SUPPLEMENTARY MATERIALS

Historical Context Changes Pathways of Parental Influence on Reproduction

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1. DESCRIPTIVE STATISTICS

Figure S 1

Distribution of ages at which participants were last seen, by UBCoS generation. Individuals may be censored due to death, long emigration out of the country or being alive at the end of 2009.

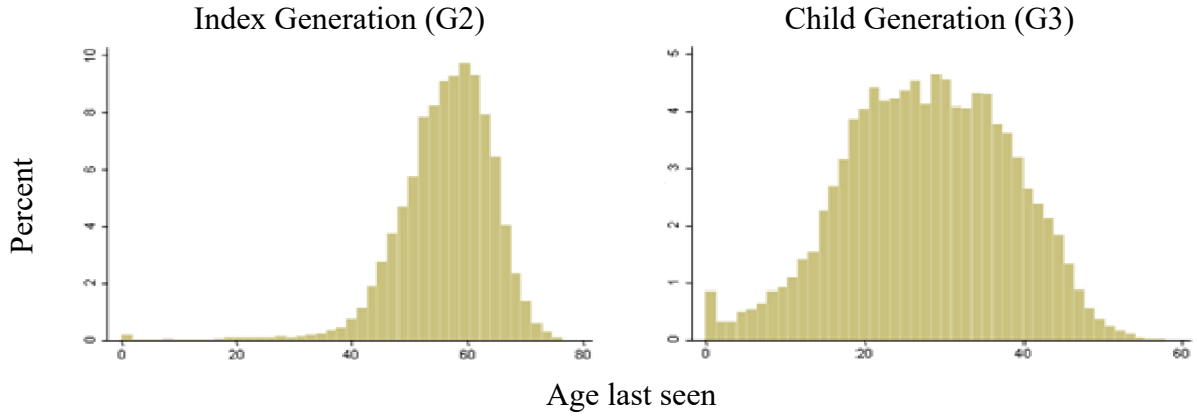
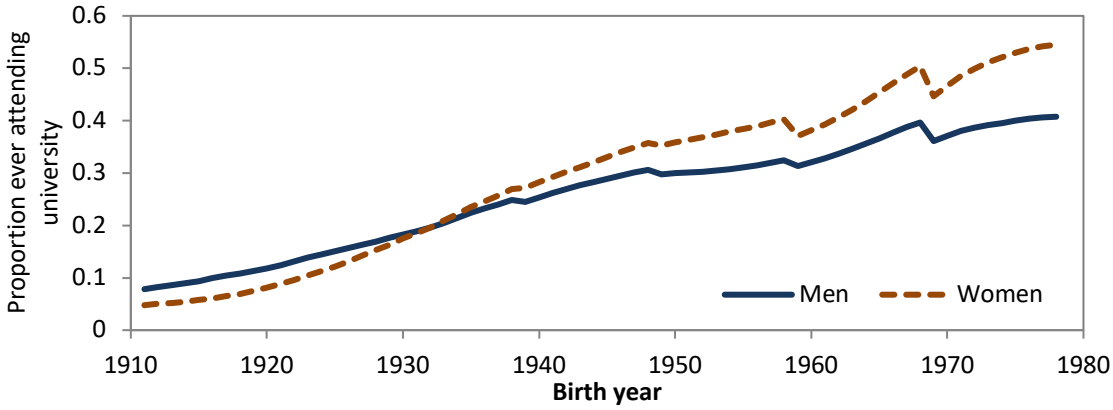


Figure S2

Proportion of people in Sweden ever attending university. Plotted by gender and earliest possible birth year in 10-year birth bands. Data from SCB Statistics Sweden collected 1985-2012.



2. ROBUSTICITY CHECKS

Individuals in the more recent "child" generation were less likely to have had a first birth than those in the "index" generation. Figure S 3 shows that the results of models predicting age at first birth are nearly identical when using a restricted age group (those over 35 years of age reducing the number of censored individuals) and when using the full sample. Furthermore, discrete-time event history analysis that incorporates individuals who have yet to reproduce gives qualitatively similar results (Figure S 4).

We also consider the possibility that we have not detected as many children with separated parents in the more recent cohort because of our not having access to data from the last decadal census. This means that some younger individuals might be categorized as coming from intact families when in fact their parents were separated. Restricting the sample to individuals over 35 years of age when last seen ensures that we have access to data from two-decade censuses that occurred within participants' first 20 years of life. Figure S 5 shows that we get very similar results to those in Figure 5 in the main text with the full sample, suggesting miscategorizations due to data access were not an issue.

