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## Career trajectories into undereducation. Which skills and resources substitute formal education in the intergenerational transmission of advantage?

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# Online Supplement to

Career Trajectories into Undereducation: Which Skills and Resources Allow Individuals to  
Seek Careers That Lie Beyond Their Formal Education?

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## A CODING OF VIRTUAL YEARS OF EDUCATION

We use information on the detailed highest qualification attained to construct a metric variable of years of education. We consider elementary, secondary, tertiary, and vocational education, in so far it results in nationally recognized qualifications. Further education programs that are company specific, or not certified, do not enter our estimation of formal education requirements. Importantly, our measure is based on the *typically* required time for the completion of qualification as opposed to the *actual* time spent on attaining it (Schneider 2010). The conversion took place using the translation keys displayed in Tables A1 and A2, which are based on background information on countries' education systems (DoE 2013, 2018; Jones 2016; KMK 2017a; b; Ofqual 2009; Schneider 2008). In cases where these background sources did not provide guidance on how to treat British vocational qualifications, we used the observed median duration needed by respondents to attain the respective qualifications to calculate its contribution to respondents' years of education.

To then derive the typical years of schooling in each occupation, we calculated the mean years of schooling and their standard deviation in 3-digit ISCO-groups from our data. To increase precision, we pooled education information within a 11-year window to form a moving average of an occupation's observed years of education. By dropping repeated observations of respondent- occupation combinations within that window, we made sure that each respondent contributed to the calculated mean and standard deviation of any occupation in a given year only once. We further distinguished between East/West Germany and (non-)/London, respectively, and employed the appropriate cross-sectional poststratification weights. In each country, this leaves us with around 100 different occupations, for which we possess information on typical education profiles. In the main article, we drop cases with an occupation-year combination, for which less than 30 education observations are available to calculate occupational education requirements. Appendix J shows the results for different cut-off points.

Detailed as the translation key displayed in Tables A.1 and A.2 may be, the decision to use a metric variable to calculate undereducation may appear questionable, given the highly discrete nature of both countries' qualification systems. However, using a metric indicator conveys significant advantages for our application. It allows us, for instance, to calculate occupation-specific standard deviations of education and thereby ensures that we consider only undereducation that is substantial, relative to the observed norm. This is the big advantage compared to other measurement strategies, for instance the self-assessed undereducation indicator that we discuss in Appendix D below, where it is much less clear, how undereducation perceptions are formed. Our measure is also inherently relative in that actually realized education-job matches form the basis of our estimation of qualification requirements. This perspective is appropriate given our substantive questions, which focus on the substitution of formal schooling through other skills and resources.

Table A.1 Virtual years of education, United Kingdom

Years of education assigned	Qualification/certificate
8	none
10	school leaving certificate, standard/ordinary grade, cse, gcse/o-level
12	a-levels and equivalents
14	Diploma in higher education
15	1st degree level including foundation degree, graduate of professional institute, pgce
17	university higher degree (e.g. Msc, Phd)
<i>to which we added a maximum of one of the following further education qualifications if respondents did not report tertiary education (values based on median duration times)</i>	
3	hnc/hnd, onc/ond
2	modern/trade apprenticeship, scotvec, scotec, scotbec, other vocational, technical or professional qualification, city and guilds certificate, gnvq/gsvq, nvq/svq-level 1-2, btec/bec/tec/edexcel/lqf,
1	rsa/ocr, clerical/commercial qualification, youth training certificate, key/basic skills, entry level qualifications (wales)
Foreign qualifications of respondents	
3	none
5	completed primary school
10	completed secondary school
11	post-secondary vocational training (up to 1 year)
12	post-secondary vocational training (2 and more years)
14	post-secondary academic below-degree level qualification
15	Bachelors or equivalent first degree qualification
16	postgraduate academic below-masters level qualification
17	Masters or equivalent higher degree level qualification
20	PhD
Qualifications of respondents' parents	
4	no schooling reported
9	left school with no qualifications or certificates
10	left school with some qualifications or certificates
12	post-school qualifications or certificates (e.g. City & Guilds)
16	university degree or higher degree

Table A.2 Virtual years of education, Germany

Years of education assigned	Qualification/certificate
7	none
9	general secondary school ( <i>Hauptschule</i> )
10	intermediate secondary school (Realschule)
10.5	general secondary school + other vocational training
11.5	intermediate secondary school + other vocational training
12	general secondary school + apprenticeship or equivalent, vocational maturity certificate (Fachabitur)
13	general maturity certificate (Abitur), intermediate secondary school + apprenticeship or equivalent
14.5	vocational maturity certificate + other vocational training
15	vocational maturity certificate + apprenticeship or equivalent
16	Bachelors or equivalent, general maturity certificate + apprenticeship or equivalent
18	Masters/PhD or equivalent
Qualifications of respondents' parents	
3	none
5	general secondary school ( <i>Hauptschule</i> )
10	intermediate secondary school (Realschule)
12	vocational maturity certificate (Fachabitur)
13	general maturity certificate (Abitur)
<i>to which we added the following vocational qualifications if applicable</i>	
1	unspecified vocational training
3	apprenticeship or equivalent
5	crafts-master (Meister), technician-degree, technical tertiary degree (FH) or equivalent
6	university degree

Immigrants were assigned the closest German equivalent.

## B FULL LPM REGRESSION TABLES

The main article displays our results as coefficient plots to ease interpretation. Here we show the full regression tables underlying those plots. Table B.1 shows results underlying Figure 1, and Table B.2 shows the results displayed in Figure 2.

**Table B.1 Linear probability models of being undereducated**

	United Kingdom		Germany	
Cognitive ability	2.76***	(8.19)	0.99 <sup>+</sup>	(1.90)
Conscientiousness	-0.51	(-1.53)	-0.88 <sup>+</sup>	(-1.91)
Neuroticism	0.030	(0.09)	-0.48	(-1.16)
Agreeableness	0.076	(0.24)	0.56	(1.30)
Extraversion	-0.035	(-0.12)	-0.34	(-0.76)
Openness	1.00**	(3.18)	1.10 <sup>+</sup>	(2.47)
Risk tolerance	0.21	(0.70)	-0.54	(-1.36)
Internal locus of control	0.91**	(3.05)	0.67 <sup>+</sup>	(1.67)
Parents' average ISEI	1.51***	(5.58)	2.45***	(5.50)
<i>Controls</i>				
Years of Schooling	-20.3***	(-55.60)	-16.6***	(-39.76)
Years of schooling <sup>2</sup>	12.3***	(66.15)	10.4***	(37.75)
Age	0.92**	(3.28)	-0.0039	(-0.01)
Age <sup>2</sup>	-0.37	(-1.39)	-0.34	(-1.05)
<i>Ref. Male</i>	0	(.)	0	(.)
Female	4.66***	(8.30)	-0.072	(-0.09)
<i>Ref. West</i>			0	(.)
East			0.48	(0.59)
<i>Ref. UK</i>	0	(.)		
London	4.95***	(5.00)		
<i>Ref. Native</i>	0	(.)	0	(.)
Immigrant	-1.69 <sup>+</sup>	(-1.81)	-2.58 <sup>+</sup>	(-1.99)
2. generation	0.45	(0.58)	1.08	(0.69)
Mental health	0.19	(0.59)	-0.55	(-1.36)
Physical health	0.74**	(2.65)	0.56	(1.47)
<i>Ref. Interview 2007</i>			0	(.)
<i>Ref. Interview 2012</i>	0	(.)		
Interview 2013	-0.19	(-0.36)	1.62 <sup>+</sup>	(1.65)
Interview 2014	-1.47	(-1.15)		
<i>Constant</i>	0.84	(1.46)	-0.14	(-0.12)
<i>N</i>	10964		12348	
<i>Imputations</i>	100		100	

Realized matches results. All continuous predictors standardized. Robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.

