A Validation Study of Intergenerational Effects of Early-Life Conditions on Offspring's Economic and Health Outcomes Potentially Driven by Epigenetic Imprinting

Evidence from the German Famine of 1916-1918*

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At the crossroads of economics and human biology, this paper investigates findings from the recent biological literature, according to which lifetime experiences of one generation are affecting later generations through epigenetic imprinting. Specifically, we analyze the impact of the German famine of 1916-1918 on individuals who were aged 8-12 at the time of the famine as well as on the children and grandchildren of these individuals with respect to a large number of economic and health outcomes.

We find that first generation males in our sample who have been affected by the famine have more children and that in particular the number of daughters increases. Second generation individuals have worse health outcomes if their mother has been affected, and this is particularly true for males. For the third generation, we find that males have more children if their paternal grandfather has been exposed to the famine and males and females have higher mental health scores if their paternal grandfather (males) or their maternal grandmother (females) has been exposed. We not find robust effects for economic outcomes such as schooling or wages.

JEL Classification: I12, J11, C41.

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1 Introduction

Recently, epigenetic imprinting has become a focal point in medical research on intergenerational effects of nutrition, behaviors and life circumstances. *Epigenetics* is defined as the process by which patterns of gene expression are modified in a relatively stable and heritable manner through methylation of the chromatin. It implies heritable changes in gene functioning that cannot be explained by changes in DNA sequence. Instead, epigenetic modifications only affect the methylation state of the DNA and the proteins that package the DNA into chromosomes. *Epigenetic imprinting* implies that shortly after conception, when stem cells are formed, some of the methyl tags from previous generations remain, leading to intergenerational non-genetic inheritance of lifetime experiences across generations.

Recent medical research has started to look for evidence of intergenerational transmission of epigenetic imprinting. Thus far, transgenerational inheritance of epigenetic states has been demonstrated in agouti-mice and rats through both paternal and maternal transmission (Anway, 2005; Rakyan et al., 2003). Moreover, there is evidence of nutrition as an important driver of epigenetic modifications Tobi et al. (2009). Unfortunately, almost all empirical evidence on epigenetic transmission stems from experiments on mice, while research on humans is extremely rare. The main reason for this is that evidence on epigenetic imprinting in humans is extremely difficult to obtain. Experiments are unfeasible and highly unethical, such that research has to rely on non-experimental data. Furthermore, not only is an exogenous variation on the first generation needed, but also outcomes for multiple later generations.

The only three generation study so far has been conducted by Gunnar Kaati and co-authors, who have come up with work showing that the paternal grandfather's food supply in pre-adolescence was linked to the mortality risk ratio of grandsons, while the paternal grandmother's food supply was linked to the mortality risk of their granddaughters (Kaati et al., 2002, 2007; Pembrey et al., 2006). The authors ascribe these effects to a potential remethylation of epigenetic marks in the sperm and egg during the ancestor's slow growth period (SGP).

In this paper, we aim to assess the external validity of these findings by Kaati and co-authors. Specifically, we examine the fate of consecutive generations following exposure to the German famine of 1916-1918 during the slow growth period. Our outcomes of interest comprise various health measures such as height, longevity, fertility and disease risk. In addition, we aim to relate Kaati's findings to economic outcomes, such as schooling and wages. Our approach of using a the German famine has several advantages. First and foremost, it provides us with an very large exogenous shock to a generation of individuals whose children and grandchildren are alive today and on which a large number of outcomes is available. Furthermore, probands were affected by the famine at different ages, such that we can identify critical periods. Moreover, since the famine was an exogenous event to the individuals, there are no issues of selection. At the same time, we have to address a number of problems that arise due to Germany's eventful history. First, shortly after the famine, Germany was hit by the Spanish influenza, such that famine and influenza effects cannot be disentangled. Furthermore, the second world war is likely to have added a lot of noise to the data and later generations may have survived the war at different rates. Last, because we lack information on methylation patterns, epigenetic imprinting cannot be pinned down as the unique root cause of our findings.

The data we use come from the German Socioeconomic Panel (GSOEP). The data are well-suited for our analysis in that they allow us to identify whether a first generation of individuals (usually the parents of SOEP respondents) were affected by the famine during their slow growth period. Furthermore the data contain information on a wide range of health information, longevity and economic outcomes.

Our findings suggest that among second generation individuals maternal SGP-affectedness has adverse health effects as measured by hospitalization and doctor visits. Besides, second generation males tend to be taller if their father has been affected. For the third generation, we find that paternal grandmother SGP-famine exposure tends to slightly reduce health outcomes and that paternal SGP-exposure increases the number of children. A result that hints towards sex-specific inheritance of epigenetic marks is the effect of first generation famine exposure on mental health: Paternal grandfather SGP-famine seems to increase mental health of third generation sons while maternal grandmother SGP-famine has a positive effect on her granddaughters mental health. We do not find robust effects for economic outcomes such as schooling or wages. We do find that being exposed to a famine affects the number of children of first generation individuals in our sample, indicating that it is important to account for dynamic intergenerational sample selection and fertility effects.

2 Epigenetics and Economics

Biological circumstances during early life have been shown to have important effects on longevity, health and economic outcomes. So far, the economics literature has focused almost exclusively on first-generation effects that emerge from *in utero* or early-life exposure to famines, influenza or even rainfall (Maccini and Yang, 2009; Doblhammer-Reiter and van den Berg, 2011; van den Berg et al., 2007; Almond Jr et al., 2007; Almond and Mazumder, 2005). Most of these studies find detrimental effects of adverse shocks on adult outcomes. In biology, such effects, termed fetal-programming, are well-known and can be produced in mammals by exposing offspring in utero to food restrictions on the pregnant female (Barker, 1995; Nathanielsz, 2003; Whitelaw, 2006).

Much fewer studies have investigated whether there exists an association of first generation exposure to reduced food supply with second and third generation outcomes. Painter et al. (2008) find that gestational famine exposure was associated with reduced offspring length in the next generation and that children of famine-exposed mothers were more likely to be in poor health from acquired neurological, auto-immune, respiratory, infectious, neoplastic, or dermatological problems. In other studies, ancestral food supply was found to affect birth weight, risk of stillbirth, perinatal death and longevity of the second or even third generation (Bygren et al., 2001; Lumey and Stein, 1997; Kaati et al., 2007). Moreover, Pembrey et al. (2006) analyze the effect of smoking during the SGP by exploring UK data on parental interviews of newborn children. They found that the sons of fathers who smoked during their SGP had higher body mass index as 9 year olds. Last, Kaati et al. (2002) and Kaati et al. (2007) study an exogenous variation in nutrition triggered by a food shortage in northern Sweden by collecting records of harvests and food prices during the 19th Century. It turned out that individuals experiencing food shortages in the SGP, had descendants with lower risks of mortality from cardiovascular disease and diabetes. In particular, the authors find that the mortality risk ratio of grandsons is adversely affected by their paternal grandfather's SGP-exposure to rich food supply while the paternal grandmother's food supply during her SGP adversely affected the mortality risk of her granddaughters.

The molecular basis for environmentally-triggered nongenetic trans-generational effects is not fully known to date, but the most prominent hypothesis is that it involves epigenetics.[1] Fraga et al. (2005) show that epigenetic patterns are formed over the entire life-course: while 3-year-old monozygotic twins have almost identical methylation patterns, their DNA methylation differs markedly at the age of 50. Besides, findings by Heijmans et al. (2008) and Tobi et al. (2009) support the presumption that epigenetic modifications in humans are related to nutrition. The authors find sex-specific differences in methylation patterns between individuals who have been prenatally exposed to the famine and their same-sex siblings.

Epigenetic inheritance would then imply that such methylation patterns in one generation would influence gene expression in the next generation. How such epigenetic transmissions or inheritance in humans works biologically is not fully resolved (Harper, 2005). Shortly after conception, when the first cell divisions are taking place, the stem cells are generally cleared of all methylation (Ahmed, 2010). However, if epigenetic modifications take place on the part of the genome that is genetically imprinted, this could explain sex-specific epigenetic inheritance. 'Imprinted genes' keep their methyl tags (about 1% of genes), which function as a biological marker to flag up their maternal or paternal origin (Masterpasqua, 2009).

Economists and social scientists are merely interested in whether adverse experiences can be transmitted non-genetically from one generation to the next rather than in the

[1]Other potential mechanisms are DNA amplification or changes in telomere length (Kaati et al., 2007).

exact mechanism.[2] Any non-genetic transmission of experiences, would revolutionize economic thinking about intergenerational transmission and human capital accumulation in at least two ways. First, if life experiences were transmitted from one generation to the next, this would imply that that the costs and benefits of any policy measure would have to be re-evaluated to include the effects on subsequent generations. Second, nature (genetic predisposition) and nurture (upbringing) were found to be inseparable and the long-fought nature-nurture debate would become obsolete. In the future, models of human capital investment would need to account for gene expressions and gene-environment interactions as well as for critical and sensitive periods of the epigenetic transmission.

