

Intelligence, social class of origin, childhood behavior disturbance and education as predictors of status attainment in midlife in men: The Aberdeen Children of the 1950s study

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ABSTRACT

In a birth cohort of 6281 men from Aberdeen, Scotland, social class of origin, childhood intelligence, childhood behavior disturbance and education were examined as predictors of status attainment in midlife (46 to 51 years). Social class of origin, intelligence and behavior disturbance were conceptualized as correlated predictors, whose effects were hypothesized to be partially mediated by educational qualifications. A structural equation model using Full Information Maximum Likelihood estimation confirmed that education had the strongest direct effect on status attainment at midlife. Furthermore, education partially mediated the effects of social class of origin and childhood intelligence, and fully mediated the effects of behavior disturbance on status attainment. Social class of origin, childhood intelligence and behavior disturbance were strongly inter-correlated. After controlling for these associations, educational and social status attainments were influenced to a considerably greater extent by childhood intelligence than by social class of origin.

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1. Introduction

There is much interest in whether contemporary Western societies adhere to meritocratic principles, which direct status attainment on the basis of individual merit rather than on social background (Young, 1958). The introduction of broad compulsory schooling, as well as the increasing accomplishment of advanced training, has enhanced the realization of meritocracy over the past century. Accordingly, modern-day social position trajectories are substantially determined by educational qualifications (e.g. Bond & Saunders, 1999) and the significance of intelligence for status attainment is captured in its high correlation with education

(e.g. Strenze, 2007). In accordance with this, Jensen (1998, p. 545) stated that intelligence was 'one of the most central phenomena in all of behavioral science, with broad explanatory powers'. However, intelligence is only one part of a complex nexus of inter-correlated variables that together predict status attainment; others include motivation, childhood behaviors and locus of control (e.g. Bond & Saunders, 1999; von Stumm, Gale, Batty, & Deary, 2009). Moreover, social class background influences educational and status attainments after adjusting for intelligence (e.g. Breen & Goldthorpe, 2001; Deary et al., 2005). Despite a substantial body of research on status attainment, it remains difficult to identify the operational set of significant predictors of status attainment, and to disentangle connections between them. After reviewing the literature on traditional predictors of status attainment, we outline a series of methodological difficulties that complicate research on status attainment,

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which we hope to overcome in the longitudinal investigation reported here.

2. Predictors of status attainment

In an extensive meta-analysis, *Strenze (2007)* reviewed correlations of general intelligence with education, occupational status and income as indicators of socio-economic success, and also summarized associations of intelligence with markers of social class of origin. Across 135 longitudinal studies, childhood intelligence was correlated with education at .56 and with occupational status at .43¹ (*Strenze, 2007*). Parental socio-economic status (SES) was found to correlate with own education at .41 and with own occupational status at .30. Intelligence was more strongly associated with indicators of socio-economic success than parental SES. However, *Strenze's (2007)* analysis did not control for the association between social class of origin and intelligence, making it impossible to disentangle their individual influences on status attainment.

In a small male sample of the Lothian Birth Cohort from 1921 ($N=243$), *Deary et al. (2005)* examined the effects of father's occupational status, childhood intelligence, and education on men's own occupational status attainment at the age of 50 years. Intelligence and father's occupation were positively correlated (.33), probably due to both shared genetic background and environmental provision. In a structural equation model that included the association between childhood intelligence and father's occupation, intelligence predicted educational and occupational outcomes better than father's occupation; the latter, however, had some statistical significance and non-trivial effects on education and occupation.

In a British birth cohort of men ($N=8287$), *von Stumm et al. (2009)* found that the variance in occupational status at the age of 30 was best accounted for by childhood intelligence, father's occupational social class, and educational qualifications. Concordant with *Deary et al.'s findings (2005)*, education was confirmed to partially mediate the effects of father's occupational social class and intelligence, both of which also had additional and substantial direct effects on own occupational class at 30 years.

Overall, the evidence suggests that childhood intelligence, social class of origin, and educational qualifications predict status attainment in adulthood. However, these variables rarely account for more than 40% of the variance in status attainment; therefore researchers have tried to identify additional predictor variables. For example, *Deary et al. (2005)* examined height in adulthood and number of siblings as potential predictors of status attainment, whereas *Bond and Saunders (1999)* and *Schoon (2008)* found significant effects for academic aspirations and school motivation. In a similar vein, *von Stumm et al. (2009)* examined the effects of self-esteem, locus of control and childhood behavior disturbance and found consistent, albeit modest effects of locus of control and childhood behavior disturbance on educational and occupational attainments.

In summary, status attainment depends largely on intelligence, social class of origin and education but a number of other psychological factors deserve consideration. Beyond the identification of relevant predictors, however, it is also important to disentangle their inter-correlated nexus. In this context, a number of methodological criteria need to be fulfilled to obtain meaningful results.

