



BARNETT PAPERS IN SOCIAL RESEARCH

SOCIAL ORIGINS, COGNITIVE ABILITY, EDUCATIONAL ATTAINMENT AND
SOCIAL CLASS POSITION IN BRITAIN: A BIRTH COHORT AND LIFE-COURSE
PERSPECTIVE

SUMMARY REPORT

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SUMMARY

- Children of similar cognitive ability have very different chances of educational success, depending on their parents' economic, socio-cultural and educational resources.
- For children born in the early 1990s, parents' economic resources are somewhat less important while parents' socio-cultural and educational resources are more important in affecting their educational attainment than for children born in the late 1950s or the early 1970s.
- About half of the difference in educational attainment between children from advantaged and disadvantaged parental backgrounds is due to a difference in their cognitive ability, while the other half is due to other factors.
- Obtaining formal qualifications is only one channel for upward mobility for high-ability individuals of disadvantaged backgrounds; there are other channels that are more directly related to cognitive ability, such as job training programmes, promotions or becoming self-employed in higher-level occupations.
- Our findings suggest that there are limits to the extent to which inequalities of opportunity can be reduced through educational policy alone.

In Britain, as long ago as the 1930s, Gray and Moshinsky commented on the ‘striking discrepancy’ that exists between ‘the amount of good material in the community and the extent to which the existing machinery of social selection utilizes it’ (1935: 115). Under ‘meritocracy’, individuals’ educational and occupational attainments should reflect their abilities and competencies rather than the social and economic conditions of their families of origin. Insofar as men and women of less advantaged origins fare less well in terms of educational and labour market outcomes than do men and women of more advantaged origins when their cognitive ability is held constant, it may be supposed that there is a wastage of talent – a failure of the educational system to ensure that the academic potential of all individuals is fully realised. And whether or not the extent of any such wastage is reduced over a period of more or less continuous educational expansion and reform is a question of obvious relevance in evaluating the capacity of educational policy to increase equality of opportunity in the face of persisting inequalities of condition.

In much previous research into social inequalities in educational attainment the assumption has been made that different parental characteristics can serve as ‘interchangeable indicators’ of social origins (e.g. Shavit and Blossfeld, 1993; Breen *et al.*, 2009). We believe that this assumption is invalid and will lead to the importance of social origins being significantly underestimated. As we have demonstrated in previous research (Bukodi and Goldthorpe, 2013), while different features of individuals’ social origins are certainly correlated, the correlations are far from perfect, and it is therefore necessary to take a multidimensional approach and to consider how far different features of social origins – most importantly, parental class, parental status and parental education – have independent and in turn cumulative effects on individuals’ educational attainment and labour market outcomes.

The aim of this Summary Report is to show how social origins, when viewed in a comprehensive, multidimensional way, affect the educational and labour market attainments of individuals whose cognitive ability at a relatively early stage in their educational histories is at a similar level.

More specifically, we ask the following questions.

- Is the association between early-life cognitive ability and subsequent educational attainment strengthening or weakening across cohorts born in the late 1950s, early 1970s and early 1990s?
- Is the importance of cognitive ability relative to social origins strengthening or weakening?
- To what extent are the differences in educational attainment between children from advantaged and disadvantaged parental backgrounds due to differences in their cognitive ability?
- Do further qualifications – obtained after the completion of full-time education – provide second chances for individuals of relatively high ability from disadvantaged backgrounds?

Box 1: What is cognitive ability? – Our approach

We use the term ‘cognitive ability’ rather than ‘intelligence’ to try to avoid debates about different types of intelligence and to refer to a general, underlying capacity – referred to by psychologists as the ‘*g* factor’ – that has been shown to be involved in a range of mental processes, such as comprehension, knowledge acquisition, reasoning and problem solving.

We should make it clear that we do not seek to address in any direct way the issue of heredity versus environment in the formation of cognitive ability. We do not take any position on how far variance in cognitive ability in fact reflects the intergenerational transmission of genetic or of social (dis)advantage. We believe that attempts to partition this variance additively into one part that is determined by genetic effects and another by environmental effects is by now scientifically outmoded. Not only are complex gene–gene interactions involved but, further, yet more complex processes of gene–environment interaction from the womb onwards (cf. Cunha & Heckman 2007; Heckman, 2007, 2013).

Box 2: Data, variables and methods

Data sources:

- The 1958 National Child Development Study [NCDS] (N=18,558);
- The 1970 British Cohort Study [BCS70] (N=18,737);
- The 1990s Avon Longitudinal Study of Parents and Children [ALSPAC] (N=15,445).

Key variables:

Educational attainment: We consider whether cohort members attained at least higher level secondary qualifications (2+ A-level passes or NVQ4) rather than any lower level, by age 20. In some of our analyses, we consider cohort members' complete qualifications histories up to age 38.

Social class position: We measure cohort members' class position at age 38, via the seven-category National Statistics Socio-Economic Classification (NS-SEC), distinguishing the following categories:

- Class 1 – higher managers and professionals;
- Class 2 – lower managers and professionals;
- Class 3 – ancillary professional and administrative occupations;
- Class 4 – self-employed and own account workers;
- Class 5 – lower supervisory and technical occupations;
- Class 6 – semi-routine occupations;
- Class 7 – routine occupations.