Kaati and co-authors argue that the slow growth period of a child may be such a sensitive period. It takes place at ages 9-12 for boys and at ages 8-10 for girls and is thus the developmental period just before onset of puberty where eggs and sperm are formed. The SGP is thus the beginning of reprogramming of methylation imprints (Pembrey, 2002). This period of childhood is also known as the 'fat spurt': growth is low and the body is accumulating reserves for in anticipation of the puberty-related development spurt (Marshall and Tanner, 1968; Gasser et al., 1994; Gasser, 1996). It is plausible that limited food availability during the 'fat spurt' leads to worse pubertal development and imprinting on the sperm or egg. Indeed, this growth period has previously been found to be critical for development. Sparén et al. (2004) for example find that a famine at this age increases cardiovascular problems later in life. Similarly, van den Berg and Gupta (2007) and van den Berg et al. (2009) find this age period to be critical for life expectancy and adult height, respectively.

3 The famine

The World War 1 famine in the German empire is said to be the severest famine experienced in Europe outside of Russia since Ireland's travail in the 1840s (Raico, 1989). At the end of the war, the German 'Reichsgesundheitsamt' (Health Office) calculated that 763,000 German civilians had died from starvation.[3]

The period of food scarcity started in June 1915 when bread began to be rationed, but only in early 1916 food rationing first became severe. From 1916 to mid-1919 the German population had to live on less than 1500 calories (Starling, 1919). Yet because the portion of bran in the bread was very large, the calorie value was further reduced by about 15 to 20 percent.[4] Most Germans had to live on a meagre diet of dark bread, slices

[2]For an overview of molecular genetics and economics see Lundborg and Stenberg (2009). For Epigenetics and Psychology see Harper (2005).

[3]The overall population of the German empire at that time was about 65 million. In addition there were about 2 million military deaths, who in a conventional ground-based war like WW1, were almost exclusively men of age 17-60.

[4]In comparison, a man needs about 2500 calories a day and a women needs about 2000.

of sausage without fat, three points of potatoes per week and turnips (Vincent, 1985). Table 1 displays an overview over the amount of food consumed during the famine as compared to prewar times. While these amounts are well below subsistence to begin with, the situation was aggravated by the mere length of the famine which started in 1916 and extended into 1919.

The effects on the population were detrimental. On average the German population has lost about 15-25 percent of their weight between 1916 and 1919.[5] Many children suffered from edema, tuberculosis, rickets, influenza, dysentery, scurvy, and keratomalacia. There even exists research claiming that the famine had such a damaging effect on German youth that it impaired adult rational thinking and laid ground for later adherence to National Socialism (Loewenberg, 1971).

Three factors had led to the extreme shortage of food. First, by mid-1916 the Allied Powers had successfully enacted a complete naval blockade of Germany restricting the maritime supply of raw materials and foodstuffs. Before the war Germany had imported one third of its food, but after the blockade Germany was cut from foodstuff imports of all sorts: fodder for livestock, grain and potatoes. Importantly, the blockade continued even after the Armistice and until June 1919 to force Germany to sign the Treaty of Versailles. In fact, throughout 1919 rationing was maintained in many parts of the country at a rate of 1000-1300 calories per day (Vincent, 1985).[6]

Second, in the summer 1916, the root crop and grain harvest were particulary bad and the potato crop failed almost completely. The latter was particularly detrimental because much of the German food supply was based on potatoes and during the war more agricultural crop land had been shifted away from turnip cultivation and towards potatoes (Klein, 1968). The Winter of 1916-1917 thus marked the climax of the famine and is today remembered as the 'turnip winter' (Steckrübenwinter), because the only food in sufficient supply during that winter were turnips.

Last, food storage was a concern. Before the war most of the potato crop was stored in the countryside and only supplied to the cities on demand. After the start of the war, when transportation and dislocation became more difficult, and potatoes had to be stored in larger quantities by individuals unschooled in the proper techniques of storage, which led to spoilage and waste (Vincent, 1985).

3.1 Spanish Influenza

In 1918/1919, the Spanish Influenza hit many countries all over the world. In Germany, about 150,000 individuals have died as a result of the disease (Vincent, 1985). This number is low when compared to the overall number of deaths that resulted from starvation,

[5]Individuals who had lost 30 percent or more mostly died.

[6]The reason for continued food rationing was that even after the end of the blockade in June 1919 Germany could not import freely, since all funds had to be saved for war reparations.

Table 1: Food consumption before and during the famine

Item	Before War	During Famine
Kalories	2280 per day	1313 per day
Protein	70g per day	30-40g per day
Fat	70g per day	15-20g per day
Bread	225g a) per day	160g per day
Meat	1050g per week	135g per week
Potatoes	100%	71%
Grain	100%	53%
Sugar	100%	49%
Vegetable oil	100%	39%
Meat	100%	31%
Butter	100%	22%
Egges	100%	18%
Pulse	100%	14%
Cheese	100%	3%

Notes:
Adult quantities reported.
Lower part of the table (percentages) indicate offical rations and not actual amounts which were often lower.
Products that vanished almost entirely: cheese, fruit, leather.
a) in 1915.
Sources:
Ernest H. Starling, 1919, Report on Food Conditions in Germany. (London: H.M. Sationary Office) pp. 7-16.
Paul C. Vincent, 1985, The politics of Hunger.
Klein, 1968, Deutschland im ersten Weltkrieg.

but still considerable. The first wave of the pandemic hit Germany in June 1918, the second one in the fall and the third one in January 1919 (Witte, 2008). In our study, it is thus not possible to separate the effects of the famine from the effects of the influenza pandemic. However, what characterized the Spanish Influenza was that, for the most part, it was lethal only for individuals of ages 20-40, such that concerns of selective survival can be neglected for our cohorts of interest. Mamelund (2003) using data on Norway, which was neutral during WWI, confirms this presumption. He finds that the cohorts born 1890-1910 experienced the lowest immediate death rates of the Spanish Influenza. Nevertheless, since the continuation of the blockade and the third wave of the Spanish influenza extended well into 1919, we conduct robustness checks where we include the year 1919 in our famine period.

4 Famine exposure and Outcomes of Interest

To investigate systematically how adult outcomes of the first (F0), second (F1) and third (F2) generation vary with first generation SGP exposure to the famine, we focus on individuals if whom at least one ancestor was born in the years 1902-1913. This implies that the males of our core sample were too young to have been drafted and females were too young to have conceived a child during the war.[7] Also, none of the individuals in our core sample were born during the war, such that we do not need to account for selective fertility during war times or for in utero exposure to the famine.[8]

The effect of interest (F_{SGP}) is defined as F0-SGP-exposure to the famine, i.e. being of ages 8-10 for females and of age 9-12 for males. We thus distinguish between three first-generation cohorts. a) males (females) whose SGP lies in the famine period: birth years 1904-1909 (1906-1910) b) males (females) born and in SGP before the famine hit: born before 1903 (1904) and c) males (females) born after 1910 (1911), i.e. who are too young for the famine to have affected them in their SGP.

Note that the famine variable ($F_{SGP,i}$) differs by generation. For F0, famine exposure is simply defined as an indicator variable of whether a proband's own SGP took place during the famine. For F1, $F_{SGP,i}$ is a vector with a first entry indicating whether the mother was affected by the famine during her SGP and a second entry indicating whether the father was affected during that same period. Following the same logic, F2 can be treated by four differen effects: Paternal grandfather (PGF) SGP famine, paternal grandmother (PGM) SGP famine, maternal grandfather (MGF) SGP famine and maternal grandmother (MGM) SGP famine.

Our outcome measures of interest (Y_{it}) are health outcomes and indicators of economic success. First, we use adult height as an indicator of past nutritional experience and predictor of morbidity and mortality risks (Waaler, 1984; Steckel, 1995). Second, we look at the Body mass index (calculated as weight(kg)/stature(m^2)), which is the most commonly used anthropometric index and useful a a screening tool for both excess adiposity and malnutrition (Zemel, 2002). Moreover, we look at summary measures of physical health, mental health, self-rated health and life satisfaction, as well as at more direct measures such as mortality, the number of doctor visits or nights spent in a hospital during the past year. While self-rated health and life satisfaction are measures that are administered on hands of five and ten point Likert scales, physical and mental health summary measures represent the two sub-dimensions of the SF-12 questionnaire, which measures the health-related quality of life (Andersen et al., 2007). Last, we investigate fertility, because differential first and second generation fertility patterns may explain differences in third generation outcomes, and because major health shocks such as wars have been shown to affect the gender ratio (Bethmann and Kvasnicka, 2009).

Economic outcomes comprise education and wages. The education outcome is defined as whether an individual has obtained an upper secondary school degree, the German university entrance diploma. Moreover, wages have been calculated as the logarithm of

[7] Men of ages 17-60 could be drafted into the military (Foerster, 1994).

[8] Note that this does not have to be true for all other ancestors. E.g. for third generation individuals only ONE out of four grandparents has to be born in the period 1902-1913d.

the monthly wage divided by the actual number of hours worked.

5 Identification and Outcome Models

We use common coefficient models and matching to identify the famine SGP-exposure of F0 ancestors on F1 and F2 individuals. We thus calculate a famine effect that compares individuals with the same background and of the same age, who only differ with respect to exogenous first generation SGP famine exposure. Because, first generation famine-SGP exposure is a historical incident that is completely exogenous at the individual level, our approach allows us to identify the true impact of the famine on the first, second and third generation.