3. Criteria for research of status attainment

In general, studies that investigate status attainment require a longitudinal design and a large, representative, population sample. The longitudinal element aids inferences about the direction of association for the observed variables, whilst a large sample composed of individuals from the general population, incorporating all social strata, allows for valid conclusions about generalizability to the background population. Besides its heterogeneity regarding social stratification, the sample must be homogenous in three other aspects. First, status attainment can only be investigated within the boundaries of a given social, legal and geographical context to ensure that the examined population is subject to similar environmental conditions. Second, the sample must be composed of a cohort of individuals born within a precisely confined time period (e.g. a year or a decade). Economic, societal and educational conditions vary over time and therefore, affect social mobility and status attainment (*Breen & Goldthorpe, 2001; Schoon, 2007*). For example, a farm worker's son born in the 1930s will typically have had less chance to benefit from education than a farm worker's son born in the 1970s. Third, predictor variables of social mobility differ for males and females (*Nettle, 2003*), as men and women traditionally hold different social roles (*Farmer, 1997; Gottfredson, 1981*). Thus, men and women are best studied separately, firstly to identify the correct set of predictor variables applicable to each sex and secondly, to estimate effect sizes of the predictors on status attainment separately for men and women.

The sample should fulfill yet another criterion; that is, of relative maturity. Members of an insufficiently aged birth cohort will not have reached their peak social position and, thus, models of status attainment will fail to account for all of the variance. For example in the UK, peak social positions—based, for example, on occupational status—are held at the earliest by the age of approximately 40 years, when educational qualifications and early career training are completed and there has been time for promotion (*von Stumm et al., 2009*).

Although birth cohorts provide longitudinal data, they suffer from attrition due to emigration, refusal to participate, death and loss of contact, which distort the representativeness of the population (*Plewis, Calderwood, Hawkes, & Nathan, 2004*). Specifically, men from disadvantaged social class backgrounds and less intelligent individuals withdraw frequently from ongoing longitudinal research (*Nishiwaki, Clark, Morton, & Leon, 2005*). Previous studies often applied listwise or pairwise deletion to missing data, which reduces sample sizes and alters within-sample distributions. For example, *Breen and Goldthorpe (2001)* analyzed the 1958 and 1970 British birth cohorts, both of which originally surveyed between 16,000 and 17,000 people. Each cohort

¹ All coefficients cited are sample size weighted average correlations corrected for unreliability and dichotomization (*Strenze, 2007*).

was reduced to a quarter of its original size after all study members with missing data points had been excluded (Breen & Goldthorpe, 2001). A preferable approach is the Full Information Maximum Likelihood (FIML) estimation, which allows fitting models to the complete data if the assumption of data missing at random is met (e.g. Arbuckle, 1996). Furthermore, FIML estimation is also fairly reliable under conditions of data not missing randomly (Arbuckle, 1996; Little & Rubin, 2002). It is therefore a superior means of analyzing data from longitudinal studies (e.g. Richards & Sacker, 2003; Schoon, 2008).

Research on status attainment is further complicated by measurement issues. On one hand, measurements of social class of origin and of destination vary greatly across the literature. Some studies employ a single index of occupational social class, such as the UK Registrar General's Classification of occupation, or the Goldthorpe class schema (e.g. Breen & Goldthorpe, 2001; von Stumm et al., 2009). Others apply income (Osborne Groves, 2005; Strenze, 2007), or latent traits derived from several indicator variables, including level of deprivation, car ownership and occupational social class (Deary et al., 2005; Schoon, 2008). In this context, Korenman and Winship (2000) demonstrated that a single indicator of social class is an unreliable and insufficient measure of status. A latent trait derived from multiple indicator variables conceptualizes status attainment more adequately (Korenman & Winship, 2000; Schoon, 2008).

4. The current study

In the present study, we aim to overcome the methodological problems that have often hampered previous research on status attainment. To this end, a large, representative birth cohort of the Aberdeen Children of the 1950s (ACONF) is examined with a total $N=12,150$. With regard to the aforementioned heterogeneity of sexes, only men are included in the analysis ($N=6821$). This is to investigate men and women separately, not to omit the latter.² All cohort members were born within a time span of six years in the Aberdeen area in Scotland; they were assessed in childhood at the age of 11 years, and again at midlife, when they were aged between 46 and 51 years. Thus, the sample is homogeneous with regard to time, location, and sex, and is also sufficiently mature to examine predictors of status attainment.

Social class of origin and of destination is conceptualized as reflective latent traits and their indicator variables include a wider-than-usual range of status-related measurements, such as income, occupational class and housing tenure. In this context, Bollen and Lennox (1991) pointed out that markers of socio-economic status are theoretically formative; that is, the indicator variables cause a person's social status rather than the reverse. Modeling formative constructs, however, is problematic with regard to model identification (e.g. Bollen & Lennox, 1991; MacCallum & Browne, 1993) and hence, we presently follow recommendations to conceptualize social

status as reflective constructs (Howell, Breivik, & Wilcox, 2007).

Childhood intelligence and social class of origin are understood as inter-correlated, direct predictors of education and status attainment at midlife (Fig. 1). In line with previous research (e.g. Bond & Saunders, 1999; Deary et al., 2005), education is hypothesized to mediate the effects of social class of origin and intelligence on social class of destination. Importantly, the set of traditional predictor variables—in terms of social class of origin and intelligence—is supplemented here by a latent trait of childhood behavior. Childhood behaviors predict not only personality structure in adulthood but also educational and occupational status attainments (e.g. Feinstein, 2000; McCrae et al., 2000). For example, studies of the 1958 and 1970 British birth cohorts showed that childhood behaviors—such as withdrawal, aggression and resentment, assessed at ages of 5, 11 and 16 years—significantly affected adult earnings (Silles, 2005), occupational and educational attainment (Jackson, 2006; von Stumm et al., 2009), social exclusion (Sigle-Rushton, 2004), and labour market returns (Osborne Groves, 2005). Childhood behavior disturbance indicates social maladjustment, which impacts negatively on individuals' ability to perform successfully in academic and occupational settings, as well as on their position within a general social environment (e.g. McLeod & Kaiser, 2004). Therefore, childhood behaviors are hypothesized to contribute to educational achievement and social class attainment, in addition to parental social class and mental ability.

