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Social origins, elite education and elite destinations

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Abstract

This paper examines pathways to high socio-economic positions for men and women born in Britain in 1970. Our analysis draws on the 1970 British Cohort Study (BCS70), exploiting data from birth to age 42. We provide a comprehensive account of the way in which cognitive and educational attainment mediate the link between social origins and elite destinations in terms of social class and earnings in mid-life. We assess the roles of private and selective secondary schools, and of high-status universities and fields of study. We find that, once a sufficiently detailed picture of educational attainment is taken into account, education fully explains the link between social origins and top social class destinations.

Introduction

The link between social origins and destinations (Halsey, Heath and Ridge 1980) has been extensively documented (Blanden et al. 2004; Blanden, Gregg and Machin 2005; Blau and Duncan 1967; Boliver and Swift 2011; Chan and Boliver 2013; Goldthorpe and Jackson 2007; Goldthorpe and Mills 2008; Gorard 2008; Jencks 1972). Education has become a stronger mediator of social origins over time (Devine and Li 2013; Halsey 1977), and the direct role of social origins is weaker for university graduates (Breen and Jonsson 2005; Torche 2011). But studies have found a persistent direct link between social origins and destinations which is not accounted for by individual educational attainment (Breen and Goldthorpe 2001; Bukodi and Goldthorpe 2011; Devine and Li 2013; Gutierrez, Micklewright and Vignoles 2015). In other words, the 'Origins-Education-Destinations' (OED) triangle retains a direct Origins-Destinations link. A growing literature has explored the potential mechanisms underpinning this residual direct link, including the role of social networks (Gutierrez, Micklewright and Vignoles 2015) and 'soft skills' (Blanden, Gregg and Macmillan 2007; Jackson 2007). Attention has focussed particularly on barriers to social mobility into elite occupations (Ashley et al. 2015).

Socio-economic inequalities in educational attainment develop throughout the life course, and are apparent from early childhood cognitive scores onwards. Social class differences in cognitive attainment are apparent before the start of formal schooling (Duncan and Magnuson 2011), and have been shown to widen during the early years in Britain (Feinstein 2003; Sullivan, Ketende and Joshi 2013). Cognitive scores predict later educational attainment, but cognitive scores and educational qualifications reflect somewhat different skills (Heckman and Kautz 2012). Both cognitive scores and educational attainment independently predict occupational outcomes (Hauser et al. 2000), but the mechanisms are likely to be somewhat different, as qualifications are a visible signal to prospective employers, unlike cognitive test scores.

The theories of Maximally Maintained Inequality (MMI) (Raftery and Hout 1993), and Effectively Maintained Inequality (EMI) (Lucas 2001), state that, as education systems expand, and access to any given level of education becomes near-universal, inequalities will be maintained via access to the next level (MMI), or via status distinctions within a given level (EMI). So, for example, if inequalities in access to a university degree diminish, their role will be displaced by differentials in access to high status universities and courses. It is therefore vital to take account of such educational differentials in a refined way in order to capture the role of education in accounting for the link between origins and destinations. In order to fully assess the relevance of class differentials at each stage of the educational trajectory in accounting for inequalities in socio-economic outcomes in mid-life, we need to adopt a life-course approach using rich educational and cognitive data.

One route through which advantaged families may promote their children's attainment is via private and selective schooling. The over-representation of the privately educated in elite jobs continues (Macmillan, Tyler and Vignoles 2014). Advocates of grammar schools (selective schools within the state system) in Britain argue that they provide opportunities for bright working-class children, giving them a chance of upward mobility that they would not otherwise receive. Critics point to the fact that working class children are far less likely than the middle classes to gain a

grammar place, and that selective systems as a whole tend to disadvantage the poor (Boliver and Swift 2011; Burgess, Dickson and Macmillan 2014).

We conceive of elite education in terms of private and selective secondary schooling, and highly selective higher education participation. People who have attended private and grammar schools are advantaged in terms of school qualifications (Feinstein and Symons 1999; Sullivan and Heath 2003) and in terms of income and occupational attainment (Crawford and Vignoles 2014; Dearden, Ferri and Meghir 2002; Green et al. 2012; Iannelli 2013; McKnight 2015).

Differentiation within higher education is important (Gerber and Cheung 2008), and there is evidence of higher income returns to degrees from elite universities compared to non-elite universities (Brewer, Eide and Ehrenberg 1999; Chevalier and Conlon 2003). As well as status differentials between universities, there are also important differences in status and income returns between degrees in different subject areas (Croxford and Raffe 2014; Jackson et al. 2008; Ma and Savas 2014; O Leary and Sloane 2005; Patrignani and Conlon 2011; Walker and Zhu 2011; Walker and Zhu 2013). Selection into elite courses reflects social origins, largely but not entirely via academic selectivity (Grodsky 2007; Grodsky and Jackson 2009), and unobserved heterogeneity into selective institutions and courses remains an issue for research in this area (Kim, Tamborini and Sakamoto 2015). Private school pupils have a higher chance of gaining a degree from an elite university than state school pupils with the same school level qualifications (Sullivan et al. 2014).

Social reproduction is also shaped by gender. Past work has found that women's labour market outcomes have been less driven than men's by social origins (Gutierrez, Micklewright and Vignoles 2015; Heath and Cheung 1988) and that private schools have provided a larger advantage for men than for women (Sullivan, Joshi and Leonard 2010; Sullivan, Joshi and Leonard 2011). Women continue to be lower paid than men at the same level of qualifications (Joshi, Makepeace and Dolton 2007) and are less likely to be employed at the top end of the income and social class distribution. Although women's chances of entering higher education are now higher than men's in many countries, persistent differences in field of study remain (Riegle-Crumb et al. 2012).

We consider outcomes for the 1970 British Cohort Study (BCS70) at age 42, a time when career trajectories will be well established for most. This is an opportunity to understand the trajectories of a generation of which many of the current ruling elite are part. Previous research on elite formation has not typically exploited rich life-course data (Wakeling and Savage 2015). This paper considers the link between social origins and elite destinations from a life course perspective, examining the extent to which the origins-destinations link is accounted for by cognitive and educational attainment and the type of educational institutions attended throughout the educational career. While other research on occupational attainment has examined aspects of cognition or qualifications; private schooling or higher education; to our knowledge, this is the first study to address all of these in conjunction.

British schools and universities in historical context

The majority (80%) of the 1970 cohort attended comprehensive state secondary schools (for all abilities), with minorities attending selective state grammar schools (4%) for those who passed the '11-plus' competitive entrance exam, and secondary modern schools (9%) for those who failed. The 1970 cohort took public examinations at age 16, O levels (Ordinary Levels) for the more academic and CSEs (Certificate of Secondary Education) for the rest. Comprehensive schools typically offered both O level and CSE exams to their pupils. A top grade CSE pass was deemed equivalent to an O level grade C. A minority of pupils stayed on at school from 16-18 to take A (Advanced) level courses, which were (and remain) the academic college-track qualification.

Private schools in the 1980s were in a position to take advantage of the decline of grammar schools, by providing an academically selective education for those able to pay, though they also lost some of their previous business in 11-plus failures from affluent families. There was substantial heterogeneity within the private sector in terms of both academic selectivity and fees. Private schools responded to the expansion of Higher Education and to increasing reliance on academic qualifications in the labour market by increasing their focus on academic attainment (Green et al. 2012; Rae 1981). They responded to parental demands for high attainment, advertising their pupils' A level grades and rates of success in getting into the universities of Oxford and Cambridge (colloquially known by the portmanteau term 'Oxbridge') (Green et al. 2012). In contrast, state schools faced particular difficulties during the 1980s due to education cuts under the Thatcher government (Gillard 2011). The fabric of buildings was in poor repair, and teachers' status and salaries were lower than they had been in the past. A long period of industrial action meant that extra-curricular activities no longer took place in many state schools. The pupil-teacher ratio was around 18, compared with only 12 in the private sector (Green et al. 2012).

