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**Intergenerational social mobility and mid-life status attainment:
influences of childhood intelligence, childhood social factors, and education**

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Abstract

We examined the influences of childhood social background, childhood cognitive ability, and education on intergenerational social mobility and social status attainment at midlife. The subjects were men born in 1921 and who participated in the Scottish Mental Survey of 1932 and thereafter in the Midspan Collaborative study in Scotland between 1970 and 1973. In logistic regression analyses, childhood cognitive ability and height were associated with upward and downward change from father's social class to participant's social class at mid-life. Education significantly influenced upward social mobility. Number of siblings had no significant effect on social mobility. These effects were also examined after adjusting for the other variables. In structural equation modelling analyses, father's social class and childhood cognitive ability influenced social status attainment at midlife, with education and occupational status in young adulthood as partially mediating factors. It was noteworthy that childhood cognitive ability related more strongly to occupation in midlife than to first occupation. These data add to the relatively few studies that track the process of status attainment in adulthood, they provide information from a new geographical setting, and they contain information from a greater proportion of the lifecourse than do most existing studies.

1. Introduction

The determinants of individual and group differences in social status attainment, material conditions, wealth, and other aspects of the well-being of people in adulthood are studied by psychologists, sociologists, human geographers, epidemiologists, and specialists in social medicine. This spread of disciplines signals the importance of the topic, and also the diversity of determinants and research approaches that may be applied to human social status attainment and social mobility. Adult social status is important *per se*, as an index of access to material things and environments, and also as an important predictor of health, with people in poorer social categories having higher morbidity and mortality (Davey Smith, Hart, Watt, Hole, & Hawthorne, 1998; Drever & Whitehead 1997). Understanding the influences on adult social status is problematic. There is a correlated nexus of independent variables that are consistently found to be associated with adult outcomes but whose effects are difficult to disentangle. Mental ability, parental social class, and education all correlate significantly with individual differences in people's future social status (Blau & Duncan, 1967; Breen & Goldthorpe, 2001; Halsey, Heath, & Ridge 1980; Jencks, 1979; Sewell & Hauser, 1975). Mental ability test scores are also well-validated predictors of future educational and occupational performance (Neisser et al., 1996; Schmidt & Hunter, 1998). Using unusually informative data from a novel geographical setting, this report addresses the contributions of childhood IQ, childhood social factors, and education to social mobility and individual differences in social status attainment in middle age. A principal aim is to isolate better the role of psychometric intelligence in the causal sequence between father's and son's social positions.

1.1 Previous studies on the determinants of status attainment

An informative, early contribution to this field was the analysis of seven studies by Jencks and co-authors (Jencks, 1979). Six studies were from the USA, and one was from Sweden. For the most part, the subjects in the samples, which ranged in size from 198 to 1,789, were given mental ability tests during their school years. Most of the studies ran from the 1960s to the 1970s. With a few exceptions, the final data were typically collected when subjects were in their 20s or early 30s. Adolescent ability test scores were strongly predictive of educational outcomes (standardised betas from .403 to .576), and the reduction in this bivariate association was between 12% to over 40% after controlling for multiple background variables such as parent's education, occupation and income. Adolescent ability test scores were strongly predictive of occupational status (standardised betas from .350 to .474). The reduction in this bivariate association was between 12% and about 25% after controlling for the parental background variables. There was a much larger reduction in the size of the adolescent ability-occupational status association when the subject's education was controlled, with attenuations in the effect size between 59% and 91%. However, adolescent ability was often a significant predictor of occupational status and earnings after controlling for education. Controlling first occupation in addition reduced the effect by only a further 1% to 3%. Intriguingly, the studies tended to indicate that the association between adolescent mental ability and earnings became stronger as subjects grew older. However, most of these studies ended relatively early in people's careers, and it will be useful to examine this finding further with occupational data from later in life.

Three large-scale, longitudinal studies in the USA and the UK are especially relevant to the present study and have more recently addressed the determinants of adult social status.

In *The Bell Curve*, Herrnstein and Murray (1994) used data from the National Longitudinal Survey of Youth 1979 in the USA. Within the Survey, thousands of white people in the USA were tested on the Armed Forces Qualification Test (AFQT) between age 14 and 22. They were followed up over 10 years later. There were significant associations between AFQT test scores and later poverty, schooling, education, marriage, welfare dependency, children's health, and crime. The effect sizes were often modest, but they were not substantially diminished after controlling for parental social class. Re-analyses of siblings in the same data set, to control for family background in the association between AFQT and life outcomes, confirmed that AFQT scores significantly predict social and economic success (Korenman & Winship, 2000). Korenman and Winship emphasised that there are important, independent contributions from education and family background to these life outcomes. In addition, they recommended that the direct and indirect (e.g., through education) effects of mental ability on life outcomes should be studied.

