

SUPPLEMENTARY MATERIAL**Supplementary Material, Table 1: Comparison of the early-life characteristics of the G3 study subjects with all births in Sweden between 1973 and 1980.**

Early-life characteristics	Range/categories	Percent in G3 (N=9706)	Percent in all Swedish births (N=786,743) [†]	Percent difference G3s minus total population
Gender	Male	50.7	51.3	-0.6
	Female	49.3	48.7	0.6
Birthweight	<2500g	3.5	4.0	-0.5
	2500-3000g	13.0	11.8	1.2
	3000-3500g	34.2	33.7	0.5
	3500-4000g	33.8	34.6	-0.8
	≥4000g	15.6	16.3	-0.7
Gestational age	Preterm (<37 weeks)	4.5	5.0	-0.5
	Term (37-41weeks)	81.4	82.4	-1.0
	Postterm (≥42 weeks)	14.0	12.7	1.3
Birth multiplicity	Singleton	98.4	98.3	0.1
	Twin/triplet	1.6	1.7	-0.1
Birth order	1	47.2	43.3	3.9
	2-3	49.6	51.6	-2.0
	4-5	3.0	4.6	-1.6
	6 or more	0.2	0.6	-0.4
Mother's age at birth	15-19 years	5.6	6.2	-0.6
	20-24 years	35.0	29.6	5.4
	25-29 years	42.8	37.9	4.9
	30-34 years	14.7	20.0	-5.3
	35-39 years	1.9	5.6	-3.7
	≥40 years	0.1	0.9	-0.8
Mother's marital status	Married	59.4	65.4	-6.0
	Unmarried	39.0	32.8	6.2
	Widowed/divorced	1.6	1.7	-0.1
Family social class^{††}	High/mediate non-manual	38.0	34.4	3.6
	Low non-manual	13.3	12.0	1.3
	Skilled manual	19.1	19.6	-0.5
	Semi/unskilled manual	16.7	19.3	-2.6
	Self-employed	7.2	7.4	-0.2
	Farmer	2.2	2.6	-0.4
	Retired, student, other	3.6	4.6	-1.0

[†]As with the G3 sample, the total population sample excludes all those who died before turning 20 or were adopted. Data on emigration was not available to us for the total population, but as only 0.5% of our G3 sample emigrated this unlikely to affect findings. ^{††}For the total Swedish population we did not have data on the mother's cohabiting partner unless this was the child's father. This would be expected to underestimate family social class, by ignoring non-biological-father partners with a higher social class than the mother. This plausibly contributes to the slightly better social class profile of the G3 population.

Supplementary Material, Table 2: School achievement and education continuation by early-life characteristics in subjects from the Uppsala Birth Cohort (G1s, born 1915-1929) their grandchildren (G3s, born 1973-1980)