British school leavers in the late 1980s still had access to means-tested maintenance grants, paid for by the state. All universities were public, and none charged tuition fees. Therefore, for this generation, ability to pay was not a barrier to either attending higher education in general, or to attending a particular institution. Acceptance on a course was largely determined by the A level grades achieved by the applicant. In the UK system, candidates apply to study a particular course at a particular institution. This is unlike the US, where applicants are typically accepted to institutions regardless of major. Higher education institutions were divided into universities and polytechnics (the latter being lower in status). Despite the subsequent abolition of the university/polytechnic divide, status differentials between British universities have not diminished in importance.

Research questions

Our over-arching research question concerns the link between social origins and elite social destinations. To what extent can this be accounted for by a refined life-course account of cognitive and educational attainment?

Our approach also allows us to assess whether there is a decisive stage in the educational trajectory which accounts for the origins-destinations link. To what extent have inequalities already crystallised on entry to primary school, and to what extent do they emerge later in the educational career?

We address the role of private and selective secondary schooling. In particular, is there a direct link between school type and socio-economic destinations which cannot be accounted for by cognitive and educational attainment? We assess whether there is an interaction between social class origins and the type of secondary school attended, in order to test the hypothesis that selective schooling has greater benefit for working class pupils.

Does degree institution or subject influence outcomes? We provide a detailed examination of degree level attainment, encompassing both institutional status and subject specialism. We are able to control for prior cognitive and educational attainment in an exceptionally fine-grained way, in order to account for differential selectivity into the different types of degree.

A focus on income or earnings by economists and on social class by sociologists has led to controversial and conflicting findings on social mobility (Blanden et al. 2004; Goldthorpe 2013). Therefore, we examine both social class and earnings as outcomes, in order to address the question of whether the influence of social origins on getting a high-ranking job or a high ranking income is essentially similar or different. We may hypothesise for example that parental income will be more important in driving the offspring's adult income than their adult occupational social class.

Data, variables and methods

The 1970 British Cohort Study (BCS70) follows the lives of more than 17,000 people born in England, Scotland and Wales in a single week of 1970 (Elliott and Shepherd 2006). Over the course of cohort members' lives, the BCS70 has collected information on health, physical, educational and social development, and economic circumstances among other factors. Since the birth survey in 1970, there have been eight surveys (or 'waves') at ages 5, 10, 16, 26, 30, 34, 38 and 42. An understanding of the educational progress of this cohort during their childhood is vital to understanding their later life course trajectories.

BCS70 is particularly rich in measures of cognition. The range and sources of these tests is described under our modelling strategy below. We make use of the full set of cognitive tests at the ages of 5, 10 and 16. We use varimax Principal Components Analysis (PCA) to extract a single main component score for cognition using all available tests at each age. The resulting PCA score is standardised in our analyses. Cronbach's Alpha for these age-specific measures ranged between 0.6 and 0.9 (Parsons 2014).

The 1970 British Cohort Study (BCS70) should be a prime source of longitudinal information on the role of schooling in shaping people's lives. However, a lack of adequate secondary school data has previously prevented researchers from examining the effects of schooling on the 1970 cohort to the same extent as has been achieved with the earlier 1958 cohort. Due to a teachers' strike in 1986, information on secondary schooling was absent in 60% of cases. This has left gaps in the understanding of the trajectories of the generation who attended secondary school in the 1980s. The project we report on in this paper has filled in the gaps in the BCS70 school information using a combination of recall data at age 42 and historical administrative data (1986 Schools Census). These variables have been deposited for wider use by the research community.

Within the private sector, it is important to distinguish between elite 'public' schools and other private schools, as it is the public schools that most strongly dominate the British ruling elite. We considered various operationalisations of this variable, as the definition of a 'public school' is contested, and overly restrictive definitions would leave us with excessively small cell sizes. We have used the 'Tatler'[i] list of 'public' schools to identify elite establishments. We use the distinction between 'public' or Tatler and private schools for men only, as the number of women attending schools on the Tatler list was insufficient for analysis. We therefore distinguish between the following secondary school sectors: 'Tatler' (elite private), private (other), grammar (state academically selective schools), secondary modern (state schools for those not selected for grammars) and comprehensive (all-ability state schools).

We also exploit fine-grained data on higher education collected at age 42. Our measure of an elite university is based on the Russell Group[ii] of universities, which promotes itself as representing the leading UK universities (Boliver 2013)[iii]. We acknowledge the element of arbitrariness in this measure. We considered a more restrictive definition of elite higher education, as evidence suggests that 'top jobs' are particularly strongly dominated by graduates of the 'Golden Triangle' of Oxbridge and certain London colleges (Boliver 2015; Wakeling and Savage 2015). However, use of such a classification would have led to insufficient numbers for robust analysis. We include anyone gaining a degree awarded by a polytechnic within the ordinary degree category. (We tried using the university/polytechnic divide in our analyses, but found no significant difference in outcomes). Following Walker and Zhu (2011), we group degree subjects into: STEM (Science, Technology, Engineering and Mathematics), LEM (Law, Economics and Management) and OSSAH (other social sciences, arts and humanities, including languages – in what follows, we sometimes refer to this category as 'humanities').

Because we exploit data from all of the childhood waves of the study, including the age 16 wave, the problem of missing data must be addressed. The age 16 survey employed sixteen separate survey instruments, and unfortunately coincided with a teachers' strike which affected the completion of those instruments, including cognitive tests, that were administered via schools (Dodgeon 2008). This led to substantial instrument non-response, though the overall response and representativeness of the sample at this wave was good (Mostafa and Wiggins 2015). As list-wise deletion is not a practical option, we use multiple imputation to 'fill-in' values of any missing items in the variables selected for our analysis adopting Schafer's data augmentation approach (Schafer 1997) under the assumption of 'missing at random' (MAR). In order to strengthen the MAR assumption and to

protect against departures from multivariate normality we also included a set of auxiliary variables in our imputation model. Our analytical sample includes all cohort members resident in England and Wales in 1986 with a full set of birth characteristics, who participated in the age 42 survey and had information on school type and on our dependent variables. Cohort members resident in Scotland were excluded because Scotland's system of school qualifications differs from that in England and Wales. All reported analyses are averaged across 20 replicates based upon Rubin's Rule for the efficiency of estimation under a reported degree of missingness across the whole data of around 0.20 (Little and Rubin 2014).

As we are interested in elite formation, we examine differences in access to the top of the social class spectrum. We also acknowledge that we are limited by our sample size. We identify the top social class group using the NS-SEC (Rose and O'Reilly 1998) occupational schema, which determines class position in terms of employment relations. It reflects not just income, but longer term economic security, stability and prospects, as reflected in a person's labour market position. It also reflects power in terms of relationships of authority, control and autonomy within the workplace (Goldthorpe and McKnight 2006). While the theoretical basis of the NS-SEC differs from Erik Olin Wright's Marxist schema, which is based on the concepts of exploitation and domination (Wright 2005), in practice the two approaches are largely equivalent from an empirical perspective. We examine access to the top NS-SEC class (class 1, comprising 1.1 and 1.2). Class 1.1 consists of large employers and higher managerial and administrative occupations such as chief executives, production managers and senior police officers. Class 1.2 consists of higher professional occupations, such as lawyers and doctors. Some major graduate occupations are not included in class 1, because they are subject to a relatively high degree of day-to-day managerial control. For example, school teachers, librarians and social workers are in class 2, 'lower managerial, administrative and professional occupations'. For our sample, a minority (35%) of those with degrees were in class 1 at age 42. However, class 1 is by no means exclusively composed of graduates – a bare majority (55%) of this class have a degree.