We estimate four different types of outcome models to account for the different distributional properties of the respective outcome variables: A duration model for individual mortality, a discrete choice model for binary dependent variables, a negative binomial regression model for count data and a linear regression model for continuous outcomes. In all models, x_i denotes an individual-specific vector of observable characteristics and f_t is a vector of birth year fixed effects (for F1 and F2) that captures any variation that may be cohort or birth year specific. For the third generation (F2), this vector also comprises parental birth year fixed effects to capture any other historic variation such as business cycle effects.[9]

5.1 Duration Model

First, to estimate the impact of the famine on longevity, we model the hazard of mortality at any given point in time as being multiplicatively separable in a (nonfrailty) hazard function μ_0 and a frailty term (α):

$$h(t) = \alpha\mu_0 \tag{5.1}$$

Following the standard biological literature on modeling mortality, the baseline hazard has the shape of a Gompertz distribution with ancillary parameter γ:

$$\mu_0 = \exp(\gamma t)\exp\,(\sum_{i=1}^{N} F'_{SGP,i}\delta + x'_i\beta + f'_t\eta). \tag{5.2}$$

[9] For the effect of business cycle variation on outcomes see e.g. van den Berg et al. (2011).

here, $F_{SGP,i}$ is a vector denoting the famine indicator and measures of famine intensity. The frailty distribution α follows a gamma distribution with:

$$\alpha \sim \Gamma(1, \theta) \tag{5.3}$$

Because our sample is special in a sense that selection into the sample is conditional on having conceived a child (F0) or on ever having responded to a the household questionnaire (F1), we model mortality only for death beyond age 44 (F0) and 40 (F1) respectively, and adjust the likelihood accordingly.

5.2 Probit Model

We model binary outcomes such as disability status or upper secondary schooling as a binary outcome latent index model with $Y_{it} = 1_{[Y_{it}^* > 0]}$, where Y_{it}^* denotes the latent continuous variable. The latent variable in turn is determined by famine exposure, birth year fixed effects and observable control variables. We assume a linear structure and additive separability in the error term. Thus:

$$Y_{it}^* \quad = \quad F'_{SGP,i}\delta + x'_i\beta + f'_t\eta + \epsilon_{it}.$$

The observed binary variable Y_{it} is an indicator variable that is assumed to equal one if the latent variable crosses zero as a threshold $Y_{it}^* > 0$. We estimate a probit model, assuming that $P(Y_{it} = 1|x_i, f_t, F_{SGP,i}) = \Phi(F'_{SGP,i}\delta + x'_i\beta + f'_t\eta)$ with Φ being the normal cdf.

5.3 Negative Binomial Regression Model

The number of children or the number of doctor visits during the past year are count variables. The density of the number of occurrences or counts is assumed to be Poisson distributed:

$$\begin{aligned} Y_{it} &\sim Poisson(\mu_{it}) \\ \text{with} & \\ \mu_{it} &= exp(F'_{SGP,i}\delta + x'_i\beta + f'_t\eta + v_i) \\ \text{and} & \\ exp(v_i) &\sim Gamma(1/\alpha, \alpha). \end{aligned}$$

α is the so-called dispersion parameter and v_i is a random intercept coefficient that allows for variation unexplained by the covariates. $F_{SGP,i}$ again denotes a vector of famine indicators, x_i a number of control variables and f_t individual birth year dummies.

5.4 Linear Regression Model

For continuous outcomes, we estimate the following linear model between outcomes Y_{it}, famine effects and covariates for adult i born in year t:

$$Y_{it} = F'_{SGP,i}\delta + x'_i\beta + f'_t\eta + \epsilon_{it}.$$

again x_i denotes a vector of control variables and the equation comprises a vector of own birth-year fixed effects (f_t) to capture any variation that may be cohort or birth year specific.
Covariates in all models comprise parental education, sibship size, parental age at birth of their children and measures of GDP and birth rates at the time of first generation birth. This way we are trying to control for possible mediating factors. Furthermore, outcome measures vary naturally with a proband's age at the time of measurement. Thus, although SGP famine-exposure lies roughly in the middle of the first-generation birth year window, we include an individual's age at the time of measurement as a covariate in the model. We report robust standard errors and standard errors are clustered on the household level for the third generation where siblings mostly have the same history of ancestral famine exposure. Last, all analyzes are performed separately for males and females, because epigenetic inheritance is likely to be sex specific (Pembrey et al., 2006).

6 Data

We use data taken from the German Socioeconomic Panel (SOEP), a representative longitudinal micro-dataset for Germany (Wagner et al., 2007). The data are well-suited for our analysis in that they allow us to identify whether a first generation of individuals (usually the parents of SOEP respondents) were affected by the famine during their slow growth period. Moreover, the data contain information on a wide range of health information, longevity and economic outcomes.

6.1 Sample

Our sample is comprised of 7233 first-generation (F0) individuals who were born 1902-1913 and had children who later became the primary SOEP respondents. These primary SOEP respondents constitute the second generation (F1) in our sample and their children, who enter the SOEP upon the age of 17 are, form the third generation (F2). To denote the different generations, we adopt common notation from biology where F1 denotes the first filial generation, that is the generation resulting immediately from a cross of the first set of F0-parents. Consequently, the F2 generation is the result of a cross between two F1 individuals.

The advantage of using the SOEP is that it gives us a second-generation sample that is representative of the German population. The downside to this is that first-generation individuals are sampled only if they have reached the reproductive age and conceived children. This means that they need to have survived the famine and the Spanish influenza. Moreover, they either need to have survived WW2 or had children relatively early. We thus have to be careful with the effect of the selective sampling scheme on the correlations in the data, e.g. to account for the fact that first generation individuals are more likely to be sampled if the they have more children.

Figure 1 shows how the first generation sample is constructed and which individuals are identified as being 'SGP-exposed' by the hunger period. F1 and F2 individuals are sampled if at least one parent (F1) or one grandparent (F2) has been born in 1902-1913.

The chance of using an unforeseeable historic events is that it provides a large shock on

Figure 1: Sample Construction

Females

Males

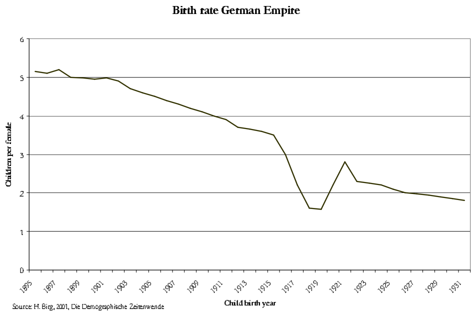
Birth cohorts	age																		
Born 1902	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Born 1903		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Born 1904			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Born 1905				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Born 1906					0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Born 1907						0	1	2	3	4	5	6	7	8	9	10	11	12	13
Born 1908							0	1	2	3	4	5	6	7	8	9	10	11	12
Born 1909								0	1	2	3	4	5	6	7	8	9	10	11
Born 1910									0	1	2	3	4	5	6	7	8	9	10
Born 1911										0	1	2	3	4	5	6	7	8	9
Born 1912											0	1	2	3	4	5	6	7	8
Born 1913												0	1	2	3	4	5	6	7
Hunger Period	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920

SGP defined as ages 9-12 for males (grey) and as ages 8-10 for females (orange)
Criteria for sample construction: Too young to be drafted in WW1, too old to be born in WW1

humans that is impossible to produce in the lab. Besides, such historical variation usually does not provide for a control group that is completely unaffected by the event.[10] In our study, all first-generation individuals have been affected by the famine during different

[10]A rare exception is the Dutch Hunger Winter analyzed for example by Scholte et al. (2010)

Figure 2: Birth rate, German empire



Source: H. Birg, 2001, Die Demographische Zeitenwende.

ages. Hence, any finding can only be interpreted with respect to being affected by the famine at a different point in life. In our case, this is beneficial because it allows us to separate the effect of 'being affected by a famine at some point during life' from 'being affected by a famine during SGP'.

6.2 Possible Confounders and Important Controls

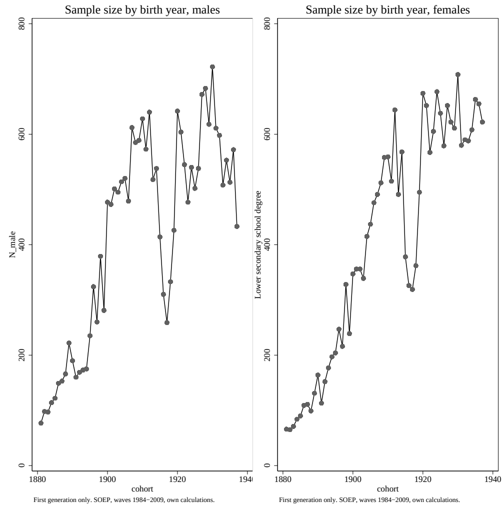
Several issues of selection, spurious correlation, and early age economic conditions need to be accounted for in the estimations. First, our analysis relies on the assumption that there are no differences in famine survival between the treated and control groups. Hence, we assume that children in their slow growth period have been about equally likely to die from the famine than children that were slightly younger or older at the time. Historical sources seem to back this claim. Death rates of children between the ages of one and five had risen by fifty percent during the famine, while for children from five to fifteen were only slightly higher (fifty-five percent) (Vincent, 1985).