**Table B.2 Linear probability models of entering undereducation**

	w/o controls for prior attainment				w/ controls for prior attainment			
	UK		Germany		UK		Germany	
	Entry	Prom.	Entry	Prom.	Entry	Prom.	Entry	Prom.
Cognitive ability	0.86 (1.59)	0.25*** (3.93)	0.73 (1.29)	0.16 (1.31)	0.57 (1.06)	0.18** (2.85)	0.53 (0.97)	0.053 (0.43)
Compliance enhancing traits	0.13 (0.26)	-0.069 (-1.02)	-0.73 (-1.34)	-0.074 (-0.74)	0.12 (0.24)	-0.070 (-1.03)	-0.66 (-1.25)	-0.026 (-0.27)
Entrepreneurialism	0.40 (0.79)	0.22** (3.25)	0.67 (1.03)	0.23* (2.36)	0.48 (0.94)	0.20** (2.95)	0.47 (0.79)	0.11 (1.18)
Parents' av. ISEI	0.72 (1.55)	0.067 (1.25)	2.43*** (4.06)	0.49*** (4.90)	0.46 (0.98)	0.029 (0.53)	1.87** (3.08)	0.35*** (3.58)
<i>Controls</i>								
Y. of schooling	-13.9*** (-21.99)	-1.48*** (-9.80)	-14.1*** (-24.99)	-3.26*** (-12.87)	-15.2*** (-23.43)	-1.78*** (-10.07)	-16.0*** (-24.93)	-4.22*** (-14.76)
Y. of schooling <sup>2</sup>	11.2*** (26.29)	0.81*** (6.36)	10.2*** (26.47)	2.24*** (9.15)	11.2*** (26.79)	0.87*** (6.75)	9.55*** (23.09)	2.24*** (8.92)
Age	-0.45 (-0.98)	-0.16* (-2.48)	-0.57 (-1.04)	-0.26* (-2.40)	-0.80+ (-1.77)	-0.17* (-2.50)	-0.53 (-1.02)	-0.23* (-2.08)
Age <sup>2</sup>	-0.20 (-0.47)	0.093 (1.37)	0.36 (0.86)	0.047 (0.61)	-0.24 (-0.56)	0.12* (1.66)	0.30 (0.78)	0.028 (0.37)
Ref. Male	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
Female	2.94*** (3.37)	0.24* (2.17)	0.59 (0.65)	0.059 (0.34)	2.13* (2.25)	0.078 (0.63)	-0.43 (-0.43)	-0.17 (-0.80)
Ref. West			0 (.)	0 (.)			0 (.)	0 (.)
East			2.26* (2.20)	0.26 (1.56)			3.18** (3.19)	0.75*** (4.19)
Ref. UK	0 (.)	0 (.)			0 (.)	0 (.)		
London	1.67 (1.23)	0.16 (1.23)			1.67 (1.22)	0.088 (0.67)		
Ref. Native	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
Immigrant	0.64 (0.50)	-0.17 (-1.13)	2.21 (1.12)	-0.36 (-1.14)	1.55 (1.24)	-0.024 (-0.16)	4.91* (2.57)	0.40 (1.19)
2. generation	1.07 (0.90)	-0.13 (-1.10)	-1.02 (-0.73)	-0.25 (-0.75)	0.47 (0.40)	-0.15 (-1.28)	-0.66 (-0.50)	-0.23 (-0.72)
Mental health	0.40 (1.08)	-0.017 (-0.35)	0.49 (1.20)	-0.016 (-0.21)	0.46 (1.26)	-0.010 (-0.21)	0.35 (0.85)	-0.034 (-0.46)
Physical health	0.68 (1.62)	0.10+ (1.77)	0.48 (1.04)	0.12* (1.67)	0.50 (1.19)	0.075 (1.36)	0.41 (0.93)	0.042 (0.57)
Tenure		-0.0025 (-0.25)		0.016 (1.56)		-0.0045 (-0.46)		-0.0017 (-0.16)
Overtime l. year		-0.80 (-1.48)		1.62 (1.62)		-0.69 (-1.62)		0.49 (0.50)
Part-time last year		-0.036 (-0.22)		-0.29 (-1.28)		0.054 (0.35)		-0.022 (-0.09)
Last wages						-0.000014 (-0.46)		0.0000040 (0.09)
Constant	-0.33 (-0.21)	0.11 (0.52)	-0.71 (-0.36)	0.75+ (1.87)	1.29 (0.57)	8.49* (2.39)	-3.58 (-0.81)	5.12*** (3.92)
Year of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of spell	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Transition origin	Yes	No	Yes	No	Yes	No	Yes	No
Last occ. pos. FE	No	No	No	No	Yes	Yes	Yes	Yes
Last industry FE	No	No	No	No	Yes	Yes	Yes	Yes
Size of l. empl. FE	No	No	No	No	No	Yes	No	Yes
N	3698	27594	7161	53304	3698	27594	7161	53304
N <sub>cluster</sub>	3191	10256	4926	13904	3191	10256	4926	13904
Imputations	100	100	100	100	100	100	100	100

Realized matches results. All continuous predictors standardized. Cluster-robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.

## C GENERALIZED LINEAR MODELS

To facilitate between-country comparisons, we rely on linear probability models (LPM) in the main text. This section demonstrates that the substantive conclusions are identical, when we estimate generalized linear models (GLM) for binary outcomes instead. Table C.1 replicates the main analyses using a logit link function for the cross-sectional and entry-into-undereducation models, and a complementary log-log link function for the promotion models. While the logit is widely applied in the social sciences, the complementary log-log link is somewhat less common. It is given by  $\eta_i = \log(-\log(1 - \pi_i))$ . The complementary log-log transformation is similar to the logit-transformation in that it maps the probability  $\pi$  to observe a positive outcome from a  $[0, 1]$  interval onto  $\eta$ , a random variable defined over the interval  $[-\infty, +\infty]$ , which can be conveniently modelled. However, unlike the logit, the complementary log-log link is not symmetric around  $\pi = 0.5$  and it approaches zero slower than the logit transformation. Hence it is especially useful when predicting outcomes that are rare. For this reason, the complementary log-log is often used in discrete-time survival analysis. Another important property of the complementary log-log model in this context is that its coefficients have a direct interpretation in terms of effects on the hazard ratio, which makes it the discrete time equivalent of the continuous time Cox model. Since our promotion models are in effect survival models, we opted for the complementary log-log as the appropriate link function.

Table C.1 shows patterns that are very similar to those reported in the main article. Of course, effect sizes are not directly comparable between the LPM and GLM specifications. If we concentrate on the pattern of t-values, however, we find little substantive differences between Table C.1 and those reported in Appendix B, save for the fact that estimates in the GLM tend to be substantially more precisely estimated (as indicated by their t-ratios).