Analyses of the British 1946 Birth Cohort provided a path analysis of the determinants of occupational status at age 46 (Richards & Sacker, 2003). Three influences were considered: father's occupation, cognition at 8 years, and education by 26 years, in that order. Each had direct effects on occupational status at 43 years. The effect of father's occupation was partly indirect, via cognition at 8 years and education. The effect of cognition at 8 years was partly indirect, via education.

Linked to the correlates of social status is the issue of intergenerational social mobility. Previous research has asked whether the UK has a meritocratic society, i.e. one in which social status is largely achieved by merit. Merit, in this sense, is sometimes defined as IQ plus effort (Breen & Goldthorpe, 2001; Saunders, 2002; Young, 1958). Analyses of the UK's National Child Development Study (NCDS) led some to assert that social

mobility in the UK takes place largely on meritocratic grounds (Saunders, 1997, 2002), and some to disagree (Breen & Goldthorpe, 1999, 2002). The NCDS gathered birth data on all children born in Great Britain in one week in March 1958. They were followed up at ages 7, 11, 16, 23 and 33 years. They were given the General Ability Test at age 11. Breen and Goldthorpe (1999, 2002) found that there were still substantial effects of class of origin in predicting social class at age 33 after controlling for General Ability Test scores and academic effort. Education tended to have a stronger effect of reducing the effects of class of origin. They hypothesized that the effects of mental ability on social status might substantially operate through education (Breen & Goldthorpe, 1999, 2001). Controlling for education, ability and effort in the NCDS still did not eliminate the effects of social class of origin: “children from disadvantaged class origins have to display *far more merit* than do children of more advantaged origins in order to attain similar class positions” (Breen & Goldthorpe, 1999, p. 21). Using the same data, Saunders (2002) found that class of origin accounted for about one quarter of the explained variance in class at age 33, whereas ability, motivation and qualifications accounted for over 60%. He concluded that Britain operated largely on a meritocratic basis and that the principal deviation from this was in the lack of children from middle class backgrounds who declined in social class as would be predicted from their ability levels.

1.2 The present study

From the studies cited above there is agreement that it is important to examine childhood ability, childhood social background, and education as contributors to adult social status. Here we examine these associations in a new setting, the west of Scotland. The time course of the present study extends that of previous reports: the childhood mental

ability data were collected in 1932 and the final occupational and other social data were collected in the 1970s. As far as we are aware, this is the first study to model childhood IQ and both first and mid-life occupations in addition to education and father's status. The present study is in an especially strong position to examine the mediating effect of education between ability and occupation (Jencks, 1979; Breen & Goldthorpe, 1999, 2001), because the mental test was administered to our cohort at an age prior to individual differences in the number of years of full time education (Scottish Council for Research in Education, 1933). The study will advance methodologically from previous studies by: examining for mediating effects using structural equation modelling, with mid-life social status as a latent trait containing multiple indicators; and also examining intergenerational social mobility using logistic regression.

The present study's data are a new, enhanced version of the West of Scotland Collaborative study that has been linked to the Scottish Mental Survey of 1932 (Hart, Deary et al., 2003). A previous analysis of the Collaborative study data found that height at mid-life, education, and number of siblings (used as an indicator of material circumstances in the family of origin) were related to upward and downward social mobility (Blane, Davey Smith, & Hart, 1999). Each was significant when the other two were controlled. The report was one of the few to examine these factors in relation to intergenerational social mobility. The present study adds mental ability test scores at age 11 years to the factors considered in the previous Collaborative study report (Blane, Davey Smith et al., 1999).

We shall first examine the factors associated with whether sons move upward or downward in social class compared with their fathers: social mobility. Second, we ask what explains the variance in sons' status attainment. That is, we model the process of

child-to-midlife social change by examining the mediating effect of education and first job on the influences of childhood IQ and social background.

2. Participants and method

2.1 Participants

The people whose lifecourse data are considered here took part in two large studies, one during childhood and the other during mid-adulthood.

During childhood, they participated in the Scottish Mental Survey 1932 (SMS1932). This was conducted under the auspices of the Scottish Council for Research in Education (SCRE) and obtained data about the psychometric intelligence of Scottish pupils (SCRE, 1933). On June 1st 1932, children born in the calendar year 1921 and attending schools in Scotland were given the same, well-validated mental ability test. Almost all schools in Scotland took part. The number of children who sat the test was 87,498 (44,210 boys and 43,288 girls). They were aged between 10½ and 11½ years. The mental test was based on the Moray House tests that were in use in 11+ exams (for educational selection) in England. They covered general, spatial and numerical reasoning (see Deary, Whalley, Lemmon, Crawford & Starr, 2000, for a fuller description). The SMS1932 test was validated in 1932 by administering the Stanford revision of the Binet-Simon scale 1,000 of the children (500 boys and 500 girls). The two tests correlated about .8 (SCRE, 1933). Because the children's ages varied between 10½ and 11½ years at the time of testing, the test scores were corrected here for age (in days) and converted to IQ-type scores with mean 100 and standard deviation 15.

