watson, 2016).

The paper proceeds as follows. The second section describes our dataset, and presents some descriptive statistics. The third section outlines our methods, while our results can be found in the fourth section. The last section concludes.

DATA

We use linked administrative data for three recent pre-covid cohorts of university students. Our linked samples are HEI (Higher Education Institution) first year and graduating students,

with university data made available by the HESA. The first year sample is all full time or sandwich first degree students on programmes lasting 2 years or more, aged 20 or below at entry, for three cohorts from 2014/2015 to 2016/2017 for every HEI in the UK.[3] The graduating sample is those on full-time or sandwich courses who left university in the three cohorts 2015/2016 to 2017/2018 in all HEIs, and were under age 25 at the start of their final year to allow for 4 year degree courses. We then link 743,900 English domiciled first years and 614,580 graduating students to their school records in the NPD at age 16 and their school records (NPD) and/or college records (ILR) at age 18 or 19.

Outcomes

We measure three adverse outcomes for students: dropping out, repeating their first year and graduating below a 2:1. We define students dropping out as those first years who are not found in the HESA data in the following year, including those who have repeated their first year one or more times and then drop out. Students repeating are those recorded as being in the first year of their degree programme in the second year after their entry to their HEI, studying the same main subject at the same HEI. It is therefore a measure of lack of academic progression. For our third outcome, our sample is all graduates with a classified degree. We only consider those who graduate for this outcome, so dropouts are excluded, i.e. the outcome is conditional on graduating.

SES quintiles

For our measure of students' SES we use pupil-level NPD age 16 data following Chowdry et al. (2013) to construct quintiles. The SES quintiles are computed using a variety of measures including individual free school meal (FSM) eligibility and very local neighbourhood measures. The neighbourhood data are based on 2011 census measures, calculated at output area level (around 150 households). The FSM indicator is effectively a measure of whether students' families were in receipt of benefits, and the neighbourhood data capture a broader set of indicators of socioeconomic background; they include the proportion of individuals working in managerial or professional occupations, the proportion holding a level 3 qualification or above, and the proportion of home-owning households. We also use the Index of Multiple Deprivation (at the Lower Super Output Area level of around 700 households for 2015) and a classification of residential neighbourhoods type (ACORN (CACI Ltd, 2021)), derived from information on housing details and socioeconomic characteristics at a postcode level of around 15 households. These measures are combined in a principal components analysis. While it would be desirable to construct SES based on individual-level measures, these are not available in the NPD. The approach taken, of combining area-based measures with the one individual-level measure available (FSM eligibility) to construct an SES measure from the NPD is considered the best proxy available (Jerrim, 2020).

If any of the variables used in constructing the SES quintiles is missing, we use NPD pupil-level data at age 18 and the ILR data to fill in as many gaps as possible. Almost all the missing data relate to students at private schools at age 16, for whom these variables are not available. These students are assigned to the top SES quintile, following Chowdry et al. (2013) (86,085 first years and 74,435 graduates[4]).

Table 1 sets out outcomes and other characteristics for the top and bottom SES quintiles and the full sample for first years (top panel) and graduating students (bottom panel). The

TABLE 1 Descriptive statistics for three cohorts of young English-domiciled full time first year (2015–2017) and graduating students (2016–2018) at UK universities.

	Top SES quintile[a]	Bottom SES quintile	Full sample
First years			
Number of observations	215,660	132,490	743,900
Dropout (%)	5	12	8
Repetition (%)	3	7	4
A-levels only (%)	85	50	70
Mixture of A-levels and BTECs[b]	3	11	7
BTECs only (%)	6	29	16
Mean points from GCSEs	460	362	427
Mean number of A and A* at GCSE	4.2	1.6	3.0
Percentage of non-White students[c]	14	52	2
Percentage of female students	53	58	56
Percentage of first-in-family students[d]	26	72	47
Graduating students			
Number of observations	188,310	96,405	614,580
Graduating below a 2:1 (%)	14	31	20
A-levels only (%)	87	57	75
Mixture of A-levels and BTECs (%)	3	9	6
BTECs only (%)	5	22	12
Mean points from GCSEs	481	367	439
Mean number of A and A* at GCSE	4.5	1.7	3.2
Percentage of non-White students	12	50	23
Percentage of female students	53	60	57
Percentage of first-in-family students	26	72	47

[a]Top quintile of all students with non missing socioeconomic status (SES) quintile, plus all private school students.