Second, selection into fertility would be a problem if parents from differen social classes had been more or less likely to conceive male (female) children in the periods 1902-1903 (1902-1904) or 1910-1913 (1911-1913) than during the years 1904-1909 (1906-1910). Figures 2 and 3 however show that for the time period of births we are analyzing (1901-1914), overall birth rates do not show any systematic pattern. Together with the fact that the famine was impossible to anticipate a decade earlier, this makes us confident that selective fertility is not an issue for these birth cohorts.[11]

Third, systematic World War 2 survival could be problematic in the light of our sampling scheme. If for example SGP famine exposure had adverse health effects on the first generation, it would be less likely for them to have alive children, and thus less likely to be included as parents of SOEP-respondents. Similarly, if sons of men in our SGP-cohort were more likely to serve (and die) in WW II then daughters would be more common

[11] During WW1, on the other hand, the birthrate was falling from thirty per thousand to fifteen per thousand (Vincent, 1985).

Figure 3: Sample size by birth cohort



Note: SOEP, waves 2004-2009. The Figure displays the sample size of SOEP parents born during the years 1880-1940.

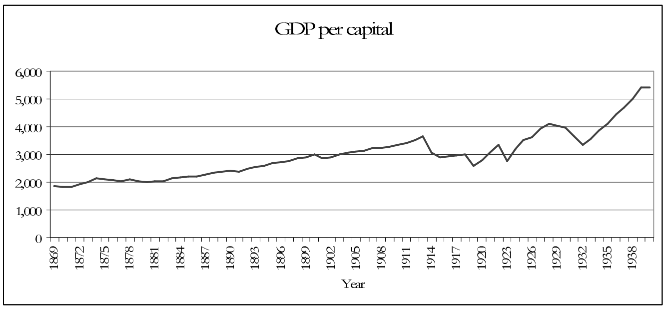
among their alive children. To investigate selective survival and fertility among first generation individuals with and without SGP famine exposure, we analyze the impact on the famine on first generation longevity, number of children and education. As shown in Table 2, we find no significant differences in schooling, age at death or number of sons. Besides, Table 3 shows that famine SGP exposure does not affect mortality. However, as shown in Table 2, first generation males do have more children and especially more daughters in our sample. This result is interesting and possibly related to findings by Kaati et al. (2002), who report a surfeit of food to reduce the number of offspring. Yet, it is important not to put too much emphasis on this findings as it is also possible that it reflects selective WW2 mortality of sons of the affected generation. To account for sample selectivity, we are thus including birth year fixed effects of the second and third generation. Besides, we are controlling for fertility, sibship size and parental age at birth.

Table 2: Estimation results, F0

	Males	Females
	(1)	(2)
Age at death	-.18	0.26
Number of Children	0.11**	-.03
Number of Daughters	0.09**	-.04
Number of Sons	0.02	0.008
Higher Secondary School Degree	-.01	0.01
N	4081	3253

Source: *GSOEP, all waves*, own calculations.
Robust standard errors are reported.

Figure 4: GDP per Capita, German Empire



Notes: 1990 International Geary-Khamis dollars.
Source: The World Economy: Historical Statistics, OECD Development Centre, Paris 2003.

Fourth, recent literature demonstrates long-run mortality effects of economic and health conditions at birth and during infancy (van den Berg et al., 2011). Such effects would bias our findings if the treated generation was born in years with systematically higher or lower GDP rates than the adjacent cohorts. Hence, we are controlling for business cycle trends and population size during the year of birth of our cohorts of interest. The data are displayed in Figure 4 and Figure 5, which show German GDP per capita estimates and population sizes for the years 1864-1940 as published by the OECD Development Centre.

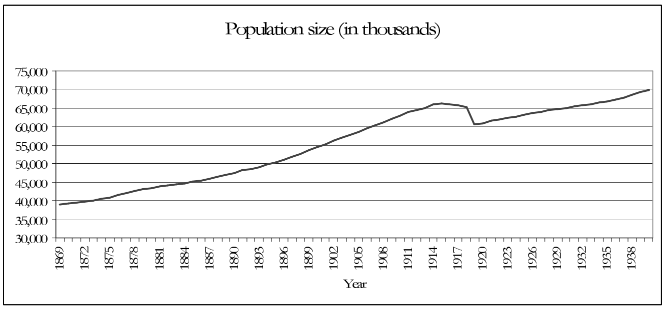
Fifth, we lack information on methylation patterns for all generations. Thus if we observe intergenerational correlations, we cannot be certain at all that our estimated effects are 'biological', let alone epigenetic. Other explanations for potential findings may be that SGP exposure affects height, fertility or cognitive and noncognitive skills of the first generation, which then influence later generation outcomes. Hence, epigenetic imprinting is only one possible channel through which intergenerational transmission of famine exposure may operate. We investigate this problem by conducting robustness checks with controls for possible mediating factors, such as parental education, sibship size or socioeconomic status.

Last, we only observe one period of famine, such that cohort effects can never be ruled out completely. As a solution, we use place of residence and class affectedness as additional non cohort-specific variation in famine intensity as described in Section 7.1.

7 Main Results

Our interest lies in the intergenerational transmission of first generation famine exposure on second and third generation outcomes. For the second generation, Figure 6 gives a graphical summary of the extensive number of results that can be found in Tables 4 to 15 (Columns 6 to 9). The graph displays the effect size of parental SGP-famine exposure

Figure 5: Population size, German Empire



Notes: Population in thousands.
Source: The World Economy: Historical Statistics, OECD Development Centre, Paris 2003.

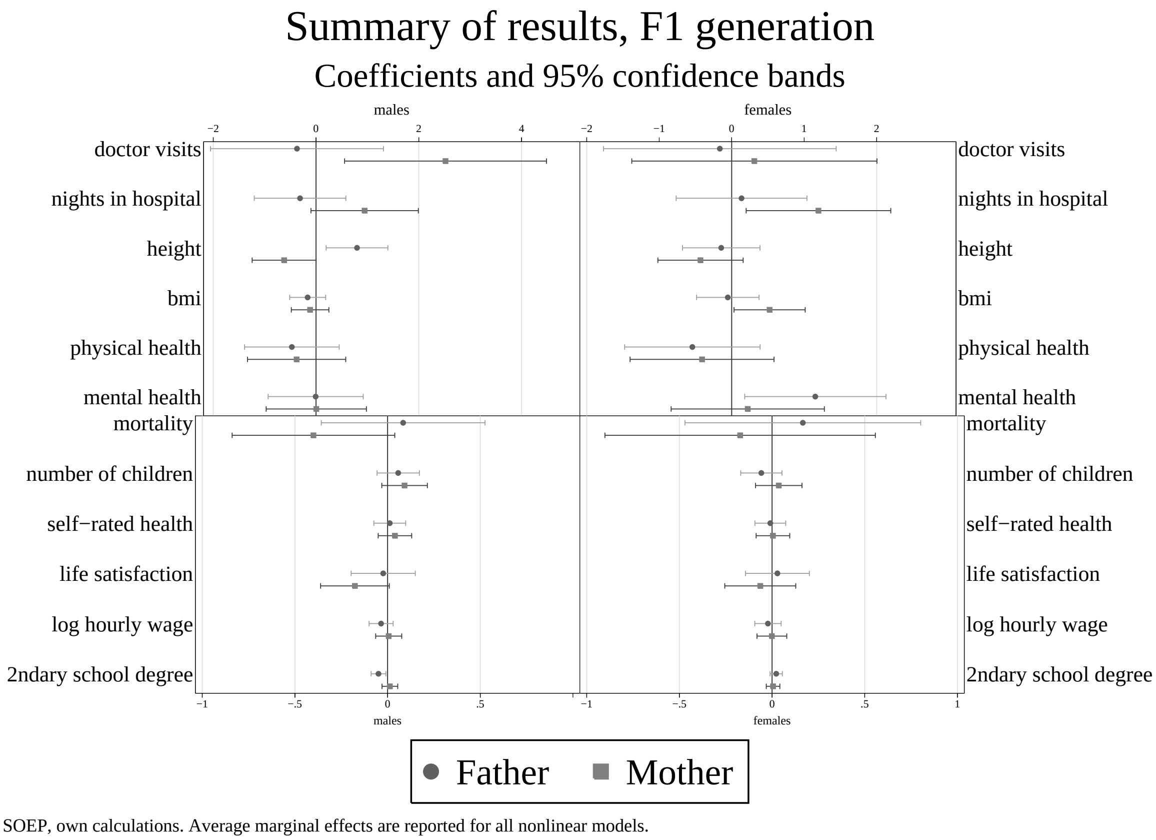
on all outcomes under consideration. Furthermore, effect sizes are estimated while controlling for GDP and birth rates at the time of birth of the first generation, parental age at birth of their children, own birth year fixed effects, age at the time of measurement, paternal and maternal birth year fixed effects, sibship size and parental education. The thin bars represent 95% confidence intervals. For most outcomes, we find that parental SGP exposure does not have an effect. However, the number of medical doctor visits and the number of nights spent in a hospital during the past year are significantly higher for males whose mother has been SGP-exposed to the famine, while body height and life satisfaction are lower. For females, only the number of nights spent in hospital is significantly higher if the mother has been exposed. Overall, maternal SGP famine exposure thus seems to have adverse health effects on the next generation. Furthermore, effects sizes are relatively large. Maternal SGP famine exposure increases the number of nights spent in a hospital by about one night, corresponding to 29% given that the average hospitalization rate in the sample is about 3.5 nights. What is interesting in this respect, is that mortality of second generation males seems to be lower is their mother has been exposed during SGP. Thus, morbidity increases while mortality reduces with maternal SGP exposure. Furthermore, for males we find that father famine exposure has a positive effect on height and a small but significant negative effect on the probability of obtaining a higher secondary school degree among males. Yet, this finding does not seem to be very robust across specifications. Our second generation findings are mostly incongruent with the findings by Kaati et al. In Pembrey et al. (2006), the authors find that poor food availability during maternal SGP reduces female mortality but not male mortality, while we find the opposite. Furthermore, their findings are 'gender line specific' meaning that maternal SGP exposure affects daughters, while paternal SGP exposure affects sons. We cannot confirm this result, but instead find stronger effects of maternal SGP exposure on males than on females.