Early-life cognitive ability: We use principal components analysis to capture the common variance across tests of verbal and non-verbal ability, at age 11 in NCDS, at age 10 in BCS70 and at age 8 in ALSPAC (reflecting the respondents' ages at the time the tests were administered).

Social origins: We include measures of parental class, status and education, at around cohort members' age 10.

Box 2: Cont.

- *Parental class*, indicating the extent of family economic resources, is represented by the seven-category NS-SEC.
- *Parental status* is taken to represent family socio-cultural resources. We use parents' occupations to assign them to the 31 categories of the Chan–Goldthorpe (2004) status scale, which is based on the occupational structure of close friendship.
- *Parental education* indicates the extent of the specific educational resources that parents have available to create a favourable home learning environment and provide their children with informed guidance through the educational system, in regard, say, to choice of schools, subjects and courses. Parents are allocated a value on a seven-category scale, which takes into account the qualifications of both fathers and mothers.
- We also use a measure that considers all three components of social origins in *combination*. More precisely, we work with a three-fold collapse of parental class, and an approximation to tertiles for parental status and education. We then combine these, to create a three-category measure that distinguishes between respondents with 'consistently advantaged', 'consistently disadvantaged' and 'intermediate' social origins.

We have produced a series of Data Notes. These provide a detailed description of the variables generated and the methods used.

Box 2: Cont.

Methods:

We employ a range of statistical methods:

- logistic regression combined with predicted probabilities;
- path analysis;
- decomposition techniques;
- multilevel growth curve modelling.

We emphasise that our primary aim is to give a comprehensive *descriptive* account of the associations existing between social origins, early-life cognitive ability and educational attainment. We do not claim to establish causal relationships between these attributes of individuals. When using the term ‘effect’ we therefore refer to a purely statistical and not to a causal effect.

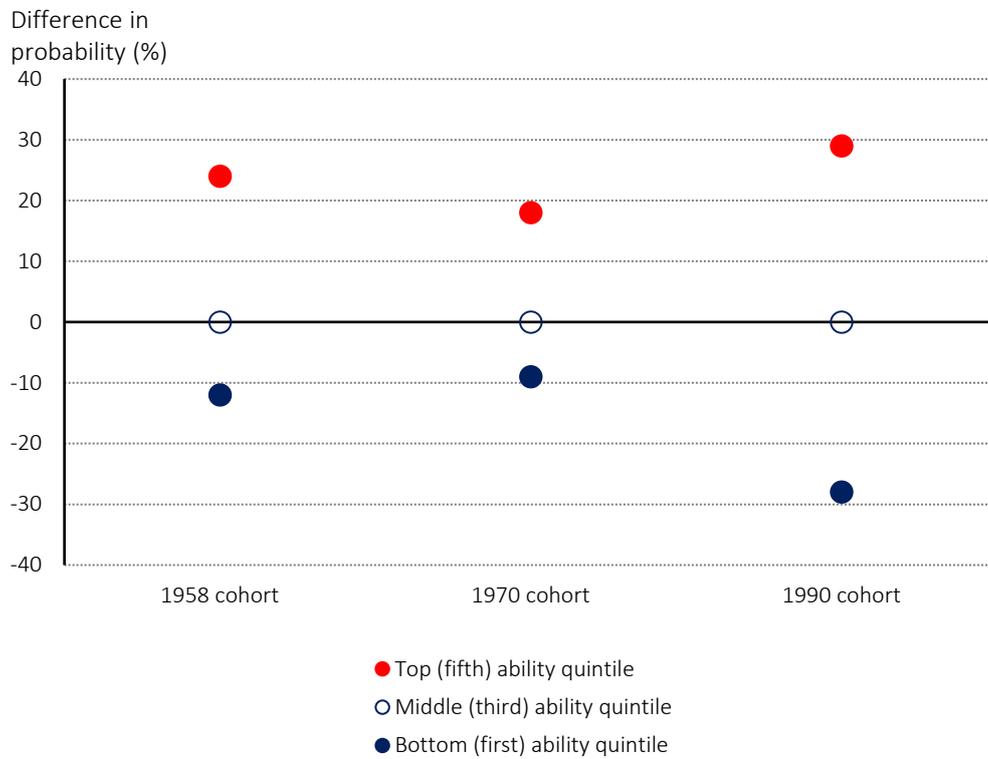
We do not believe that it is possible to establish causal relationships through statistical analysis *alone* but that a subject-matter and theoretical input is always required. In the field of educational inequalities some relevant theory has in fact been developed (Breen and Goldthorpe, 1997; Breen and Yaish, 2006; Breen, van de Werfhorst and Jaeger, 2014). We draw on this body of theory in interpreting our empirical results, and at the same time use our findings as a basis for its critique and refinement.

IS THE ASSOCIATION BETWEEN COGNITIVE ABILITY AND EDUCATIONAL ATTAINMENT STRENGTHENING OR WEAKENING?

British studies have demonstrated that the role of cognitive ability in affecting individuals' educational attainment, net of the influence of their social origins, declined across cohorts born between 1946 and 1958 (Richards *et al.*, 2009) and between 1958 and 1970 (Galindo-Rueda and Vignoles, 2005; Schoon, 2010; Bukodi *et al.*, 2014). In some contrast, studies in the US have identified a long period of stability in the role of cognitive ability – for cohorts born between the 1920s and 1960s (Jencks *et al.*, 1979) – but followed by a slightly strengthening correlation for cohorts born since the 1970s (Marks, 2014). The question can then be raised of whether the association between individuals' early-life cognitive ability and their subsequent educational attainment, net of the effects of social origins, continues to weaken across cohorts, as past research using the British birth cohort studies would suggest, or strengthens as appears to be the case in the US. *Figure 1* summarises our results in this respect. More specifically, the figure shows the percentage-point difference in the probability of attaining at least higher level secondary qualifications by age 20, for high-ability individuals as compared to middle-ability individuals (upper panel) and for low-ability individuals, again, in comparison with middle-ability individuals (lower panel).