[b]Includes those with AS levels and BTECs but no A levels, as well as those with A levels and BTECs. Excludes those with any other level 3 qualifications.

[c]Of non-missing.

[d]Of non-missing.

raw gaps in outcome by SES quintile are clear: students from the bottom SES quintile are between two and three times more likely to experience all three adverse outcomes as their top quintile peers.

Entry qualifications

Table 1 goes on to show that students from these different SES backgrounds also enter university with different qualifications. We categorise our entry qualifications according to whether students have ACAD, MIXED or VOC qualifications. Some 85% of our sample of first year top quintile students enter university via the ACAD route compared with only half of bottom quintile entrants. Conversely only 6% of the top quintile enter with VOC qualifications, compared with nearly 29% of the least privileged. Slightly lower

proportions of the bottom SES quintile of graduating students are VOC students, reflecting the fact that more of them do not reach graduation, and these were earlier cohorts, with fewer VOC entrants.

Prior attainment

Clearly the outcomes we examine are related to prior attainment. A great benefit of using linked data to measure prior attainment is that we can construct common measures across students at the end of lower secondary schooling, age 16,[5] before their qualification types at level 3 diverge. We aim to compare university outcomes for students from different SES backgrounds who have similar academic profiles up to age 16, and examine how much of the gap we observe is accounted for by the divergent paths they have taken in post-16 education. The level 3 qualifications we consider, for example, have varying assessment methods, breadth of subjects studied and emphasis on transferable skills vs. knowledge (qualification attributes). Using scores available across qualifications at level 3 (Universities and Colleges Admission Service tariff scores (UCAS, 2023)) would therefore conflate prior academic achievement with differences in qualification types in post-16 education, as these scores were developed to inform universities about the performance they might expect from entrants with equivalent tariff scores. These measures reflect not just prior achievement but also the appropriateness of qualification attributes for university study, which is what we aim to investigate. The position is further complicated as research shows that the UCAS equivalence scales are imperfect in predicting degree outcomes (Gill, 2015; Green & Vignoles, 2012).

We therefore link our sample to their attainment at age 16, using the Qualifications and Curriculum Authority points available in the NPD data, which are much more comparable across the whole sample. We include the points from GCSEs, the most common set of examinations age 16 in England, together with the points from GCSE equivalents, and detailed measures of performance in specific subjects and combinations of subjects which have been identified as important in educational trajectories (Crawford et al., 2017).[6] Table 1 illustrates that the average prior attainment of students in the top and bottom SES quintiles differs, particularly in terms of their entering with top grades at GCSE.

Other demographics

Table 1 shows how other demographic characteristics of top and bottom SES quintile students differ: the least privileged quintile contains fewer White students, more women and fewer students with graduate parents.

University and degree subject

Different degree subjects and university types have widely differing profiles of SES and entry qualifications, as well as different proportions of students dropping out, repeating and graduating with a grade below a 2:1, which we take into account in our formal analysis. Universities are classified by type in appendix 1, Boliver (2015), based on a cluster analysis of university attributes developed by Boliver (2015).[7]

METHODS

We are interested in the extent to which entering university via the VOC rather than ACAD route might account for observed gaps in adverse outcomes between more and less privileged students. Our aim is to see whether if we compare outcomes for students entering with the same qualifications and educational profile, and with the same demographic characteristics doing the same degree subject at the same university, a gap by social background persists.