Figure S 3

Predicted associations between parental absences in first 20 years of life and age at first birth. Column a) shows results from analyses restricted to individuals who reached 35 years of age b) includes all participants. Models included all covariates discussed in the paper. Parental absences are documented in first 20 years of life. Robust 95% CIs are shown.

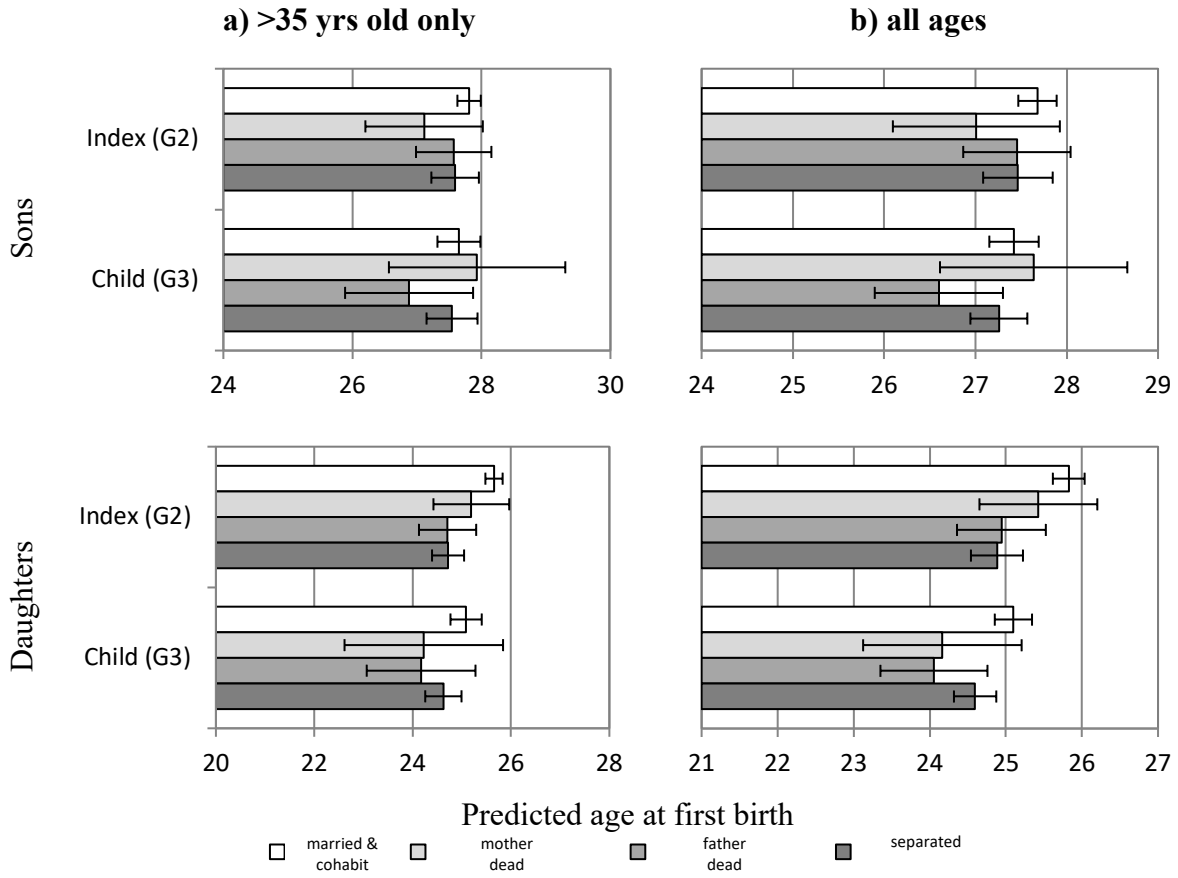


Figure S 4

Associations between early family absences and AFB – Across generations (Discrete-time Event History Analysis). Analyses included all covariates discussed in the paper. Family absences are documented in first 20 years of life.