		G1s				G3s			
		N†	Schoolmark mean (z-score)	% secondary school	% tertiary education	N†	Schoolmark mean (z-score)	% secondary school	% tertiary education
Total population		12674	0.00	28.2	4.7	9706	0.00	89.5	32.3
Gender	Male	6560	-0.17	32.0	6.6	4924	-0.20	87.9	27.2
	Female	6114	0.18	24.2	2.6	4782	0.21	91.0	37.6
Birthweight	<2500g	551	-0.07	24.7	3.5	333	-0.21	85.3	29.1
	2500-3000g	1806	-0.05	26.7	3.7	1258	-0.09	87.4	30.2
	3000-3500g	4559	0.03	28.2	4.8	3294	-0.01	89.2	31.5
	3500-4000g	4112	0.01	28.8	4.6	3261	0.06	90.6	33.8
	≥4000g	1561	-0.03	29.7	6.2	1502	0.03	90.2	33.0
Gestational age	Preterm	899	-0.10	27.0	4.0	432	-0.11	85.9	31.9
	Term	9862	0.02	29.1	5.0	7838	0.01	89.8	32.4
	Postterm	1480	-0.06	24.6	3.2	1351	-0.01	89.0	32.1
Birth multiplicity	Singleton	12332	0.00	28.3	4.7	9499	0.00	89.5	32.2
	Twin/triplet	342	-0.07	24.9	4.8	156	0.03	89.5	38.6
Birth order	1	4967	0.10	31.5	5.8	4563	0.10	91.2	36.8
	2-3	4663	-0.03	29.1	5.0	4784	-0.07	88.3	28.7
	4-5	1709	-0.10	24.8	3.3	286	-0.41	81.6	20.2
	6 or more	1332	-0.11	17.2	1.0	22	-0.57	77.3	18.2
Mother's age at birth	15-19	717	0.02	20.5	1.2	540	-0.42	81.0	17.3
	20-24	3380	-0.05	25.2	3.1	3398	-0.14	88.6	27.2
	25-29	3557	0.02	30.1	5.6	4158	0.11	91.0	35.7
	30-34	2574	0.04	31.2	5.8	1422	0.18	90.3	39.2
	35-39	1675	-0.02	31.3	6.1	181	0.21	88.8	40.2
	≥ 40 years	763	0.04	22.7	3.5	6	-0.34	83.3	16.7
Mother's marital status	Married	10073	0.03	30.5	5.6	5488	0.12	91.2	37.1
	Unmarried	2470	-0.11	18.9	0.9	3625	-0.16	87.9	25.5
	Widowed/divorced	103	-0.14	24.2	1.1	149	-0.61	69.8	12.8
Family social class	High/mediate non-manual	1065	0.36	62.6	30.1	3619	0.41	94.3	50.1
	Lower non-manual	841	0.02	41.1	7.2	1255	-0.05	90.1	27.9
	Skilled manual	1753	-0.03	27.7	2.5	1790	-0.22	87.9	20.6
	Semi/unskilled manual	5786	-0.10	21.9	1.2	1554	-0.43	83.2	15.4
	Self-employed	389	0.10	40.7	7.1	673	-0.15	89.0	22.3
	Farmers	1780	0.15	22.7	1.3	211	0.12	95.2	33.5
	Housedaughter	679	-0.02	16.8	1.0				
	Retired, student, other					342	-0.37	78.6	22.3

† Missing data means that the number of individuals for some variables is less than the total.

Supplementary Material, Table 3: Further results regarding association between early-life characteristics and school achievement