5. Methods

5.1. Sample

The Aberdeen Children of the 1950s study comprises 12,150 men and women born in Aberdeen, Scotland, between 1950 and 1956. Cohort members attended primary schools in the city in 1962 when they were aged 6 to 12 years. At this time, children completed mental ability tests and demographic information, whilst teachers rated children's behaviors. In 1964, mothers of a randomly chosen sub-sample (1 out of 5; $N=2510$) were surveyed in-depth to provide detailed information on the family's socio-economic status and children's home environment. However, only half of the mothers fully completed the postal questionnaires. The surveys were linked with socio-demographic information on families from birth certificates, hospital records and Scottish population registries. The sample was followed up with a postal questionnaire between 2001 and 2003 when participants were aged 46 to 51 years, achieving a response rate of 64% ($N=7183$). The follow-up survey included questions on educational, occupational and socio-economic status. Batty et al. (2004) and Leon, Lawlor, Clark, and Macintyre (2006) provide a detailed summary of study design. Only males were included in this study with $N=6281$ for the overall sample and $N=1104$ for the randomly chosen sub-sample of mothers who were more thoroughly surveyed in 1964. In the present analysis, data were used, which had been recorded in school, by mothers, and from official records; sources are indicated where appropriate.

² Women's status attainment will be examined in an independent, forthcoming study.

5.2. Measures

5.2.1. Intelligence

Within 6 months of their 11th birthday, children completed four mental ability tests including the Moray House Verbal Reasoning tests I and II, and an arithmetic and an English test. Local education authorities provided the test materials and corresponding manuals with scoring and standardization instructions. The manuals reported reliabilities of above .90 for all tests (test scores were not recorded on item level and hence, it is impossible to obtain exact reliability estimates in the current sample). The tests were administered and scored by primary school teachers; scores were normed according to local standards in line with the test manuals. The individual test results were documented in the official Aberdeen school records. These tests were part of the 'qualifying' exam, taken at the end of primary school, which determined which type of secondary school, and which stream in the first form of secondary school, pupils would be selected for.

The Moray House Verbal Reasoning tests I and II comprised overall 30 verbal ability tests, including finding synonyms and antonyms to a given reference word, spelling exercises, finding words to complete sentences, and deductive reasoning problems.

The arithmetic test comprised two sections. The first 40-item section assessed children's ability to add, subtract, multiply, and divide; these arithmetic problems included up to four figures at a time. The second part comprised 44 worded arithmetic problems which required fractions and understanding of non-metric units.

The English test included a set of 16 different tasks, which mainly assessed text comprehension, grammar and spelling. For example, children were presented with a short text paragraph and subsequently completed questions about its general content and featured characters.

5.2.2. Childhood behavior

Class teachers completed the 26-item Rutter Scale B (Rutter, 1967)³ and rated behaviors of the children, who were aged 6 to 12 years, on a three-point Likert scale ranging from 'Does not apply' to 'Definitely applies'. The scale assesses a variety of behaviors, including aggression, clumsiness, worrying, and concentration difficulties. Individual item scores were documented in the official Aberdeen school records.

5.2.3. Education

During the follow-up survey between 2001 and 2003, a number of dichotomous variables on education were recorded, such as 'O-levels; yes/no'. From these, an education index with a seven-point scale was developed ranging from no formal education, simple school leaving certificate, clerical qualifications, O-levels (certificate of secondary education), Highers or Certificate of Secondary Education (advanced school leaving certificates which enable university entry), National Certificate (HNC; equivalent to a college qualification but below a bachelor's degree), to degree level.

Participants' highest educational qualification was taken as indicator of their educational attainment.

5.2.4. Social class of origin

A set of five variables was utilized to indicate participants' social class of origin: mother's and father's occupation at the time of the child's birth, house tenure, number of rooms, and family car ownership.⁴

Information on mother's and father's occupational status was extracted from obstetric hospital records. Father's occupational status at the time of the index child's birth was coded on a seven-point scale ranging from unskilled, semi-skilled manual, skilled manual with a) an apprenticeship and b) other skilled manual occupations, skilled non-manual, managerial to professional, according to the OPCS Registrar General's Classification of Occupations (RG; OPCS, 1951). Categories of skilled manual a) and b) were collapsed into one resulting in a six-point scale overall. Fathers, who were unemployed or had died before the child's birth, were treated as missing. Mother's pre-pregnancy social occupational class was recorded on a six-point scale ranging from unskilled manual, semi-skilled manual, skilled manual, distributive, clerical to professional and technical; mothers whose occupational skill level was unknown were treated as missing. This scale is not strictly in line with the RG classifications, which typically do not differentiate distributive and clerical; however, the differences between fathers and mothers in categories of occupational status reflect societal and occupational sex roles in the 1950s in Aberdeen.