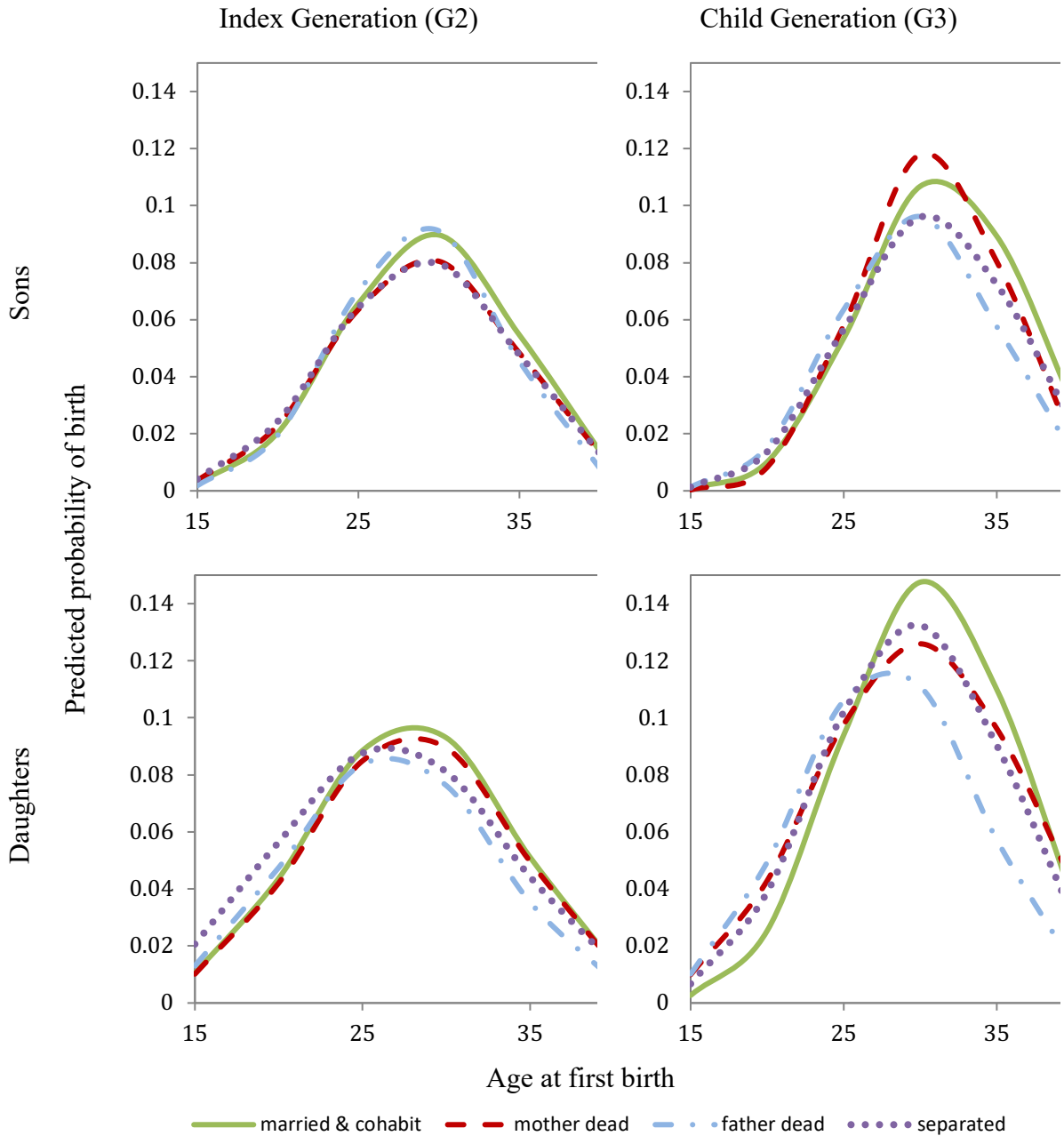
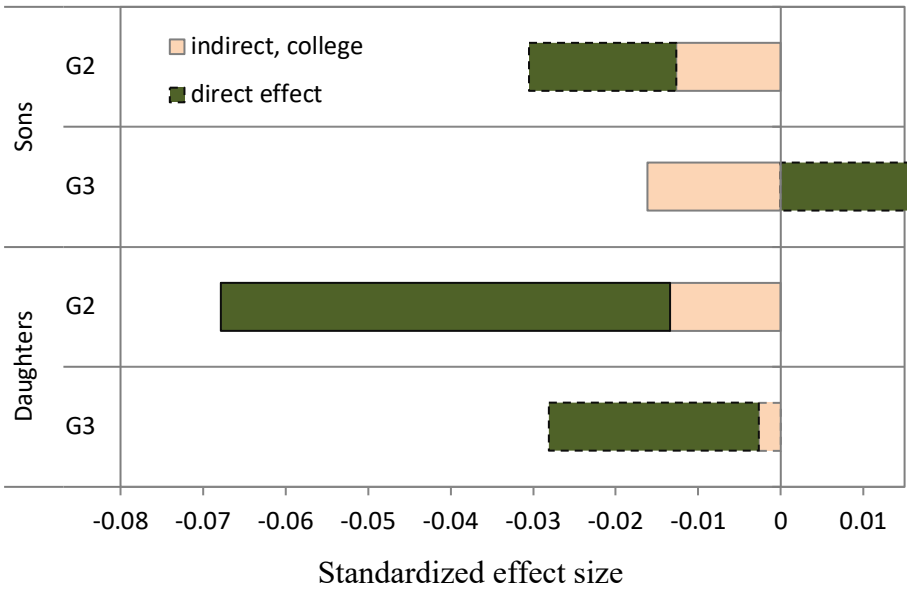