For each cohort, cognitive ability plays a significant part in affecting individuals' educational attainment, over and above their social origins. For the 1958 cohort, those who demonstrate a high level of ability around age 10 are 25 percentage-points more likely, and those who demonstrate a low level of ability are 12 percentage-points less likely, than individuals with a middling level of ability to attain higher level secondary qualifications by age 20. And as is further apparent from *Figure 1*, between the 1958 and 1970 cohorts, the probability differences between high-ability and low-ability individuals in attaining at least higher level secondary qualifications, although still roughly 30 percentage-points, converge towards the zero axis, confirming that the association between cognitive ability and educational attainment weakened over this period. However, between the 1970 and the 1990s cohorts, we observe a movement *away* from the axis – in particular for those whose ability level in the low range – indicating that the convergent trend may have now *reversed*. The percentage-points difference between high-ability and low-ability individuals is in fact the largest in the 1990s cohort at around 60 percentage-points.

FIGURE 1: Percentage-point difference in probability of attaining at least higher level secondary qualifications by age 20 between individuals in top and middle ability quintiles and between individuals in bottom and middle ability quintiles, by cohort



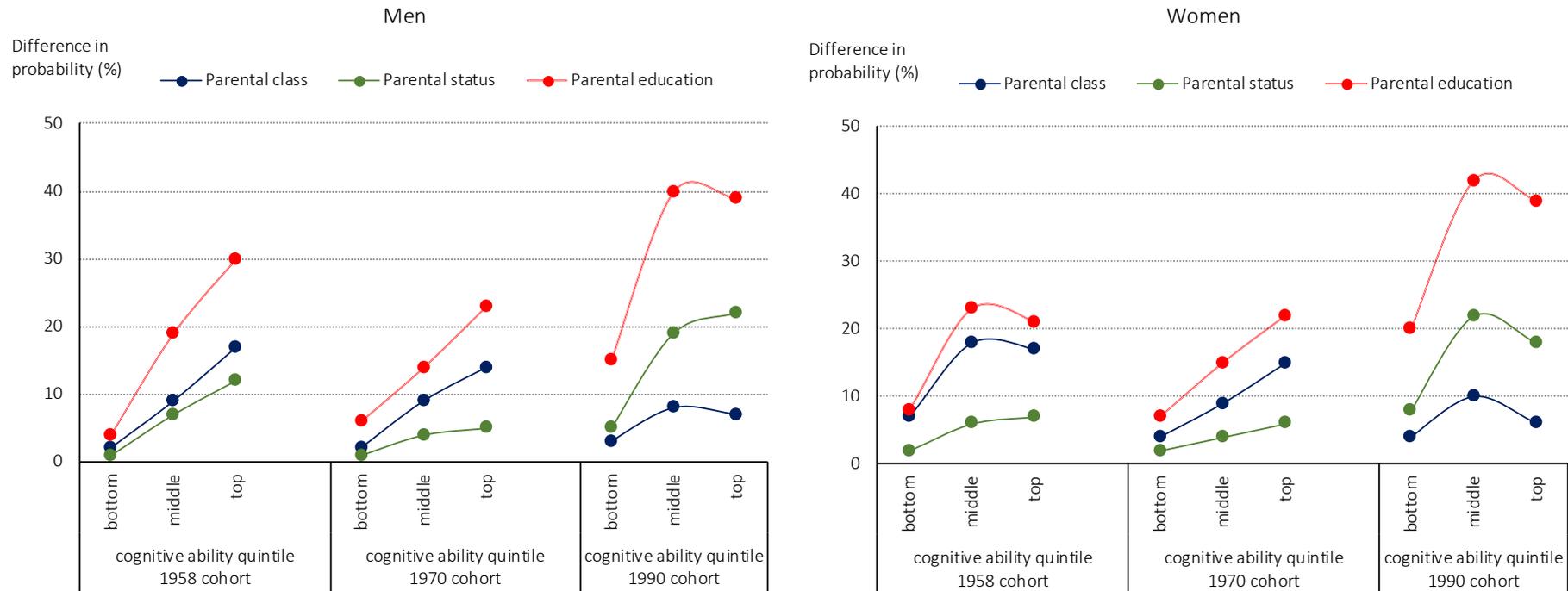
Note: Model includes parental class, status and education, cognitive ability quintiles and gender, and it was ran separately by cohort.

Source: Bukodi, E., Bourne, M. and Betthäuser, B. (2018). Wastage of talent? Social origins, cognitive ability and educational attainment in Britain. *Advances in Life Course Research*, 34: 34-42.

The question that now arises is whether the increase in the importance of cognitive ability for educational attainment leads to a corresponding decrease in the importance of social origins. *Figure 2* shows the differences in the probability of attaining at least higher level secondary qualifications by age 20 that exist between men and women coming from the most and the least advantaged social origins, in terms of class, status and education, when early-life cognitive ability is fixed at the same level.