We treat earnings as log hourly wages for all those in paid employment. We assess entry to the top 15% of the distribution, as this provides comparability with the top social class group, which accounts for approximately 15% of our sample. This approach is in line with Wiggins et. al.'s (2004) use of income septiles for comparison with the NS-SEC.

It is important to note that the overlap between being in the top social class and income groups is surprisingly modest, especially for women. For women in class 1, only 36% are in the top 15% or earnings. For women with top earnings, 42% are in class 1. For men, the figures are 52% and 53% respectively. This makes it likely that findings could differ across the two outcomes.

We carry out separate analyses for men and women, in order to assess gender differences in the pathways to occupational and income attainment by 42.

Our analysis unfolds across six models. Blocks of variables are added sequentially to each model.

Model 1 includes only social origins, measured by parents' qualifications, income and social class. We retain these three separate measures, as they express different, though overlapping, sets of parental resources, and we may expect the effect of parental education on the child's occupational outcomes to be fully mediated by the child's own educational attainment, while this may not be the case for parental income and occupational social class. We have however re-run our results using a single measure of social origins (social class) with no substantial difference found in the results.

Parents' highest qualification (1975): coded as mother's or father's whichever is highest.

Family income (1980).

Occupational social class (1970): We use the Registrar General's classification, as NS-SEC (Goldthorpe 1997) is not available for 1970. We use the highest occupation based on either the mother or father's current or most recent job. Non-working mothers are grouped with the reference social class if this is the only information available (this is a small group). We considered using both mother's and father's class as separate variables, but decided against this approach as many mothers had not supplied any occupation information (8.2%) or were not in paid employment (37.7%).

Model 2 includes cognition at age 5. At age five the children took the following five tests. Copying designs: An assessment of visual-motor co-ordination (Rutter, Tizard and Whitmore 1970); English picture vocabulary (Brimer and Dunn 1962); Human figure drawing (draw-a-man) and Complete a profile: Intended to reflect conceptual maturity (Goodenough 1926; Harris 1963); Schonell graded reading (Golding 1975). Combined cognitive scores at 5, 10 and 16 (derived using PCA) are derived from the range of tests taken by the cohort members, and transformed into standardised scores (Parsons 2014).

Model 3 includes cognitive scores at age ten. The children took eight cognitive tests. Shortened Edinburgh Reading Test (Godfrey Thompson Unit 1978); Pictorial language comprehension test; Friendly maths test; Spelling; British Ability Scales (BAS) (Elliott, Murray and Pearson 1979; Hill 2005): comprising of two verbal subscales (word definitions and word similarities) and two non-verbal subscales (digit recall and matrices) (Butler, Despotidou and Shepherd 1980).

Model 4 adds the type of secondary school attended (1986), comprehensive, grammar, secondary modern, or private. In the case of boys, we distinguish between the more exclusive 'public' schools from the Tatler list, and other private schools.

Model 5 includes qualifications and cognitive scores up to age 20 (typically age 16-18).

In 1986, the BCS70 cohort members took cognitive tests in: vocabulary, comprehension, verbal reasoning, non-verbal reasoning and spelling (Closs and Hutchings 1976; Dodgeon 2008). Examination results at age 16 (1986) include a derived total point score from all O level and CSE examinations. We also include separate binary variables to indicate whether a cohort member had a maths or English O Level grade A-C or equivalent. A level qualifications by age 20: A levels were the main qualification for university entry for this cohort. They were typically taken at age 18, but we include qualifications up to age 20 to allow for re-takes. Note that British qualifications have been subject to substantial grade inflation since the abolition of norm-referenced marking in the 1990s, but for this cohort, it was still possible to get a place at a Russell Group university with C and D grades at A level (O' Leary and Cannon 1993)[iv].

Model 6 includes the type of university (Russell Group or not) and the subject discipline of the degree. The reference category is non-graduate status (i.e. no degree).

Analysis

Descriptives

Tables 1 and 2 show the frequencies for the independent variables, and the proportions in each category in the top group for NSSEC and income, for men and women respectively. Overall, men (19%) are nearly twice as likely to be in class 1 as women (11%). Similarly, 20% of men compared to 10% of women are in the top earnings group.

Table 1: Proportion of men in top 15% by social origins and educational characteristics

	NSSEC class 1	***Original N***	***% missing***	**Gross hourly Pay (top 15%)**	***Original N***	***% missing***
Percentage in top 15%	**19.2**	***3561***	***0***	**20.4**	***3127***	***0***
Degree status		*3561*	*0*		*3127*	*0*
No degree	11.8	2750		12.3	*2377*	
OSSAH, Ordinary univ	28.1	217		29.1	*206*	
OSSAH, Elite univ	45.3	106		48.9	*94*	
STEM, Ordinary univ	50.0	220		49.8	*203*	
STEM, Elite univ	59.6	114		60.0	*100*	
LEM, Ordinary univ	42.6	122		56.5	*115*	
LEM, Elite univ	62.5	32		59.4	*32*	

	NSSEC class 1	***Original N***	***% missing***	**Gross hourly Pay (top 15%)**	***Original N***	***% missing***
Highest parent qual (5)		*3149*	*11.6*		*2773*	*11.3*
% no quals	11.5	1102		10.2	*936*	
% Vocational	13.4	460		15.8	*402*	
% O Levels	20.3	703		22.0	*642*	
% A Levels	24.0	310		26.2	*280*	
% Degree or higher	35.3	574		39.1	*513*	
Social class (birth):		*3561*	*0*		*3127*	*0*
% IV/V	12.9	*512*		10.9	*442*	
% IIIm	13.1	*1103*		12.6	*954*	
% IIInm	21.2	*1077*		23.4	*953*	
% II or I	28.3	*869*		32.5	*778*	
Income (10):		*2932*	*17.7*		*2587*	*17.3*
<£35	11.8	*43*		12.1	*34*	
£36 - £49	12.0	*107*		10.5	*86*	
£50 - £99	14.2	*771*		14.5	*668*	
£100 - £149	17.5	*1085*		16.4	*963*	
£150 - £199	23.6	*556*		25.0	*502*	
£200 - £249	26.5	*182*		35.1	*169*	
£250+	36.9	*188*		46.6	*165*	
Cognitive score (5) (range: -3.94 - 5.02)		*2819*	*20.8*		*2483*	*20.6*
Lowest quartile	10.6	686		11.6	*582*	
2nd quartile	18.3	697		17.4	*618*	
3rd quartile	19.7	711		22.5	*633*	
Highest quartile	28.4	725		30.5	*650*	
Cognitive score (10) (range: -4.11 – 3.25)		*2802*	*21.3*		*2464*	*21.2*
Lowest quartile	6.8	688		6.0	*598*	
2nd quartile	12.4	659		14.9	*572*	
3rd quartile	20.9	680		21.5	*605*	
Highest quartile	34.9	775		37.6	*689*	
Secondary school type		*3561*	*0*		*3127*	*0*
Comprehensive	17.6	2848		17.7	*2503*	
Secondary Modern	11.6	303		12.4	*274*	
Grammar	31.3	150		43.1	*130*	
Private (all schools)	43.4	228		55.7	*201*	
Private (non-Tatler)	40.9	(159)		50.4	*(141)*	
Private (Tatler)	49.3	(69)		68.3	*(60)*	
Special	6.3	32		-	*19*	
Cognitive score (16) (range: -5.00 – 2.45)		*674*	*81.1*		*612*	*80.4*
Lowest quartile	8.2	133		6.8	*120*	
2nd quartile	13.6	145		15.0	*130*	
3rd quartile	22.0	195		22.7	*177*	
Highest quartile	35.0	201		39.6	*185*	