		G1 characteristics predicting G1 schoolmarks: linear regression, regression coefficients and 95% CI				G3 characteristics predicting G3 schoolmarks: linear regression, regression coefficients and 95% CI			
		Min. adjusted†	Multivariable				Min. adjusted†	Multivariable	
N		12674	12674	12674	12674	9706	9706	9706	9706
Gender	Male	0***	0***	0***	0***	0***	0***	0***	0***
	Female	0.35 (0.30, 0.41)	0.37 (0.31, 0.42)	0.36 (0.30, 0.41)	0.37 (0.32, 0.43)	0.42 (0.38, 0.46)	0.43 (0.40, 0.47)	0.41 (0.37, 0.45)	0.43 (0.39, 0.47)
Birth-weight	<2500g	-0.13 (-0.22, -0.04)	-0.11 (-0.20, -0.01)		-0.13 (-0.23, -0.04)	-0.22 (-0.35, -0.10)	-0.23 (-0.36, -0.09)		-0.22 (-0.34, -0.09)
	2500-3000g	-0.09 (-0.17, -0.01)	-0.08 (-0.16, 0.00)		-0.09 (-0.17, -0.02)	-0.10 (-0.17, -0.04)	-0.10 (-0.17, -0.04)		-0.10 (-0.17, -0.04)
	3000-3500g	0**	0*		0**	0***	0***		0***
	3500-4000g	0.01 (-0.04, 0.05)	0.00 (-0.05, 0.04)		0.02 (-0.03, 0.07)	0.10 (0.05, 0.15)	0.07 (0.03, 0.12)		0.08 (0.04, 0.12)
	≥4000g	0.01 (-0.06, 0.08)	-0.01 (-0.09, 0.06)		0.04 (-0.04, 0.11)	0.11 (0.05, 0.17)	0.09 (0.03, 0.15)		0.12 (0.06, 0.18)
Gesta-tional age	Preterm	-0.10 (-0.17, -0.02)	-0.03 (-0.11, 0.04)		-0.02 (-0.09, 0.05)	-0.09 (-0.20, 0.02)	0.08 (-0.03, 0.20)		0.10 (-0.01, 0.22)
	Term	0**	0		0	0	0*		0*
	Postterm	-0.06 (-0.11, 0.00)	-0.06 (-0.11, 0.00)		-0.05 (-0.10, 0.01)	-0.04 (-0.10, 0.02)	-0.05 (-0.11, 0.00)		-0.06 (-0.12, -0.01)
Multiple births	Singleton	0	0		0	0	0		0
	Twin/triplet	-0.10 (-0.24, 0.05)	-0.05 (-0.19, 0.10)		-0.02 (-0.17, 0.13)	-0.02 (-0.21, 0.17)	0.04 (-0.13, 0.21)		0.12 (-0.04, 0.29)
Birth order	1	0***		0***	0***	0***		0***	0***
	2-3	-0.12 (-0.16, -0.07)		-0.19 (-0.24, -0.14)	-0.20 (-0.25, -0.15)	-0.18 (-0.21, -0.14)		-0.29 (-0.33, -0.25)	-0.30 (-0.34, -0.26)
	4-5	-0.18 (-0.24, -0.12)		-0.30 (-0.37, -0.23)	-0.31 (-0.38, -0.24)	-0.55 (-0.68, -0.41)		-0.64 (-0.76, -0.51)	-0.65 (-0.77, -0.52)
	6 or more	-0.21 (-0.28, -0.14)		-0.37 (-0.46, -0.28)	-0.39 (-0.48, -0.30)	-0.66 (-1.13, -0.20)		-0.72 (-1.17, -0.26)	-0.74 (-1.19, -0.30)
Mother's age at birth	15-19 years	0.04 (-0.04, 0.13)		0.06 (-0.03, 0.15)	0.06 (-0.03, 0.15)	-0.29 (-0.38, -0.20)		-0.20 (-0.29, -0.11)	-0.20 (-0.29, -0.11)