We run a series of models starting with the 'raw' difference in outcomes between people from different SES backgrounds, taking only the university/degree course attended (treated as random effects) and cohort into account. We then take a series of other observable differences into account, starting with qualification type and noting for each the extent to which any gaps in the probability of the outcome between SES groups are accounted for by the new variables. We concentrate on the gaps between the top and bottom SES quintiles. Our third model includes the detailed record of attainment at age 16 described above and the fourth model controls for a rich set of demographic and university attendance variables.[8]

Our aim is to model the expected value μ_{ijt} of our three dichotomous outcomes, where the outcome we observe y_{ijt} is assumed to depend on the individual level variables X_{ij}, the cluster level variables C_j (where clustering is at the level of individual university x degree course subject), and a cohort variable T_t to take account of trends over time. u_j is the random effect of cluster j.

$$\mu_{ijt} = \Pr(y_{ijt} = 1 \,|\, X_{ij}, C_j, T_t, u_j),$$

$$\text{We model } g\left(\mu_{ijt}\right) = \alpha + \beta X_{ij} + \gamma C_j + \tau T_t + u_j,$$

where $g(.)$ is a link function which transforms the expected value of the outcome so it can be linearly related to the predictor variables, and in particular constrains it to lie between 0 and 1.

We use the logit function as our link:

$$\text{logit} = \log(\text{Odds}) = \log\left(\frac{Pr}{1 - Pr}\right)$$

giving

$$\text{logit}\left(\mu_{ijt}\right) = \alpha + \beta X_{ij} + \gamma C_j + \tau T_t + u_j.$$

The standard assumptions of multi-level models, of which ours are examples, is that the level two (cluster level) error is a random variable with normal distribution—$u_j \sim N\left(0, \sigma_{u_j}^2\right)$—and that the level two error is not correlated with the individual level variables—$E\left(u_j \,|\, X_{ij}, C_j\right) = 0$. This is unlikely to be the case—for example the relationship of a particular university/course combination with graduating with a grade below a 2:1 is likely to be correlated with the GCSE results of the students on the course. Unless this issue is dealt with, the estimates of β will be biased. Using fixed rather than random effects estimators deals with this problem but is not feasible in our case because of the large number of clusters to estimate (there are over 5000 university/course combinations in our data).

The solution is therefore to use a correlated random effects model (Wooldridge, 2010), which includes the cluster-level means of the individual-level variables $\overline{X}_j$. This then picks up any correlation between the X_{ij}s and the cluster random effect u_j, ensuring the $E\left(u_j \,|\, X_{ij}, C_i\right) = 0$ assumption is not violated. The coefficients on these cluster level means are not of substantive interest in this study, where we are focusing on the mean relationship of individuals rather than courses with outcomes. Although it is possible for reasons of

efficiency to exclude these cluster-level means from models if they are not significant, all levels of a variable need to be included if any of them is significant. This is the case for our suite of models, so all cluster means are included for all individual-level variables.

Taking account of this expands our basic model equation to:

$$\text{logit}\left(\mu_{ijt}\right) = \alpha + \beta_W X_{ij} + \lambda \overline{X}_j + \gamma C_j + \tau T_t + u_j,$$

where β_W is the within-cluster effect (the equivalent of the coefficient given in a fixed effect model) and $\lambda = \beta_B - \beta_W . \beta_B$ is the between-cluster effect, which is not the focus of our study, as noted above.

The variables X_{ij}, $\overline{X}_j$ and C_j are added to the models in the four stages discussed above.

To try to untangle the relationship between university outcomes, SES quintile and entry qualification more fully, we run an additional model, including interactions which allow the relationship of qualification with outcome to vary by SES quintile.

Given that we have a census, rather than sample, of three cohorts in our data it is the size of the relationships that we observe that matters, and the *p*-values showing significance are not important, but are included in our tables of results as is customary.

RESULTS AND DISCUSSION

Dropping out

Table 2 presents the results from our models focusing on the probability of dropping out of university before the start of the second year. The table reports marginal effects from our models, conditional on cohort and university effects. Model 1 illustrates the baseline SES penalty in dropping out of university, with the most affluent students, from the top

TABLE 2 Difference in predicted probability of dropout before the start of the second year by SES quintile and qualification type (baseline bottom SES quintile and just A levels).

	Model 1	Model 2	Model 3	Model 4
Top SES quintile	−0.038	−0.022	−0.015***	−0.016***
	(0.001)	(0.001)	(0.001)	(0.001)
Just BTECs		0.091***	0.057***	0.054***
		(0.001)	(0.001)	(0.001)
Observations	743,900	743,900	743,900	743,900
Controls				
Cohort	×	×	×	×
University/course random effects	×	×	×	×
SES quintile	×	×	×	×
Qualification type		×	×	×
Attainment age 16			×	×
Demographics/uni				×
(Controls for cluster means are included alongside the individual level control)				

Note: Standard errors in parentheses.