Information on housing tenure ($N=1096$) and the number of rooms ($N=1104$) at home were provided by sub-samples of mothers in 1964. House tenure was coded on a four-point scale ranging from living with relatives, rented from town council, rented from private landlord and to house owned. The number of rooms in the house included bedrooms and living rooms but excluded utility rooms like baths, kitchens and sculleries. The number of rooms was directly coded. Car ownership was assessed during the follow-up survey between 2001 and 2003; cohort members stated whether their family possessed a car when they were aged 12 years (dichotomously coded).

5.2.5. Social class of destination

A set of four variables was utilized to indicate social class by midlife: participants' occupational status, income per annum, house tenure and car ownership. All variables were assessed during the follow-up questionnaire between 2001 and 2003.

Occupational status was coded—as for fathers' occupational class—on a six-point scale ranging from unskilled, semi-skilled manual, skilled manual, skilled non-manual, managerial to professional, according to the OPCS Registrar General's Classification of Occupations (OPCS, 1990).

Income per annum was coded on a nine-point scale ranging from 0 = no income to 8 = 40,000 Pounds per annum or more. Housing tenure was dichotomous, distinguishing

³ The administered scale was an early but identical version of the Rutter Scale B (1967).

⁴ ACONF also entails information on mother's and father's education. These variables, however, were found to be highly skewed and of little meaningful variance. Therefore, parental education was not included as indicator variable.

renters and owners. Car ownership was coded on a three-point scale ranging from none, one, to two and more. Details on the frequencies of indicator variables of social class of origin and status attainment are shown in the [Appendices A, B, and C](#).

5.3. Statistical analysis

The analyses were conducted using SPSS 14.0 and AMOS 5.0 for Windows. Predictors of status at midlife included social class of origin, childhood intelligence, childhood behaviors, and educational qualifications. Variables were coded such that higher scores referred to more advantaged social classes, greater behavioral disturbance, higher levels of intelligence, and higher educational qualification. The four intelligence test scores were subjected to principal axis factoring analyses (PAF) to derive the general intelligence factor g . The dimensionality of the Rutter Scale B, which does not implicate an a priori structure, was also examined using PAF and higher order factor analysis. Social class of origin and social class of destination were conceptualized as reflective constructs from their respective set of indicator variables, including occupational class, income, house tenure, number of rooms and car ownership. The unidimensional factor structure of both social class factors was confirmed using PAF. The results of the PAF analyses, which individually confirm the psychometric structure of the included constructs prior to fitting the overall model, are presented in the first part of the Results section.

In a second step, a comprehensive structural equation model (SEM) of status attainment was tested. A simplified graphical representation of the hypothesized model is shown in [Fig. 1](#). Observed variables included four intelligence tests completed in childhood, teacher ratings of childhood behavior disturbance, father's and mother's occupational class, family housing tenure, number of rooms at home and family car ownership. Furthermore, education, income, house tenure, car ownership and occupational class at midlife were observed variables. Overall, four reflective constructs – intelligence, childhood behavior disturbance, social class of origin, and social class of destination – were derived. Social class of destination was the main outcome variable. Intelligence, childhood behavior disturbance and social class of origin were inter-correlated predictors of social class of destination. Education was included to examine whether it partially or wholly mediated the effects of the predictor

variables, which were also modeled to directly affect social class of destination.

In addition to attrition, which affects all longitudinal studies, ACONF data are partially incomplete because some variables (e.g. housing tenure during childhood) were only recorded for a sub-sample of the study. For SEM analysis with missing or incomplete data, FIML estimation is most effective (e.g. [Enders & Bandalos, 2001](#); [Schafer & Graham, 2002](#)) and was used here. Furthermore, FIML yields robust and consistent results under conditions of data missing completely at random and data missing at random, as well as when assumptions of multivariate normality are mildly violated (e.g. [Arbuckle, 1996](#); [Enders and Bandalos, 2001](#)). In the present study, data are missing at random; multivariate-normality was found to be violated for two variables only.

As a goodness-of-fit measure, the model χ^2 tests for differences between log-likelihood functions of the implied and the saturated model. A significant χ^2 result is insufficient for model rejection because it is affected by sample size ([Jöreskog, 1969](#)). Incremental fit indices, such as the Comparative Fit Index (CFI), Bentler–Bonett Normed Fit Index (NFI) and the Tucker–Lewis Index (TLI), assess the implied model's fit relative to the null or independence model with a recommended minimum of .90 and .95, respectively ([Hu & Bentler, 1999](#)). In the present data, the assumption of multivariate normality was violated, which distorts both incremental fit indices and χ^2 results ([West, Finch, & Curran, 1995](#)). [Gignac, Palmer, Bates, and Stough \(2006\)](#) suggested placing interpretive confidence in absolute close-fit indices rather than in incremental fit indices. An absolute close-fit index is the parsimony measure of the Root-mean-square error of approximation (RMSEA), which is based on the non-centrality parameter and indicates an adequate model fit with a value below .05 ([Hu & Bentler, 1999](#)).