	20-24 years	0*		0**	0**	0***		0***	0***
	25-29 years	0.08 (0.02, 0.13)		0.07 (0.01, 0.13)	0.07 (0.01, 0.13)	0.25 (0.20, 0.30)		0.16 (0.12, 0.21)	0.16 (0.11, 0.21)
	30-34 years	0.09 (0.02, 0.15)		0.11 (0.03, 0.19)	0.11 (0.03, 0.19)	0.32 (0.26, 0.39)		0.25 (0.19, 0.32)	0.25 (0.18, 0.31)
	35-39 years	0.04 (-0.02, 0.10)		0.11 (0.03, 0.18)	0.11 (0.03, 0.18)	0.32 (0.17, 0.47)		0.33 (0.19, 0.47)	0.33 (0.19, 0.48)
	≥40 years	0.07 (-0.02, 0.15)		0.19 (0.09, 0.29)	0.19 (0.09, 0.29)	[too few cases]		[too few cases]	[too few cases]
Mother's marital status	Married	0***		0***	0***	0***		0***	0***
	Unmarried	-0.15 (-0.20, -0.10)		-0.15 (-0.21, -0.08)	-0.14 (-0.21, -0.08)	-0.27 (-0.32, -0.23)		-0.15 (-0.20, -0.11)	-0.15 (-0.19, -0.11)
	Widow/divorced	-0.21 (-0.41, -0.01)		-0.09 (-0.29, 0.12)	-0.09 (-0.29, 0.11)	-0.73 (-0.90, -0.56)		-0.55 (-0.70, -0.39)	-0.54 (-0.70, -0.39)
Family social class	High/mediate NM	0***	0***	0***	0***	0***	0***	0***	0***
	Low MN	-0.34 (-0.47, -0.21)	-0.34 (-0.46, -0.21)	-0.30 (-0.42, -0.17)	-0.30 (-0.42, -0.17)	-0.47 (-0.53, -0.40)	-0.46 (-0.52, -0.39)	-0.39 (-0.46, -0.33)	-0.39 (-0.45, -0.32)
	Skilled M	-0.42 (-0.52, -0.32)	-0.41 (-0.51, -0.32)	-0.37 (-0.47, -0.27)	-0.36 (-0.46, -0.26)	-0.64 (-0.70, -0.58)	-0.63 (-0.69, -0.57)	-0.52 (-0.58, -0.46)	-0.51 (-0.57, -0.45)
	Semi/unskilled M	-0.48 (-0.56, -0.39)	-0.48 (-0.56, -0.39)	-0.40 (-0.49, -0.32)	-0.40 (-0.48, -0.31)	-0.86 (-0.92, -0.79)	-0.84 (-0.91, -0.78)	-0.70 (-0.77, -0.63)	-0.69 (-0.76, -0.62)
	Self-employed	-0.26 (-0.38, -0.13)	-0.25 (-0.38, -0.12)	-0.22 (-0.35, -0.10)	-0.22 (-0.35, -0.09)	-0.57 (-0.65, -0.48)	-0.56 (-0.64, -0.48)	-0.47 (-0.55, -0.39)	-0.46 (-0.54, -0.38)
	Farmers	-0.22 (-0.32, -0.12)	-0.22 (-0.32, -0.12)	-0.15 (-0.25, -0.05)	-0.15 (-0.25, -0.05)	-0.29 (-0.43, -0.16)	-0.30 (-0.43, -0.16)	-0.23 (-0.36, -0.09)	-0.23 (-0.36, -0.10)
	Housedaughter	-0.41 (-0.51, -0.31)	-0.40 (-0.51, -0.30)	-0.33 (-0.45, -0.21)	-0.32 (-0.44, -0.21)	-	-	-	-
	Other	-	-	-	-	-0.81 (-0.95, -0.67)	-0.79 (-0.93, -0.65)	-0.64 (-0.78, -0.51)	-0.63 (-0.77, -0.50)