***$p < 0.001$.

20% of the SES distribution, 3.8 percentage points[9] less likely to drop out of university than those from the most deprived students (bottom 20% of SES distribution). This is consistent with previous findings in the literature (Crawford, 2014; Crawford et al., 2016; Vignoles & Powdthavee, 2009) and the most recent Higher Education Statistics Agency data on dropout differentials by higher education participation area (HESA, 2022b). The contribution of this paper is to move beyond this to understand the role of prior qualification choices in driving these SES gaps in outcomes.

Model 2 introduces a measure of qualifications studied at level 3 including an indicator of whether the student studied VOC only. Studying for this qualification type shows the largest differences in university outcomes relative to the ACAD route and is associated with a 9 ppt increase in the probability of dropping out of university before the start of the second year. While high SES students are still 2.2 ppt less likely to drop out of university than their low SES peers, the inclusion of the qualification type studied at level 3 reduces the SES gradient (top vs. bottom) in dropping out of university by 1.6 ppt—a 42% reduction. This is indicative of the important relationship between qualification choice, deprivation and university outcomes seen in Table 1—students from low SES backgrounds are far more likely to take the VOC route relative to their high SES peers, who are far more likely to take the ACAD route, and are also far more likely to drop out of university.

Models 3 and 4 show that these SES and qualification associations with dropping out are, in part, driven by prior attainment at age 16 and other demographic characteristics. The SES gradient is reduced by a further 0.7 ppt with the inclusion of earlier measures of prior attainment, while the VOC penalty is reduced by 3.4 ppt—suggesting that individuals who are low SES and taking the VOC rather than ACAD route are also lower attaining at level 2 (GCSEs and equivalents), which can account for some of the higher probability of dropping out of university before the start of their second year. Yet even comparing students with the same GCSE (or equivalent) achievement with similar demographic characteristics, and studying similar subjects at similarly ranked universities, there is still an additional penalty to being low SES, and having VOC qualifications is associated with dropping out of university. Although taking account of demographics accounts for almost no more of the SES gap, this is the net effect of relationships acting in different directions. Non-White students are on average from lower SES backgrounds than White students, but are less likely to drop out than their White peers. On the other hand, other demographic characteristics associated with coming from a lower SES background, such as having no graduate parent and living at home rather than in halls of residence, are associated with increased chances of dropping out.

Figure 1 considers whether there is an *additional* penalty, in terms of dropping out, to taking the VOC rather than ACAD route to university if the student is from a low SES background, compared with students from high SES backgrounds. We therefore focus on the interaction between SES and qualification type, to understand if there is a double disadvantage to a combination of the two. Table 3 shows the percentage point differences in the penalty from the VOC route relative to the ACAD route for low and high SES students. Figure 1 and Table 3 illustrate that there is an additional penalty to being low SES *and* studying vocational qualifications prior to university—while high SES students are 5.3 ppt more likely to drop out if they take the VOC rather than ACAD route, low SES students are 6 ppt more likely to drop out, a relative difference of 0.7 ppt. Overall, an 'average' low SES VOC student is over twice as likely to drop out as a high SES ACAD student with otherwise similar characteristics and attainment at age 16.
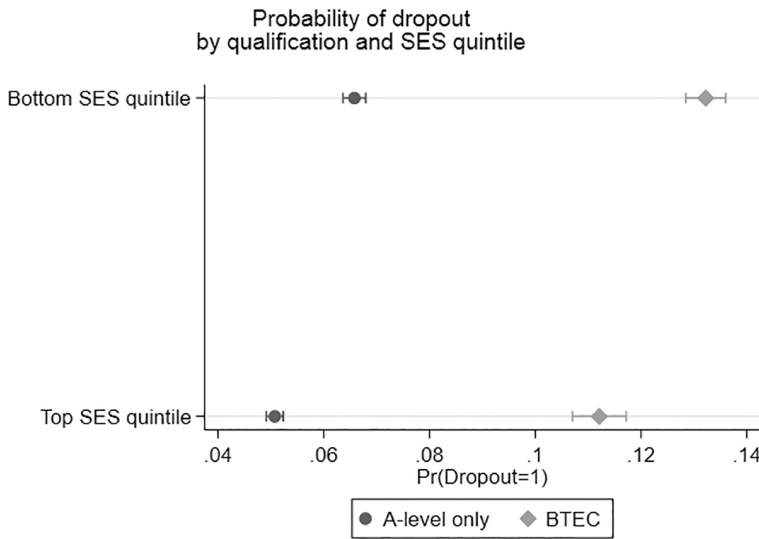
FIGURE 1 Predicted probabilities of dropout for students in the bottom and top socioeconomic status (SES) quintiles with just A levels and just BTECs.