At mid-life, a subset of the subjects participated in one of the Midspan studies, which were large health studies of adults carried out in Scotland in the 1960s and 1970s. The particular Midspan study they took part in was the Collaborative study of 6,022 men and 1,006 women, conducted between 1970 and 1973 in 27 workplaces in the West and central belt of Scotland (Davey Smith, Hart, Hole et al., 1998). Participants completed a questionnaire and attended a physical examination. The physical examination included the measurement of height. Achieved adult height is a marker of childhood conditions, since inadequate nutrition and childhood illness contribute to lower achieved height (Davey Smith et al., 2000; Wadsworth, Hardy, Paul, Marshall, & Cole, 2002). In this area in the 1920s when these men were children, there was a lot of poverty, poor housing and childhood illness. Nutritional and socio-economic factors were associated with sizeable and important differences in childhood growth, and thus attained adult height, for people around the time the cohort were born (Gunnel, Davey Smith, Frankel, Kemp, and Peters, 1998). The questionnaire asked for the home address, occupation at the time of screening, father's main occupation, the participant's own first regular occupation, the age of finishing full time education, number of brothers and sisters, and whether the participant was a regular car driver. This last variable was used as a proxy for car ownership, and car ownership is often used as a marker of available income, especially at the time of the study in the 1970s. The home address at the time of screening was retrospectively postcoded, enabling deprivation category as defined by Carstairs and Morris to be ascertained (Carstairs & Morris, 1991). Social class was coded according to the Registrar General's Classification (General Register Office, 1966) for participant's occupation at the time of screening, participant's first occupation, and father's occupation. Six social classes were used, ranging from I (highest, more professional) to V (lowest, more manual), with class III subdivided into non-manual (IIINM) and manual (IIIM), with non-manual representing

the higher social status. Years of education were calculated assuming education began at age five. Some analyses used years of education and some used age leaving full time education as appropriate. Number of brothers and sisters were added to obtain the number of siblings, which can be considered an indicator of childhood circumstances, with large families being most disadvantaged on average with respect to nutrition, overcrowding, and poor housing conditions (Hart & Davey Smith, 2003).

2.2 Linkage of the Midspan and SMS1932 datasets

The age ranges of the Midspan studies were such that some participants were born in 1921 and may therefore have taken part in the SMS1932 as children. Ethical permission was obtained from the Multi-Centre Research Ethics Committee for Scotland to link the SMS1932 data set with the 1921-born participants of the Midspan data sets. Full details of the matching procedures were reported elsewhere (Hart, Deary et al., 2003). The small number of women born in 1921 in the Collaborative study were excluded as they were not representative of the social spectrum. There were 245 men in the Collaborative study who were matched to their childhood IQ score, out of a possible 324. Two men with missing data on father's social class were excluded, leaving 243 men.

2.3 Analyses of intergenerational social mobility

The full social mobility matrix of father's social class by own social class (Erikson & Goldthorpe 1992; Goldthorpe, Llewellyn, & Payne 1980), using all six of the Registrar General's occupational social classes, had some empty cells and some with very small numbers. In one analysis, for the calculation of mean childhood IQ by father's and own

social class, social classes I and II and social classes IV and V were combined, leaving four groups.

Upward mobility was defined as moving to a higher social class at screening than the father's social class, using six social class categorisations at both points. Downward mobility was defined similarly, as going to a lower social class than father's social class. The remainder were stable.

For the predictors of the chances of social mobility, one man was excluded who had missing data on years of education (remaining $n = 242$). For upward mobility, the eight participants in father's social class I were excluded as they could not move upwards. Otherwise, the upwardly mobile were compared to those who were not upwardly mobile, i.e., the downwardly mobile and the stable. Four logistic regression analyses were performed to investigate the chances of upward mobility using height (in cm), years of education, number of siblings, and childhood IQ (expressed in standard deviation units) individually. A further logistic regression analysis was then run using all four factors simultaneously. Similar analyses were performed for the predictors of downward social mobility, this time excluding 17 men whose fathers were in social class V, from which downward mobility was not possible.

To examine whether IQ related meaningfully to sons' social mobility, the 'relative index of inequality' was used (Davey Smith, Hart, Hole et al., 1998; Kunst & Mackenbach 1994). This index is useful for comparing measures with, for example, social class groupings of different sizes. In this case own social class at mid-life and father's social class contained different-sized groups, so could not be compared directly. A new, rescaled variable was calculated with values between zero and one for each group, according to the proportion of participants with a higher position than the midpoint of each group. This was done for both father's social class and own social class in mid-life. Two regression

analyses were performed using childhood IQ as a continuous dependent variable and the newly-created mid-life social class (or newly-created father's social class) as the independent variable. From these results we can examine, and compare for significance, the relative sizes of the β s for father's and son's social status on IQ.