**Table C.1 Generalized linear models of being in and entering undereducation**

	United Kingdom			Germany		
	Overall	Entry	Promotion	Overall	Entry	Promotion
Cognitive ability	0.35*** (7.18)	0.13 (1.47)	0.33** (3.27)	0.034*** (4.63)	0.18 (1.33)	0.14 (1.49)
Conscientiousness	-0.091+ (-1.67)			-0.020** (-2.80)		
Neuroticism	-0.013 (-0.25)			-0.015* (-2.20)		
Agreeableness	-0.00039 (-0.01)			0.00018 (0.03)		
Extraversion	-0.047 (-0.87)			-0.0022 (-0.34)		
Openness	0.17** (3.19)			0.026*** (3.75)		
Risk tolerance	0.044 (0.86)			-0.0075 (-1.23)		
Internal locus of control	0.18** (3.19)			0.020** (3.29)		
Compliance enhancing traits		0.0074 (0.07)	-0.15 (-1.30)		-0.17 (-1.31)	-0.023 (-0.32)
Entrepreneurialism		0.099 (0.83)	0.37** (3.04)		0.20 (1.28)	0.17* (2.31)
Parents' average ISEI	0.30*** (5.56)	0.20 (1.54)	0.16 (1.46)	0.047*** (7.56)	0.57*** (4.22)	0.42*** (5.82)
<i>Constant</i>	-4.50*** (-33.05)	-4.98*** (-10.78)	-6.47*** (-15.00)	0.10*** (6.26)	-3.80*** (-9.01)	-4.70*** (-21.72)
<i>N</i>	10964	3697	27356	12348	7117	49060
<i>N<sub>cluster</sub></i>		3191	10233		4926	13841
<i>Imputations</i>	100	100	100	100	100	100

Realized matches results. All continuous predictors standardized. (Cluster-)robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.

Controls as in Table B.1 and Table B.2 respectively. No controls for prior attainment.

## D SELF-ASSESSED UNDEREDUCATION

The most contentious methodological issue in mismatch-scholarship is the measurement of mismatches. It is well known that different strategies to measure mismatches, most prominently the realized-matches approach and the self-assessment approach, produce relatively low agreement on who should be regarded as undereducated (Leuven and Oosterbeek 2011; Verhaest and Omey 2011).

Fortunately, we are able to test the robustness of our core findings against a second indicator of undereducation that is based on the self-assessment approach in Germany. Here respondents assess the qualification requirements of their current job themselves, after being prompted by the question “What type of education or training is usually required for this type of work?”, with the four answers ranging from “None” to “a tertiary degree”. We define respondents as undereducated if their actual formal education falls short against their own assessment of requirements. This approach has the advantage that it does not rely on years of education as a metric variable. Another advantage is that it captures actual mismatch-situations which are perceived by workers themselves. In contrast to the realized-matches approach, self-assessment also does not rely on the assumption that education requirements have to be constant within occupations as defined by ISCO-codes. Yet, this approach has the disadvantage that it cannot distinguish typical from untypical and thus substantial undereducation. What is more, by relying on just four qualification levels, it identifies undereducation in relatively coarse terms. And of course, workers’ self-assessment can be wrong or outdated.

Table D.1 shows results based on this alternative indicator of undereducation. Model 1 replicates the results for Germany displayed in Figure 1 of the main article. Model 2 and Model 3 replicate the career trajectories into undereducation results displayed in Figure 2. Across the three models, we see that the overall pattern of results remains largely similar to the realized-matches approach. Yet, a clear divergence from the results reported in the main article is the null-result for cognitive ability and entrepreneurial traits in Model 1. Parental SES is a systematic predictor of undereducation and external entries into self-rated undereducation. Like in the main article, there are no benefits to compliance increasing traits (i.e., conscientiousness, agreeableness, and neuroticism), and entrepreneurial traits predict promotions into undereducation.

**Table D.1 Linear probability models of being in and entering self-assessed undereducation**

	(1) Overall		(2) Entry		(3) Promotion	
Cognitive ability	-0.090	(-0.12)	-0.16	(-0.21)	-0.14	(-0.98)
Conscientiousness	-1.50 <sup>†</sup>	(-2.27)				
Neuroticism	-0.74	(-1.29)				
Agreeableness	0.19	(0.32)				
Extraversion	0.57	(1.07)				
Openness	0.71	(1.27)				
Risk tolerance	-0.55	(-1.02)				
Internal locus of control	0.14	(0.28)				
Compliance enhancing traits			-0.14	(-0.25)	-0.079	(-0.67)
Entrepreneurialism			0.33	(0.51)	0.23 <sup>*</sup>	(2.18)
Parents' average ISEI	3.88 <sup>***</sup>	(4.95)	1.64 <sup>*</sup>	(2.28)	0.24	(1.62)
<i>Controls</i>						
Years of Schooling	1.92	(1.16)	0.83	(0.43)	2.28 <sup>***</sup>	(5.63)
Years of schooling <sup>2</sup>	4.71 <sup>***</sup>	(5.47)	2.94 <sup>***</sup>	(3.38)	1.99 <sup>***</sup>	(5.75)
Age	0.020	(0.04)	-1.49 <sup>†</sup>	(-2.40)	-0.29 <sup>†</sup>	(-2.35)
Age <sup>2</sup>	-0.11	(-0.29)	0.18	(0.42)	0.15	(1.44)
<i>Ref. Male</i>	0	(.)	0	(.)	0	(.)
Female	-5.66 <sup>***</sup>	(-5.48)	-1.55	(-1.50)	-0.70 <sup>**</sup>	(-3.22)
<i>Ref. West</i>	0	(.)	0	(.)	0	(.)
East	-1.67	(-1.45)	1.41	(1.05)	-0.21	(-1.01)
<i>Ref. Native</i>	0	(.)	0	(.)	0	(.)
Immigrant	-3.75 <sup>†</sup>	(-2.11)	0.34	(0.17)	-0.73 <sup>†</sup>	(-1.96)
2. generation	-1.30	(-0.80)	-2.21	(-1.60)	-0.35	(-1.10)
Mental health	-0.40	(-0.76)	0.53	(1.10)	-0.096	(-0.98)
Physical health	1.44 <sup>**</sup>	(3.08)	0.070	(0.16)	0.15 <sup>+</sup>	(1.85)
Tenure					0.024 <sup>†</sup>	(2.47)
Share overtime last year					3.77 <sup>**</sup>	(2.85)
Part-time last year					-0.13	(-0.58)
Last wages						
<i>Constant</i>	11.9 <sup>***</sup>	(8.47)	5.57 <sup>*</sup>	(2.34)	2.99 <sup>***</sup>	(6.51)
Year of interview	Yes		Yes		Yes	
Number of spell	No		Yes		Yes	
Transition origin	No		Yes		No	
<i>N</i>	8995		5630		35400	
<i>N<sub>cluster</sub></i>			3855		9441	
<i>Imputations</i>	100		100		100	

Self-assessed undereducation results. All continuous predictors standardized. Cluster-robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P<0.05; +P<0.10.

## E METRIC DEPTH OF UNDEREDUCATION AND ALTERNATIVE DEFINITIONS

The information on which the realized matches indicator in the main text is based is metric in nature: The deviation from the occupation mean years of education expressed in occupation-specific standard deviations. As Equation 1 in the main text shows, we dichotomize this information in order to generate consistency with prior research, and to give a clear interpretation to the concept of *transitions* into undereducation. However, the choice of one standard deviation as the cut-off is largely conventional, and disposes of valuable information in the dependent variable. In this section, we therefore replicate the analyses in the main text using the original metric depth of undereducation and alternative cut-off values for dichotomisation.