Table 3: Estimation results of hazard model, F0

	males			females		
	(1)	(2)	(3)	(4)	(5)	(6)
Famine in SGP (males)	0.0009	-.01	-.02			
	(0.05)	(0.11)	(0.11)			
Famine in SGP (females)				-.05	0.02	0.02
				(0.05)	(0.1)	(0.1)
City size		0.02	0.03		0.04	0.04
		(0.03)	(0.03)		(0.03)	(0.03)
Interaction term, city*treatment (male)		0.03	0.03			
		(0.04)	(0.04)			
Interaction term, city*treatment (female)					-.05	-.05
					(0.04)	(0.04)
Indicator of class affectedness		-.26***	-.26***		-.15***	-.15***
		(0.05)	(0.06)		(0.05)	(0.04)
Interaction term, class*treatment (male)		0.0002	0.002			
		(0.07)	(0.07)			
Interaction term, class*treatment (female)					-.02	-.02
					(0.06)	(0.06)
Upper secondary school (males)			-.23***			
			(0.09)			
Intermediate school school (males)			-.12			
			(0.08)			
Upper secondary school (females)						-.50***
						(0.13)
Intermediate school school (females)						-.23***
						(0.07)
γ	0.11***	0.12***	0.12***	0.1***	0.11***	0.11***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
$\ln(\theta)$	-1.00***	-.98***	-.98***	-1.94***	-1.85***	-1.91***
	(0.15)	(0.14)	(0.14)	(0.32)	(0.29)	(0.31)
Obs.	3347	3347	3347	3061	3061	3061
LL	1563.28	1589.6	1594.17	1536.82	1549.42	1562.5

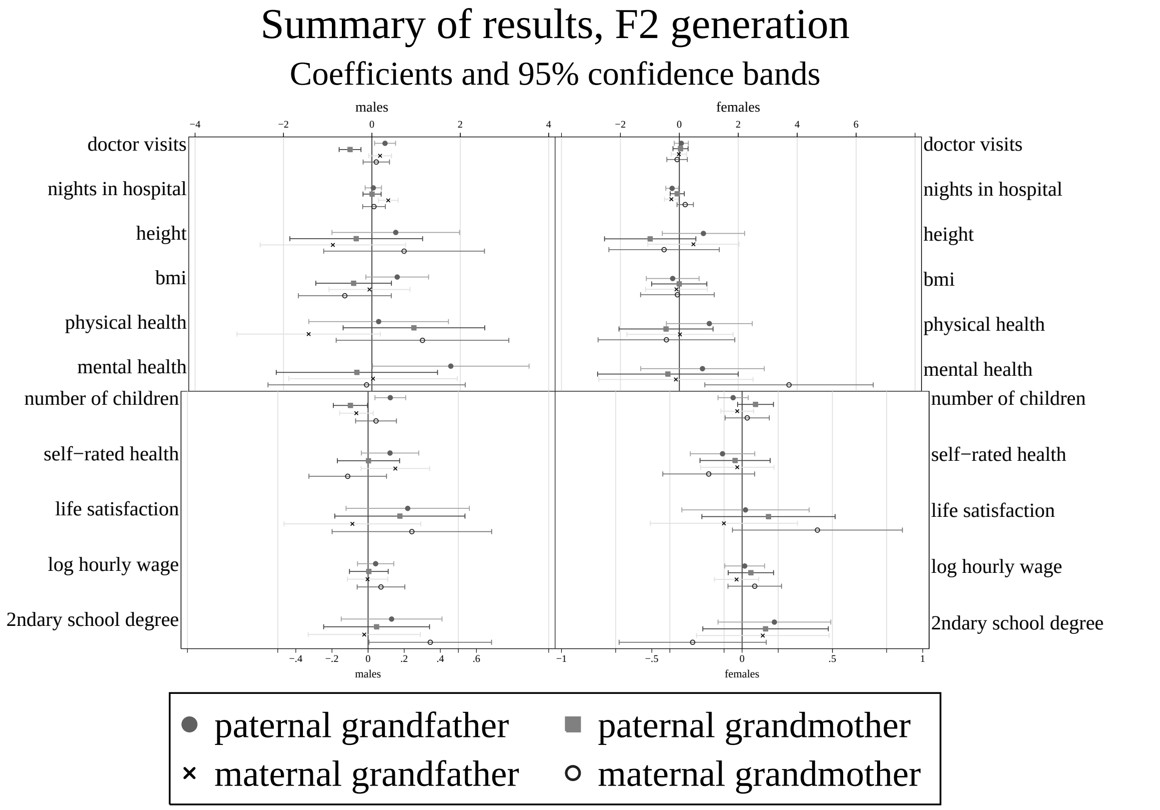
Source: *GSOEP, all waves*, own calculations.
The sample is truncated at age 44, excluding all individuals who have died before 1945. Table displays coefficients, not hazard rates. Gamma is an ancillary parameter that parametrizes the Gompertz baseline hazard function. $ln(\theta)$ parametrizes the gamma frailty distribution. Model accounts for censoring. Robust standard errors are reported.

Figure 6: Second generation results



Source: *GSOEP, all waves*, own calculations.
The graph displays coefficients and 95% bands for a variety of outcomes. Effect sizes are conditional on GDP and birth rates at the time of birth of the first generation, parental age at birth of their children, own birth year fixed effects, age at the time of measurement, paternal and maternal birth year fixed effects, sibship size and parental education. Robust standard errors were used to calculate confidence bands.

Figure 7: Third generation results



SOEP, own calculations. Average marginal effects are reported for all nonlinear models.

Source: *GSOEP, all waves*, own calculations.
The graph displays coefficients and 95% bands for a variety of outcomes. Effect sizes are conditional on GDP and birth rates at the time of birth of the first generation, parental age at birth of their children, own birth year fixed effects, age at the time of measurement, paternal and maternal birth year fixed effects, sibship size and parental education. Robust standard errors (clustered at the household level) were used to calculate confidence bands.

Table gives a summary of results for the third generation. Note, that now there are four ancestors who have potentially been affected by the famine during their SGP: the paternal grandfather, the paternal grandmother, the maternal grandfather and the maternal grandmother. We find that if the paternal grandfather is affected by the famine, the male number of children increases as does the probability of obtaining higher secondary schooling for males if the maternal grandmother is treated. Besides, there is a positive effect of maternal grandmother affectedness on the number nights spent in a hospital. Kaati et al. (2007) and Pembrey et al. (2006) argue it is likely for imprinting to be sex-specific. This would imply that males were more likely to be affected by the father and paternal grandfather, while females were affected by their mother's and maternal grandmother's famine exposure. Overall, we do not find evidence for male-line or female-line effects on health. The only results that points to such sex-specific imprinting is the effect on mental health and, although not significant, the effect on life satisfaction. We find that paternal grandfather SGP exposure has positive effects of the mental health of the grandson, while maternal grandmother SGP exposure positively affects granddaughters' mental well-being.[12]

7.1 Effect Heterogeneity and Robustness Checks

To address some of the open issues mentioned in Section 6.2 and to check to which extend our findings are robust, we conduct three robustness checks. First, we investigate whether the exclusion of parental education and sibship size as possible 'non-biological' mediators factors affects our results. To see whether results are affected, one needs to compare Columns 3 and 4 (9 and 10) for males (females) of the second generation, and Columns 5 and 6 (13 and 14) for males (females) of the third generation. All results remain about the same. Hence, parental education or family size do not seem to be important mediating factors.