2.4 Analyses of social status attainment at mid-life

For the computation of correlations and structural equation model analysis, there were 240 men from the Collaborative study with full data on the following variables: IQ at age 11, height, number of siblings, father's social class, age leaving full time education, first social class, social class at midlife, deprivation of area of residence at midlife, and car driving. In the structural equation models, social status in the 1970s was the main outcome variable. This was hypothesised to be a latent trait with own social class, deprivation of area of residence, and car driving as indicators. These three indicators were measured at midlife. Childhood social position was originally hypothesised to be a latent trait with father's social class, number of siblings, and adult height as indicators. However, when structural equation modelling was undertaken, the main contributor to education and first social class was father's social class and not the latent trait. Therefore, father's social class is used as the single indicator of childhood social background in the structural equation modelling. IQ was used as an independent variable to predict social status at midlife, as was father's social class. IQ and father's social class were allowed to correlate. The effects of childhood IQ and father's social class on social status at midlife were hypothesised to be direct and also mediated via education and the social class of the person's first job. The paths in this model follow suggestions in the literature, as outlined in the introduction. The EQS package was used to conduct the structural equation modelling by modelling

covariances. Figure 1 names the constructs modelled in this analysis and shows how they track over time. There are independent variables (childhood IQ and father's social class), mediating variables (education and social class of first occupation) and an outcome variable (social position at mid-life). Figure 2 shows how the constructs are measured in the model, using the convention of having measured (manifest) variables in rectangles and the latent trait in a circle.

Figures 1 and 2 about here

3. Results

3.1 Analyses of intergenerational social mobility

Men participating in the SMS1932 who later took part in the Collaborative study did not always end up at midlife in the same occupational social class as their father (Table 1). There was some social mobility: 45% of men were upwardly mobile, 14% were downwardly mobile and 41% were socially stable. There were social class differences in mean IQ scores, in the expected direction. Childhood IQ had a graded relationship with own social class. Men in social classes I & II had the highest childhood IQ (bottom row). Similarly, a graded relationship was seen with father's social class (right column). Note the high mean IQ of participants whose own social class is I & II, irrespective of their father's social class (left column). For example 27 of the 119 participants (22.7%) whose father's social class was IIIM, and 14 of the 70 participants (20%) whose father's social class was

IV and V, were in class I & II at mid-life, with mean childhood IQs of 112.8 and 109.8, respectively. These descriptive data are now subjected to logistic regression analyses.

Table 1 about here

Height at mid-life, years of education, and childhood IQ, but not number of siblings, were significantly positively related to upward social mobility (Table 2). An example from Table 2 is selected to explain the presentation of the statistical results. In the extreme right hand column of the first row of results it may be seen that, for each standard deviation increase in IQ score at age 11, the chances of upward social mobility increase by 69% (with a 95% confidence interval of 30% to 120%). Controlling the effect of the individual independent variables for the other variables reduced the effects, with only height and education remaining significant. Childhood IQ was of borderline significance. Height at mid-life and childhood IQ, but not years of education or number of siblings, were significantly inversely related to downward social mobility when considered individually. Controlling these for the other variables reduced the effects, with only childhood IQ remaining significant. Thus, more education helps a son rise beyond the father's social class and low IQ makes him vulnerable to falling below the father's social class.

Table 2 about here

Childhood social class (based on father's occupation) and own mid-life social class (based on the participant's occupation) were converted to comparable scales using the 'relative index of inequality' (Davey Smith, Hart, Hole et al., 1998). Rescaled own mid-life social class and father's social class had values between zero

and one, as described in the method section above. The regression equations with childhood IQ obtained using these were:

$$\text{predicted IQ} = 117.8 - 30.12 \times \text{rescaled own mid-life social class};$$

$$\text{predicted IQ} = 111.7 - 17.85 \times \text{rescaled father's social class}.$$

The significantly stronger ($z = 2.52, p = .012$) association with own mid-life social class rather than childhood social class indicates some IQ-based social mobility.

3.2 Analyses of social status attainment at mid-life

Correlations among the measured variables are shown in Table 3. All variables are correlated in the expected direction, with more favourable outcomes tending positively to covary. Higher childhood IQ was significantly related to higher social class at midlife, more likely regular car driving at midlife, higher first social class, higher father's social class, fewer siblings, higher age leaving education, being taller, and living in a less deprived area at midlife. IQ was significantly more strongly related to social class of the job at midlife than to the social class of the first job ($t = 3.25, p = .001$). Age leaving education had strong associations with father's social class, social class at mid-life, and social class of first job. Father's social class was strongly related to social class at mid-life and to the social class of first job.

Table 3 about here

A structural equation model was fitted to the data. It used a path-type analysis, with a mixture of manifest and latent traits, as described in the method section. As stated earlier, height and number of siblings were not included in the modelling. The model in Figure 2 was tested for fit to the relevant data in Table 3 using maximum likelihood in the EQS

structural equation modelling program (Bentler, 1995). Note that, as stated in the Method section, the influences of IQ and father's social class were hypothesised to be direct as well as mediated by education and social class of first job: Figure 2 shows the hypothesised pathways in the model. The standardised parameter weights of the paths are shown in Figure 3. The average of the off-diagonal absolute standardised residuals was .019 (RMSEA = .039). The χ^2 (d.f. = 8) = 10.9, $p = .21$. The comparative fit indices were as follows: Bentler-Bonett normed fit index = .975; Bentler-Bonett non-normed fit index = .982; comparative fit index = .993, all exceeding the recommended 0.90 or .95 (Hu & Bentler, 1999). All of the paths shown in the model were significant when their parameter estimates were divided by their standard errors. Therefore, the model provides a good fit to the data on all these indicators.