To generate a metric indicator of the depth of undereducation, we code workers, who have more education than the mean in their occupation with a zero and assign all others the deviation from their occupation mean years of education in units of occupation-specific standard deviations. In the cross-sectional models, we simply model the expected metric undereducation as a function of our covariates using ordinary least squares. For the promotion models, we regress the annual *change* in metric undereducation on our variables of interest. These models tell us about likely undereducation trajectories of people with different characteristics.

We cannot provide a metric specification of our entry-into-undereducation models, because the *transition* into undereducation after job-change or labour market entry is not well defined as a metric variable. For these models to be meaningful, it is important to control undereducation in the last job, which is however not defined for labour market entrants. Other than in the dichotomous case, finally, simply excluding those job-changers, who have been undereducated before, is impossible given the lack of a clear criterion.

We further provide results for two alternative cut-off rules to define somebody as undereducated in the dichotomous case in Table E.2. The first of these is based on simply using *half* a standard deviation around the occupation mean to define education-matched employees. This specification addresses the possible issue that undereducation might be too rare to be picked up efficiently by our models, by somewhat balancing the distribution of the dichotomous outcome variable. However, this comes at the expense of a less strict definition of undereducation. The second rule is based on the median and on the inter-quartile range (IQR) instead of mean and standard deviation, respectively. Here we define employees as undereducated if they have less than their occupation-median minus half an IQR of education.

Tables E.1 and E.2 demonstrate that the results of the alternative specifications are largely in line with the specification presented in the main article. It is also apparent, however, that the metric formulation tends to have more statistical power, as standard errors are consistently smaller and t-values

larger. Especially in Germany, we find that relationships that bordered the level of statistical significance in the dichotomous specification are often clearly significant in the metric specification. This demonstrates that a lack of statistical significance in any one model should not be prematurely dismissed as indicating a lack of association.

**Table E.1 Linear models of (changes in) metric undereducation**

	United Kingdom		Germany	
	Overall	Promotion	Overall	Promotion
Cognitive ability	0.060*** (13.00)	0.0030** (3.21)	0.034*** (4.63)	-0.0019 (-0.77)
Conscientiousness	-0.010* (-2.27)		-0.020** (-2.80)	
Neuroticism	0.0059 (1.25)		-0.015* (-2.20)	
Agreeableness	0.0047 (1.04)		0.00018 (0.03)	
Extraversion	0.0028 (0.68)		-0.0022 (-0.34)	
Openness	0.025*** (5.46)		0.026*** (3.75)	
Risk tolerance	0.0036 (0.87)		-0.0075 (-1.23)	
Internal locus of control	0.019*** (4.39)		0.020** (3.29)	
Compliance enhancing traits		-0.0013 (-1.47)		-0.000088 (-0.05)
Entrepreneurialism		0.00097 (1.18)		-0.00029 (-0.18)
Parents' average ISEI	0.034*** (8.32)	0.0010 (1.34)	0.047*** (7.56)	0.0041* (2.56)
<i>Constant</i>	0.17*** (20.20)	0.0016 (0.54)	0.10*** (6.26)	0.0094 (1.16)
<i>N</i>	10785	26250	12348	58173
<i>N<sub>cluster</sub></i>		9799		14905
<i>Imputations</i>	100	100	100	100

The dependent variable is the (change in the) difference between own education and the occupation mean in occupation-specific standard deviations. All continuous predictors standardized. (Cluster-)robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.

Controls as in Table B.1 and Table B.2 respectively. No controls for prior attainment.

**Table E.2 Linear probability models of being in and entering undereducation**

	United Kingdom						Germany					
	Overall IQR	Overall .5SD	Entry IQR	Entry .5SD	Promotion IQR	Promotion .5SD	Overall IQR	Overall .5SD	Entry IQR	Entry .5SD	Promotion IQR	Promotion .5SD
Cognitive ability	0.028*** (7.93)	0.031*** (7.87)	0.0047 (0.81)	0.024*** (3.67)	0.0020* (2.42)	0.0034*** (3.68)	0.012* (2.24)	0.026*** (3.72)	0.0083 (1.48)	0.012* (1.67)	0.0017 (1.58)	0.0040* (2.14)
Conscientiousness	-0.0031 (-0.91)	-0.0011 (-0.27)					-0.0078 (-1.60)	-0.0095 (-1.50)				
Neuroticism	0.00056 (0.16)	0.0072* (1.83)					-0.0055 (-1.26)	-0.010* (-1.67)				
Agreeableness	-0.00052 (-0.15)	-0.0016 (-0.41)					0.0034 (0.73)	0.00075 (0.13)				
Extraversion	0.00061 (0.19)	0.000028 (0.01)					-0.0030 (-0.66)	0.00058 (0.09)				
Openness	0.011** (3.04)	0.0078* (2.01)					0.014** (2.90)	0.021*** (3.39)				
Risk tolerance	0.0036 (1.10)	0.00053 (0.14)					-0.0061 (-1.41)	-0.0053 (-0.95)				
Internal locus of control	0.0092** (2.88)	0.0091* (2.46)					0.0055 (1.28)	0.016** (2.96)				
Compliance enhancing traits			0.0012 (0.23)	-0.0026 (-0.38)	-0.00041 (-0.50)	0.00025 (0.25)			-0.0050 (-0.91)	-0.0013 (-0.18)	-0.0014 (-1.39)	-0.0022 (-1.25)
Entrepreneurialism			0.0097 (1.62)	0.0024 (0.35)	0.0020* (2.49)	0.00098 (0.97)			0.0081 (1.37)	0.014* (1.85)	0.0029** (3.05)	0.0039* (2.56)
Parents' average ISEI	0.016*** (5.47)	0.018*** (5.12)	0.0081 (1.61)	0.016** (2.68)	0.00029 (0.43)	0.00044 (0.56)	0.022*** (4.82)	0.034*** (5.86)	0.017*** (3.46)	0.026*** (3.47)	0.0039*** (4.05)	0.0071*** (4.68)
Constant	0.025*** (3.87)	0.17*** (21.47)	0.0025 (0.14)	0.14*** (5.79)	0.0026 (1.07)	0.0082* (2.47)	-0.0053 (-0.46)	0.094*** (6.48)	0.0056 (0.30)	0.060* (2.32)	0.0039 (0.97)	0.027*** (4.39)
<i>N</i>	10785	10964	3553	3458	27027	23337	12348	12014	7130	6680	51955	45868
<i>N<sub>cluster</sub></i>			3075	3007	10048	8822			4911	4690	13642	12392
<i>Imputations</i>	100	100	100	100	100	100	100	100	100	100	100	100

Realized matches results. All continuous predictors standardized. (Cluster-)robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P<0.05; +P<0.10. Controls as in Table B.1 and Table B.2 respectively. No controls for prior attainment.

## F PARENTAL EDUCATION AND OCCUPATION

The main article uses average parental ISEI as the best indicator of respondents' SES backgrounds. Here we report results that instead use average years of parental education as well as both average parental ISEI and education as predictors of undereducation. The robustness test is based on the results displayed in Table 2 of the main manuscript. Table F.1 shows the results. Model 1 repeats the results shown in the main article. Model 2 instead uses average parental years of education, based on the coding described in Appendix A, as alternative indicator. Just as parental ISEI, parental education is a strong and significant predictor of undereducation in Germany, but not in the UK. Model 3 finally uses both parental ISEI and education as indicators in the same model. Because both are indicators of parental SES, their simultaneous inclusion reduces their coefficients, but nevertheless both remain strong and systematic predictors of undereducation in Germany. One could therefore even claim that the German results discussed in the main article provide only a lower bound for the overall importance of parental SES, because dimensions not reflected in parental ISEI seem to matter as well. In the UK, by contrast, background effects are exclusively due to parents' occupational standing, but not their education.