Second, we expect the effect of the famine to have had more detrimental effects on a) the population living in cities and b) those parts of the population whose wages were not flexibly adjusted to keep pace with rising food prices.[13] First, city dwellers were more heavily affected because most large German cities had severely controlled food rations (Vincent, 1985). Furthermore, food rations (especially of potatoes) could often not be met in the cities due to a lack of supply from farmers who refused to sell their products at the prevailing fix-prices (Klein, 1968). Individuals in large cities were also disproportionately affected by the Spanish Influenza (Witte, 2008). Secondly, in general, the lower classes suffered more from the famine as their monetary reserves were depleted more quickly (Klein, 1968). Lower-class civil servants and public sector employees were worst of, because their wages were not adjusted as flexibly to the rising level of prices. Contrarily, the daily nominal wage of a male blue-collar worker increased during the famine, because two thirds of the male population was serving in the war and physical labor was in high demand.[14] Rising nominal wages thus buffered some of the hardship experienced by blue collar workers, although real wages continued to decrease as a consequence of a sharp increase in prices. As a robustness check, we use two additional measures of famine heterogeneity that we interact with the famine dummy: First, the size of the city an individual lived in during the famine (*city*) and second an indicator of social class (*class*). For class we distinguish between three groups of individuals: farmers and farm workers (class=0), who had the greatest access to food; high-skilled high-pay occupations (class=1), and low-skilled low-pay occupations (class=2). Note that *city* and *class* are not directly observed in our data. We thus proxy *city* by the city size where F0-individuals

[12]Note that in our sample, almost none of the third generation individuals has died, such that we cannot investigate mortality effects.

[13]The incidence of starvation was highest among inmates of jails, asylums and other institutions where food rations were particularly sparse (Vincent, 1985)

[14]For example, the nominal wage of blue collar workers increased by 17-13% between September 1916 and March 1917.

raised their own children and *class* by their own class status. These proxies are insofar problematic as the imply conditioning on outcomes of F0. However, this problem is less severe in this generation where physical and social mobility was still relatively low. If our class and city interaction terms were to capture higher famine intensity, we would expect most of these interaction terms to affect outcomes adversely. Overall, this is not the case, such that the results have to be interpreted with caution. Most of the estimated effect coefficients keep their sign, but standard errors increase and often the terms become insignificant. (this part still needs work and we need different indicators of famine intensity)

Apart from the World War 1 famine, German history is very rich in other events, such as the great depression or World War 2, that may influence outcomes as well as the probability for an individual to appear in our sample. The inclusion of birth year fixed effects for the second and third generation should control for most of this variation and, if such differences exist, we should always observe a difference between treated and controls. Yet, as a robustness check where we repeat our estimations for a sample as homogenous as possible: We restrict second and third generation observations to those where both parents or all four grandparents have been born in the period of 1902-1913. The results are displayed in Columns 6 and 12 of Tables 4 to 15 for the second generation and in Columns 8 and 16 of Tables to for the third generation. Most results, prevail in this smaller sample, but some change considerably. For the second generation, the negative maternal effect on health becomes insignificant for males, but remains for females. However, now also the negative effect of maternal SGP treatment on female height becomes significant. Furthermore, the negative effect of male secondary schooling becomes insignificant. If we repeat the exercise for the third generation, we remain with less than 200 observations, such that parental birth year fixed effects can no longer be estimated and the power of all estimations becomes pretty low. We find that if the paternal grandfather effect on the male number of children vanishes. Instead now maternal grandmother famine affectedness is positively associated with the number of children. Yet, the higher probability of obtaining higher secondary schooling for males if the maternal grandmother is famine affected remains, as does the positive effect of maternal grandmother affectedness on the number nights spent in a hospital. The effect gender-line specific effects on mental health remain in their signs and magnitude, but become mostly insignificant.

8 Conclusion

This paper uses the German World War 1 famine of 1916-1918 to reproduce and extend findings from the biological literature, which are highly relevant to economics and the social sciences. Previous work in this literature has found that food availability during the slow growth period affects health outcomes of subsequent generations. Furthermore, this literature argues that effects are passed down the so-called male or female line i.e. from father to son to grandson and from mother to daughter to granddaughter. We cannot confirm this result. The only result that hints towards sex-specific inheritance of epigenetic marks is the effect of first generation famine exposure on mental health: Paternal grandfather SGP-famine exposure is associate with higher mental health of third generation sons, while maternal grandmother SGP-famine exposure has a positive effect on her granddaughters mental health.

Besides, our findings suggest that among second generation individuals maternal SGP-famine exposure is associated with adverse health effects. For the third generation, we find that paternal grandmother SGP-famine exposure tends to slightly reduce health outcomes and that paternal SGP-exposure increases the number of children. We do not find robust effects for economic outcomes such as schooling or wages.

Last, we find that being exposed to a famine affects the number of children of first generation individuals in our sample, indicating that it is important to account for dynamic intergenerational sample selection and fertility effects.

Regression Tables

Second generation

Table 4: Estimation results of hazard model, F1

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	0.04		0.12	0.08	0.13	-.09	0.14		0.16	0.17	1.95	0.55
	(0.22)		(0.23)	(0.23)	(0.46)	(0.35)	(0.31)		(0.31)	(0.32)	(2.06)	(0.68)
Mother famine in SGP		-.40*	-.43*	-.40*	-.82	-.13		-.15	-.17	-.17	0.05	-.40
		(0.22)	(0.23)	(0.22)	(0.54)	(0.3)		(0.35)	(0.35)	(0.37)	(0.93)	(0.9)
City size					-.02						0.3	
					(0.12)						(0.29)	
City*treatment (father)					-.13						-1.07*	
					(0.19)						(0.57)	
City*treatment (mother)					0.28						1.21***	
					(0.18)						(0.46)	
Indicator of class affectedness					-.27						0.39	
					(0.22)						(0.41)	
Class*treatment (father)					0.03						-.86	
					(0.31)						(1.23)	
Class*treatment (mother)					0.17						-1.00*	
					(0.36)						(0.6)	
Mother upper secondary school				-.28	-.27	-20.47***				-.89	-1.58	-3.25
				(0.64)	(0.64)	(0.58)				(0.96)	(1.31)	(2.21)
Mother intermediate school				-.75	-.73	-.33				-.97	-1.03	-2.01
				(0.48)	(0.49)	(0.6)				(0.67)	(1.00)	(1.31)
Father upper secondary school				-.33	-.37	-.53				0.61	0.82	0.83
				(0.47)	(0.48)	(0.71)				(0.56)	(0.74)	(1.14)
Father intermediate school				-.10	-.10	-.45				-1.11	-1.99	-2.93
				(0.36)	(0.36)	(0.51)				(0.93)	(1.72)	(2.14)
Number of brothers				0.02	0.01	-.02				-.05	-.13	0.02
				(0.09)	(0.09)	(0.13)				(0.15)	(0.22)	(0.34)
Number of sisters				0.07	0.06	0.05				0.18	0.27	0.29
				(0.09)	(0.09)	(0.11)				(0.17)	(0.33)	(0.26)
γ	0.5***	0.5***	0.5***	0.49***	0.5***	0.49***	0.58***	0.59***	0.58***	0.61***	0.88***	1.10**
	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)	(0.09)	(0.13)	(0.13)	(0.13)	(0.21)	(0.29)	(0.46)
$\ln(\theta)$	1.45*	1.39**	1.45**	1.31	1.41*	1.49	2.44***	2.49***	2.46***	2.55**	3.34***	3.83***
	(0.78)	(0.7)	(0.7)	(0.9)	(0.77)	(1.16)	(0.75)	(0.72)	(0.75)	(1.07)	(0.75)	(0.67)
Obs.	2130	2130	2130	2130	2130	1222	2164	2164	2164	2164	2164	1270
LL	-116.93	-115.01	-114.84	-110.78	-108.43	-77.19	-124.41	-124.4	-124.27	-119.78	-110.89	-73.51

Source: *GSOEP, all waves*, own calculations.
The sample is censored for all individuals who have not died by 2009. Table displays coefficients, not hazard rates. Gamma is an ancillary parameter that parametrizes the Gompertz baseline hazard function. $\ln(\theta)$ parameterizes the gamma frailty distribution. Model accounts for censoring. Robust standard errors are reported.

Table 5: Impact of famine during SGP on body height of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	0.53*		0.64**	0.8***	0.67	0.72*	-.32		-.26	-.14	-.80	-.40
	(0.31)		(0.31)	(0.31)	(0.67)	(0.4)	(0.27)		(0.27)	(0.27)	(0.62)	(0.37)
Mother famine in SGP		-.44	-.58*	-.62*	-.28	-.69		-.37	-.31	-.43	-.78	-.97**
		(0.32)	(0.32)	(0.32)	(0.69)	(0.44)		(0.3)	(0.3)	(0.3)	(0.65)	(0.42)
City*treatment (father)					0.24						0.67***	
					(0.28)						(0.25)	
City*treatment (mother)					-.26						-.08	
					(0.28)						(0.27)	
Class*treatment (father)					-.004						0.15	
					(0.48)						(0.43)	
Class*treatment (mother)					-.16						0.32	
					(0.49)						(0.45)	
City size					0.28						-.38**	
					(0.19)						(0.17)	
Indicator of class affectedness					0.49						-.11	
					(0.32)						(0.31)	
Mother upper secondary school				0.47	0.41	0.21				1.85**	1.85**	-.17
				(1.03)	(1.02)	(1.67)				(0.93)	(0.92)	(1.31)
Mother intermediate school				-.38	-.41	-.20				1.03**	1.08**	0.36
				(0.59)	(0.59)	(0.86)				(0.51)	(0.51)	(0.71)
Father upper secondary school				3.77***	3.85***	4.27***				1.62***	1.60***	1.86**
				(0.64)	(0.64)	(1.00)				(0.53)	(0.53)	(0.8)
Father intermediate school				2.76***	2.78***	2.35***				0.45	0.44	-.14
				(0.5)	(0.51)	(0.67)				(0.5)	(0.5)	(0.68)
Number of brothers				-.27*	-.23*	-.36*				-.19	-.18	-.13
				(0.14)	(0.14)	(0.18)				(0.13)	(0.13)	(0.17)
Number of sisters				-.17	-.12	-.16				-.30***	-.29**	-.39***
				(0.14)	(0.14)	(0.18)				(0.11)	(0.11)	(0.14)
Obs.	2130	2130	2130	2130	2130	1222	2164	2164	2164	2164	2164	1270
$R^2 - adj.$	0.06	0.06	0.06	0.1	0.1	0.08	0.02	0.02	0.02	0.04	0.04	0.04