Taking individuals with the same level of cognitive ability, a significant difference exists in the probability of attaining at least higher level secondary qualifications by age 20 between those of the most and those of the least advantaged origins, and especially if we take parental education as the measure of social origins. Further, it can be seen that as one moves from the lower to the higher ability quintiles, the disparities in the probabilities of attaining higher level secondary qualifications between the most and the least advantaged clearly *widen*. In other words, cognitive ability counts for more, the more advantaged an individual's social origins or, alternatively, social origins count for more, the higher an individual's ability – a clear indication of a wastage of talent. Moreover, in the 1990s cohort, the disparities in the chances of attaining higher secondary qualifications in relation to socio-cultural and educational resources of the parental family – i.e. in relation to parental status and education – widen across the ability quintiles to a greater extent than in the two earlier cohorts. Especially notable is that for men and women in the top ability quintile, the probability of attaining higher secondary qualifications is 40 percentage-points higher for those with highly-educated parents than for those with less-educated parents. In the 1970 cohort the corresponding figure is 'only' 22 percentage-points.

FIGURE 2: Difference in probability of attaining at least higher level secondary qualifications by age 20 between men and women with *most* and *least* advantaged social origins, by cognitive ability quintiles and cohort (%)



Note: We define the most and the least advantaged in the following way. Parental class: most advantaged: managers and professionals; least advantaged: routine occupations; parental status and education: most advantaged: approximation to top quintile of the distribution; least advantaged: approximation to bottom quintile of the distribution.

Source: Bukodi, E., Bourne, M. and Betthäuser, B. (2018). Wastage of talent? Social origins, cognitive ability and educational attainment in Britain. *Advances in Life Course Research*, 34: 34-42.

TO WHAT EXTENT ARE THE DIFFERENCES IN EDUCATIONAL ATTAINMENT BETWEEN CHILDREN FROM ADVANTAGED AND DISADVANTAGED PARENTAL BACKGROUNDS DUE TO DIFFERENCES IN THEIR COGNITIVE ABILITY?

We now take into account the fact that cognitive ability is itself stratified by social origins (e.g. Jerrim *et al.*, 2013). We determine the extent to which the effects of parental background on educational attainment are channelled through individuals' cognitive ability. In other words, we examine the extent to which the differences in educational attainment between individuals from advantaged parental backgrounds and individuals from disadvantaged parental backgrounds are due to differences in cognitive ability between these groups. For the sake of brevity, we focus here only on 'decomposing' the effects of parental education on individuals' highest level of qualifications at age 20 in the 1990s cohort (*Figure 3*); but the results are very similar in all three cohorts, and irrespective of which component of social origins is considered.

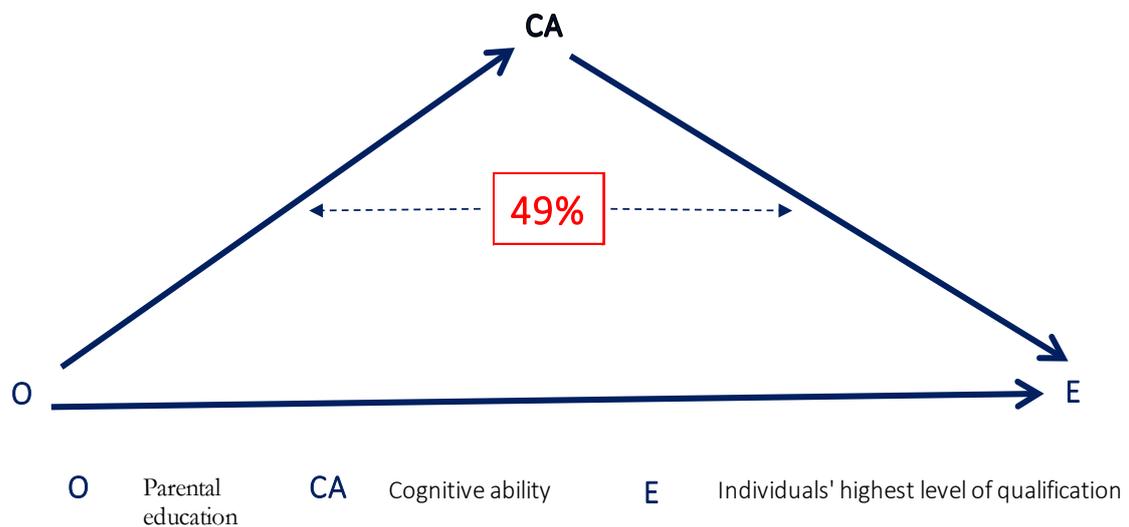
As is apparent, the effects of social origins are mediated by cognitive ability to a moderate extent. Around 50% of the parental education effect on individuals' educational attainment at age 20 is transmitted through cognitive ability. Or, one could as well say, half of the effect of social origins on educational attainment is 'direct' – i.e. not mediated via cognitive ability. The question then obviously arises of how this direct effect of social origins operates. There are two, not exclusive, possibilities.

On the one hand, there may be other individual attributes, apart from cognitive ability, that are associated with both educational attainment and social origins. There is now growing research into individuals' non-cognitive attributes – for example, self-control, self-efficacy and 'social skills' – suggesting that these may be of comparable importance for educational outcomes to cognitive ability (Gutman and Schoon, 2013), and also showing their relatively strong association with parental backgrounds (Gugushvili *et al.*, 2017).