TABLE 3 Predicted probabilities of each of the three outcomes studied for students in the bottom and top SES quintiles with just A levels and just BTECs.

Predicted probabilities (other characteristics at means)	Dropout	Repetition	Graduating below a 2:1
A level/bottom SES	6.6%	3.9%	19.2%
BTEC /bottom SES	12.6%	6.6%	27.5%
Gap at bottom SES	6.0 ppt	2.7 ppt	8.3 ppt
A level/top SES	5.3%	3.0%	16.6%
BTEC/top SES	10.6%	5.6%	23.4%
Gap at top SES	5.3 ppt	2.6 ppt	6.8 ppt
Difference in gap	−0.7 ppt**	−0.1 ppt	−1.5 ppt***
N	743,900	743,900	614,580

***$p < 0.001$; **$p < 0.01$.

Repetition

A similar pattern emerges when we consider the alternative outcome of repeating the first year of university, by SES and qualification type (Table 4). Model 1 shows that high SES students are 3.1 ppt less likely to repeat the first year of university than low SES students, a finding which is less researched in previous work.[10] As with dropping out of university, the VOC route is significantly associated with a higher probability of repeating the first year of university, with VOC entrants 5.7 ppt more likely to repeat the year than ACAD students. The inclusion of qualification studied reduces the SES gradient by 1 ppt (32%), again highlighting the important inter-relationship between SES and qualification studied for university outcomes.

As with dropping out, the inclusion of prior achievement at age 16 (Model 3) and demographics and university and subject studied (Model 4) further accounts for another half of the SES gradient in grade repetition with a reduction of 0.5 and 0.6 ppt, respectively.

TABLE 4 Difference in predicted probability of repetition of the first year by SES quintile and qualification type (baseline bottom SES quintile and just A-levels).

	Model 1	Model 2	Model 3	Model 4
Top SES quintile	−0.031***	−0.021***	−0.016***	−0.010***
	(0.001)	(0.001)	(0.001)	(0.001)
Just BTECs		0.057***	0.024***	0.025***
		(0.001)	(0.001)	(0.001)
Observations	743,900	743,900	743,900	743,900
Controls				
Cohort	×	×	×	×
University/course effects	×	×	×	×
SES quintile	×	×	×	×
Qualification type		×	×	×
Attainment age 16			×	×
Demographics/uni				×
(Controls for cluster means are included alongside the individual level control)				

Note: Standard errors in parentheses.

***$p < 0.001$.

This illustrates that low SES students also have lower prior achievement at age 16, which is an important predictor of grade repetition, and they also have other demographics more strongly associated with grade repetition, including being non-White, having a non-graduate parent, attending lower ranked universities and living in the parental home for their first year rather than halls of residence. It is striking to compare the findings for repetition with those for dropout for non-White students. These students are less likely to drop out and more likely to repeat than their White peers. It is possible that this propensity to persist at university among students from ethnic minorities could explain part of the degree class attainment gap by ethnicity and also SES that we discuss below. Interestingly, all else being equal, students from private schools are more likely to repeat than their state-educated peers, perhaps because they have more financial resources on which to rely.

Figure 2 and Table 3 again consider the interaction between qualification type and SES for the probability of repeating the first year of university. Interestingly, while VOC students are more likely to repeat and low SES students are more likely to repeat, relative to high SES ACAD students, there is no additional penalty for being low SES *and* taking the VOC route before university in terms of risk of repeating a year. Low SES VOC students are 2.7 ppt more likely to repeat the year than low SES ACAD students, while high SES VOC students are more likely by a similar amount to repeat the year than high SES ACAD students. Repetition for reasons of academic failure requires two things: academic failure in the first place and an ability to retake the year despite the increased cost in fees, time and living costs. Our finding here could be the net effect of these, consistent with both an increased chance of academic failure for low compared with high SES VOC students and decreased chances of having the resources to repeat the year.