**Table F.1 Linear probability model of being undereducated**

	(1) United King- dom	(2) United King- dom	(3) United King- dom	(4) Germany	(5) Germany	(6) Germany
Parents' average ISEI	1.51*** (5.58)		1.58*** (5.23)	2.45*** (5.50)		1.69** (3.29)
Education		0.42 (1.42)	-0.20 (-0.61)		2.49*** (4.76)	1.61** (2.65)
<i>N</i>	10964	10964	10964	12348	12348	12348
<i>Imputations</i>	100	100	100	100	100	100

Realized matches results. All continuous predictors standardized. Robust t-values in parentheses. All other variables as in Table B.1. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.



## G RELATIVE SOCIO-ECONOMIC BACKGROUND

At several points of the main text, we evoke the status maintenance motive as a possible explanation for higher undereducation probabilities of workers from high status backgrounds (Breen and Goldthorpe 1997; Goldthorpe 1996; Keller and Zavalloni 1964). However, our modelling approach considers only an *absolute* measure of social origin, whereas, strictly speaking, higher undereducation-probabilities due to the status maintenance motive should be driven by the *differences* between own attainment and parental status. An absolute measure of social status, on the other hand, can be argued to provide a good proxy for parental *resources*, which may be beneficial to undereducation careers independently of one's own position. Relative and absolute measures of status are of course strongly correlated, and so our models test both mechanisms jointly.

So why do we not estimate models with relative, or relative and absolute measures of status simultaneously? The reason lies in the nature of our dependent variable, which is itself a relative construct, based on two other variables, education and occupation, and the resulting need to control for own educational attainment in all models. If we were to include a relative measure of parental status, say the difference in own years of education from that of parents', the portion of this variable's variance that identifies parents' attainment would be strictly identical to that of the absolute measure, since own attainment is held constant. For the same reason—perfect collinearity—it is impossible to simultaneously include own attainment, parents' attainment, and the difference between the two in the same model. We have thus no analytical leverage to strictly discriminate between differential effects of absolute vs relative parental status.

However, there are two limited and imperfect strategies which might allow us to approximate relative status effects. The first of these exploits the fact that educational attainment is at least partially a positional good, i.e. that its status-generating value depends on its relative scarcity. The status-value of a given qualification-level was different in the 1940s, when few people had attained it, as in the 1980s, when it had become all but universal. However, insofar a given qualification is consistently required to perform certain occupations or attaining it conveys a certain educational content, a given level of qualification might be assumed to give access to specific resources with less changes over time. We exploit this ambiguity by calculating the z-standardised *relative position* of a respondent's parents in the education distribution of other respondents' parents from the same respondent-birth cohort (defined as an 11-year moving window). We pool all observations across survey-years available to us, in order to increase the leverage to detect differences by birth-cohort, which identify our relative measure. This inflates the sample by a factor of about 6 and accounts for the fact that parental education is a significant predictor of undereducation in the results presented below (in contrast to Section F). For this analysis, we use the highest degree of parents on the assumption that this degree, rather than the average of both parents will inform status aspirations. The absolute, here as before in

terms of parents' average years of education, and the relative measures of parental education correlate at  $r = 0.88$  in both countries, highlighting the fact that by far most of their variance is actually shared.

Table G.1 shows the results when we use this cohort-based relative measure of parental status alone and together with the absolute measure to predict undereducation in a pooled model. It emerges that the relative measure is a consistently better predictor than the conventional one, which even loses statistical significance, once we include the other measure.

What can we conclude from this exercise? At the very least, Table G.1 demonstrates that parental education effects are not *all* due to their absolute value, and that there is an aspect of positionality in parental education that plays a role here. However, our approximate set-up does not allow us to judge where this positionality stems from. It might be that parents with a given qualification in the 1950s inspired higher status aspirations in their children, than parents with the nominally same qualification did in the 1980s, due to differential status associated with the qualification. This interpretation would be consistent with the status maintenance motive hypothesis. It might, however, also be that the concrete monetary and occupational returns to a given qualification are partly positional (Bol 2015). This would mean that parental education's positionality also influences the level of *resources* available to parents.

To further discriminate between these two possibilities, we employ a second test. Here, we investigate how the importance of parental background varies with one's own education. If undereducation careers were driven by the motive to maintain parental status, we should witness a stronger effect of parental status at lower levels of education, where the difference to parents is likely to be highest. Figure G.1 shows that this is not the case. Undereducation is dramatically more likely for those with less education, which motivated us to always control for own education in the first place. However, higher parental status only shifts the curve up, it does not change its shape. Hence, there is no evidence that parental status matters any more for less educated workers than for others in explaining access to undereducation.

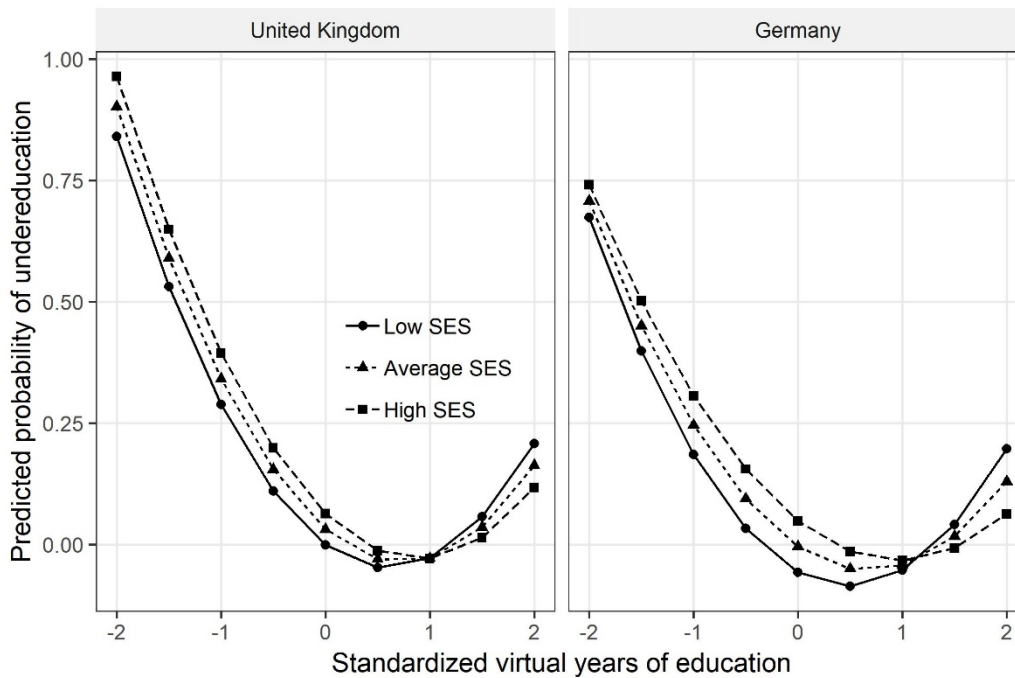
While these two approximate tests certainly cannot provide definite answers, the patterns they demonstrate are hard to square with at least a simple version of the status maintenance motive hypothesis.