On the other hand, there may be social processes through which different parental resources are brought to bear on children's chances of educational success. For example, as shown earlier, our findings indicate that while the effects of parental class, status and education on children's educational attainment are all significant, the importance of the two latter components is increasing. And there is indeed evidence that, from the 1990s, with the greater official emphasis on school choice and school

competition in regard to standards (Gibbons *et al.*, 2006), parents are drawing on their socio-cultural and specifically educational resources, yet more than on their economic resources, in order to defend and further their children’s interests. Hansen and Vignoles (2005) suggest that parents are now acting as ‘consumers’ with respect to schools and that those with higher levels of education are better placed to understand school performance and quality. And Wespieser *et al.* (2015) find that parents of higher social status are advantaged in being able to draw on wider social networks and more useful connections to learn about school characteristics, available options and how to realise them.

FIGURE 3: The percentage of the effect of parental education on individuals' highest level of qualification at age 20 that is mediated by cognitive ability, 1990s cohort



Note: Mediation percentage is calculated using path analysis - i.e. simultaneously estimating two sequential multivariate linear regression models. Model controls for gender.

Bourne, M., Bukodi, E., Betthäuser, B. and Goldthorpe, J. (2018). ‘Persistence of the social’: The role of cognitive ability in mediating the effects of social origins on educational attainment in Britain. *Research in Social Stratification and Mobility*, 58:11-21.

DO FURTHER QUALIFICATIONS PROVIDE SECOND CHANCES FOR INDIVIDUALS OF HIGH ABILITY FROM DISADVANTAGED BACKGROUNDS?

We finally consider the extent to which lifelong learning can provide second chances for bright individuals coming from disadvantaged backgrounds in achieving upward social mobility. The body of literature in this area is still relatively small, and we provide the first attempt to explicitly factor in individuals' early-life cognitive ability. *Figure 4* plots the estimated average level of academic (upper panel) and vocational (bottom panel) qualifications at each age, for four origin–ability groups in the 1970 cohort, based on a measure that considers all three components of social origins in combination (see Box 2).

As regards academic qualifications, we should first note that high-ability men and women from consistently advantaged backgrounds not only have a significantly higher level of qualification at *each* age than their counterparts from consistently disadvantaged backgrounds, but they also display a steeper trajectory of accumulation. Looking at the other extreme, individuals of low-ability from consistently disadvantaged backgrounds scarcely obtain any new academic qualification over their life-course – this group has the lowest initial attainment and the shallowest life-course slope. Second, overall, we do not find significant difference between high-ability individuals from consistently disadvantaged backgrounds and low-ability individuals from consistently advantaged backgrounds in their accumulation trajectories, suggesting that parental resources can countervail modest levels of cognitive ability. Third, it is notable that the difference between the two extreme origin-ability groups in average level of academic qualification is magnified over the life-course: it essentially doubles between ages of 16 and 38 – a pattern that is much in line with the expectations of the so-called cumulative (dis)advantages thesis (e.g. Rigney, 2010).

In the case of vocational qualifications, differences across the four origin-ability groups in their accumulation trajectories are less pronounced than in case of academic qualifications. Disadvantaged high-ability individuals, eventually, come out on top, indicating that further vocational qualifications can provide bright people from disadvantaged backgrounds with a second chance.

FIGURE 4: Estimated average level of qualification at each age, by social origins and cognitive ability, men and women in the 1970 cohort