6. Results

6.1. Principal axis factoring analyses

[Table 1](#) shows a full correlation matrix and means and Standard Deviations of all variables included in the current study. All variables correlated in the expected direction, with more favorable outcomes tending to covary positively. The highest Pearson product moment coefficients were observed amongst the four intelligence test scores, ranging from .75 to .91. Factors of childhood behavior (see below) were moder-

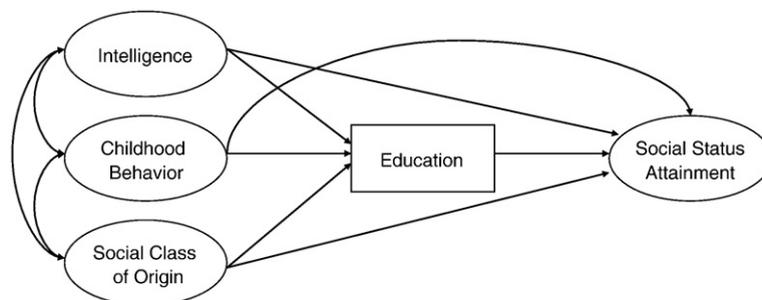


Fig. 1. Simplified graphical representation of hypothesized model of status attainment. *Note.* Latent traits are shown as ovals and observed variables are shown in rectangles in line with structural equation modeling conventions. Double-headed arrows represent correlations.

Table 1
Correlation matrix of all variables in the SEM with means and Standard Deviations (SD).

	N	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1 Verbal test I (g)	5904	99.07	14.68	–																	
2 Verbal test II (g)	5895	98.80	14.49	.91	–																
3 Arithmetic test (g)	5058	99.11	14.56	.82	.82	–															
4 English test (g)	5058	98.95	14.55	.85	.85	.75	–														
5 Restlessness (B)	6059	1.35	0.51	–.37	–.40	–.38	–.39	–													
6 Aggression (B)	6032	1.13	0.28	–.15	–.15	–.18	–.12	.58	–												
7 Anxiety (B)	6052	1.14	0.30	–.12	–.11	–.10	–.09	.11	.11	–											
8 Education	3336	4.55	2.13	.52	.53	.52	.48	.23	.13	.08	–										
9 House Tenure (SCO)	1096	2.30	0.77	.23	.21	.19	.19	–.08	–.09	–.08	.18	–									
10 N rooms (SCO)	1104	3.68	1.09	.22	.20	.13	.16	–.07	–.04	–.08	.13	.47	–								
11 Father's occ class (SCO)	5947	2.85	1.22	.30	.31	.25	.29	–.17	–.12	–.10	.27	.33	.36	–							
12 Mother's occ class (SCO)	5580	3.11	1.47	.31	.26	.27	.30	–.16	–.12	–.04	.31	.30	.33	.35	–						
13 Family car (SCO)	3401	1.48	0.50	.15	.15	.09	.13	.00	.00	–.04	.18	.08	.20	.32	.22	–					
14 House tenure (SAM)	3390	1.83	0.37	.12	.10	.11	.12	–.10	–.07	–.08	.27	.07	.07	.08	.06	.07	–				
15 Occ class (SAM)	3353	4.02	1.30	.38	.38	.37	.36	–.16	–.02	–.11	.46	.21	.22	.22	.24	.16	.34	–			
16 Income p.a. (SAM)	2792	6.26	1.56	.24	.27	.29	.25	–.12	–.01	–.09	.34	.06	.01	.13	.12	.09	.36	.46	–		
17 N cars (SAM)	3428	1.39	0.68	.12	.13	.12	.12	–.05	.00	–.08	.19	–.11	–.01	.07	.06	.13	.39	.27	.49	–	

Note. Above the diagonal, FIML estimated correlations are shown; below the diagonal are correlations derived from valid cases after listwise deletion ($N = 345$). Means and SD were computed based on all cases with complete data on the respective variable; sample sizes vary accordingly. The behavioral data from the Rutter Scale B is only shown in terms of derived composite scales. In parentheses, abbreviations of reflective constructs are shown for their respective indicator variables. Key: g = general factor of intelligence; B = behavioral disturbance; SCO = social class of origin; SAM = status attainment in midlife.

ately correlated. For the reflective constructs of social class of origin and social class of destination, the respective indicator variables were moderately correlated, with 12 out of 16 coefficient values of above .30. Education correlated most strongly with the four intelligence tests ranging from .48 to .53. No other correlation within the matrix had a higher value than .40 outside the variable's specified latent construct nexus.

6.1.1. Intelligence

PAF of the four intelligence test scores found one factor with an Eigenvalue of 3.58, which accounted for 89.37% of the variance ($N = 5051$, after listwise omission; Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO) = .87). Initial communalities were all above .74. Factor loadings were .96 for Moray House Verbal Reasoning tests I and II, .86 for the arithmetic test and .91 for the English test. The coefficient alpha was .96. The derived factor will be referred to herein as general intelligence factor g.