**Table G.1 Linear probability model of being undereducated**

	(1) United Kingdom	(2) United Kingdom	(3) United Kingdom	(4) Germany	(5) Germany	(6) Germany
Parents' average education	0.17 (0.32)		1.10*** (4.72)	0.57 (0.74)		2.30*** (6.66)
Relative parental education	1.05+ (1.90)	1.21*** (4.88)		1.89+ (2.32)	2.36*** (6.40)	
Controlled for age effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	65782	65782	65782	76553	76553	76553
<i>N<sub>cluster</sub></i>	16282	16282	16282	17416	17416	17416
<i>Imputations</i>	100	100	100	100	100	100

Realized matches results. All continuous predictors standardized. Cluster-robust t-values in parentheses. Results controlled for education, health, gender, and region. \*\*\*P<0.001; \*\*P<0.01; \*P<0.05; +P<0.10.

**Figure G.1 Predicted probabilities of undereducation by own education and parental SES**



## H CONTROLS FOR FINAL SCHOOL GRADES

Determining mismatches only with regards to *levels of education* overlooks the stratification of graduates *within* levels of education. An obvious example are school leaving grades, which are also observable to employers. From the standpoint of our wider argument, it would be worrying, if undereducation only reflected within-education-group stratification in terms of grades. We are able to address this potential objection with the German SOEP data because it contains information about the school leaving grades of respondents in German and Math, respectively. Results reported in Table H1 show that while good (German) grades do have a positive impact on the likelihood of later undereducation, the coefficients of personality, SES-background and cognitive ability remain virtually unchanged, hence, considering grades does not put into question our conclusions.

**Table H.1 Linear probability models of being in and entering undereducation**

	Overall		Entry		Promotion	
Cognitive ability	0.98 <sup>+</sup>	(1.88)	0.70	(1.24)	0.15	(1.30)
Conscientiousness	-0.99 <sup>*</sup>	(-2.17)				
Neuroticism	-0.43	(-1.03)				
Agreeableness	0.57	(1.34)				
Extraversion	-0.27	(-0.61)				
Openness	1.12 <sup>*</sup>	(2.52)				
Risk tolerance	-0.51	(-1.28)				
Internal locus of control	0.61	(1.55)				
Compliance enhancing traits			-0.78	(-1.42)	-0.081	(-0.82)
Entrepreneurialism			0.63	(0.98)	0.22 <sup>*</sup>	(2.28)
Parents' average ISEI	2.36 <sup>***</sup>	(5.31)	2.38 <sup>***</sup>	(4.00)	0.48 <sup>***</sup>	(4.82)
Final grade German	1.21 <sup>*</sup>	(-2.06)	0.95	(-1.39)	0.22 <sup>+</sup>	(-1.81)
Final grade Math	-0.66	(-1.41)	-0.40	(-0.70)	-0.030	(-0.29)
<i>Constant</i>	5.00 <sup>*</sup>	(2.42)	3.03	(1.06)	1.44 <sup>**</sup>	(2.71)
Year of interview	Yes		Yes		Yes	
Number of spell	No		Yes		Yes	
Transition origin	No		Yes		No	
<i>N</i>	12347		7161		53304	
<i>N<sub>cluster</sub></i>			4926		13904	
<i>Imputations</i>	100		100		100	

Realized matches results. All continuous predictors standardized. (Cluster-)robust t-values in parentheses. Controls as in Table B.1 and Table B.2 respectively. No controls for prior attainment. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.

## I TESTS OF PARENTAL SES MECHANISMS

Figure 3 in the main article presents results of several mediation analyses. Here we present the full regression models underlying these results. We calculated the mediation ratios visualised in Figure 3 of the main article as one minus the ratio of the SES-coefficient in the respective full model to the coefficient of the baseline model. Confidence intervals were constructed from a non-parametric bootstrap procedure. We followed the MI-BS algorithm described in Schomaker and Heumann (2018) and pooled 50 bootstrap replications from each of the 100 imputed datasets. In a next step we determined the 90% and 95% confidence intervals by calculating the 97.5<sup>th</sup>/2.5<sup>th</sup> and 95<sup>th</sup>/5<sup>th</sup> percentile of the resulting distribution of mediation-ratio estimates. This procedure ensures that the non-normal sampling distribution of the ratio of two coefficients is adequately reflected in asymmetric confidence intervals.

**Table I.1 Mediators of social background effects on undereducation, coefficient estimates**

	UK (Non-)cognitive skills				Germany (Non-)cognitive skills					
	Ref.				Ref.				Social capital	
Parents' ISEI	1.97***	(7.26)	1.51***	(5.58)	2.61***	(5.88)	2.45***	(5.50)	2.60***	(5.85)
<i>Ref. Publ. empl. agency</i>									0	(.)
Priv. empl. agency									-2.75	(-0.90)
Job ad									0.17	(0.080)
Friends/family									-1.34	(-0.67)
Former employer									1.67	(0.75)
Other									2.45	(1.22)
<i>Constant</i>	1.81**	(3.15)	0.84	(1.45)	-0.58	(-0.5)	-0.14	(-0.12)	-1.27	(-0.61)
(Non-)cog. skills	No		Yes		No		Yes		No	
<i>N</i>	10967		10967		12349		12349		12349	
<i>Imputations</i>	100		100		100		100		100	

OLS-models of undereducation controlled for region, years of schooling, years of schooling<sup>2</sup>, gender, migration status, year, health, and self-employment. Realized matches results. All continuous predictors standardized. Robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P<0.05; +P<0.10.