	NSSEC class 1	*Original N*	*% missing*	Gross hourly Pay (top 15%)	*Original N*	*% missing*
Public exams score (16) (range: -1.24-4.61)		*1410*	*60.4*		*1293*	*58.7*
Lowest quartile	11.1	288		10.4	*274*	
2nd quartile	14.5	283		14.1	*232*	
3rd quartile	18.2	352		20.2	*331*	
Highest quartile	34.8	487		39.1	*456*	
English O Level/CSE (16)		*3287*	*7.7*		*2922*	*6.6*
No	11.8	2016		11.4	*1766*	
Grade A-C	31.3	1271		35.0	*1156*	
Maths: O Level/CSE (16)		*3290*	*7.6*		*2924*	*6.5*
No	10.6	2019		10.7	*1757*	
Grade A-C	33.4	1271		35.9	*1167*	
A levels (by age 20)		*3561*	*0*		*3127*	*0*
% none	14.6	2967		14.8	*2586*	
D-E Grade	31.4	121		31.2	*109*	
1-2 A-C Grade	35.7	244		39.9	*223*	
3+ A-C Grade	55.0	229		63.2	*209*	

Imputed means, original n

Table 2: Proportion of women in top 15% by social origins and educational characteristics

	NSSEC class 1	***Original N***	***% missing***	**Gross Hourly Pay (top 15%)**	***Original N***	***% missing***
Percentage in top 15%	**10.7**	***3593***	***0***	***9.8***	***3040***	***0***
Degree status		*3593*	*0*		*3040*	*0*
No degree	5.9	2712		4.4	*2279*	
OSSAH, Ordinary univ	16.6	386		16.0	*332*	
OSSAH, Elite univ	18.9	148		27.2	*125*	
STEM, Ordinary univ	23.5	115		25.5	*98*	
STEM, Elite univ	53.4	73		41.2	*68*	
LEM, Ordinary univ	40.5	126		38.2	*110*	
LEM, Elite univ	54.5	33		57.1	*28*	
Highest parent qual (5)		*3158*	*12.1*		*2677*	*11.9*
% no quals	5.9	*1071*		4.3	*892*	
% Vocational	10.2	457		8.1	*382*	
% O Levels	10.7	752		9.8	*644*	
% A Levels	11.6	330		10.7	*297*	
% Degree or higher	20.6	548		21.9	*462*	
Social class (birth):		*3593*	*0*		*3040*	*0*
% IV/V	6.8	*558*		4.4	*474*	
% IIIm	7.5	1056		6.3	*889*	
% IIInm	10.7	1124		9.7	*947*	
% II or I	17.4	855		17.8	*730*	
Income (10):		*3000*	*16.5*		*2560*	*15.8*
<£35	6.5	*31*		3.7	*24*	
£36 - £49	4.8	*125*		4.8	*98*	
£50 - £99	8.5	*802*		5.6	*680*	
£100 - £149	9.9	*1100*		8.1	*937*	
£150 - £199	11.9	*528*		11.9	*463*	
£200 - £249	14.4	*226*		16.6	*190*	
£250+	23.7	*188*		26.8	*168*	
Cognitive score (5) (range: -3.94 - 5.02)		*2831*	*21.2*		*2406*	*20.9*
Lowest quartile	5.2	642		3.9	*566*	
2nd quartile	8.4	710		8.6	*597*	
3rd quartile	12.1	725		10.5	*612*	
Highest quartile	16.8	754		16.2	*631*	
Cognitive score (10) (range: -4.11 – 3.25)		*2858*	*20.4*		*2438*	*19.8*
Lowest quartile	3.3	680		2.1	*591*	
2nd quartile	7.1	737		5.5	*629*	
3rd quartile	12.0	753		10.8	*638*	
Highest quartile	20.7	688		21.4	*580*	
Secondary school type		*3593*	*0*		*3040*	*0*
Comprehensive	9.8	2900		8.3	*2469*	
Secondary Modern	6.5	306		6.8	*263*	

	NSSEC class 1	***Original N***	***% missing***	**Gross Hourly Pay (top 15%)**	***Original N***	***% missing***
Grammar	16.3	160		16.4	*134*	
Private (all schools)	27.1	207		31.9	*162*	
Special	5.0	20		8.3	*12*	
Cognitive score (16) (range: -5.00 – 2.45)		*815*	*77.3*		*696*	*77.1*
Lowest quartile	4.0	131		2.9	*115*	
2nd quartile	6.5	187		5.4	*161*	
3rd quartile	10.8	245		9.9	*203*	
Highest quartile	19.6	252		19.3	*217*	
Public exams score (16) (range: -1.24-4.61)		*1664*	*53.7*		*1423*	*53.2*
Lowest quartile	5.3	234		5.4	*219*	
2nd quartile	6.7	315		5.4	*241*	
3rd quartile	8.9	452		7.8	*390*	
Highest quartile	19.8	663		18.4	*573*	
English O Level/CSE (16)		*3418*	*4.9*		*2894*	*4.8*
No	5.5	1749		3.7	*1458*	
Grade A-C	16.4	1669		16.3	*1436*	
Maths: O'Level/CSE (16)		*3418*	*4.9*		*2893*	*4.8*
No	6.2	2221		4.5	*1864*	
Grade A-C	19.3	1197		19.7	*1029*	
A levels (by age 20)		*3593*	*0*		*3040*	*0*
% none	7.6	2873		5.6	*2426*	
D-E Grade	18.0	133		14.7	*116*	
1-2 A-C Grade	18.6	349		23.8	*290*	
3+ A-C Grade	32.8	238		35.6	*208*	

Imputed means, original n

Men and women with no university degree were much less likely to be in class 1 (12% and 6% respectively) than those with degrees. For both sexes, those with elite degrees in STEM (60% of men, 53% of women) and LEM (63% of men, 55% of women) had the greatest chance of being in class 1. A similar pattern is observed for earnings.

Turning to secondary school types, men and women who had been to secondary modern schools had the lowest chance of being in class 1 (12% and 7% respectively), and men who had been to top private schools were most likely to be in the top class (49%). A similar pattern is observed for income.

Table 3 shows a correlation matrix of the key cognitive and educational measures used in our models. Correlations range between 0.28 (for cognition at age 5 and A levels) and 0.68 (cognition at 10 and cognition at 16). The inter-correlations between

the three cognitive scores is fairly strong (average r=0.58). In turn, the cognitive scores all correlate positively with public exam and degree achievements although the cognitive score at age 10 years is particularly informative.

Table 3: Correlation coefficients between cognitive and attainment scores

	Cognitive 5	Cognitive 10	Cognitive 16	Exam score 16	Maths A-C	English A-C	A Levels	Elite/Degree
Cognitive 5	1							
Cognitive 10	.56 (.01)	1						
Cognitive 16	.46 (.02)	.68 (.02)	1					
Exam score 16	.35 (.01)	.51 (.01)	.51 (.01)	1				
Maths A-C	.31 (.02)	.46 (.02)	.47 (.03)	.60 (.02)	1			
English A-C	.32 (.02)	.47 (.02)	.48 (.03)	.62 (.02)	.61 (.01)	1		
A Levels	.28 (.01)	.41 (.01)	.37 (.01)	.45 (.01)	.45 (.01)	.42 (.01)	1	
Elite/Degree	.29 (.02)	.41 (.02)	.37 (.02)	.41 (.02)	.41 (.01)	.39 (.01)	.59 (.01)	1

Access to NS-SEC social class 1

Men

Table 4 shows the results of our analysis of achieving NS-SEC class 1 for men. Model 1 shows the association between social origins in terms of parental education, social class and income, and social class destinations at age 42. Surprisingly, social class of origin is not statistically significant in this model, whereas parental educational qualifications and family income are positive predictors of being in the top social class category in mid-life. Those with a parent who had a degree had 2.9 times the odds of getting into the top social class, compared to those whose parents had no qualifications.