Figure 3 about here

In the present case, there are few possible, alternative models. The measured variables that represent adult mid-life social factors load strongly on the latent trait. The variables (latent and manifest) that are shown in Figure 2 follow a time course, and so may not be altered. Of course, this does not preclude the possibility that unmeasured causes, such as genetic and persistent environmental factors, might contribute shared variance to many of the variables, even across long time scales. All direct and indirect paths were included, and proved significant. Childhood IQ and social position, the independent variables, were moderately correlated ($r = .33$).

4. Discussion

4.1 Overview of the study

Using the matched data from the combination of the Collaborative and SMS1932 datasets (Hart, Deary et al., 2003), we studied the determinants of intergenerational social mobility and social status attainment at mid-life based upon lifecourse (including childhood) factors and factors from the previous generation. The data provide information on this important question from Scotland, where it has not been studied before. Also, the data on social position stretch into people's 50s, which is rare in any previous studies. The study's initial test year of 1932 is older than even those in the classic studies described in Jencks (1979). Here, as elsewhere (Hart, Taylor et al., 2003), a novel combination of logistic regression and structural equation modelling methods was used to examine the factors associated with social mobility, and to test formally the mediating effects of education and first job between cognitive and childhood social factors and midlife social position. Childhood IQ and father's social class were significant, correlated, associates of social status attainment in midlife, with their effects partly mediated via education and the social class of the first job.

4.2 Social mobility

Height, education, and childhood IQ were predictors of upward social mobility but only height and childhood IQ were significant predictors of downward social mobility. Number of siblings was not significant in either model. After adjusting for all the variables in the downward mobility model, only childhood IQ was significant, whereas height and education were significant in the upward mobility model. These chances of upward and downward social mobility were similar to the previous social mobility analysis using

height, education, and siblings (but not childhood IQ) which was carried out on the whole Collaborative study male cohort ($N = 5,645$) (Blane, Davey Smith et al., 1999). In that study, owing probably to the larger N , all the variables were significant predictors of upward and downward social mobility, even when adjusted for each other. The present study used data from the men born in 1921, as this was the only group with childhood IQ data available. As a simple tool to explore IQ-based social mobility, we used the ‘relative index of inequality’ (Davey Smith, Hart, Hole et al., 1998; Kunst & Mackenbach 1994). There was a stronger gradient for own mid-life social class compared to father’s social class, which suggests some IQ-based social mobility effect. The correlations agree: the correlation between childhood IQ and own social class at midlife is stronger than the correlation with father’s social class. More broadly, this may also be seen in the structural equation model (Figure 3), in which the direct path between childhood IQ and social position at midlife is still strong, despite there being indirect paths from childhood IQ via education and social class of first job.

These data constitute an example of what has been called gradient constraint, by which is meant the moderating effect of social mobility on the size of social class differences (Bartley & Plewis 1997; Blane, Harding, & Rosato, 1999). Thus, there is the tendency for the size of social class differences among the socially stable (Table 1, matrix diagonal) to be larger than the size of the class differences among the combined population of socially stable and socially mobile (matrix bottom row); and that, hence, social mobility acts to constrain or reduce inequality. So, in Table 1, on the socially stable diagonal the difference in mean IQ scores between I&II and IV&V is 120.6 minus $94.1 = 26.5$; whereas among the bottom row combined population the difference is 114.5 minus $92.7 = 21.8$. The mechanism which produces this counter-intuitive effect can be illustrated by the matrix cell fatherIIINM-ownI&II: the people in this cell have a higher mean IQ score than the socially

stable in their class of origin (113.5 v 107.2), but a lower mean score than the socially stable in their class of destination (113.5 v 120.6). Social process relationships are tendencies rather than laws, so it is an empirical issue whether or not gradient constraint has occurred. Some matrix cells may not follow this pattern, but gradient constraint will result whenever this pattern occurs in the cells containing the majority of the socially mobile.

There has been absolute upward social mobility in recent decades, owing to greater numbers of service industry jobs (Breen & Goldthorpe, 1999). The asymmetry of social mobility in the present study replicated this finding. This overall movement of people from working into service sector classes is reflected in the lower mean IQs of the occupational categories in the 'own social class' compared with 'father's social class' (Table 1). Note that another implication of this upward movement of job status across generations is that those who remain in the same class as their father are, in fact, slipping behind relative to others. The low IQs in some of the cells in Table 1 that represent downward social mobility from classes I and II suggest that, in some individuals, an atypical circumstance might have affected cognitive function. However, such downward movement might also be caused by some non-cognitive disadvantage, or to natural, within-family variation. Here, the interest was in the determinants of relative social mobility and individual differences in social status attainment at mid-life. In looking at mid-life (50s)—when careers are mature—the data improved upon other British-based (Breen & Goldthorpe, 2001; Saunders, 2002) and USA-based (Herrnstein & Murray, 1994) studies, which tended to examine social status in the early-to-mid 20s or early 30s, when careers are still in evolution.