Graduating below a 2:1

Finally, we consider SES gradients in whether students achieved below a 2:1 in their degree, relative to achieving a first or a 2:1. Crawford (2014) showed that low SES students were less
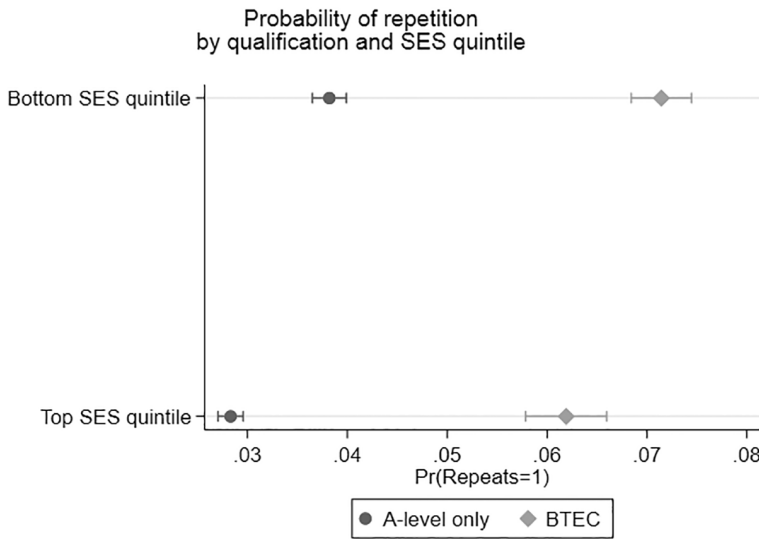
F I G U R E 2 Predicted probabilities of repetition for students in the bottom and top SES quintiles with just A levels and just BTECs.

T A B L E 5 Difference in predicted probability of graduating with a grade below a 2:1 before the start of the second year by SES quintile and qualification type (baseline bottom SES quintile and just A-levels).

	Model 1	Model 2	Model 3	Model 4
Top SES quintile	−0.107***	−0.077***	−0.047***	−0.031***
	(0.002)	(0.002)	(0.002)	(0.002)
BTECs only		0.184***	0.063***	0.072***
		(0.002)	(0.002)	(0.002)
Observations	614,580	614,580	614,580	614,580
Controls				
Cohort	×	×	×	×
University/course effects	×	×	×	×
SES quintile	×	×	×	×
Qualification type		×	×	×
Attainment age 16			×	×
Demographics/uni				×
(Controls for cluster means are included alongside the individual level control)				

Note: Standard errors in parentheses.

***$p < 0.001$.

likely to graduate with a first or a 2:1, conditional on completing university, and Model 1 of Table 5 confirms these findings for our cohorts of data. Those in the top SES quintile are 10 ppt less likely to graduate below a 2:1 than those in the bottom SES quintile.[11] Model 2 shows that around 30% of this SES gradient can be accounted for by students from low SES backgrounds being more likely to take the VOC rather than ACAD route to university. Low SES students who take the same qualifications as their high SES counterparts remain 7.7 ppt less likely to achieve a 2:1 or a first. The penalty for the VOC rather than ACAD route in terms of graduating below a 2:1 is large—VOC students are 18.4 ppt more likely to graduate with

a degree classification below a 2:1, relative to ACAD students. Note that this is for a more restricted sample of only those who complete university, relative to Tables 2 and 4, and so in addition to being associated with a higher probability of dropping out and repeating the first year, there is a large penalty to taking the VOC route to university also in terms of final degree classification.

Conditioning on achievement at age 16 and other demographic controls and university course characteristics in models 3 and 4 reduces the SES gradient in achieving below a 2:1 further, to 4.7 ppt in Model 3 and 3.1 ppt in Model 4. Qualification type, background characteristics, prior achievement and university course characteristics can account for around 70% of the SES gradient in achieving a grade below a 2:1 at university, yet there remains a 3.1 ppt difference in university achievement, even comparing low and high SES students with very similar educational experiences.