Table 4: Social class 1, men: Binary logistic regression

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
Social origins						
Parent highest qual (ref: no quals)						
Vocational	1.13	1.07	1.04	1.04	1.01	0.98
	[0.81,1.57]	[0.77,1.50]	[0.74,1.45]	[0.74,1.46]	[0.72,1.42]	[0.69,1.39]
O Levels	1.64***	1.53**	1.30	1.30	1.23	1.18
	[1.25,2.15]	[1.16,2.01]	[0.98,1.72]	[0.98,1.72]	[0.92,1.64]	[0.88,1.58]
A Levels	1.89***	1.72**	1.40	1.39	1.27	1.15
	[1.35,2.64]	[1.23,2.42]	[0.98,1.99]	[0.98,1.97]	[0.89,1.83]	[0.79,1.67]
Degree or higher	2.89***	2.50***	1.88***	1.82***	1.56**	1.36
	[2.13,3.91]	[1.83,3.40]	[1.36,2.58]	[1.32,2.52]	[1.12,2.18]	[0.96,1.92]
Social Class (ref cat: RGSC IV/V)						
III manual	0.91	0.88	0.92	0.94	0.98	0.98
	[0.66,1.25]	[0.64,1.22]	[0.66,1.27]	[0.67,1.30]	[0.70,1.37]	[0.70,1.37]
III non-manual	1.34	1.26	1.13	1.14	1.12	1.16
	[0.98,1.83]	[0.92,1.72]	[0.82,1.55]	[0.82,1.57]	[0.81,1.56]	[0.83,1.62]
II or I	1.37	1.24	1.05	1.02	1.00	1.00
	[0.98,1.91]	[0.88,1.74]	[0.74,1.48]	[0.72,1.44]	[0.70,1.42]	[0.70,1.44]
Family Income	1.13**	1.11*	1.09	1.06	1.04	1.04
	[1.04,1.23]	[1.02,1.20]	[1.00,1.19]	[0.97,1.16]	[0.94,1.14]	[0.95,1.15]
Cognitive (5)		1.51***	1.05	1.04	0.99	0.99
		[1.33,1.71]	[0.91,1.22]	[0.90,1.21]	[0.85,1.16]	[0.84,1.16]
Cognitive (10)			1.99***	1.92***	1.46***	1.43***
			[1.75,2.26]	[1.69,2.19]	[1.23,1.73]	[1.20,1.70]
School type (ref cat: comp)						
Sec Modern				0.80	0.82	0.84
				[0.55,1.17]	[0.56,1.21]	[0.57,1.24]

Grammar				1.25	1.09	1.09
				[0.85,1.83]	[0.74,1.61]	[0.72,1.63]
Private - Other				1.60*	1.41	1.31
				[1.11,2.31]	[0.96,2.06]	[0.89,1.94]
Private - Tatler				1.68	1.37	1.34
				[0.99,2.84]	[0.80,2.37]	[0.76,2.35]
Special				0.43	0.37	0.29
				[0.09,1.97]	[0.08,1.76]	[0.06,1.48]
Cognitive (16)					1.15	1.08
					[0.94,1.42]	[0.86,1.35]
Exam performance (16)						
Exam score					0.91	0.87
					[0.80,1.04]	[0.76,1.00]
English qual					1.07	1.03
					[0.82,1.40]	[0.78,1.36]
Maths qual					2.08***	1.94***
					[1.59,2.72]	[1.46,2.56]
A Levels (18) (ref cat: none)						
D-E grades					1.15	0.88
					[0.75,1.75]	[0.56,1.38]
1-2 A-C grades					1.41*	1.08
					[1.03,1.94]	[0.78,1.51]
3+ A-C grades					2.20***	1.23
					[1.58,3.06]	[0.85,1.79]
High Qual (ref cat: No degree)						
OSSAH – Non Elite univ						1.66**
						[1.16,2.36]
OSSAH – Elite univ						2.35***

						[1.47,3.76]
STEM – Non Elite univ						4.28***
						[3.10,5.90]
STEM – Elite univ						4.03***
						[2.54,6.41]
LEM– Non Elite univ						2.73***
						[1.79,4.16]
Law/Econ/Man – Elite univ						5.96***
						[2.72,13.09]
R^2	.05	.07	.10	.11	.14	.17
N	3561	3561	3561	3561	3561	3561

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

Model 2 includes cognitive scores at age 5. This tells us the extent to which the differentials apparent at age 42 had already been accounted for by cognitive attainment at the start of primary school. Cognition at 5 is clearly a powerful predictor of class at 42, but the influence of parental education and income is only somewhat attenuated in this model. The advantage due to a having a university graduate parent is reduced from OR=2.9 to 2.5, for example.

Model 3 introduces cognitive scores at age 10, towards the end of primary school. Cognition at 10 is the most important predictor of class at 42 in this model, and, as we might expect, fully accounts for the influence of cognition at 5. Family income becomes statistically insignificant in this model, and the influence of parental education is attenuated to the extent that parental qualifications lower than degree level become non-significant. In other words, the majority of the origins-destinations link has already been mediated by cognition at age ten, before cohort members have taken any formal qualifications.

Model 4 introduces the type of secondary school attended. Men who had attended private schools had 1.6 times the odds of being in social class 1 at 42 compared to those who had attended comprehensives. The coefficient for Tatler schools was similar to that for other private schools, just missing statistical significance, and giving no reason to suggest a real difference in chances between the two different types of private school. There was no statistically significant grammar school advantage, or secondary modern disadvantage.

Model 5 introduces cognitive scores at 16 and school level qualifications at 16 and 18. Surprisingly, of the age 16 variables, only maths O level is statistically

significantly associated with social class in mid-life. Men with a maths O level had twice the odds of being in class 1 at age 42 compared to men without this qualification. A level performance was also an important predictor of class attainment. However, cognition at age 10 retains its predictive power in this model, as does having a university graduate parent. The influence of attending a private secondary school is fully explained in this model.

Model 6 includes degree qualifications. Compared to no degree, a non-elite arts degree is associated with 1.7 times the odds of being in class 1. A STEM degree or an elite LEM degree is associated with a statistically significantly greater advantage. A man with an elite LEM degree has six times the odds of being in class 1 compared to his equivalent without a degree. The influence of parental education is fully accounted for in this model, leaving no significant direct social origins effects[v]. Cognitive scores at age 10 and maths O level at age 16 predict social class position at age 42, even when degree level qualifications are taken into account.

As doing a degree at an elite institution is related to degree subject, it is interesting to consider whether the pattern of results looks different when these variables are looked at separately. In separate analyses (not shown) we take degree subject out of the model to consider university status separately and vice versa. The difference between a humanities degree and a STEM degree is statistically significant. However, the difference between elite and non-elite degrees was not statistically significant.

We tested for statistical interactions between childhood social class and secondary school type, but found no statistically significant differences.

Women

Table 5 shows the regression results for women using the same modelling stages as for men.