4.3 Social status attainment

The associations between cognitive ability, education and occupation were generally congruent with the studies analysed in Jencks (1979), even though different methods of assessment were used, especially for cognitive ability and socio-economic status. The association between cognition and education was smaller here, perhaps because the mental test was administered at a younger age than in most of their studies, or because, in Scotland in the 1930s, such a high proportion of people ended their school education at age 14, producing less variance than is found in later studies. An interesting finding here was that IQ at age 11 was significantly more strongly related to occupational class at midlife than to the status of the first job. A similar result was found by Jencks (1979) who reported that the effects of mental test performance on earnings increase with age. Indeed, the association between cognitive ability and mid-life occupation was higher here than in all of the studies in Jencks (1979), perhaps because the assessment of occupation in this study was at the oldest age yet analysed. This suggests that IQ's influence grows as men move through their careers. This receives some support from a related finding in the Warsaw studies, which found that people with high IQs tend eventually to become high earners irrespective of educational attainments (Firkowska-Mankiewicz, 2002), and from the finding that higher IQ workers tend to move up in job complexity over their careers (Wilk, Desmarais, & Sackett, 1995). The present results are in agreement with the findings from the British 1946 Birth Cohort, which found that father's occupation, cognition in childhood, and education all made contributions to social status in mid-life (Richards & Sacker, 2003). The present study had the advantages of using a latent trait with multiple markers for social status at midlife. A single social class measure is an unreliable and incomplete indicator of social factors (Korenman & Winship, 2000; Saunders, 2002). Also, Richards and Sacker's path model assumed that father's occupation is causally prior to

childhood mental ability at age 8. In the present study childhood IQ and father's social class were construed as correlated independent variables, which we suggest is a preferable, theory-neutral, position until more is known about the causal relations and precedents of these two correlated variables. The two share some genetic and, of course, some environmental influences, one model for which is that both children's cognition and father's job status are related to father's own IQ which, in a given environment, is partly determined by genetic factors (Rowe, Vesterdal, & Rogers, 1998).

There was agreement with analyses of the UK's NCDS in that ability, education and social class of origin were significant determinants of later social status attainment. There was support for their hypothesis that mental ability might in part operate via education in influencing social status. What might education and father's social class contribute to social status attainment in addition to cognitive ability measured about age 11? Greater completed education might indicate the sorts of characteristics in demand by employers, such as, "a low rate of time preference, trustworthiness, and willingness to work hard" (Bowles & Gintis, 2000). This accords with the finding that the personality trait of conscientiousness contributes to educational success (Lievens, Coetsier, De Fruyt, & Maeseneer, 2002), and occupational success independent of general mental ability (Schmidt & Hunter, 1998). It is possible that employers might use education level as a fallible but useful signal of mental competence in situations where the latter is not measured explicitly (Gottfredson, 1980). The specific effects of childhood social class could work by inculcating, among those from more advantaged social backgrounds, forms of engagement in social relationships that produce favourable labour market outcomes. This may be tied to the notion of social capital (Baum & Ziersch, 2003, Kilpatrick, Field, & Falk, 2003), which Bourdieu (1986, p. 248) defined as, "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less

institutionalised relationships of mutual acquaintance and recognition.” In this sense, a person’s childhood social class might act—via what is called bonding social capital—as an inertial factor, against social mobility upwards or downwards, because such capital as the person has might be specific to the social class of the parents. Another possibility is that part of the effect of social background might be caused by social class differences in the acceptability of various occupational aspirations (Gottfredson, 1981).

There was no consistent support for Breen and Goldthorpe’s (1999) suggestion that people from lower social classes of origin required more merit to attain a given higher social class by comparison with people whose class origin was higher, though the study had limited power to examine this hypothesis. The first column in Table 1 (social classes I and II at mid-life) shows that people originating from social classes I & II have the highest ability, and that people originating from social classes IINM, IIIM, and IV/V have similar and lower ability levels. Of course, if ability test scores are, in part, caused by original social class, then Breen and Goldthorpe’s (1999) hypothesis might still be correct, because ability test scores for people of lower social class of origin will be underestimates. Breen and Goldthorpe (1999) suggested that better analyses than their own might be undertaken where more valid cognitive ability estimates were available and where social measures were more detailed. In the present study the use of the Moray House Test, which was well-validated against the Stanford-Binet test (SCRE, 1933; Deary et al., 2000), and the use of a latent trait for adult social status, were attempts to conduct improved analyses. They also advised that analyses should be conducted at different time points so that any meritocratic trends might be evident. The present data suggest that the factors they found in later cohorts operate in a similar way in those born in 1921, and that there are effects of childhood social position after controlling for cognitive ability and education.