The inclusion of prior achievement, demographics and university characteristics reduces the penalty from VOC study prior to university by over half that seen in Model 2. Figure 3 and Table 3 illustrate that the *combination* of taking the VOC route and being low SES leads to a double disadvantage in terms of degree achievement. While low SES VOC students are 8.3 ppt more likely to graduate with a degree classification below a 2:1, relative to low SES ACAD, high SES VOC students are only 6.8 ppt more likely to graduate with a degree below a 2:1, relative to high SES ACAD students. There is an additional 1.5 ppt penalty for the combination of being both low SES and taking vocational qualifications prior to university on degree attainment. Low SES VOC graduating students with average attainment and demographic characteristics are over 1.6 times as likely to graduate below a 2:1 as otherwise similar students from the top SES quintile entering with ACAD qualifications. These findings illustrate that SES gaps in achievement persist even when comparing individuals who enter university with very similar prior achievement, including studying the same qualifications prior to university. Low SES students are more likely to drop out from their studies in the first year, and then leave their studies with a lower class degree.
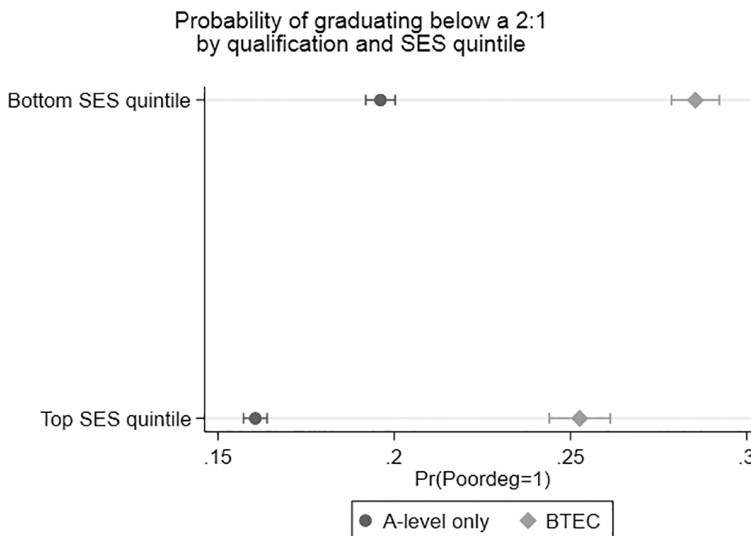
FIGURE 3 Predicted probabilities of graduating below a 2:1 for students in the bottom and top SES quintiles with just A levels and just BTECs.

We have shown the results from those taking the VOC route to university in contrast with those taking the ACAD route. Full models for students taking the MIXED route to university show reduced gaps in all three outcomes. Significant, although smaller, differences in outcome remain when comparing MIXED and ACAD route students (1.7 ppt more likely to dropout, 1.0 ppt more likely to repeat and 3.4 ppt more likely to graduate with a grade below a 2:1). These gaps are all less than half the size of the corresponding gap between fully VOC and ACAD routes.

CONCLUSION

Our work shows that a significant proportion of the gap in university outcomes between those from the most and least privileged SES quintiles is accounted for by the different choices of qualification they make at age 16. If it is indeed the qualifications themselves driving these gaps, for example through the content or assessment methods used, then one response might be to stop making those qualifications available as an entry route to university. Yet concentration on the 'gaps' misses the point that the majority of students entering university using a vocational route are successful: most do not drop out or repeat and of those who graduate, 60% do so with at least a 2:1. These qualifications have opened opportunities to students from lower SES backgrounds who without this pathway might not have entered university at all. The tension implicit in allowing students to enter university with qualifications which seem attractive to lower SES students but which do not, prima facie, provide as good preparation for university study are likely to persist, both for English students and internationally.

Our work also suggests that the drivers of repetition of the first year are worth further examination. This paper concentrates on the role of qualifications, but other characteristics of students are important to consider in future work, such as attitudes to taking on an extra year of student debt for less privileged students and investigating why on average White students are less likely to repeat than their peers of other ethnicities.