6.1.2. Childhood behavior

An exploratory PAF of the Rutter Scale B identified 13 items to have initial communalities below .25; the remaining 13 items had initial communalities above .30. A content analysis showed that the items of low communalities referred to physical impediments, such as stuttering and twitching, whereas items of high communalities addressed trait dispositions of for example restlessness and anxiety. Subsequently, items with low communalities were excluded from the further analyses. The scree plot and the Eigenvalues suggested a three-factor solution, which accounted overall for 60.57% of the variance ($N = 6012$ after listwise omission; KMO = .87). After direct oblimin rotation, the three factors were readily interpretable as Aggression (7 items; coefficient alpha = .84), Anxiety (3 items; coefficient alpha = .72), and Restlessness (3 items; coefficient alpha = .78).⁵ Composites were constructed for each factor by adding its respective items and dividing by the total number of items. Restlessness correlated with Aggression .58 and .11 with Anxiety; the latter two were correlated at .11. In line, Aggression and Restlessness were understood as aspects of externalizing behaviors, which refer to disorders characterized by behavioral disinhibition (King, Iacono, & McGue, 2004), and Anxiety as a component of internalizing problems, which are characterized by negative mood states and inhibition (King et al., 2004). Previous research found effects of externalizing behaviors on educational and occupational achievement (McLeod & Kaiser, 2004) and hence, only Restlessness and Aggression were included in the subsequent SEM of status attainment at midlife.

6.1.3. Social class of origin

Indicator variables of social class of origin, including father's and mother's occupational status, house tenure in childhood, number of rooms, and family car were subjected to PAF. The first unrotated factor with an Eigenvalue of 2.14

⁵ The item 'Often disobedient' cross-loaded onto both factors Restlessness and Aggression. The factor loading on Aggression was, however, substantially higher and with reference to the interpretability of the factors, the item was understood as part of the Aggression-factor.

accounted for 42.72% of the variance ($N = 532$, after listwise omission; $KMO = .72$). Factor loadings were .67 and .54 for fathers' and mothers' occupational status, respectively, .49 for house tenure, .58 for number of rooms and .37 for family car.

6.1.4. Social class of destination

Indicator variables for social class at midlife were occupational status, income per annum, car ownership and housing. The first unrotated factor with an Eigenvalue of 2.14, which was derived using PAF, accounted for 53.41% of the variance ($N = 2708$ after listwise omission; $KMO = .71$). Factor loadings were .59 for occupational status, .80 for income per annum, and .54 for both house tenure and number of cars.

6.2. Structural equation model

Using FIML estimation, a SEM was fitted as shown in Fig. 2. The model was based on a path-type analysis including manifest and latent traits. Overall, the model comprised 17 observed variables and four reflective construct including social class of origin and midlife and childhood intelligence and behavior. Each reflective construct was extracted from a set of three to five indicator variables. In total, 78 parameters were estimated including path coefficients, variances, covariances, means and intercepts. Note that childhood intelligence, behavior disturbance and social class of origin were allowed to correlate freely. This nexus of predictor variables was predicted to have direct and indirect influences on social class

of destination, partially mediated by education. The model fit indices were as follows ($N = 6281$): $\chi^2(96) = 826.74$, $p < .001$; $TLI = .973$; $NFI = .979$; $CFI = .981$; $RMSEA = .035$ with a Confidence Interval of 90% ranging from .033 to .037, p -Value for Test of Close Fit of 1 at .001. All path parameters were significant at $p < .001$, except for the association between childhood behavior disturbance and midlife social status ($p > .05$). Overall, the model had a good fit to the data. Social class of origin correlated with general intelligence at .51 and with childhood behavior disturbance at $-.24$. The latter two correlated at $-.47$. All three predictor variables had direct effects on social status in midlife, with intelligence having the greatest path weight of .29, followed by social class of origin with .20, and finally childhood behavioral disturbance with a non-significant parameter. Education had a direct path weight of .32 on status attainment at midlife. The predictors also had indirect effects on social status attainment which were partially and fully mediated by education.

Table 2 summarizes the direct, indirect and total effects of childhood intelligence, behavior and social class of origin. Three independent Sobel tests confirmed that education partially mediated the effects of social class of origin and intelligence, and fully the one of childhood behavior ($p < .001$, in all cases). Education was best predicted by intelligence with a path weight of .46, followed by social class of origin with a parameter of .23, and a small effect of childhood behavior of $-.09$. Overall, the model accounted for 48.3% of the total variance in social status attainment.