Figure S 5

Direct and Indirect effects of parental separations on age at first birth, restricted to individuals at least 35 years of age when last seen. Plotted separately for Index generation (G2) and Child generation (G3) cohorts. Parental separations by age 20 are used as predictors. University education is a mediator. Only effects with solid outlines have bootstrapped percentile 95% confidence intervals that did not include zero. NB: the directions of effects deviate from the Figure 4 schema in that for G3 sons parental separations have positive effects on age at first birth (c is +).



3. MODEL SCRIPTS

LINEAR REGRESSION OF AGE AT FIRST BIRTH

```
forvalues c= 2/3 {
forvalues f= 0/1 {
       reg afb ///
       i.parentabsent  ///
       i.birthband  /// /* ego vars */
       c.parentincmean##c.parentincmean i.parenteducmax /// /* par econ vars */
       parfertility parafb /// /* par fertility vars */
       if female==`f' & agelastseen>=0 & cohort==`c', ///
       vce(cluster clusterid)
       estat ic
       margins parentabsent
}}
```

In addition to the associations between parental absences and age at first birth, this model illustrates that other family background variables show comparable, or larger, associations with age at first birth (Table 2). For example, having a parent who completed high school versus one who had at least 3 years of tertiary education is associated with a 0.87-year delay to daughters' age at first birth, and a 0.71 delay to sons'. Grandparents' SES and parents' reproduction are associated with reproductive timing even after accounting for parents' SES.

EVENT HISTORY ANALYSIS OF PROGRESSION TO FIRST

```
forvalues f= 0/1 {
         di "fem=" `f'

         logit birth1_ ///
         i.parentabsent ##c.ageyear##c.ageyear##i.cohort ///
         i.birthbandcomp  /// /* ego vars */
         c.parentincmean##c.parentincmean i.parenteducmax /// /* par econ vars */
         parfertility parafb /// /* par fertility vars */
         if female==`f', vce(cluster clusterid)
         testparm c.ageyear##c.ageyear
         testparm i.parentabsent ///
         i.`neutralpar'#c.ageyear ///
         i.`neutralpar'#c.ageyear#c.ageyear
         estat ic
         margins i.parentabsent, at(ageyear=(15(5)40) cohort=(2 3))

         di "fem=" `f' "baseline no coh Xtion"
         logit birth1_ ///
         i.parentabsent ##c.ageyear##c.ageyear i.cohort ///
         i.birthbandcomp  /// /* ego vars */
         c.parentincmean##c.parentincmean i.parenteducmax /// /* par econ vars */
         parfertility parafb /// /* par fertility vars */
         if e(sample)==1, vce(cluster clusterid)
         testparm c.ageyear##c.ageyear
        estat ic
} // END ego sex
```

LOGISTIC REGRESSION OF UNIVERSITY ATTENDANCE

```
forvalues c= 2/3 {
forvalues a=0(35)35{
forvalues f= 0/1 {
         di "fem=" `f'  " agelastseen>=" `a' coh=" `c'

        logit tertiary ///
         i.parentabsent  ///
         i.birthband2  /// /* ego vars */
         c.parentincmean##c.parentincmean
        i.gparentseimax i.parenteducmax /// /* par econ vars */
         parfertility parafb /// /* par fertility vars */
         if female==`f' & agelastseen>=`a' & cohort==`c', ///
         vce(cluster clusterid) iter(500)
         estat ic
         margins parentabsent
}}}
```