Our work in the English context contributes to what we know about SES and university outcomes by going further than the existing, known, effects of prior attainment to considering how vocational and academic routes taken by students from different backgrounds might additionally relate to their persistence and university attainment. As the education systems across different countries provide increasingly flexible routes into university, particularly for those from lower SES backgrounds, understanding how these routes relate to university outcomes, and what attributes of assessment, content and alignment of upper secondary and tertiary qualifications work best, is crucial if lower SES students are not to be hindered by systems designed to help them. More research in different country contexts is needed to establish what works to improve degree completion and enhance degree performance for those entering with non-traditional qualifications.

CONFLICT OF INTEREST STATEMENT
The authors are not aware of any conflicts of interest.

DATA AVAILABILITY STATEMENT

We used linked NPD-HESA-ILR data provided by the Department for Education (DfE) accessed via the ONS Secure Research Service (ONS SRS) and we are grateful to both DfE and ONS SRS staff for their help in making this data available. The use of this data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

The linked NPD-HESA-ILR data made available by the DfE may only be accessed by accredited researchers via the ONS SRS. For reasons of confidentiality of the data subjects, as well as the legal requirements of the public bodies making the data available, it must remain in the ONS SRS environment so cannot be made be publicly available or transferred to a repository. ONS accredited researchers wishing to access the data need to apply via the Department for Education's NPD data sharing service.

ETHICS STATEMENT

Ethics approval was given by the Oxford Brookes University Research Ethics Committee, reference 191,281.

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ENDNOTES

[1] The measure is for degree completion in time to theoretical graduation plus 3 years.

[2] In the UK, undergraduate honours degrees at level 6 are graded as First class, Upper second class (2:1), Lower second class (2:2), Third class, and Pass (a degree without honours).

[3] With the exception of the Open University as its student progression is substantively different from that of other universities.

[4] These are a larger proportion of our samples than the overall proportion of 16 year olds at private schools, as our samples are defined by those at HEIs, where students from private schools are over-represented.

[5] Pupils in England take high-stakes exams called GCSEs, or equivalents which are often more vocationally based, at the age of 16. These are level 2 qualifications. Their level 3 qualification and subject choices are at least in part determined by the results of this set of exams.

[6] Separating out the points from GCSEs and GCSE equivalents allows for any non-equivalence in tariff between GCSEs and other level 2 qualifications (which include level 2 BTECs and vocational qualifications) to be taken into account in our modelling. The additional prior attainment controls are the points from English language GCSE (or English language and literature if held instead) and maths GCSEs and the numbers of GCSEs at A*, A, B, C and D–G held in EBacc excluding English and maths, which are included separately and Non-EBacc subjects. EBacc (English Baccalaureate) subjects are a suite of 'traditional' subjects taken at age 16 which are reported on in school performance tables; they are English language and literature, maths, modern foreign languages, physics, chemistry, biology, computing, history and geography.

[7] Qualifications and outcomes differ by university, and it is useful to summarise our findings by university type. Rather than using the somewhat arbitrary grouping of universities according to age or membership organisation, we use the more theoretically rigorous categories developed by Boliver (2015) based on a cluster analysis of five key dimensions of universities: research activity, teaching quality, economic resources, academic selectivity and socioeconomic mix of the student body. This gives rise to four distinct clusters: Oxbridge; most old universities (which includes all other Russell Group universities); lower ranked old and most new; and lower ranked new.

[8] These controls are age group, gender, whether students have had a gap year, ethnicity, declared disability at university, whether they had persistent absence at KS4, their type of school, their parental education, their term time accommodation (as a proxy for being a local/commuting rather than a resident student) and the type of university attended (Boliver cluster).

[9] This is smaller than the raw gap between top and bottom quintiles shown in Table 1 because the cluster means for SES quintile are included in Model 1 and account for some of the gap in observed outcomes. Low SES students are more likely to be found at universities and on degree courses where dropout is higher than average.

[10] Smaller than the raw gap in Repetition% shown in Table 1 because of the inclusion of cluster means in Model 1.

[11] Smaller than the raw gap in Graduating below a 2:1% shown in Table 1 because of the inclusion of cluster means in Model 1.

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