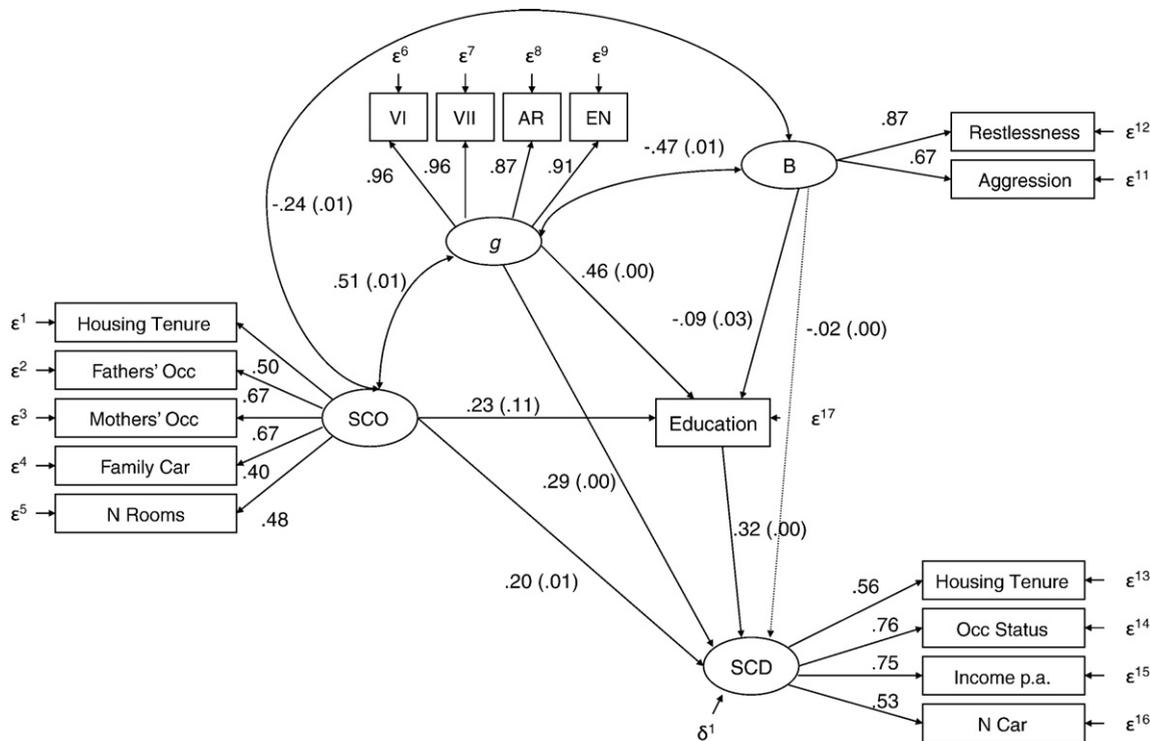


Fig. 2. Structural equation model with path coefficients, accounting for 48.3% of the total variance in status attainment at midlife. Note. All variables were coded such that higher scores referred to more advantaged social classes, greater behavioral disturbance, higher levels of intelligence, and higher educational qualification. Dashed arrows indicate non-significant pathways ($p > .05$). Error terms are denoted by ϵ for observed variables and δ for latent traits. In parentheses, Standard Errors of parameter coefficients are shown for path ways between predictor and outcome variables. Key: g = general factor of intelligence; VI and VII = Moray House Verbal Reasoning test I and II; AR = arithmetic test; EN = English test; B = latent trait of childhood behavior disturbance; Occ = occupational status; SCO = reflective construct of social class of origin; SAM = reflective construct of status attainment in midlife; N car = number of cars.

Table 2

Standardized direct, indirect and total effects of predictor variables on social status attainment at midlife.

Direct Effects	<i>g</i>	SCO	<i>B</i>
Indirect Effects	.29	.20	–.02
Total Effects	.15	.08	–.03
	.44	.27	–.06
Sobel Z	12.62 ^a	6.00 ^a	13.93 ^a

Note. Indirect effects refer to effects mediated by education; Sobel Z values refer to education as mediator of the predictor variables. Key: *g* = general intelligence; SCO = social class of origin; *B* = behavior disturbance.

^a $p < .001$.

7. Discussion

The current results confirmed that social class of origin, childhood intelligence, behavior disturbance, and educational qualifications predict social status at midlife. Overall, the predictor variables accounted for almost 50% of the variance in social class of destination. Intelligence, behavior disturbance and social class of origin were inter-correlated predictors of educational and status attainment. After controlling for these associations, the effects of intelligence on education were twice as strong as those of social class of origin (standardized path weights of .46 and .23, respectively). Also, intelligence had a greater impact on status attainment than social class of origin, albeit the difference was not quite as large compared to their respective effects on education. Education had the greatest effect on social class at midlife and partially mediated the effects of intelligence and social class of origin on status attainment. The effects of behavior disturbance on status attainment at midlife were fully mediated by education.

In contrast to Strenze's (2007) meta-analytic investigation, this study controlled for the correlation between social class of origin and childhood intelligence, which was at .51. This estimate is slightly higher than previous results. For example, Deary et al. (2005) found a coefficient of .33. On one hand, this discrepancy may be due to differences in measurement. Deary et al.'s (2005) study used father's occupation as single indicator of social class of origin, whereas the current study employed a reflective trait derived from mother's and father's occupational status at child's birth and indicators of family home conditions.⁶ On the other, the current result may be due to societal changes, which have over time credited educational qualifications with increasing significance for people's life trajectories. That is, parents of children born in the 1950s were more likely to enter and benefit from educational systems compared to the parents of children born in the 1920s. In the face of the high heritability estimates of intelligence (e.g. Plomin, DeFries, Craig, & McGuffin, 2003), it seems plausible that, within a meritocratic system, the phenotypic association between parents and children increases when both rely to a greater extent on their intelligence for status attainment compared to previous generations, which were more affected by an impermeable class system. A second observation supports this suggestion. Deary et al. (2005) found

that intelligence had a much smaller effect on educational qualifications compared to social class attainment; also, the path weight of educational qualifications to social status was lower than in the current results (path weights of .24 and .32, respectively). This suggests that educational qualifications have become the core determinant of socio-economic success over time. Moreover with the growing importance of education, intelligence has also gained predictive validity for status related outcomes, accounting presently for the greatest amount of variance in status attainment.