BINARY MEDIATION ANALYSIS

This function required running separate models for each level of the parent absent variable. The reference group is always married & cohabiting parents. The results of this analysis are shown in the main text.

```
forvalues f= 0/1 {
foreach par in "moth" "fath"{
forvalues c=2/3{

di "fem=" `f' " parent=`par'" "coh=" `c'

 *** DEAD ***
  /* main mediation */
  binary_mediation if female==`f' & cohort==`c', dv(afb) ///
  mv(tertiary) iv(`par'dead20) ///
  cv(i.birthband ///
  c.parentincmean##c.parentincmean i.parenteducmax ///
  `par'fertility `par'afb)

  /* bootstrapped SE */
  bootstrap r(indir_1) r(tot_ind) r(dir_eff) r(tot_eff), ///
  reps(500): binary_mediation if female==`f'& cohort==`c', dv(afb) ///
  mv(tertiary) iv(`par'dead20) ///
  cv(i.birthband ///
  c.parentincmean##c.parentincmean i.parenteducmax ///
  `par'fertility `par'afb)
  estat bootstrap, percentile bc

*** SEPARATION ***
  /* main mediation */
  binary_mediation if female==`f'& cohort==`c', dv(afb) ///
  mv(tertiary) iv(parentsseparatedby20) ///
  cv(i.birthband ///
  c.parentincmean##c.parentincmean i.parenteducmax ///
  `par'fertility `par'afb)

  /* bootstrapped SE */
  bootstrap r(indir_1) r(tot_ind) r(dir_eff) r(tot_eff), ///
  reps(500): binary_mediation if female==`f'& cohort==`c', dv(afb) ///
  mv(tertiary) iv(parentsseparatedby20) ///
  cv(i.birthband ///
  c.parentincmean##c.parentincmean i.parenteducmax ///
  `par'fertility `par'afb)
  estat bootstrap, percentile bc
  }}}
```

4. EXTRA MODEL RESULTS

Table S 1 Logistic regression predicting probability of attending university from parental absence and other socio-demographic variables. Separate models were run for each sex and cohort. Robust standard errors are shown.

	Index (G2)						Child (G3)					
	Men			Women			Men			Women		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Parental status (*ref = married & cohabiting*)												
mother dead	-0.241	0.189	0.200	-0.366	0.203	0.071	-0.364	0.237	0.125	-0.254	0.210	0.226
father dead	-0.234	0.134	0.080	-0.027	0.128	0.830	-0.438	0.158	0.005	-0.403	0.148	0.006
separated	-0.377	0.085	<.001	-0.318	0.080	<.001	-0.175	0.054	0.001	-0.169	0.051	0.001
Birth year (*ref = 1932-39*)												
1940-44	0.382	0.229	0.094	0.714	0.254	0.005	-	-	-	-	-	-
1945-49	0.457	0.220	0.038	0.870	0.251	0.001	-	-	-	-	-	-
1950-54 (ref for G3)	0.602	0.220	0.006	1.045	0.251	<.001	-	-	-	-	-	-
1955-56	0.384	0.224	0.087	0.944	0.253	<.001	0.927	0.318	0.004	0.925	0.298	0.002
1960-64	0.408	0.232	0.078	0.897	0.259	0.001	1.189	0.149	<.001	1.209	0.128	<.001
*1965-69***	0.297	0.248	0.231	0.779	0.276	0.005	1.366	0.100	<.001	1.048	0.094	<.001
1970-74	-	-	-	-	-	-	1.339	0.085	<.001	1.222	0.080	<.001
1975-79	-	-	-	-	-	-	1.234	0.080	<.001	1.365	0.075	<.001
1980-84	-	-	-	-	-	-	1.005	0.074	<.001	1.147	0.072	<.001
Parent's education												
elem. ,≤ 8 yrs	0.394	0.491	0.422	1.472	0.563	0.009	-2.924	0.235	<.001	-2.266	0.216	<.001
elem. , 9-10 yrs	0.871	0.500	0.081	1.964	0.570	0.001	-2.844	0.195	<.001	-1.975	0.191	<.001
h.s., <3yrs	0.975	0.491	0.047	2.072	0.563	<.001	-2.451	0.162	<.001	-1.707	0.170	<.001
h.s., 3yrs	1.374	0.495	0.006	2.464	0.567	<.001	-2.000	0.164	<.001	-1.341	0.172	<.001
<3yrs after h.s.	1.779	0.498	<.001	2.734	0.570	<.001	-1.466	0.161	<.001	-0.881	0.170	<.001
≥3 yrs after h.s.	2.290	0.497	<.001	3.311	0.568	<.001	-0.802	0.159	<.001	-0.359	0.168	0.033
post graduate (ref G3)	2.775	0.529	<.001	3.973	0.603	<.001	-	-	-	-	-	-
Parents' hh income	0.344	0.043	<.001	0.253	0.044	<.001	0.724	0.066	<.001	0.765	0.071	<.001
Parents' hh income ^{2}	-0.037	0.009	<.001	-0.007	0.011	0.562	-0.092	0.027	0.001	-0.135	0.040	0.001
Grandparent's SES *(ref = higher & mediate non-manual)*												
entrepreneurs & farmers	-0.260	0.102	0.011	-0.045	0.107	0.672	-	-	-	-	-	-
lower non-manual	-0.162	0.121	0.179	0.032	0.127	0.802	-	-	-	-	-	-
skilled manual	-0.203	0.108	0.059	-0.202	0.112	0.070	-	-	-	-	-	-
unskilled manual, production	-0.327	0.100	0.001	-0.357	0.105	0.001	-	-	-	-	-	-
service	-0.349	0.105	0.001	-0.298	0.109	0.006	-	-	-	-	-	-
Parent's fertility	-0.079	0.022	<.001	-0.015	0.022	0.489	-0.021	0.025	0.400	-0.061	0.024	0.012
Parent's age at 1st birth	0.054	0.007	<.001	0.069	0.007	<.001	0.095	0.007	<.001	0.076	0.007	<.001
Constant	-3.141	0.566	<.001	-4.957	0.643	<.001	-2.222	0.282	<.001	-1.634	0.286	<.001