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 6: Impact of famine during SGP on BMI of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	-.15		-.13	-.16	-.32	0.02	0.12		0.03	-.05	-.47	0.006
	(0.18)		(0.18)	(0.18)	(0.39)	(0.22)	(0.21)		(0.22)	(0.22)	(0.56)	(0.3)
Mother famine in SGP		-.17	-.15	-.12	0.04	-.13		0.45*	0.44*	0.52**	1.75***	0.44
		(0.18)	(0.19)	(0.19)	(0.39)	(0.26)		(0.24)	(0.25)	(0.25)	(0.68)	(0.39)
City*treatment (father)					0.5***						-.01	
					(0.16)						(0.18)	
City*treatment (mother)					-.01						0.19	
					(0.16)						(0.2)	
Class*treatment (father)					-.15						0.34	
					(0.28)						(0.36)	
Class*treatment (mother)					-.12						-1.06**	
					(0.28)						(0.43)	
City size					-.26**						-.04	
					(0.11)						(0.13)	
Indicator of class affectedness					-.03						0.12	
					(0.2)						(0.22)	
Mother upper secondary school				-.73	-.80*	-.38				-1.23**	-1.27**	-.70
				(0.46)	(0.46)	(0.57)				(0.61)	(0.61)	(0.83)
Mother intermediate school				-.34	-.34	-.48				-.50	-.52	-.38
				(0.29)	(0.3)	(0.39)				(0.4)	(0.4)	(0.55)
Father upper secondary school				-.65**	-.67**	-1.06**				-1.73***	-1.69***	-2.11***
				(0.32)	(0.33)	(0.45)				(0.43)	(0.43)	(0.6)
Father intermediate school				-.90***	-.89***	-1.21***				-.78**	-.79**	0.08
				(0.28)	(0.28)	(0.35)				(0.39)	(0.39)	(0.52)
Number of brothers				0.02	0.01	0.11				0.14	0.14	0.13
				(0.08)	(0.08)	(0.1)				(0.1)	(0.1)	(0.14)
Number of sisters				-.13*	-.13	-.01				0.1	0.09	0.13
				(0.08)	(0.08)	(0.1)				(0.09)	(0.09)	(0.11)
Obs.	2130	2130	2130	2130	2130	1222	2164	2164	2164	2164	2164	1270
$R^2 - adj.$	0.02	0.02	0.02	0.03	0.03	0.04	0.005	0.007	0.007	0.03	0.03	0.03

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 7: Impact of famine during SGP on the number of children of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	0.09		0.07	0.06	0.09	0.03	-.04		-.04	-.06	0.09	-.08
	(0.06)		(0.06)	(0.06)	(0.13)	(0.07)	(0.06)		(0.06)	(0.06)	(0.14)	(0.08)
Mother famine in SGP		0.1*	0.09	0.09	0.21	0.12		0.008	0.02	0.04	0.14	-.01
		(0.06)	(0.06)	(0.06)	(0.13)	(0.09)		(0.06)	(0.06)	(0.06)	(0.15)	(0.09)
City*treatment (father)					0.12**						-.02	
					(0.06)						(0.05)	
City*treatment (mother)					-.05						0.04	
					(0.06)						(0.06)	
Class*treatment (father)					-.09						-.10	
					(0.09)						(0.1)	
Class*treatment (mother)					-.06						-.10	
					(0.09)						(0.1)	
City size					-.16***						-.10**	
					(0.04)						(0.04)	
Indicator of class affectedness					0.01						-.08	
					(0.06)						(0.08)	
Mother upper secondary school				-.06	-.08	0.03				-.19	-.21	-.44*
				(0.16)	(0.16)	(0.22)				(0.18)	(0.17)	(0.23)
Mother intermediate school				0.05	0.05	0.07				-.20**	-.20**	-.29**
				(0.1)	(0.1)	(0.14)				(0.1)	(0.1)	(0.13)
Father upper secondary school				0.02	0.008	-.18				0.04	0.02	0.1
				(0.1)	(0.1)	(0.14)				(0.11)	(0.11)	(0.16)
Father intermediate school				-.16	-.17*	-.27**				-.17*	-.17*	-.19
				(0.1)	(0.1)	(0.13)				(0.1)	(0.1)	(0.13)
Number of brothers				0.07***	0.06**	0.07*				0.06**	0.05**	0.08**
				(0.03)	(0.03)	(0.04)				(0.03)	(0.03)	(0.03)
Number of sisters				0.06**	0.05**	0.08***				0.08***	0.06**	0.08**
				(0.02)	(0.02)	(0.03)				(0.03)	(0.03)	(0.03)
Obs.	2130	2130	2130	2130	2130	1222	2164	2164	2164	2164	2164	1270
LL	-3383.75	-3383.46	-3382.92	-3373.71	-3360.5	-1945.92	-3484.62	-3484.76	-3484.59	-3471.68	-3460.81	-2013.73

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 8: Impact of famine during SGP on the probability of obtaining an upper secondary school degree of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	-.07***		-.07***	-.05**	-.02	-.04	0.006		0.002	0.02	0.04	0.03
	(0.02)		(0.02)	(0.02)	(0.05)	(0.03)	(0.02)		(0.02)	(0.02)	(0.04)	(0.02)
Mother famine in SGP		0.005	0.02	0.01	-.002	-.003		0.02	0.02	0.005	-.04	0.01
		(0.02)	(0.02)	(0.02)	(0.05)	(0.03)		(0.02)	(0.02)	(0.02)	(0.04)	(0.03)
City*treatment (father)					0.03						-.01	
					(0.02)						(0.01)	
City*treatment (mother)					-.01						0.02	
					(0.02)						(0.02)	
Class*treatment (father)					-.04						-.009	
					(0.03)						(0.03)	
Class*treatment (mother)					0.02						0.03	
					(0.03)						(0.03)	
City size					-.02						-.02*	
					(0.01)						(0.01)	
Indicator of class affectedness					0.04**						0.002	
					(0.02)						(0.02)	
Mother upper secondary school				0.2***	0.2***	0.37***				0.31***	0.31***	0.35***
				(0.07)	(0.07)	(0.11)				(0.07)	(0.07)	(0.1)
Mother intermediate school				0.16***	0.16***	0.19***				0.21***	0.21***	0.14***
				(0.04)	(0.04)	(0.06)				(0.04)	(0.04)	(0.05)
Father upper secondary school				0.39***	0.39***	0.33***				0.17***	0.17***	0.15***
				(0.04)	(0.04)	(0.07)				(0.04)	(0.04)	(0.05)
Father intermediate school				0.23***	0.23***	0.23***				0.12***	0.12***	0.09*
				(0.04)	(0.04)	(0.05)				(0.04)	(0.04)	(0.05)
Number of brothers				-.02**	-.02**	-.03***				-.02***	-.02***	-.03**
				(0.009)	(0.009)	(0.01)				(0.008)	(0.008)	(0.01)
Number of sisters				-.03***	-.03***	-.04***				-.02**	-.02**	-.02**
				(0.009)	(0.009)	(0.01)				(0.007)	(0.007)	(0.009)
Obs.	2115	2115	2115	2115	2115	1208	2084	2084	2084	2084	2084	1235
LL	-1317.61	-1322.13	-1317.29	-1170.99	-1165.64	-643.42	-975.29	-974.64	-974.63	-855.49	-850.77	-493.06

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 9: Impact of famine during SGP on the physical health score of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	-.67		-.61	-.47	0.56	-.14	-.70		-.63	-.54	-.53	-.65
	(0.47)		(0.47)	(0.47)	(1.02)	(0.62)	(0.46)		(0.48)	(0.48)	(1.05)	(0.61)
Mother famine in SGP		-.43	-.31	-.38	0.23	-.39		-.49	-.34	-.41	-1.76	-.53
		(0.49)	(0.49)	(0.49)	(1.03)	(0.72)		(0.49)	(0.51)	(0.51)	(1.07)	(0.71)
City*treatment (father)					-.30						0.34	
					(0.44)						(0.43)	
City*treatment (mother)					-.76*						-.54	
					(0.42)						(0.45)	
Class*treatment (father)					-.64						-.22	
					(0.73)						(0.75)	
Class*treatment (mother)					-.06						1.35*	
					(0.71)						(0.78)	
City size					0.39						-.05	
					(0.27)						(0.29)	
Indicator of class affectedness					0.9*						-.17	
					(0.51)						(0.51)	
Mother upper secondary school				2.48*	2.48*	3.22*				2.38	2.43	0.24
				(1.38)	(1.37)	(1.95)				(1.49)	(1.50)	(2.12)
Mother intermediate school				2.73***	2.72***	2.83**				0.78	0.86	-.22
				(0.85)	(0.85)	(1.26)				(0.86)	(0.87)	(1.09)
Father upper secondary school				1.67*	1.73*	1.71				2.49***	2.44***	3.00**
				(0.89)	(0.9)	(1.36)				(0.94)	(0.94)	(1.29)
Father intermediate school				1.40*	1.39	1.69				0.49	0.46	1.60
				(0.85)	(0.85)	(1.23)				(0.86)	(0.86)	(1.09)
Number of brothers				-.19	-.17	-.11				-.06	-.06	-.009
				(0.21)	(0.21)	(0.28)				(0.21)	(0.22)	(0.28)
Number of sisters				-.07	-.06	-.26				0.04	0.05	0.03
				(0.21)	(0.21)	(0.29)				(0.18)	(0.19)	(0.23)
Obs.	2062	2062	2062	2062	2062	1184	2075	2075	2075	2075	2075	1223
$R^2 - adj.$	0.07	0.07	0.07	0.09	0.09	0.08	0.09	0.09	0.09	0.1	0.1	0.08