Table 5: Social class 1, women: Binary logistic regression results

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
Social origins						
Parent highest qual (ref: no quals)						
Vocational	1.67*	1.60*	1.54*	1.54*	1.47	1.40
	[1.13,2.48]	[1.08,2.38]	[1.04,2.29]	[1.03,2.29]	[0.98,2.20]	[0.92,2.12]
O Levels	1.59*	1.46*	1.26	1.25	1.16	1.11
	[1.10,2.29]	[1.02,2.10]	[0.87,1.82]	[0.86,1.82]	[0.80,1.69]	[0.76,1.63]
A Levels	1.52	1.34	1.13	1.12	0.99	1.01
	[0.97,2.38]	[0.85,2.10]	[0.71,1.79]	[0.71,1.79]	[0.62,1.58]	[0.63,1.62]
Degree or higher	2.65***	2.21***	1.71*	1.67*	1.39	1.28

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
	[1.78,3.94]	[1.48,3.30]	[1.14,2.59]	[1.10,2.52]	[0.91,2.12]	[0.83,1.98]
Social Class (ref cat: RGSC IV/V)						
III manual	0.98	0.97	0.97	0.97	0.96	1.00
	[0.65,1.47]	[0.64,1.46]	[0.64,1.46]	[0.64,1.46]	[0.64,1.46]	[0.65,1.53]
III non-manual	1.24	1.14	1.03	1.04	0.93	0.95
	[0.83,1.84]	[0.77,1.71]	[0.69,1.54]	[0.69,1.55]	[0.62,1.41]	[0.62,1.44]
II or I	1.59*	1.43	1.17	1.16	1.03	0.99
	[1.04,2.42]	[0.93,2.19]	[0.76,1.81]	[0.75,1.79]	[0.66,1.60]	[0.63,1.56]
Family Income	1.13*	1.09	1.07	1.04	1.02	1.01
	[1.02,1.24]	[0.99,1.21]	[0.96,1.18]	[0.94,1.15]	[0.92,1.13]	[0.91,1.12]
Cognitive (5)		1.64***	1.18	1.17	1.09	1.08
		[1.38,1.94]	[0.97,1.44]	[0.96,1.43]	[0.89,1.34]	[0.88,1.33]
Cognitive (10)			1.91***	1.87***	1.33*	1.29*
			[1.60,2.29]	[1.56,2.25]	[1.05,1.69]	[1.01,1.66]
School type (ref cat: comp)						
Sec Modern				0.87	0.93	0.96
				[0.54,1.41]	[0.57,1.51]	[0.58,1.56]
Grammar				0.93	0.80	0.86
				[0.58,1.47]	[0.50,1.27]	[0.53,1.40]
Private				1.55*	1.35	1.15
				[1.07,2.25]	[0.93,1.98]	[0.77,1.72]
Special				0.56	0.61	0.55
				[0.07,4.42]	[0.08,4.95]	[0.07,4.69]
Cognitive (16)					1.26	1.16
					[0.98,1.63]	[0.89,1.51]
Exam performance (16)						
Exam score					1.15	1.14
					[0.99,1.34]	[0.97,1.34]
English qual					1.10	1.03
					[0.78,1.54]	[0.72,1.47]
Maths qual					1.39*	1.23
					[1.01,1.91]	[0.88,1.72]
A Levels (18) (ref cat: none)						
D-E grades					1.31	1.10
					[0.80,2.15]	[0.66,1.84]
1-2 A-C grades					1.23	0.90
					[0.87,1.73]	[0.62,1.30]
3+ A-C grades					1.81**	1.08
					[1.24,2.64]	[0.71,1.64]
High Qual (ref cat: No degree)						
OSSAH – Non Elite univ						1.89***
						[1.32,2.71]
OSSAH – Elite univ						1.67
						[0.99,2.80]
STEM – Non						2.84***

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
Elite univ						
						[1.74,4.66]
STEM – Elite univ						8.01***
						[4.61,13.91]
LEM– Non Elite univ						6.28***
						[4.06,9.72]
Law/Econ/Man – Elite univ						8.40***
						[3.92,17.99]
R^2	.04	.06	.08	.09	.11	.16
N	3593	3593	3593	3593	3593	3593

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

The results for women are broadly similar to those for men. The results by degree discipline shown in the final model are even more marked than those for men. Compared to women with similar social backgrounds and qualifications up to age 18, women with a non-elite humanities degree had nearly twice the odds of being in class 1 (OR=1.9), but the advantage associated with elite humanities degrees was non-significant. Compared to both types of arts degrees, elite STEM (OR=8.0), non-elite LEM (OR=6.3) and elite LEM (OR=8.4) were all associated with statistically significantly and substantially increased odds of reaching the top social class.

High earners (top 15%)

Men

Now, turning our attention to high earners, table 6 shows the analysis of being in the top 15% of the earnings distribution for men. Model 1 shows a more consistent pattern of associations between social origins and destinations than for social class attainment, across parental education and social class categories as well as family income.

Table 6: Earnings top 15%, men: Binary logistic regression results

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
Social origins						
Parent highest qual (ref: no quals)						
Vocational	1.42*	1.34	1.30	1.31	1.26	1.20
	[1.01,2.01]	[0.95,1.90]	[0.92,1.84]	[0.92,1.86]	[0.88,1.81]	[0.83,1.74]
O Levels	1.81***	1.68***	1.42*	1.44*	1.32	1.25

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
	[1.35,2.43]	[1.25,2.25]	[1.05,1.93]	[1.05,1.95]	[0.96,1.81]	[0.90,1.74]
A Levels	2.12***	1.93***	1.57*	1.57*	1.43	1.31
	[1.47,3.06]	[1.33,2.78]	[1.08,2.29]	[1.07,2.30]	[0.97,2.11]	[0.88,1.96]
Degree or higher	3.08***	2.65***	1.98***	1.89***	1.52*	1.32
	[2.22,4.28]	[1.90,3.69]	[1.41,2.78]	[1.34,2.67]	[1.07,2.18]	[0.92,1.92]
Social Class (ref cat: RGSC IV/V)						
III manual	1.00	0.97	1.01	1.03	1.12	1.16
	[0.70,1.44]	[0.68,1.40]	[0.69,1.46]	[0.71,1.50]	[0.77,1.65]	[0.79,1.72]
III non-manual	1.73**	1.65**	1.50*	1.52*	1.56*	1.70**
	[1.22,2.45]	[1.16,2.35]	[1.04,2.15]	[1.06,2.19]	[1.08,2.27]	[1.16,2.49]
II or I	1.79**	1.64**	1.40	1.32	1.33	1.40
	[1.24,2.60]	[1.13,2.39]	[0.95,2.06]	[0.89,1.95]	[0.89,1.99]	[0.93,2.11]
Family Income	1.22***	1.20***	1.19***	1.13**	1.10*	1.12*
	[1.12,1.33]	[1.10,1.30]	[1.09,1.30]	[1.03,1.24]	[1.00,1.22]	[1.01,1.23]
Cognitive (5)		1.51***	1.07	1.06	0.98	0.98
		[1.31,1.73]	[0.91,1.25]	[0.90,1.24]	[0.83,1.15]	[0.83,1.16]
Cognitive (10)			1.97***	1.85***	1.29**	1.28**
			[1.72,2.25]	[1.61,2.12]	[1.08,1.55]	[1.07,1.54]
School type (ref cat: comp)						
Sec Modern				0.86	0.90	0.92
				[0.58,1.27]	[0.60,1.34]	[0.61,1.37]
Grammar				2.11***	1.74**	1.75**
				[1.43,3.11]	[1.16,2.61]	[1.16,2.66]
Private - Other				2.23***	1.92**	1.74**
				[1.53,3.27]	[1.29,2.86]	[1.15,2.63]
Private - Tatler				3.30***	2.60**	2.58**
				[1.82,5.95]	[1.41,4.80]	[1.37,4.86]