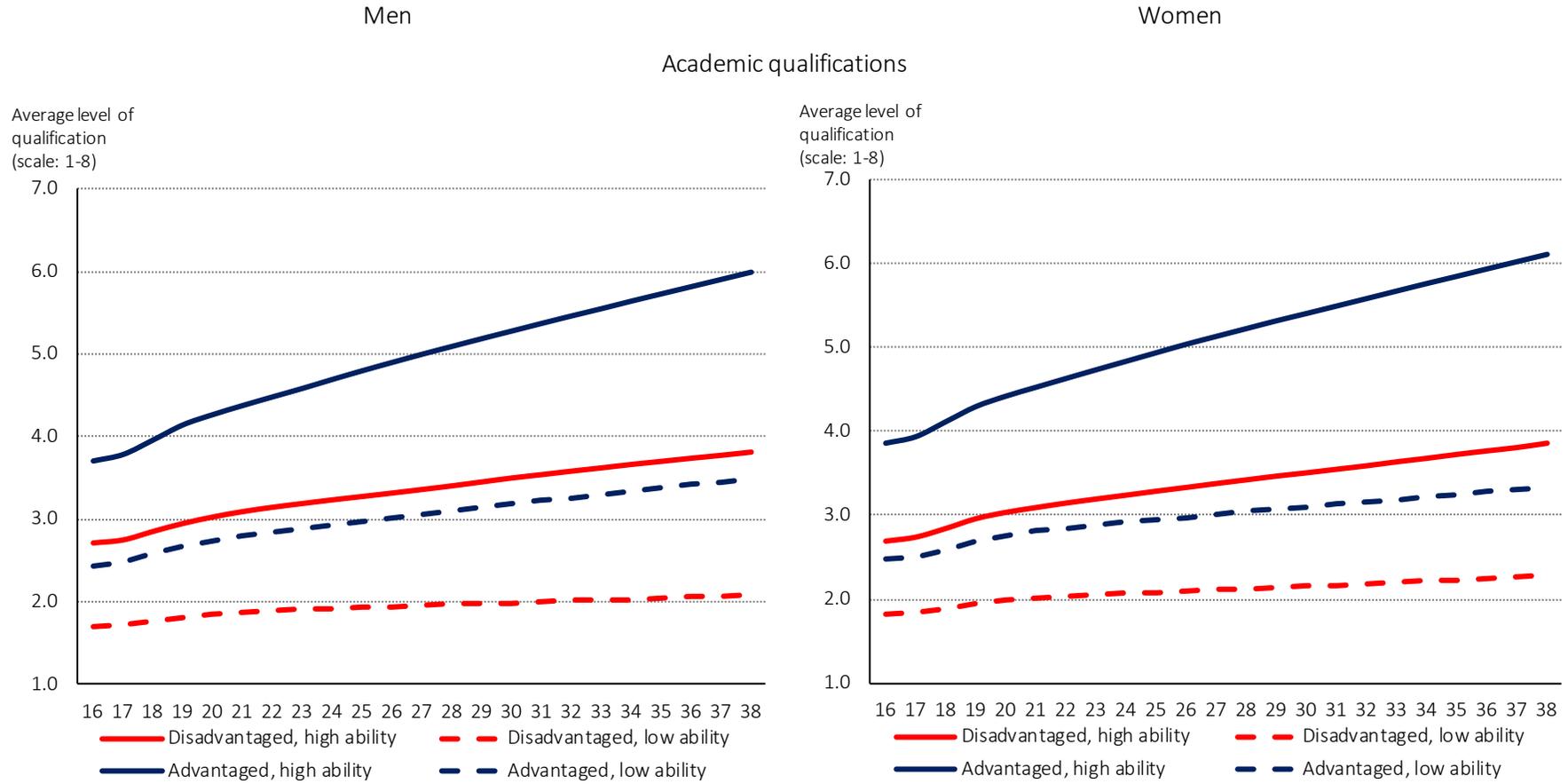
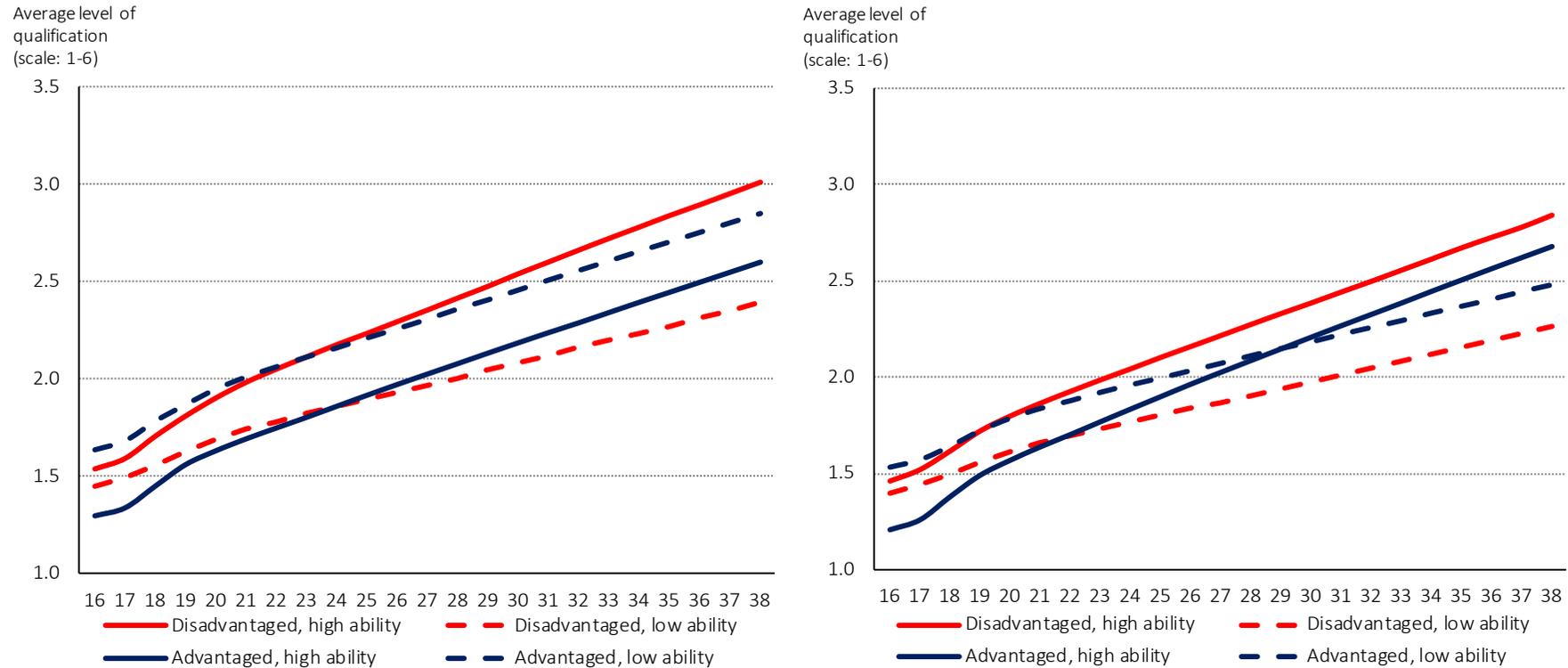


FIGURE 4: Cont.
Vocational qualifications



Note: The variable of academic qualifications consists of eight categories and ranges from 'no qualification' to 'postgraduate qualifications'. The variable of vocational qualifications consists of six categories and ranges from 'no qualifications' to 'NVQ5-6 qualifications'. Results are based on a growth curve model that includes the following variables: age, cognitive ability, social origins, interactions between ability and age, interactions between social origins and age, interactions between ability and social origins and interactions between ability, social origins and age. Model was run separately by gender.