4.3 Limitations of the study

In the present study the outcomes at midlife were assessed with only a limited number of social indicators: occupation, deprivation of the area of residence, and regular car driving. Obviously, there are other aspects of life's quality, and childhood factors might be related to these also. For example, parents' occupation was significantly related to hopelessness at midlife, and parents' education was related to cynical hostility and hopelessness at midlife in the Kuopio Ischaemic Heart Disease Risk Factor Study (Harper et al., 2002).

The modest size and any unrepresentativeness of the sample studied here are possible limitations. The mean IQ of the 552 men whose data were linked from the Scottish Mental Survey (SMS) to the Midspan studies was 101.3 (SD = 15.3). The present sample with relevant data have a mean IQ of about 103 (SD = 16). Therefore, they are reasonably representative of the SMS-Midspan sample. These IQs were derived from raw scores from the Moray House Test (MHT). The men from the SMS-Midspan sample have a mean raw age 11 MHT score of 38.3 (SD = 14.2), and the whole Scottish population mean for boys was 34.5 (SD = 15.9, N = 44,210; Scottish Council for Research in Education, 1933). Therefore, the subsample analysed in the SEM model and the SMS-Midspan sample as a whole are reasonably representative of the whole population. It is the unique fact that the SMS of 1932 tested the whole nation that allowed us to indicate this degree of representativeness.

The relative contributions of childhood IQ and father's social class in this study should be treated with caution. Re-analyses of data used in *The Bell Curve* (Herrnstein and Murray, 1994) showed that mental ability test scores were more reliable than measures of social factors (Korenman & Winship, 2000). This means that, as an independent variable,

social background could be handicapped when compared with IQ in accounting for variance in an outcome measure. When various estimates of the reliability of social background were made, the effect of socio-economic status in predicting outcomes was increased. On the other hand, there is a danger in merely adjusting for reliability of social background measures, or of just adding in several social background indicators that might not be related to a theoretical construct, and which might be surrogates for IQ-type measures. The better way forward will be to develop reliable measures related to validated constructs of social background, something that is being attempted with new socio-economic classifications in the UK (Rose & Pevalin, 2003). There was much debate in the analyses and reanalyses of the NLSY data used in *The Bell Curve* about whether education should be statistically controlled. Herrnstein and Murray (1994) argued that it should not, as psychometric intelligence is a determinant of education. The present study had the advantage that mental ability was measured at a time when all children were still in basic education. Therefore, the mental ability measure was collected prior to individual differences in the number of years of full time education, and even before the choices of different academic subjects in secondary education.

An inevitable limitation of this study is the fact that it addresses the associations among phenotypic variables that are richly inter-correlated, but was not able to assess more fundamental causes of variation in them. This state of affairs precludes strong conclusions from these and the other relevant datasets that were discussed earlier. More longitudinal twin and family studies would be useful in separating the genetic and environmental correlations between the variables measured here. Though it is only partly feasible at present, augmenting mental ability tests with validated cognitive and biological measures of mental abilities would allow the validation of IQ-type tests as assessments of brain efficiency rather than social status (Deary, 2000).

The data analysed in the present study represent a specific, Western society at a specific time: Scotsmen who first entered the job market in the mid to late 1930s, many of whose careers were interrupted by active service in World War II, and who were interviewed again about their social status in the 1970s when they were in their 50s. The findings might not apply elsewhere and to other times, even within the same society. However, a strength is that, given this new and specific setting, there are congruences in the directions and sizes of the associations between mental ability, education and occupational outcomes with later-born cohorts in the UK and USA, as discussed in the Introduction, and with cohorts born about the same year in the USA and Sweden, as discussed by Jencks (1979).

4.4 Conclusions

The correlation between the chief independent variables of father's social class and childhood mental ability make it difficult to support any one side of the debate as to whether social status attainment in Britain is principally a function of being bright and working hard (Saunders, 1996), or whether there is still inertia of social mobility based upon childhood social circumstances (Breen & Goldthorpe, 1999). It is this correlation, reflecting a tangle of causal influences, that makes it difficult to undertake what otherwise seems like a straightforward test of the meritocracy hypothesis: "In a perfect meritocracy, class of origin and class of destination would be statistically independent once merit was taken into account." (Breen & Goldthorpe, 1999, p. 6).

Part of the reason that the present and previous studies cannot decide on these issues is that they deal with phenotypes only. There is often a competition to see whether IQ or background socio-economic status (SES) better predicts the given outcome, say

occupation. The implicit assumptions are that 'IQ = merit' and 'SES = unfair social privilege'. Both equations are disputed: by those who worry that IQ might substantially reflect social privilege; and by those who suggest that SES influences, controlling for IQ, could reflect some non-cognitive mental attributes that are helpful for, say, occupational success. These latter attributes might even be partly heritable. All studies to date, though they contribute to our understanding, share these limitations and the ambiguities about causes that are inherent in them. Even with useful new data such as those provided by the present study, such ambiguities will persist until the causes of the independent variables and their mechanisms of association are better understood.