5. ASSOCIATIONS WITH FERTILITY

Data from members of the cohort born before 1964 indicate that 99% of these women had their last child by age 43 and 99% of men had their last child by age 50. We restricted our analyses of completed fertility to the 19,242 *index* generation members who were at least 45 the last time their data were updated (date of death, date of extended emigration outside the country, or December 2009, whichever was earliest).

To examine completed fertility outcomes for the *index* cohort we used zero-inflated Poisson models to predict number of children born given that they fit better than Poisson and negative binomial models. The zero-inflation was driven by men, who were more likely than women to be childless, but to facilitate comparison we use zero-inflated Poisson models for both sexes.

The associations we find between early parental absences and age at first birth do not translate to effects on total fertility (Figure S 6). Models predicting fertility fit better without the parental availability measures than with them (see Table S 2 for full model). The parental absence that is most strongly, though not significantly, associated with fertility is that of a mother's death, which is predicted to result in 0.12 more children for her sons at the means of other covariates (poisson B=.06, SE=.06, p=0.27).

As previously documented in the UBCoS sample (Goodman & Koupil, 2009), family background variables are more reliably associated with both sons' and daughters' total fertility (Table S 2). Parents' reproductive strategies have similar effects on both daughters and sons – there are intergenerational correlations in total fertility, and earlier ages of parents' first births correspond to higher fertility in their children. A family's socio-economic background, on the other hand, tends to have different effects on sons' and daughters' fertility. Generally, the higher one's family's socio-economic background the higher a male's fertility and the lower a female's fertility, with this negative effect on females appearing to be mediated to a considerable degree by university attendance. Because we do not find strong associations between parental absence and fertility we did not consider it in our mediation analysis.

Figure S 6

Associations between parental absences and total fertility. Data from the index generation. Absences are documented in first 20 years of life. Robust 95% CIs are shown.