**Table I.2 Interactions of social background and potential mediators**

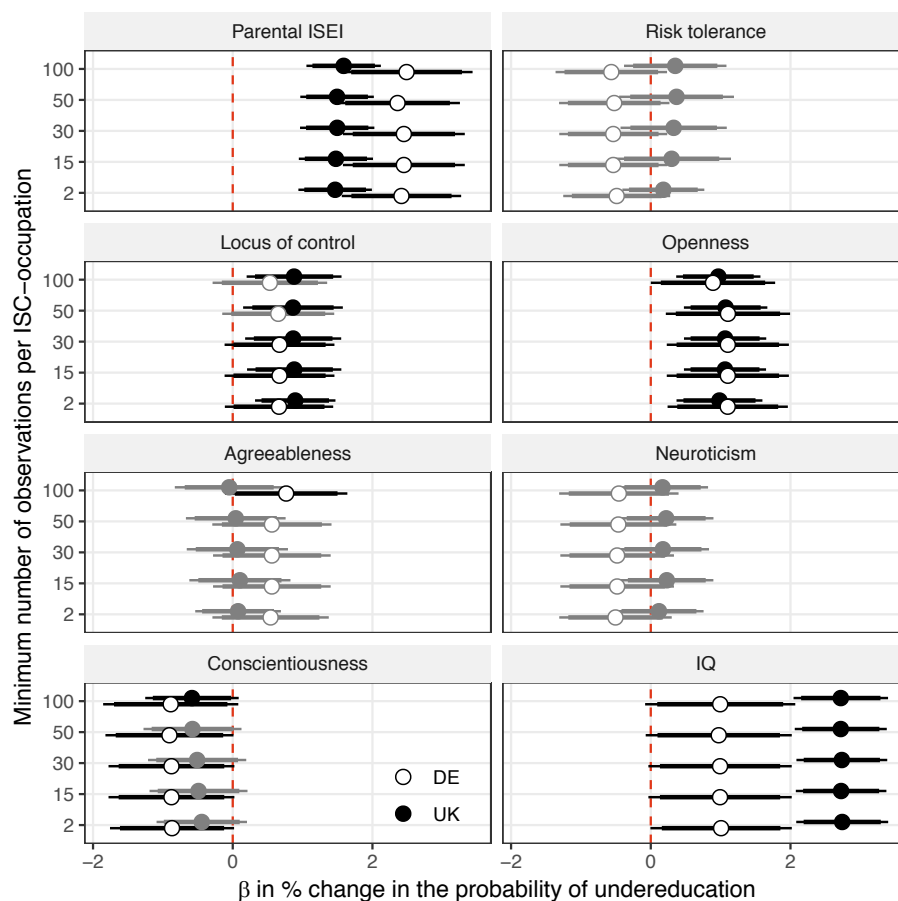
	UK		Germany		Social capital	
	(Non-)cognitive skills	(Non-)cognitive skills	(Non-)cognitive skills	(Non-)cognitive skills		
Parents' average ISEI	1.61***	(5.72)	2.52***	(5.60)	2.55	(1.48)
Conscientiousness	-0.54+	(-1.66)	-0.87+	(-1.87)		
Openness	0.94**	(3.03)	1.05*	(2.33)		
Extraversion	-0.024	(-0.082)	-0.30	(-0.67)		
Neuroticism	0.026	(0.080)	-0.46	(-1.12)		
Agreeableness	0.064	(0.21)	0.54	(1.25)		
Risk tolerance	0.21	(0.71)	-0.52	(-1.32)		
Internal locus of control	0.89**	(2.97)	0.60	(1.48)		
Cognitive ability	2.61***	(7.88)	0.95+	(1.83)		
Conscientiousness x par. ISEI	0.41	(1.29)	0.23	(0.59)		
Openness x par. ISEI	-0.69*	(-2.37)	-0.64	(-1.53)		
Extraversion x par. ISEI	-0.20	(-0.75)	0.75+	(1.80)		
Neuroticism x par. ISEI	-0.070	(-0.25)	0.087	(0.23)		
Agreeableness x par. ISEI	-0.27	(-0.90)	-0.12	(-0.31)		
Risk tolerance x par. ISEI	-0.11	(-0.39)	0.21	(0.55)		
Internal locus of control x par. ISEI	-0.20	(-0.74)	-0.60	(-1.54)		
Cognitive ability x par. ISEI	-0.80**	(-2.72)	-0.52	(-1.28)		
Publ. empl. agency					0	(.)
Priv. empl. agency					-2.90	(-0.96)
Job ad					0.19	(0.092)
Friends/family					-1.21	(-0.59)
Back to former employer					1.83	(0.81)
Other					2.48	(1.22)
Priv. empl. agency x par. ISEI					-1.58	(-0.53)
Job ad x par. ISEI					-0.020	(-0.011)
Friends/family x par. ISEI					0.67	(0.34)
Back to former employer x par. ISEI					1.12	(0.53)
Other x par. ISEI					-0.62	(-0.33)
<i>Constant</i>	1.02+	(1.75)	-0.066	(-0.057)	-1.29	(-0.61)
<i>N</i>	10967		12349		12349	
<i>Imputations</i>	100		100		100	

OLS-models of undereducation controlled for region, years of schooling, years of schooling<sup>2</sup>, gender, migration status, year, health, and self-employment. Realized matches results. All continuous predictors standardized. Robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.

## J SENSITIVITY TO CELL DENSITY

We use a realized matches approach and estimate the required education in an occupation from the data. Thus, there might be concerns that this strategy yields implausible results if the number of observations in a given occupation is small. If there is only one observation per occupation, over- and undereducation are essentially ruled out. In all the analyses presented elsewhere, we require at least 30 unique observations per occupation in the 11-year window to rule out this problem. Here, we probe the sensitivity of our analyses to this choice and compare the coefficients of interest in our simplest cross-sectional model across different values for the minimally required observations per occupation. Reassuringly, Table J.1 demonstrates that the estimated size of coefficients is highly consistent over different choices of the cut-off value.

**Table J.2 Coefficients' sensitivity to occupation-cell density**



Note: LPM estimates with 95 and 90% confidence intervals based on robust standard errors. Estimates that do not reach a marginal level of significance are displayed in grey. Results are controlled for region, years of schooling, years of schooling<sup>2</sup>, gender, migration status, year, and health.

## K ALTERNATIVE SCALES FOR NON-COGNITIVE SKILLS

We report a condensed version of our personality measures in our transition-models in order to ease interpretation. This section contains results for the transition models using the full inventory of personality dimension and explains how the condensed scales were constructed.

To arrive at a two-factor model of undereducation-related non-cognitive skill, we postulated two latent traits, *entrepreneurialism* and *compliance*, and investigated whether they mapped onto the personality-items at our disposal. For the two surveys, we used the entire sample between the ages of 20 and 60 in the survey-year during which the last set of personality items were collected to carry out the confirmatory factor analysis (CFA). While we acknowledge that mapping items that were *designed* to capture independent dimensions of personality on a two-factor structure may be questionable from a psychometric point of view, our results show that the two-factor model in fact represents covariance-patterns in the data satisfactorily. In any case, our purpose in this exercise is much less *realistic* than *heuristic*, to facilitate presentation, and full results using the detailed scales are below.

We proceed in a stepwise fashion, starting with the full set of items that entered our measures of non-cognitive skills, and drop items that appeared to be insufficiently related to the postulated latent traits. We found that the neuroticism and extraversion-items were largely unrelated to the compliance-dimension. Our final model thus uses the FFM items for openness, the internal locus of control item, and the question on risk tolerance to infer entrepreneurialism, and conscientiousness and agreeableness to infer compliance. We imposed no restriction on the correlation between the two factors, but the variance of both latent traits is set to one. The model was estimated using a maximum-likelihood procedure using the SEM command in Stata 15.1, excluding missing values (which were later imputed along with other missing data). As Table K.1 shows, the final model has a reasonable fit to the data. The Table also shows that the relationship between measured and latent variables is very similar in the two countries, and that entrepreneurialism tends to be dominated by the openness-items. In both countries there is a significant negative correlation between the two latent traits.



**Table K.1 Regression coefficients and indices of fit in the CFA model**

	Item	UK		Germany	
		Coefficient	Std. Error	Coefficient	Std. Error
Entrepreneurialism	Locus of Control	0.13	0.013	0.26	0.015
	Risk	0.78	0.024	0.55	0.023
	Openness 1	1.07	0.014	0.96	0.015
	Openness 2	0.89	0.016	0.84	0.018
	Openness 3	1.08	0.014	0.87	0.015
Compliance	Agreeableness 1	0.40	0.013	0.63	0.008
	Agreeableness 2	-0.67	0.014	-0.72	0.014
	Agreeableness 3	0.85	0.012	0.72	0.009
	Conscientiousness 1	-0.70	0.015	-0.4	0.017
	Conscientiousness 2	0.44	0.015	0.42	0.013
	Conscientiousness 3	-0.82	0.012	-0.54	0.010
<i>Cor(Entrepren, Compli)</i>		-0.41	0.010	-0.36	0.011
<i>N</i>		14088		13586	
<i>RMSEA</i>		0.083		0.093	
<i>CFI</i>		0.816		0.761	
<i>TLI</i>		0.765		0.694	
<i>SRMR</i>		0.061		0.072	