*p<0.05, **p<0.01, ***p<0.001. †Min. Adjusted = minimally adjusted: variables entered separately, adjusting only for gender and birthyear. NM=non-manual, M=manual.

Results not presented for G3 children of mothers aged 40 or more because of the very small sample size (N=6)

Supplementary Material, Table 4: Early-life characteristics and secondary school attendance among subjects from the Uppsala Birth Cohort (G1s, born 1915-1929) and their grandchildren (G3s, born 1973-1980)

		G1 characteristics predicting G1 secondary school attendance: logistic regression, odds ratios & 95% CI			G3 characteristics predicting G3 secondary school attendance: logistic regression, odds ratios & 95% CI		
		Minimally adjusted†	Multivariable: all early-life characteristics	Multivariable: all early-life characteristics plus schoolmarks	Minimally adjusted†	Multivariable: all early-life characteristics	Multivariable: all early-life characteristics plus schoolmarks
N		12674	12674	12674	9706	9706	9706
Gender	Male	1***	1***	1***	1***	1***	1
	Female	0.68 (0.62, 0.73)	0.67 (0.62, 0.73)	0.60 (0.55, 0.66)	1.40 (1.22, 1.60)	1.43 (1.24, 1.64)	0.86 (0.74, 1.00)
Birth-weight	<2500g	0.87 (0.70, 1.09)	0.90 (0.71, 1.15)	0.93 (0.73, 1.19)	0.69 (0.48, 0.98)	0.76 (0.49, 1.18)	0.95 (0.61, 1.49)
	2500-3000g	0.95 (0.83, 1.09)	0.95 (0.83, 1.10)	0.98 (0.84, 1.13)	0.82 (0.67, 1.01)	0.82 (0.67, 1.01)	0.91 (0.73, 1.15)
	3000-3500g	1	1*	1	1***	1*	1
	3500-4000g	1.00 (0.90, 1.10)	1.05 (0.94, 1.17)	1.04 (0.93, 1.16)	1.21 (1.02, 1.42)	1.16 (0.98, 1.38)	1.07 (0.89, 1.28)
	≥4000g	1.02 (0.89, 1.16)	1.13 (0.98, 1.30)	1.12 (0.97, 1.30)	1.18 (0.96, 1.45)	1.20 (0.97, 1.49)	1.06 (0.83, 1.34)
Gesta-tional age	Preterm	0.89 (0.76, 1.04)	1.02 (0.86, 1.22)	1.03 (0.87, 1.23)	0.71 (0.52, 0.95)	0.95 (0.66, 1.36)	0.87 (0.61, 1.25)
	Term	1**	1*	1*	1*	1	1
	Postterm	0.80 (0.70, 0.91)	0.82 (0.72, 0.94)	0.83 (0.72, 0.95)	0.89 (0.74, 1.08)	0.85 (0.69, 1.03)	0.90 (0.73, 1.12)
Multiple births	Singleton	1	1	1	1	1	1
	Twin/triplet	0.84 (0.64, 1.11)	0.83 (0.63, 1.10)	0.84 (0.63, 1.12)	1.00 (0.54, 1.83)	1.39 (0.74, 2.63)	1.11 (0.57, 2.15)
Birth order	1	1***	1***	1***		1***	1
	2-3	0.90 (0.82, 0.98)	0.69 (0.63, 0.77)	0.73 (0.66, 0.81)	0.74 (0.64, 0.84)	0.59 (0.50, 0.69)	0.82 (0.69, 0.97)
	4-5	0.71 (0.62, 0.82)	0.50 (0.43, 0.59)	0.54 (0.46, 0.64)	0.43 (0.31, 0.59)	0.39 (0.27, 0.57)	0.84 (0.55, 1.26)
	6 or more	0.46 (0.39, 0.54)	0.30 (0.25, 0.37)	0.33 (0.27, 0.41)	0.34 (0.12, 0.93)	0.32 (0.10, 1.01)	0.78 (0.21, 2.82)
Mother's age at birth	15-19 years	0.76 (0.62, 0.93)	0.95 (0.76, 1.17)	0.93 (0.75, 1.15)	0.52 (0.40, 0.66)	0.54 (0.42, 0.70)	0.65 (0.49, 0.87)
	20-24 years	1***	1***	1***	1***	1***	1
	25-29 years	1.28 (1.14, 1.43)	1.17 (1.04, 1.31)	1.15 (1.02, 1.29)	1.36 (1.16, 1.59)	1.29 (1.09, 1.54)	1.10 (0.91, 1.32)
	30-34 years	1.36 (1.20, 1.53)	1.36 (1.19, 1.55)	1.32 (1.16, 1.51)	1.32 (1.07, 1.64)	1.37 (1.07, 1.76)	1.03 (0.80, 1.34)
	35-39 years	1.34 (1.17, 1.54)	1.62 (1.38, 1.91)	1.58 (1.34, 1.86)	1.19 (0.73, 1.94)	1.43 (0.83, 2.47)	0.96 (0.52, 1.77)
	≥40 years	0.89 (0.73, 1.08)	1.38 (1.10, 1.74)	1.31 (1.05, 1.65)	[too few cases]	[too few cases]	[too few cases]
Mother's marital status	Married	1***	1***	1***	1***	1***	1**
	Unmarried	0.52 (0.46, 0.59)	0.69 (0.59, 0.80)	0.71 (0.61, 0.83)	0.72 (0.63, 0.83)	0.88 (0.74, 1.03)	1.05 (0.88, 1.25)
	Widow/divorced	0.76 (0.46, 1.27)	1.03 (0.59, 1.78)	1.07 (0.62, 1.84)	0.21 (0.15, 0.31)	0.27 (0.18, 0.41)	0.42 (0.27, 0.65)
Family social class	High NM	1***	1***	1***	1***	1***	1*
	Low NM	0.40 (0.33, 0.48)	0.44 (0.36, 0.53)	0.47 (0.39, 0.57)	0.54 (0.42, 0.69)	0.61 (0.47, 0.78)	0.99 (0.76, 1.29)
	Skilled M	0.22 (0.19, 0.26)	0.25 (0.21, 0.29)	0.27 (0.23, 0.32)	0.43 (0.35, 0.54)	0.53 (0.42, 0.66)	0.99 (0.78, 1.26)
	Unsk. M	0.16 (0.13, 0.18)	0.19 (0.16, 0.22)	0.21 (0.18, 0.24)	0.29 (0.24, 0.36)	0.38 (0.30, 0.47)	0.87 (0.69, 1.10)
	Self-empl.	0.40 (0.31, 0.51)	0.43 (0.33, 0.55)	0.45 (0.35, 0.58)	0.47 (0.36, 0.62)	0.56 (0.42, 0.75)	0.98 (0.72, 1.34)
	Farmers	0.16 (0.14, 0.20)	0.19 (0.16, 0.23)	0.19 (0.16, 0.23)	1.19 (0.61, 2.32)	1.30 (0.66, 2.56)	1.79 (0.92, 3.48)
	Housedau	0.11 (0.09, 0.14)	0.15 (0.12, 0.20)	0.16 (0.12, 0.22)	-	-	-
	Other	-	-	-	0.21 (0.15, 0.30)	0.28 (0.20, 0.39)	0.59 (0.40, 0.87)

