sociological science

Supplement to:

Paterson, Lindsay. 2021. "Filial Intelligence and Family Social Class, 1947 to 2012." Sociological Science 8: 325-345.

Online appendix for 'Filial intelligence and family social class, 1947-2012'

Appendix: robustness checks of analytical decisions

(1) Use of Scotland-only data in 1947

The first check relates to the combination of Scottish data in 1947 with data from the whole of Britain in the other years. Table A1 is analogous to Table 2(a) in the main text, but based only on the Scottish data for all the surveys, and re-standardising intelligence on these Scottish sub-samples. (To include the Millennium Cohort survey design in the model, we had to exclude 4 sample members who had migrated from Wales or Northern Ireland to Scotland by the time of the fifth sweep, because their number was too few to allow standard errors to be calculated with respect to their original sample selection. No such problem arose with the larger number of 28 migrants from England to Scotland.) The general pattern is similar to Table 2(a) – a large average effect of class, and a much smaller interactive effect of class with year (for which there is no reliable evidence here ($p = 0.37$) because the sample sizes are much smaller). The pattern of predicted means is also similar: compare Figure A1 (Scotland) with Figure I in the main text. In particular, the decline in the class gap in filial intelligence is still clear, and that decline is still mainly due to a fall in mean intelligence in class I&II.

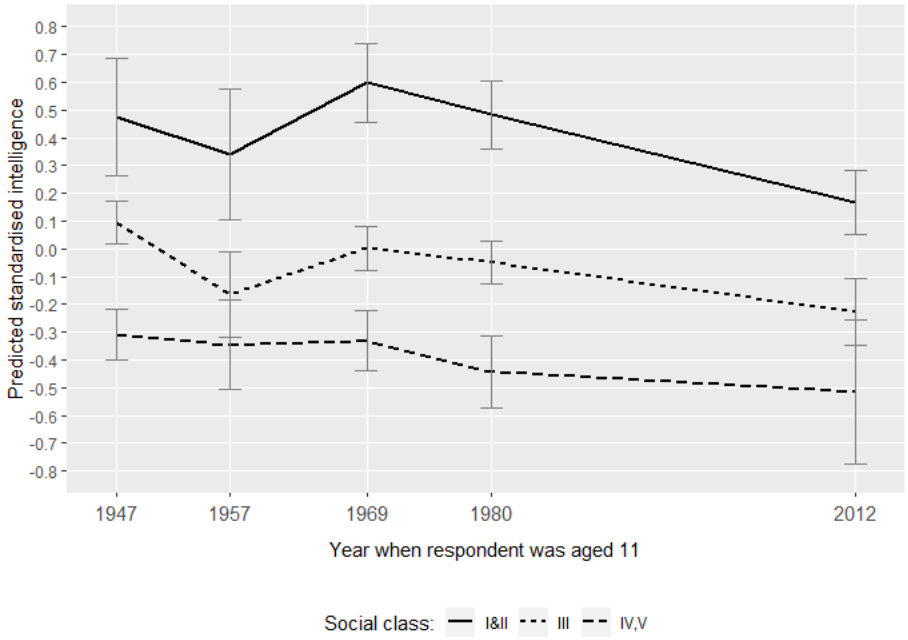
Table A1
Model of standardised intelligence in terms of year and class: Scotland only

Chi-squared tests

Model term (: means interactive term)	Degrees of freedom	Chi-square	p-value
Year	4	37	<0.001
Class	2	334	<0.001
Year:class	8	8.7	0.37
R^2	7.6%		

Intelligence standardised within year: see main text.
Omits cases with missing data on social class.

Figure A1
Predicted mean intelligence, by class and year: Scotland only



Error bars are 95% confidence intervals.
Source: predicted means from model in Table A1.

(2) Choice of intelligence measure

The second decision for checking is the choice of intelligence measures. There are two aspects. The main one is the use in 2012 of the only available sub-scale of the British Ability Scales, the similarities test. We assess the effect of this on the models by restricting the 1980 measure of intelligence to that sub-scale as well. The respective predicted means for 1980 for the three classes were now 0.38, -0.08 and -0.37, compared to 0.45, -0.11 and -0.41 in Table 2(b) in the main text. This slight attenuation is what would be expected if the similarities sub-scale is a somewhat unreliable but not unbiased surrogate for the fuller scale that was used in Table 2(b). The attenuated range of 0.75 (the difference between 0.38 and -0.37) is 13% lower than the unattenuated range of 0.86. If the 2012 means in Table 2(b) are attenuated to a similar extent from what they would have been if we had had available a fuller set of British Ability Scales in that year, then we would expect the gap between classes I&II and IV&V with the full scales to be 0.59 instead of 0.51. That change of 0.08 would be only about one-

quarter of the difference between the 2012 gap in Table 2(b) and the mean class gap for the earlier years. Therefore attenuation through using only the similarities sub-scale in 2012 is probably only a small part of the explanation of the decline in the social-class gap in predicted mean intelligence.

The other aspect of the choice of intelligence measures relates to the other four surveys, and is the question of whether a measure of general intelligence (as we have used) might have a different relationship to class from the relationship with class of more specific types of cognitive ability. To assess this, we compared the correlation with father's class of the measure of general intelligence and other available measures of cognitive ability (for details of which, see the sources cited for the intelligence measures in the main text). For this purpose, class was coded into a numerical scale with 5 points (the 5 classes in Table 1(a) in the main text, with the category 'unclassified' omitted). In the 1947 data, there was one other measure, the Moray House No. 12 test of verbal ability. In the 1957, there were five other measures (ability in reading and in arithmetic, verbal intelligence, non-verbal intelligence, and vocabulary). In the 1969 and 1980 data, there were two other measures (ability in reading and in mathematics). Table A2 shows the correlations with father's class of all these measures. Within each survey, all but one of the correlations are within 10% of the correlation of general intelligence, the exception being verbal intelligence in 1947, which is 15% lower. Thus the relationships of class with general intelligence is quite similar to its relationship with more specific types of cognitive ability.