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
Special				1.00	1.00	1.00
				[1.00,1.00]	[1.00,1.00]	[1.00,1.00]
Cognitive (16)					1.20	1.11
					[0.95,1.51]	[0.88,1.40]
Exam performance (16)						
Exam score					1.02	0.99
					[0.89,1.17]	[0.86,1.13]
English qual					1.23	1.18
					[0.93,1.63]	[0.88,1.58]
Maths qual					1.75***	1.61**
					[1.32,2.32]	[1.21,2.15]
A Levels (18) (ref cat: none)						
D-E grades					1.02	0.75
					[0.65,1.59]	[0.47,1.22]
1-2 A-C grades					1.53*	1.18
					[1.10,2.13]	[0.84,1.68]
3+ A-C grades					2.66***	1.69**
					[1.86,3.81]	[1.14,2.52]
High Qual (ref cat: No degree)						
OSSAH – Non Elite univ						1.39
						[0.95,2.02]
OSSAH – Elite univ						1.78*
						[1.07,2.96]
STEM – Non Elite univ						3.74***
						[2.65,5.27]
STEM – Elite univ						2.91***

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
						[1.77,4.80]
LEM– Non Elite univ						4.01***
						[2.57,6.25]
Law/Econ/Man – Elite univ						3.68**
						[1.63,8.32]
R^2	.08	.09	.13	.14	.17	.20
N	3127	3127	3127	3108	3108	3108

NOTE: N reduced by 19 when introduce school type – these are boys at a special school and none are among top 15% earners

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

Model 2 introduces cognitive scores at age 5 which only somewhat attenuate the differentials observed for social origins. Model 3 introduces cognitive scores at age 10, which accounts for cognition at age 5. The differentials observed for social origins are further reduced.

Secondary school type is introduced in model 4. Whereas grammar schooling was not predictive of social class for men, it is predictive of income. Tatler and other private schools are also linked to better odds of being in the top income group, but the difference between the two kinds of private school does not reach statistical significance. The social origins differences are only very marginally reduced in this model.

Model 5 brings in secondary school level qualifications, and again the special place of maths O level at 16 is apparent, alongside A level grades. The differences due to social origins are further reduced in this model, though some significant parameters remain for parental education, social class and family income. Importantly, the secondary school type differences are not explained by secondary school level qualifications.

Model 6 introduces degree level qualifications. Non-elite humanities degrees gave no statistically significant advantage over not having a degree. Elite humanities degrees were linked to increased odds of OR=1.8. None of the differentials between other types of degree was statistically significant. In this model, cognition at age 10, maths O level, and A level grades remain statistically significant. In addition, family income retains a positive and statistically significant association with earnings at 42, as does having intermediate non-manual social class origins. This suggests that, whereas the path between high social class origins and destinations is mediated by education, those with intermediate social class origins find other routes to upward income mobility which are less dependent on cognition and qualifications.

In supplementary analyses treating university status separately, elite degrees and non-elite degrees both conferred a similar level of advantage over not having a degree. Turning to degree subject, the advantage associated with a STEM or LEM degree was statistically significantly greater than that for a humanities degree.

As before, no statistically significant interaction between social origins and secondary school type was found.

Women

Table 7 shows the analysis of earnings for women. Model 1 shows that, as for men, parental education, social class and family income are linked to earnings at 42. The results are similar in general to those for men. However, there is a notable difference in the influence of secondary school type. In model 4, we see that, unlike for men, women who had gone to grammar schools fared no better than those who attended comprehensives. Private school women had 1.9 times the odds of being in the top 15% of the earnings distribution compared to those who attended comprehensives.

Table 7: Earnings top 15%, women: Binary logistic regression results

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
Social origins						
Parent highest qual (ref: no quals)						
Vocational	1.67*	1.61	1.51	1.50	1.46	1.37
	[1.02,2.73]	[0.98,2.64]	[0.92,2.50]	[0.91,2.49]	[0.87,2.43]	[0.81,2.32]
O Levels	1.91**	1.78*	1.51	1.52	1.36	1.31
	[1.22,2.99]	[1.14,2.79]	[0.96,2.38]	[0.96,2.39]	[0.86,2.17]	[0.81,2.12]
A Levels	1.77*	1.59	1.31	1.32	1.14	1.16
	[1.05,2.98]	[0.94,2.68]	[0.77,2.24]	[0.77,2.26]	[0.65,1.99]	[0.66,2.05]
Degree or higher	3.21***	2.72***	2.00**	1.96**	1.53	1.40
	[1.98,5.19]	[1.67,4.43]	[1.21,3.32]	[1.18,3.25]	[0.90,2.59]	[0.81,2.40]
Social Class (ref cat: RGSC IV/V)						
III manual	1.21	1.19	1.21	1.20	1.18	1.28
	[0.72,2.04]	[0.71,2.02]	[0.71,2.06]	[0.71,2.04]	[0.69,2.02]	[0.74,2.22]
III non-	1.56	1.45	1.28	1.28	1.16	1.23

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
manual						
	[0.94,2.59]	[0.87,2.42]	[0.77,2.15]	[0.76,2.14]	[0.69,1.96]	[0.72,2.10]
II or I	1.99*	1.82*	1.48	1.42	1.23	1.24
	[1.17,3.39]	[1.06,3.10]	[0.86,2.55]	[0.83,2.46]	[0.70,2.15]	[0.70,2.19]
Family Income	1.27***	1.23***	1.20**	1.17**	1.16*	1.14*
	[1.14,1.42]	[1.11,1.38]	[1.08,1.35]	[1.04,1.31]	[1.03,1.30]	[1.01,1.29]
Cognitive (5)		1.57***	1.10	1.08	0.98	0.95
		[1.30,1.91]	[0.88,1.37]	[0.86,1.34]	[0.78,1.23]	[0.76,1.20]
Cognitive (10)			2.05***	2.00***	1.36*	1.31
			[1.68,2.51]	[1.63,2.45]	[1.04,1.76]	[1.00,1.71]
School type (ref cat: comp)						
Sec Modern				1.15	1.35	1.39
				[0.68,1.93]	[0.80,2.29]	[0.81,2.38]
Grammar				1.02	0.85	0.92
				[0.61,1.72]	[0.51,1.44]	[0.53,1.58]
Private				1.90**	1.48	1.28
				[1.27,2.86]	[0.97,2.25]	[0.83,1.97]
Special				0.99	1.15	0.90
				[0.12,8.44]	[0.13,10.32]	[0.09,9.11]
Cognitive (16)					1.17	1.08
					[0.85,1.61]	[0.79,1.48]
Exam performance (16)						
Exam score					0.92	0.91
					[0.77,1.08]	[0.77,1.08]
English qual					1.62*	1.55*
					[1.07,2.47]	[1.01,2.38]
Maths qual					1.73**	1.55*
					[1.20,2.49]	[1.06,2.27]

	Odds Ratios [95% CIs]					
	M1	M2	M3	M4	M5	M6
A Levels (18) (ref cat: none)						
D-E grades					1.39	1.10
					[0.78,2.46]	[0.60,2.00]
1-2 A-C grades					2.24***	1.60*
					[1.56,3.23]	[1.08,2.36]
3+ A-C grades					2.68***	1.52
					[1.77,4.06]	[0.97,2.39]
High Qual (ref cat: No degree)						
OSSAH – Non Elite univ						1.91**
						[1.26,2.88]
OSSAH – Elite univ						2.65***
						[1.56,4.51]
STEM – Non Elite univ						3.83***
						[2.22,6.60]
STEM – Elite univ						5.02***
						[2.73,9.24]
LEM– Non Elite univ						5.81***
						[3.55,9.51]
Law/Econ/Man – Elite univ						9.66***
						[4.19,22.30]
R^2	.07	.09	.12	.12	.17	.21
N	3040	3040	3040	3040	3040	3040

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

Model 5 shows that, for women, both English and maths O levels, as well as A level grades, are linked to an advantage. Parental education is fully mediated in this

model, but family income remains statistically insignificant. The private school advantage is also fully accounted for by secondary school qualifications in the case of women, unlike for men.