All coefficients are significant at  $P < 0.001$ . RMSEA= Root mean squared error of approximation; CFI=Comparative fit index; TLI=Tucker-Lewis index; SRMR= Standardized root mean squared residual

**Table K.2 Linear probability model of being undereducated using alternative scales**

	United Kingdom		Germany	
Cognitive ability	2.85***	(8.54)	1.04*	(2.02)
Compliance enhancing traits	-0.17	(-0.50)	-0.57	(-1.25)
Entrepreneurialism	0.84*	(2.50)	1.01*	(2.21)
Parents' average ISEI	1.55***	(5.79)	2.51***	(5.76)
<i>Controls</i>				
Years of Schooling	-20.2***	(-56.11)	-16.5***	(-40.35)
Years of schooling^2	12.3***	(67.12)	10.4***	(38.25)
Age	0.84**	(3.04)	0.21	(0.52)
Age^2	-0.31	(-1.16)	-0.24	(-0.74)
Ref. Male	0	(.)	0	(.)
Female	4.51***	(8.29)	0.30	(0.42)
Ref. West			0	(.)
East			0.70	(0.89)
Ref. UK	0	(.)		
London	5.12***	(5.31)		
Ref. Native	0	(.)	0	(.)
Immigrant	-1.69+	(-1.86)	-2.78*	(-2.20)
2. generation	0.74	(0.93)	1.48	(0.96)
Mental health	0.21	(0.75)	-0.33	(-0.91)
Physical health	0.79**	(2.87)	0.61	(1.64)
Ref. Interview 2007			0	(.)
Ref. Interview 2012	0	(.)		
Interview 2013	-0.18	(-0.34)	1.52	(1.57)
Interview 2014	-1.41	(-1.14)		
Constant	0.79	(1.38)	-0.41	(-0.37)
N	11125		12660	
Imputations	100		100	

Realized matches results. All continuous predictors standardized. Robust t-values in parentheses. \*\*\*P<0.001; \*\*P<0.01; \*P <0.05; +P<0.10.

**Table K.3 Linear probability models of entering undereducation using alternative scales**

	UK		Germany	
	Entry	Prom.	Entry	Prom.
Cognitive ability	0.86	0.23***	0.71	0.15
	(1.58)	(3.70)	(1.25)	(1.25)
Conscientiousness	-0.78+	0.057	-0.36	-0.17*
	(-1.66)	(0.92)	(-0.73)	(-1.73)
Neuroticism	0.78	0.055	0.12	-0.12
	(1.60)	(0.77)	(0.23)	(-1.35)
Agreeableness	0.43	-0.12+	-0.68	0.13
	(0.96)	(-1.88)	(-1.30)	(1.56)
Extraversion	0.47	-0.022	-0.19	0.093
	(1.03)	(-0.38)	(-0.41)	(1.08)
Openness	0.72	0.19**	0.51	0.21*
	(1.56)	(3.18)	(0.94)	(2.21)
Risk tolerance	0.52	0.085	0.50	-0.085
	(1.09)	(1.27)	(1.09)	(-1.06)
Internal locus of control	0.23	0.064	0.70+	0.20*
	(0.51)	(1.09)	(1.67)	(2.38)
Parents' average ISEI	0.67	0.063	2.41***	0.47***
	(1.43)	(1.16)	(4.00)	(4.69)
Constant	-0.17	0.11	-0.74	0.77+
	(-0.11)	(0.52)	(-0.38)	(1.94)
Year of interview	Yes	Yes	Yes	Yes
Number of spell	Yes	Yes	Yes	Yes
Transition origin	Yes	No	Yes	No
N	3698	27594	7161	53303
N <sub>cluster</sub>	3191	10256	4926	13904
Imputations	100	100	100	100

Realized matches results w/o controls for prior attainment. Other controls as in Table B.2. Cluster-robust t-values in parentheses. All continuous predictors standardized.

## Bibliography

- Bol, T.** 2015 'Has education become more positional? Educational expansion and labour market outcomes, 1985-2007', *Acta Sociologica* 58(2): p.105–120.
- Breen, R. and Goldthorpe, J.H.** 1997 'Explaining Educational Differentials Towards a Formal Rational Action Theory', *Rationality and Society* 9(3): p.275–305.
- DoE** 2018 'The national curriculum', *GOV.UK*. Available at: <https://www.gov.uk/national-curriculum> [Accessed September 22, 2018].
- DoE** 2013 *The national curriculum in England*, Department for Education.
- Goldthorpe, J.H.** 1996 'Class Analysis and the Reorientation of Class Theory: The Case of Persisting Differentials in Educational Attainment', *The British Journal of Sociology* 47(3): p.481–505.
- Jones, K.** 2016 *Education in Britain: 1944 to the Present*, Wiley.
- Keller, S. and Zavalloni, M.** 1964 'Ambition and Social Class: A Respecification', *Social Forces* 43(1): p.58–70.
- KMK** 2017a *Basic Structure of the Education System in the Federal Republic of Germany*, Berlin: Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany. Available at: [https://www.kmk.org/fileadmin/Dateien/pdf/Dokumentation/en\\_2017.pdf](https://www.kmk.org/fileadmin/Dateien/pdf/Dokumentation/en_2017.pdf) [Accessed September 22, 2018].
- KMK** 2017b *The Education System in the Federal Republic of Germany 2015/2016*, Bonn: Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany. Available at: [https://www.kmk.org/fileadmin/Dateien/pdf/Eurydice/Bildungswesen-engl-pdfs/dossier\\_en\\_ebook.pdf](https://www.kmk.org/fileadmin/Dateien/pdf/Eurydice/Bildungswesen-engl-pdfs/dossier_en_ebook.pdf) [Accessed September 22, 2018].
- Leuven, E. and Oosterbeek, H.** 2011 'Overeducation and Mismatch in the Labor Market' in E. A. Hanushek, S. Machin, and L. Woessmann (eds) *Handbook of the Economics of Education*, Elsevier.
- Ofqual** 2009 *Explaining Qualifications*, Office of the Qualifications and Examinations Regulator. Available at: <http://webarchive.nationalarchives.gov.uk/+http://www.ofqual.gov.uk/2368.aspx> [Accessed September 22, 2018].
- Schneider, S.L.** 2010 'Nominal comparability is not enough: (In-)equivalence of construct validity of cross-national measures of educational attainment in the European Social Survey', *Research in Social Stratification and Mobility* 28(3): p.343–357.
- Schneider, S.L.** 2008 'The application of the ISCED-97 to the UK's educational qualifications' in *The International Standard Classification of Education (ISCED-97). An evaluation of content and criterion validity for 15 European Countries*, Mannheim: MZES. Available at: [http://www.mzes.uni-mannheim.de/publications/misc/isced\\_97/schn08e\\_the\\_application\\_of\\_the\\_isced-97\\_to\\_the\\_uks\\_educat.pdf](http://www.mzes.uni-mannheim.de/publications/misc/isced_97/schn08e_the_application_of_the_isced-97_to_the_uks_educat.pdf) [Accessed September 20, 2016].
- Schomaker, M. and Heumann, C.** 2018 'Bootstrap inference when using multiple imputation', *Statistics in Medicine* 37(14): p.2252–2266.
- Verhaest, D. and Omey, E.** 2011 'Overeducation, Undereducation and Earnings: Further Evidence on the Importance of Ability and Measurement Error Bias', *Journal of Labor Research* 33(1): p.76–90.