Source: Bukodi, E., Bourne, M. and Betthäuser, B. (2019). Cognitive ability, life-long learning and social mobility in Britain: Do further qualifications provide second chances for bright people from disadvantaged backgrounds? *European Sociological Review*, 35: 49-64.

The question that we next turn to is whether further qualifications, either academic or vocational, have a pay-off in the labour market in the form of ‘class returns’. In *Figure 5*, we present the estimated probabilities of men and women from our four origin-ability groups being found in managerial and professional positions (i.e. Classes 1 and 2 of NS-SEC – see Box 2) around age 40, separately for those who obtained no further qualifications, those who obtained further academic qualifications and those who obtained further vocational qualifications.

The returns to further qualifications in terms of class attainment are dependent on the type of new qualifications acquired. Obtaining further academic qualifications increases the chances of moving up to managerial and professional positions for *all* individuals. For high-ability individuals from consistently disadvantaged backgrounds, obtaining new academic qualifications elevates the probability of ending in such positions by around 15 percentage-points. It can also be seen that, given the acquisition of a further academic qualification, the likelihood of bright but disadvantaged individuals being found in managerial and professional positions is almost comparable to that of similarly high ability individuals from consistently advantaged backgrounds. In other words, for high ability individuals from disadvantaged backgrounds attaining academic qualifications through lifelong learning is, indeed, an important route to intergenerational upward mobility. However, the probability of obtaining such qualifications is substantially lower for this group than for their counterparts from advantaged backgrounds (cf. *Figure 4*).

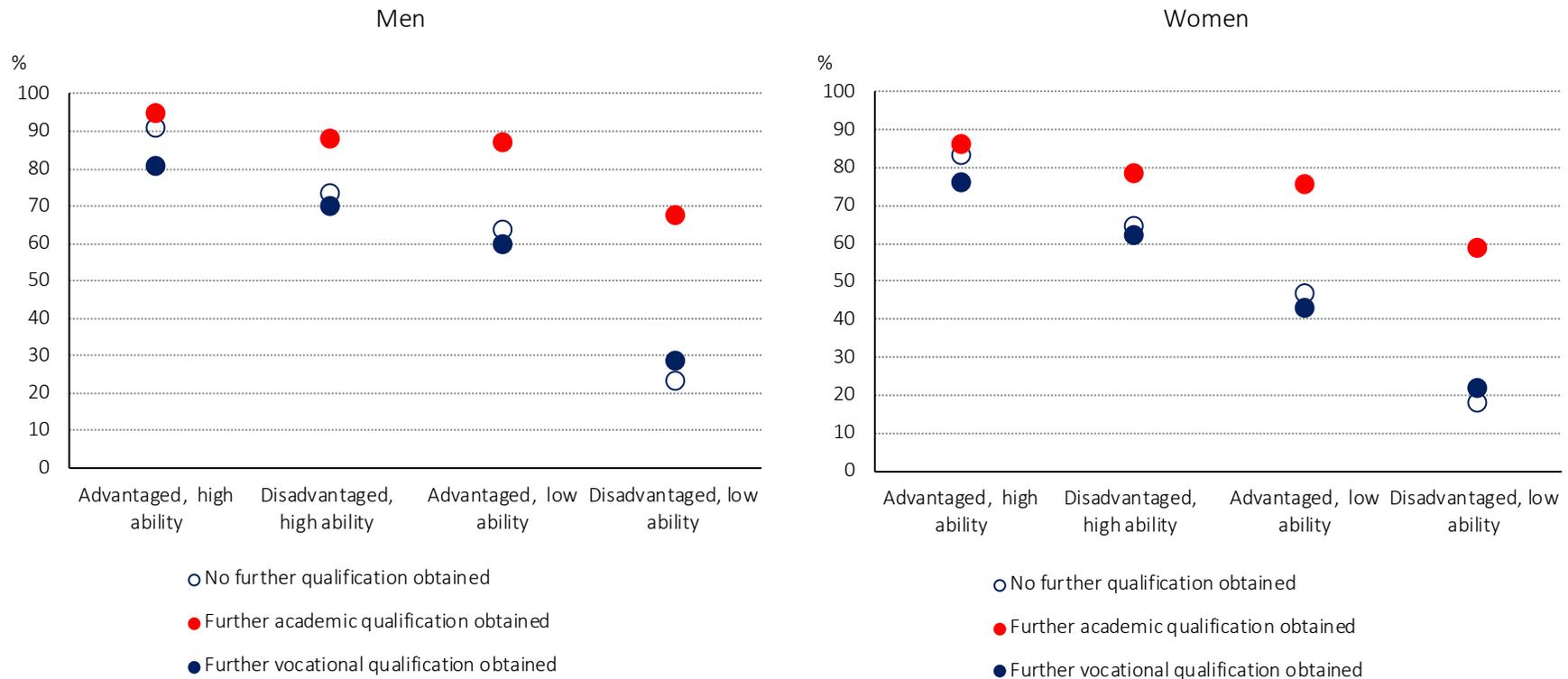
We should also add that, while the focus here has been on the effect of obtaining new qualifications on the class attainment of high-ability individuals from disadvantaged backgrounds, it is for such individuals who are of *low* ability that the class returns are greatest. They are more than 40 percentage-points more likely to access the managerial and professional salariat if they obtain new academic qualifications than if they do not – although, as *Figure 4* indicates, these individuals are rather small in number.