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Table 1

Mean IQ (number of cases) and standard deviation by father's and own social class for men in Collaborative study and in SMS1932

Father's social class	Own social class				
	I & II	IIINM*	IIIM*	IV & V	All
I & II	120.6 (21) 7.8	105.2 (3) 12.3	82.9 (1) -	115.7 (1) -	117.2 (26) 11.6
IIINM	113.5 (17) 10.7	107.2 (7) 12.5	87.8 (2) 5.0	105.3 (2) 7.3	109.5 (28) 12.4
IIIM	112.8 (27) 9.4	101.4 (19) 14.5	97.6 (49) 18.4	89.4 (24) 13.4	100.0 (119) 16.9
IV & V	109.8 (14) 12.7	98.4 (7) 18.4	98.9 (25) 14.4	94.1 (24) 11.1	99.4 (70) 14.3
All	114.5 (79) 10.5	102.2 (36) 14.5	97.5 (77) 16.9	92.7 (51) 12.8	102.7 (243) 16.3

Note: *NM = non-manual and M = manual.

Table 2

Predictors of the chances (95% confidence interval) of social mobility based on 242 men in the Collaborative study with IQ at age 11 available

	Height	Years of education	Siblings	IQ
Upward mobility*				
Individual‡	1.07 (1.03 - 1.11) <i>p</i> = 0.001	1.54 (1.23 - 1.94) <i>p</i> = 0.0002	0.92 (0.83 - 1.02) <i>p</i> = 0.12	1.69 (1.30 - 2.20) <i>p</i> = 0.0001
Simultaneous‡	1.05 (1.00 - 1.09) <i>p</i> = 0.037	1.38 (1.10 - 1.75) <i>p</i> = 0.006	1.00 (0.89 - 1.12) <i>p</i> = 0.99	1.33 (0.99 - 1.78) <i>p</i> = 0.06
Downward mobility†				
Individual	0.95 (0.91 - 1.00) <i>p</i> = 0.05	0.81 (0.63 - 1.04) <i>p</i> = 0.10	1.09 (0.95 - 1.25) <i>p</i> = 0.22	0.58 (0.42 - 0.80) <i>p</i> = 0.001
Simultaneous	0.97 (0.92 - 1.03) <i>p</i> = 0.32	0.91 (0.74 - 1.13) <i>p</i> = 0.40	1.01 (0.87 - 1.17) <i>p</i> = 0.88	0.65 (0.46 - 0.94) <i>p</i> = 0.020

Note. *Excludes participants in father's social class I, *n* = 8; †excludes participants in father's social class V, *n* = 17. ‡'Individual' refers to a model with the variable entered alone. 'Simultaneous' refers to the effect of the variable in a model in which all four variables are entered simultaneously.

Height = per 1 cm increase; Years of education = per additional year; Siblings = per additional sibling. IQ = per increase in standard deviation.

Table 3

Correlations among the variables assessed in the study

	Height	No. sibs	Father's class	IQ	Age leaving education	First class	Own class	Car driving	Mean (SD)
Height (cm)	-								172.5 (7.1)
No. sibs	-.249	-							3.6 (2.5)
Father's class	.134	-.305	-						4.0 (1.1)
IQ	.277	-.269	.330	-					102.8 (16.2)
Age leaving education	.143	-.159	.399	.314	-				15.4 (3.1)
First class	.140	-.224	.488	.344	.549	-			3.7 (1.2)
Own class	.263	-.258	.452	.523	.476	.520	-		3.3 (1.4)
Car driving	.041	-.121	.095	.215	.227	.215	.285	-	0.51 (.50)
Less deprivation	.366	-.217	.374	.378	.306	.276	.415	.151	4.3 (1.8)

Note. $N = 240$. All variables, except No. of siblings, have been coded so that higher scores refer to: greater height, more professional social class, higher IQ, more education, more likely to drive a car, and less deprivation. All variables except Height and No. of siblings were used in the structural equation modelling

Figure captions

Figure 1

Basic model showing the constructs tested in this study and their temporal sequence. It also shows how the influences of father's social class and IQ upon social status attainment at midlife might be both direct and partly mediated via education and social class of first job.

Figure 2

Model showing how the constructs in the present study were measured. The usual structural equation modelling conventions are used, with the latent trait shown as a circle and manifest variables in rectangles. 'e' variables represent unique and error variance. 'd' represents disturbance on a latent trait. The double headed arrow represents the correlation between independent variables. Single-headed arrows represent putative causal influences.

Figure 3

Fitted path (structural equation) model of the direct and indirect influences of childhood social position and IQ upon social status attainment at midlife. Numbers beside paths may be squared to obtain the variance shared by adjacent variables. All parameters are significant ($p < .05$). The circle (F1) represents a latent trait; rectangles represent measured variables. See results section details of model fit indices.

Note. All variables have been coded so that higher scores refer to: more professional social class, higher IQ, more education, more likely to drive a car, and less deprivation.