An exploratory analysis of childhood behavior resulted in two factors of externalizing behavior problems – Restlessness and Aggression – and one, relatively independent dimension of internalizing behavior in form of Anxiety. This distinction is in line with child psychopathology research, which has also suggested that externalizing disorders negatively affect educational outcomes and status attainment (e.g. McLeod & Kaiser, 2004). Externalizing behavior problems made the smallest contribution to the outcome variable in the current model. In line with the hypothesis, childhood behavior had a significant, negative effect on educational qualifications but only negligible, direct effects on social class at midlife. Childhood intelligence and behavior disturbance were substantially correlated, which may be due to teachers' general perception of less intelligent or diligent students rather than to a true conceptual association. However, future research on the overlap of intelligence and behavioral disturbance will be needed to answer this question. Overall, childhood behavior disturbance – despite its substantial inter-correlations with intelligence and social class of origin – appears to only contribute trivially to models of status attainment. In this context, other predictor variables, such as academic motivation (Schoon, 2008), may be better suited to explain individual differences in status attainment.

Previously, a number of conditions for meaningful research on status attainment were outlined. The current study meets all these conditions. A large, representative birth cohort of men from Aberdeen was studied and assessed in childhood and at midlife between the ages of 46 and 51 years. The extensive dataset allowed us to investigate a complex nexus of variables that predict social status, as well as conceptualizing exogenous and endogenous variables in terms of reflective traits. Finally, the missing data were dealt with by the state of the art method of FIML instead of reductive, listwise deletion. However, this study has also limitations. First, it was impossible to precisely disentangle the pheno- and genotypic causes of the observed association of intelligence and social class origin and corresponding explanations remain speculative. Second, the conceptualization of social class of origin and social status attainment at midlife as reflective latent constructs may be considered inappropriate (Bollen & Lennox, 1991) and instead, formative measurement models would be more accurate. Because of the complexity and interconnected nature of the present structural model, a formative measurement approach was found to be unfeasible. Finally, the current model of status attainment applies only to men; this in itself is not a disadvantage but future research must develop corresponding models for women.

In conclusion, the current study examined predictors of status attainment by midlife in a birth cohort of Scottish men.

⁶ An additional SEM with father's occupational class as sole indicator of social class of origin showed lower effects of the latter on all other variables and also had a worsened model fit.

Childhood intelligence was the strongest predictor. Social class of origin was substantially correlated with childhood intelligence and after controlling for this association, continued to predict midlife social class. Education partially mediated the effects of intelligence and social class of origin, and fully mediated the effects of childhood behaviors. Perhaps the two greatest challenges for this area of research—which tries to find out who gets ahead in life—are to untangle the etiologies of the predictor variables (e. g. childhood intelligence and social class of origin), and to discover determinants of the unaccounted 50% or so of variance in the outcome.

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Appendix A. Frequencies of occupational classes for ACONF members and their parents

	Father		Mother		Own	
	N	%	N	%	N	%
I Professional	167	2.8	237	4.2	312	9.3
II Intermediate	450	7.6	994	17.8	1319	39.3
III Skilled non-manual	688	11.6	990	17.7	323	9.6
IV Skilled manual	2720	45.7	1285	23.0	1013	30.2
V Semi-skilled manual	886	14.9	1083	19.4	286	8.5
VI Unskilled	1036	17.4	991	17.8	100	3.0
Total N	5947	100	5580	100	3353	100

Note. Father's and mother's occupational status were derived from obstetric hospital records; own occupational status was reported by ACONF members during the follow-up survey in 2001 to 2003. For mothers, classes III and II were referred to as 'distributive' and 'clerical' respectively. Key: Own = ACONF members' occupational class; Father and Mother = ACONF parents' occupational class.

Appendix B. Frequencies of indicator variables of social class of origin

Variable	Categories	N	%
Car	None	1755	51.6
	One	1646	48.4
	Total	3401	100
Housing Tenure	Living with relatives	67	6.1
	Renting from council	777	70.9
	Renting privately	108	9.9
	Owner	144	13.1
	Total	1069	100
Number of rooms	1	12	1.1
	2	39	3.5
	3	474	42.9
	4	458	41.5
	5	65	5.9
	6	23	2.1
	7	13	1.2
	8	10	0.9
	9	10	0.9
		Total	1104

Note. Frequencies on number of rooms and housing tenure were obtained from a randomly chosen sub-sample (20% of the original cohort) of ACONF. Frequencies for car possession in family during childhood were obtained during the follow-up questionnaire 2001 to 2003.

Appendix C. Frequencies of indicator variables of status attainment in midlife from the follow-up questionnaire in 2001 to 2003

Variables	Categories	N	%
Number of cars	None	384	11.2
	One	1,311	38.2
	Two or more	1,733	50.6
	Total	3428	100
Housing Tenure	Renting	571	16.8
	Owner	2,819	83.2
	Total	3390	100
Income p.a.	0	11	0.4
	<£2000	8	0.3
	£2000–£5999	55	2.0
	£6000–£9999	52	1.9
	£10000–£14999	257	9.2
	£15000–£19999	357	12.8
	£20000–£29999	774	27.7
	£30000–£39999	482	17.3
£40000 and more	796	28.5	
	Total	2792	100

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