Despite the evidence that obtaining further academic qualifications does contribute to closing the gap between individuals coming from advantaged and disadvantaged backgrounds in their probability of ending up in the managerial and professional class at around age 40, social origins still matter, especially for individuals of low ability. The low-ability advantaged are just as likely as the high-ability disadvantaged to be found among the managers and professionals, when both acquire new academic qualifications. But the cognitive ability effect is also quite large. For example, if we take

two individuals, both coming from consistently disadvantaged backgrounds and both with new academic qualifications, the probability of moving up to the managerial and professional class is roughly 20 percentage-points higher for the one of high ability than for the one of low ability. What this suggests is that, in addition to formal qualifications, there are also other channels, which are more directly related to cognitive ability, that appear to improve individuals' chances of attaining more advantaged labour market positions. For example, high-ability individuals may more successfully undertake job training programmes, may be more likely to gain promotions or may become self-employed in higher-level occupations.

In regard to further vocational qualifications, we find much less evidence of class returns. There is no significant difference in the probability of ending up in the managerial and professional class between those who obtained and those who did not obtain further vocational qualifications in their working lives regardless of their social origins or cognitive ability.

FIGURE 5: Estimated probability of individuals being found in the managerial and professional class at age 38 by social origins and cognitive ability, for those obtaining or not obtaining further academic or vocational qualification since leaving full-time education



Note: Model includes the following variables: origins-ability groups, highest level of qualification when leaving full-time education, a binary indicator of whether or not respondent obtained any further academic / vocational qualification since leaving full-time education, interactions between further qualifications and the origin-ability groups. Model was run separately by gender.

Source: Bukodi, E., Bourne, M. and Betthäuser, B. (2019). Cognitive ability, life-long learning and social mobility in Britain: Do further qualifications provide second chances for bright people from disadvantaged backgrounds? *European Sociological Review*, 35: 49-64.

Our results indicate that there is a wastage of talent in Britain. Although we estimate that around half of the effects of their social origins on young people's educational attainment is mediated via their cognitive ability, individuals with high levels of cognitive ability but who are disadvantaged in their social origins are persistently unable to translate their ability into educational attainment to the same extent as their more advantaged counterparts. In other words, our results go against the position of those who would claim 'the decline of the social' in regard to differences in educational attainment: that is, on the grounds that the educational systems of modern societies are sufficiently developed to ensure that such differences predominantly reflect variation in cognitive ability that is itself taken to be for the most part genetically determined (e.g., Marks, 2014). To the contrary, what our findings show is that children of similar ability still, in later birth cohorts as in earlier ones, have very different chances of educational success, depending on their parents' resources as these are represented by their class, status and education. But, on the more positive side, we have also found that obtaining formal qualifications is only one channel for upward social mobility for at least high-ability individuals of disadvantaged backgrounds; there are other channels that are more directly related to cognitive ability.

Our results further demonstrate that the role of different components of social origins – parental class, status and education – in affecting individuals' educational attainment has changed over recent decades. We have found indications of the economic resources of the family becoming somewhat less important, while parents' socio-cultural and educational resources become more important. We can then echo Buis (2013), who argues that parents' superior socio-cultural and educational resources play a major part in offsetting policy and institutional changes aimed at reducing social inequalities in educational attainment and in thus maintaining the status quo. To take the now well-known example of Brighouse and Swift (2014), one cannot – and would not want to - force highly educated parents to stop reading bedtime stories to their children.

In summary, our findings suggest that limits exist to what can be achieved through educational policy alone – or at least through those so far conceived and implemented – in increasing equality of opportunity, and thus in reducing the wastage of talent, in the face of persisting inequalities of condition.

Research outputs

Bukodi, E., Bourne, M. and Betthäuser, B. (2018). Wastage of talent? Social origins, cognitive ability and educational attainment in Britain. *Advances in Life Course Research*, 34: 34-42.

Bourne, M., Bukodi, E., Betthäuser, B. and Goldthorpe, J. (2018). 'Persistence of the social': The role of cognitive ability in mediating the effects of social origins on educational attainment in Britain. *Research in Social Stratification and Mobility*, 58:11-21.

Bukodi, E., Bourne, M. and Betthäuser, B. (2019). Cognitive ability, life-long learning and social mobility in Britain: Do further qualifications provide second chances for bright people from disadvantaged backgrounds? *European Sociological Review*, 35: 49-64.

Betthäuser, B., Bourne, M. and Bukodi, E. (2019). Understanding the mobility chances of children from working-class background in Britain: How important are cognitive ability and locus of control? Manuscript. University of Oxford.

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Data notes

(Available: <https://www.spi.ox.ac.uk/social-origins-cognitive-ability-and-educational-attainment-birth-cohort-and-life-course-perspecti#tab-822571>)

Betthäuser, B. and Bourne, M. (2016). Harmonizing the measurement of social origin, cognitive ability and educational attainment in four British population surveys: NCDS, BCS70, LSYPE and ALSPAC.

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