*p<0.05, **0<0.01, ***p<0.001. High NM = high/mediate non-manual, Low NM=low non-manual, Skilled M=skilled manual, Unsk M=semi/unskilled manual, Self-emp=self-employed, Housedau=housedaughters, Other=retired/student/other. †Minimally adjusted: variables entered separately, adjusting only for gender and birthyear. Results not presented for G3 children of mothers aged 40 or more because of the very small sample size (N=6)

Supplementary Material, Table 5: G1 early-life characteristics and educational outcomes among their G3 grandchildren

		G3s			
		N†	Schoolmark mean (z-score)	% secondary school	% tertiary education
Total population		9706	0.00	89.5	32.3
G1 gender	Male	4467	-0.01	89.2	31.6
	Female	5239	0.02	89.7	32.9
G1 birthweight	<2500g	386	-0.06	91.4	30.5
	2500-3000g	1346	-0.01	88.1	33.1
	3000-3500g	3542	0.00	89.3	31.2
	3500-4000g	3135	0.00	89.5	32.5
	≥4000g	1230	0.08	91.1	34.6
G1 gestational age	Preterm	695	-0.04	88.7	30.7
	Term	7530	0.03	89.9	32.7
	Postterm	1149	-0.11	87.6	31.0
G1 birth multiplicity	Singleton	9464	0.01	89.4	32.3
	Twin/triplet	242	-0.07	90.4	31.3
G1 birth order	1	3656	0.02	90.2	33.3
	2-3	3459	0.03	89.3	33.0
	4-5	1411	-0.05	88.0	30.2
	6 or more	1177	-0.05	89.5	29.3
G1 mother's age at birth	15-19	626	-0.06	88.3	30.0
	20-24	2647	-0.06	88.1	30.0
	25-29	2670	0.04	90.5	32.9
	30-34	1936	0.07	90.0	34.5
	35-39	1193	0.04	89.6	34.1
	≥ 40 years	629	-0.05	90.1	31.4
G1 mother's marital status	Married	7653	0.03	90.1	33.6
	Unmarried	1945	-0.12	87.1	27.1
	Widowed/divorced	87	0.14	90.7	37.2
G1 family social class	High/mediate non-manual	745	0.32	91.6	44.0
	Lower non-manual	666	0.15	89.0	40.4
	Skilled manual	1367	-0.01	89.1	33.7
	Semi/unskilled manual	4568	-0.08	88.5	28.9
	Self-employed	299	0.31	94.3	42.9
	Farmers	1399	0.06	91.4	31.0
	Housedaughter	532	-0.17	88.5	26.8

† Missing data means that the number of individuals for some variables is less than the total.