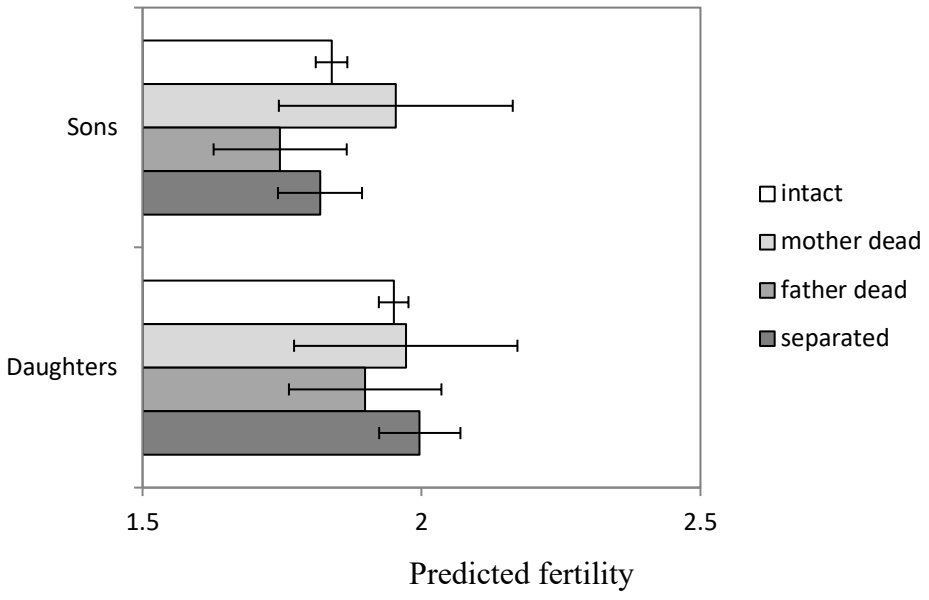


Table S 2

Zero-inflated poisson models predicting total fertility from parental presence within first 20 years of life. Models include family background and parents' life history covariates and is only run on the i*ndex* generation (G2) only. Coefficients are changes in the log count for a one-unit change in the predictor. Robust standard errors controlling for family clusters (parent's id) are given.

		Sons		Daughters	
		B (R. SE)	**p**	**B (R. SE)**	**p**
Parental presence	**parents' status** (*ref. = married & cohabiting)*				
	Mother dead	0.06(0.06)	0.27	0.01(0.05)	0.83
	Father dead	-0.05(0.04)	0.15	-0.03(0.04)	0.48
	Separated	-0.01(0.02)	0.61	0.02(0.02)	0.23
Family SES	**parents' mean inc.**	0(0.01)	0.94	-0.03(0.01)	0.01
	parents' mean inc ^{2}	0.001(0.002)	0.51	0.003(0.002)	0.15
	grand parents's socio-economic status *(ref. = higher and mediate non-manuals)*				
	entrepreneurs & farmers	-0.015(0.03)	0.6	0.003(0.03)	0.91
	lower non-manuals	-0.01(0.03)	0.71	0.01(0.03)	0.69
	skilled manuals	-0.03(0.03)	0.37	-0.03(0.03)	0.36
	unskilled manuals, production	-0.03(0.03)	0.3	0.001(0.03)	0.97
	unskilled manuals, service	-0.04(0.03)	0.22	0.01(0.03)	0.78
	maximum of parents' education *(ref. = elem. school, <8yrs)*				
	elem. , 8 yrs	-0.01(0.09)	0.94	-0.07(0.06)	0.25
	elem. , 9-10 yrs	0.01(0.09)	0.91	-0.05(0.07)	0.5
	h.s., <3yrs	0.03(0.09)	0.78	-0.03(0.06)	0.62
	h.s., 3yrs	0.05(0.09)	0.57	-0.08(0.07)	0.22
	<3yrs after h.s.	0.02(0.1)	0.82	-0.02(0.07)	0.74
	≥3 yrs after h.s.	0.08(0.09)	0.42	-0.03(0.07)	0.66
	post graduate	0.05(0.1)	0.6	-0.04(0.08)	0.62
Parents' reprod.	**parent's fertility**	0.03(0.01)	<.001	0.04(0.01)	<.001
	parent's AFB	-0.01(0.002)	<.001	-0.01(0.002)	<.001
Other	**birth year band** *(ref. = 1932-39)*				
	1940-44	-0.01(0.05)	0.79	0.01(0.04)	0.77
	1945-59	-0.04(0.04)	0.4	-0.03(0.04)	0.54
	1950-54	-0.07(0.04)	0.12	-0.04(0.04)	0.32
	1955-59	-0.05(0.05)	0.26	-0.06(0.04)	0.14
	1960-65	-0.15(0.05)	0.002	-0.08(0.05)	0.07
	1965-	-0.32(0.06)	<.001	-0.23(0.05)	<.001
	constant	0.91(0.119)	<.001	0.81(0.09)	<.001
	inflation constant	-2.45(0.073)	<.001	-17.84(1.758)	<.001