Model 6 shows that, compared to non-elite arts degrees, elite and non-elite LEM degrees are linked to a significantly increased chance of women being in the top 15% of earners at age 42. In this final model, family income remains statistically significant, alongside the attainment of English and maths O level qualifications.

Discussion

Our results do not reveal one decisive stage of the educational career that accounts for mid-life occupational outcomes. Our analysis supports the view that cognitive scores at the start of formal schooling are important (Downey and Condron 2016), but cognitive progress between age five and ten accounts for a greater portion of the origins-to-destinations link. This link is further chipped away by qualifications at 16 and 18, and finally by degree level qualifications. In policy terms, this confirms the importance of the pre-school years, and emphasises the salience of the primary school years. However, our findings also suggest that there is scope for intervention with a view to promoting social mobility throughout the educational career.

We considered whether there was a direct link between family background and adult access to the top social class and the top income group. Overall, we find that childhood social advantage is almost entirely channelled by educational and cognitive attainment. In the case of social class, we did not find a direct link between social origins and destinations for either sex. However, the results for income did reveal direct social origins effects. The fact that we find no direct link between social origins and social class destinations once individual educational attainment is accounted for contrasts with previous work. A key difference between ours and previous studies is the comprehensiveness of our measures of cognitive and educational attainment. This suggests the importance of taking into account a full picture of educational attainment before seeking alternative explanations for the origins-destinations link. Our current findings apply to a single cohort, however, and further analysis will be needed to address the extent to which these findings may reflect change over time.

As a proviso to our findings, we note that this paper has focussed on access to the top social class and equivalent position in the earnings distribution only. In supplementary analysis (available on request), we used a five-class version of NS-SEC to examine these relationships across the spectrum of class destinations. For men, the use of a more selected bottom social class category as a reference strengthened the apparent social origins effects to a degree. Notably, the influence of social class origins was most persistent in the case of intermediate and lower professional and managerial occupations, as opposed to higher professional and managerial occupations. This suggests that the policy focus on access to occupations at the top of the occupational structure ignores significant barriers further down the hierarchy.

In respect of access to the top income group, it is notable that the type of secondary school attended (in the case of men) and social origins are directly linked to mid-life earnings, but only indirectly linked, via education, to getting into the top social class. This suggests the need to consider income inequalities within occupational classes (Friedman, Laurison and Miles 2015; Kim and Sakamoto 2008). This finding is consistent with previous research (Green et al. 2015) which examined school-type effects on continuous earnings, and is also in line with research showing that private schooling is linked to higher incomes within occupations (Crawford and Vignoles 2014). This suggests differences between the mechanisms of social and income mobility and reproduction. For men, educational attainment may be sufficient to open the door to the top occupations independent of school type and social origin, but not sufficient to deliver a top income. For women, private secondary schools did not yield the same earnings benefits as they did for men, but there may be an important return via the marriage market (Chiappori, Iyigun and Weiss 2009) – we intend to investigate this in future work.

We cannot rule out the possibility of unobserved selectivity into the private and grammar secondary schools. For example, parents who sent their children to these schools may have had stronger materialistic aspirations for their sons in particular. If nevertheless the effect is taken to be causal, then given that the results are not driven by educational qualifications, other possible explanations include social networks (the 'old school tie') or non-cognitive characteristics, such as self-confidence and aspirations – though the measures available in our data do not account for the direct private school effect (Green et al. 2015). We also found no evidence that the gains linked to a private or grammar education varied according to social origins, a view suggested by those who believe that selective schooling is vital to the social mobility chances of working class youth.

The consistent positive role of school level mathematics qualifications is worth noting. This is in line with previous work which finds a distinctive return to numeracy and mathematics qualifications (Parsons and Bynner 2005), and reaffirms concerns regarding inequalities in school mathematics attainment (Riegle-Crumb and Grodsky 2010).

How important was elite higher education to access to the top tier of earnings and jobs? Overall, a university degree was a powerful predictor of increased odds of reaching the top, but there were also clear differentials between types of degrees. The overall pattern for social class and income is for STEM and LEM to give greater gains than OSSAH degrees, especially for women. In general, the distinction between elite and non-elite degrees appeared less important than the degree subject taken. Overall, degrees from elite institutions did not confer a statistically significant additional advantage over non-elite degrees once selectivity into the elite institutions had been taken into account. This finding is unexpected, and it is possible that more refined definitions of an elite university may have yielded different results (further refinement would not have yielded robust results with our data unfortunately). However, it is notable that we have been able to control for selectivity into elite universities in a much more refined way than has been possible for previous studies, and this may account for the lack of a clear additional gain from degrees from elite institutions. This suggests that the institution that a degree comes from is less important to employers than has been assumed (Deterding and Pedulla 2016).

Of course, our findings relate to a particular historical and national context. British university admissions were (and remain) largely determined by applicants' academic results, whereas in the US for example, 'leadership' and extra-curricular activities, as well as other factors such as parental alumni status, are influential (Karabel 2005). In systems where students are selected on non-cognitive skills and social factors, controlling for purely cognitive and educational characteristics would still be likely to yield an overestimate of the returns to elite degrees.

Finally, our results may seem to present a rosy picture of broadly 'meritocratic' access to top jobs and incomes. Against this, we should first of all be clear that our models only explain a minority of the variance in access to the top jobs and incomes, leaving plenty of scope for factors other than cognition and education to play a role. But in terms of explaining the origins-destinations link, the important point is that the parental resources and access to high quality education which provide huge advantages in developing cognitive skill and achieving educational credentials are not evenly distributed. As parents with the necessary resources invest heavily in their children's education (Putnam 2015; Reardon 2011), ascriptive forces are increasingly expressed as 'merit'.

Ethics Statement

The research in this manuscript was registered and conducted in line with the requirements of the ethics committee of the University College London Institute of Education. The research is purely secondary analysis. The datasets we have used are available to the international research community via the UK Data Service. The researchers observed the Centre for Longitudinal Studies (CLS) code of practice on protecting the privacy of cohort members, not identifying individual cases, and not copying the data to other people who have not signed the appropriate undertaking. Any work on data containing identifiers was done on an isolated network in a secure computing environment.

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[i] 'Tatler Schools Guide 2014' http://www.tatler.com/guides/schools-guide/2014

[ii] The Russell Group was established in 1994. Its current members are the universities of: Birmingham, Bristol, Cambridge, Cardiff, Durham, Edinburgh, Exeter, Glasgow, Imperial College London, King's College London, Leeds, Liverpool, LSE, Manchester, Newcastle, Nottingham, Oxford, Queen Mary University of London, Queen's Belfast, Sheffield, Southampton, University College London, Warwick, York.

[iii] We also consulted data on university points entry from 1989-90 and 2011, and included two additional universities that have consistently featured in the top 30 most selective institutions: University of Bath and St Andrews.

[iv] The Times Good Universities Guide (1993) comments of Durham University that 'Chemistry (CCD), geography (BBC), music and physics (both BCC) are among the top departments. Only Oxford and Cambridge have higher entry standards.' (p.110).

[v] Neither were parents' social class, education and income jointly significant (F=0.962).