Table A2
Pearson correlations with father's class of various measures of cognitive ability

Survey	General intelligence*	Verbal intelligence	Non-verbal intelligence	Reading	Vocabulary	Arithmetic/ mathematics
1947	0.259	0.220				
1957	0.321	0.307	0.301	0.321	0.356	0.307
1969	0.304			0.319		0.319
1980	0.317			0.289		0.293

* *As used in the main analysis*

(3) Measurement of social class

The third decision is about how to measure social class. There are again two aspects. One is whether to use both parents to measure family class where information is available on each. This affects the results only for 1980 and 2012. If we base family

class on the higher of mother's and father's occupation in these years, then the class gaps rise slightly. The 1980 gap of 0.86 in Table 2(b) in the main text becomes 0.90. The 2012 gap of 0.51 becomes 0.54. The conclusion which we reached from Table 1(b) and Figure I is unchanged: the class gap in 2012 is less than in previous years, and this is due mainly to a fall in the mean filial intelligence in the class I&II.

Table A3
Model of standardised intelligence in terms of year and Goldthorpe class

(a) Chi-squared tests

Model term (: means interactive term)	Degrees of freedom	Chi-square	p-value
Year	2	136	<0.001
Goldthorpe class	6	2,483	<0.001
Year: Goldthorpe class	12	49	<0.001
R^2	9.0%		

(b) Predicted mean standardised intelligence (standard errors in brackets)

	Year		
Goldthorpe class:	1969	1980	2012
I	0.59 (0.03)	0.57 (0.03)	0.34 (0.04)
II	0.39 (0.02)	0.29 (0.02)	0.08 (0.03)
III	0.22 (0.03)	0.03 (0.02)	-0.10 (0.04)
IV	0.01 (0.05)	-0.06 (0.03)	-0.31 (0.05)
V	-0.03 (0.04)	-0.21 (0.03)	-0.30 (0.09)
VI	-0.17 (0.02)	-0.33 (0.02)	-0.27 (0.07)
VII	-0.40 (0.02)	-0.47 (0.03)	-0.39 (0.07)
Gap (I minus VII)	0.99 (0.04)	1.03 (0.04)	0.73 (0.07)
Gap (II minus VI)	0.55 (0.03)	0.62 (0.03)	0.35 (0.07)

Intelligence standardised within year: see main text.
Omits cases with missing data on social class.

The other way in which we assess the validity of the inferences with respect to class is to use the more sociologically valid Goldthorpe scheme to measure class in 1969, 1980 and 2012. Because these samples are large, we can use all seven of the Goldthorpe classes. The summary results are in Table A3(a). As in Table 2(a) in the main text, we still see a strong effect of class and only a small change of it over the years. The predicted mean values of intelligence are in Table A3(b), and again the inferences are similar to those from the analogous Table 2(b). The gaps between the high and low classes fell between 1980 and 2012. For class I against class VII, the gaps are 0.99, 1.03

and 0.73. For II against VI, they are 0.55, 0.62 and 0.35. As in Table 2(b), this is mainly due to a fall in the mean intelligence in the higher classes. These results suggest that the decline of the gap in Table 2 is not due to a decline in the validity of the Registrar General class scheme used there (for example, because that scheme could be only approximated in 2012).

(4) Choice of Millennium Cohort Study

The final decision is the choice of the Millennium Cohort Study for the latest time point. This is an important feature of the analysis, because the tentative conclusion that social-class inequality of intelligence may have declined rests in large part on that survey. The Millennium Cohort has been conducted to the same high standards as the other surveys, and is managed by the same research centre as the 1969 and 1980 surveys (the Centre for Longitudinal Studies at University College London). We can provide a partial assessment of the validity of its measurement of inequality by comparison with another high-quality survey, the Growing Up in Scotland study (ScotCen, 2018). Its cohort born in 2005 was assessed for intelligence in 2015, using the 'Listening Comprehension' subtest of the Wechsler Individual Achievement Tests. This survey records social class only in the five-class version of the National Statistics Socio-Economic Classification (ONS, 2004: 10). Thus it was not possible to derive an approximation to either the Registrar General or the Goldthorpe schemes, but it was possible to compare this survey with the equivalent measure of inequality in the Scottish part of the Millennium Cohort (continuing to use the standardised measure of intelligence that we have used in the main text). The sample size for this analysis of Growing Up in Scotland at age 10 is 3,063. Defining household class as the higher of father's and mother's class, the means (and standard errors) of the standardised Listening Comprehension scale in the five classes were 0.13 (0.02), -0.08 (0.05), -0.13 (0.07), -0.44 (0.07) and -0.43 (0.04). In the Millennium Cohort at age 11, where the sample size was 1,111 for people in Scotland for whom information on this measure of class was available, the analogous means were 0.30 (0.05), -0.04 (0.09), -0.11 (0.11), -0.37 (0.12) and -0.27 (0.12). The difference of the first and fifth classes were thus in the two surveys respectively 0.56 and 0.57, and of the second and fourth class were 0.36 and 0.33. These calculations suggest that inequality as measured by the two surveys is similar. Indirectly, therefore, the comparison with Growing Up in Scotland tends to confirm the validity of the

Millennium Cohort as a source of evidence about social-class inequality of relative intelligence.