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 10: Impact of famine during SGP on the mental health score of the second generation

	males								females			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	-.10		-.11	-.007	-.01	0.28	1.15**		1.10**	1.15**	0.42	1.25*
	(0.47)		(0.47)	(0.47)	(1.02)	(0.63)	(0.48)		(0.5)	(0.5)	(1.15)	(0.67)
Mother famine in SGP		0.02	0.04	0.005	0.89	0.69		0.5	0.24	0.22	-.02	-.06
		(0.5)	(0.5)	(0.5)	(1.06)	(0.71)		(0.52)	(0.54)	(0.54)	(1.19)	(0.74)
City*treatment (father)					-.17						-.09	
					(0.42)						(0.45)	
City*treatment (mother)					-.86**						0.73	
					(0.42)						(0.47)	
Class*treatment (father)					0.14						0.56	
					(0.7)						(0.79)	
Class*treatment (mother)					-.24						-.16	
					(0.73)						(0.82)	
City size					0.55**						-.08	
					(0.27)						(0.33)	
Indicator of class affectedness					1.36***						1.07*	
					(0.49)						(0.57)	
Mother upper secondary school				-1.56	-1.60	1.54				-1.82	-1.73	-1.88
				(1.17)	(1.19)	(1.69)				(1.27)	(1.28)	(1.71)
Mother intermediate school				1.91**	1.84**	3.72***				-.65	-.68	-.74
				(0.8)	(0.8)	(1.07)				(0.9)	(0.91)	(1.20)
Father upper secondary school				1.84**	1.98**	-.24				2.34***	2.48***	3.56***
				(0.86)	(0.87)	(1.27)				(0.91)	(0.92)	(1.24)
Father intermediate school				0.38	0.38	0.45				0.17	0.26	0.43
				(0.82)	(0.82)	(1.13)				(0.93)	(0.93)	(1.25)
Number of brothers				-.12	-.07	-.26				-.50**	-.46**	-.14
				(0.21)	(0.21)	(0.29)				(0.23)	(0.23)	(0.29)
Number of sisters				-.10	-.07	-.21				0.19	0.25	0.01
				(0.21)	(0.21)	(0.29)				(0.2)	(0.2)	(0.24)
Obs.	2062	2062	2062	2062	2062	1184	2075	2075	2075	2075	2075	1223
$R^2 - adj.$	0.03	0.03	0.03	0.03	0.04	0.04	0.06	0.05	0.06	0.06	0.06	0.04

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 11: Impact of famine during SGP on number of nights in hospital (past year) of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	0.04		-.16	-.31	-1.50	-.28	0.42		0.14	0.14	-.03	0.19
	(0.48)		(0.48)	(0.45)	(0.98)	(0.55)	(0.49)		(0.48)	(0.46)	(0.95)	(0.59)
Mother famine in SGP		0.92*	0.96*	0.95*	1.96	0.27		1.18**	1.14**	1.20**	-.40	1.48**
		(0.55)	(0.55)	(0.53)	(1.19)	(0.63)		(0.54)	(0.52)	(0.51)	(0.95)	(0.67)
City*treatment (father)					0.7*						-.05	
					(0.38)						(0.36)	
City*treatment (mother)					1.13***						1.43***	
					(0.42)						(0.4)	
Class*treatment (father)					0.56						0.11	
					(0.69)						(0.74)	
Class*treatment (mother)					-1.48**						0.28	
					(0.71)						(0.71)	
City size					-.66**						-.24	
					(0.26)						(0.25)	
Indicator of class affectedness					-.63						-.35	
					(0.48)						(0.49)	
Mother upper secondary school				6.73*	5.44*	2.71				-.52	-.54	-2.74***
				(3.43)	(2.82)	(3.69)				(1.34)	(1.33)	(1.00)
Mother intermediate school				-.06	-.12	-.40				-.76	-.87	-1.47*
				(0.85)	(0.83)	(1.10)				(0.66)	(0.63)	(0.84)
Father upper secondary school				-.67	-.59	0.18				1.08	1.43	2.18
				(0.76)	(0.78)	(1.30)				(1.14)	(1.18)	(2.12)
Father intermediate school				-.59	-.39	0.47				-.50	-.13	-.57
				(0.71)	(0.72)	(1.10)				(0.73)	(0.78)	(0.96)
Number of brothers				0.18	0.15	0.05				0.62***	0.62***	0.95***
				(0.21)	(0.2)	(0.26)				(0.23)	(0.23)	(0.33)
Number of sisters				-.09	-.12	-.14				-.37**	-.33*	-.33
				(0.21)	(0.2)	(0.25)				(0.18)	(0.18)	(0.22)
Obs.	2102	2102	2102	2102	2102	1208	2130	2130	2130	2130	2130	1255
LL	-5272.05	-5267.82	-5267.69	-5250.63	-5225.43	-3013.7	-5246.61	-5240.81	-5240.69	-5224.53	-5203.69	-3064.98

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 12: Impact of famine during SGP on self-rated health status of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	0.03		0.02	0.01	0.03	-.02	-.003		-.003	-.009	0.08	-.01
	(0.04)		(0.04)	(0.04)	(0.09)	(0.06)	(0.04)		(0.04)	(0.04)	(0.1)	(0.06)
Mother famine in SGP		0.04	0.03	0.04	-.0006	0.06		0.0003	0.001	0.005	0.03	0.05
		(0.05)	(0.05)	(0.05)	(0.1)	(0.07)		(0.05)	(0.05)	(0.05)	(0.1)	(0.06)
City*treatment (father)					-.01						-.007	
					(0.04)						(0.04)	
City*treatment (mother)					0.12***						0.08*	
					(0.04)						(0.04)	
Class*treatment (father)					-.01						-.06	
					(0.07)						(0.07)	
Class*treatment (mother)					-.04						-.07	
					(0.07)						(0.07)	
City size					-.03						-.03	
					(0.03)						(0.03)	
Indicator of class affectedness					-.09*						-.04	
					(0.05)						(0.05)	
Mother upper secondary school				-.19	-.18	-.32*				-.38***	-.39***	-.30*
				(0.14)	(0.14)	(0.18)				(0.13)	(0.13)	(0.17)
Mother intermediate school				-.22***	-.21***	-.25**				-.10	-.11	-.0002
				(0.08)	(0.08)	(0.12)				(0.08)	(0.08)	(0.1)
Father upper secondary school				-.17*	-.18**	-.11				-.21**	-.21**	-.37***
				(0.09)	(0.09)	(0.14)				(0.09)	(0.09)	(0.12)
Father intermediate school				-.08	-.08	-.07				0.03	0.04	-.09
				(0.08)	(0.08)	(0.11)				(0.07)	(0.08)	(0.1)
Number of brothers				0.03*	0.03	0.03				0.02	0.02	0.01
				(0.02)	(0.02)	(0.03)				(0.02)	(0.02)	(0.03)
Number of sisters				0.007	0.006	0.02				-.04**	-.04**	-.04*
				(0.02)	(0.02)	(0.03)				(0.02)	(0.02)	(0.02)
Obs.	2092	2092	2092	2092	2092	1196	2126	2126	2126	2126	2126	1253
$R^2 - adj.$	0.05	0.05	0.05	0.07	0.07	0.05	0.07	0.07	0.07	0.08	0.08	0.08

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 13: Impact of famine during SGP on the number of doctor visits last year of the second generation

	males							females				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	-.02 (0.84)		-.41 (0.86)	-.37 (0.86)	0.92 (2.13)	-.75 (1.02)	-.12 (0.81)		-.17 (0.83)	-.16 (0.82)	1.45 (1.62)	0.1 (1.05)
Mother famine in SGP		2.48** (0.99)	2.56** (1.03)	2.52** (1.00)	2.06 (2.35)	1.28 (1.18)		0.25 (0.84)	0.28 (0.86)	0.31 (0.86)	-1.22 (1.71)	-.64 (1.19)
City*treatment (father)					-.98 (0.81)						-.70 (0.72)	
City*treatment (mother)					1.29 (0.9)						2.42*** (0.77)	
Class*treatment (father)					-.46 (1.44)						-.84 (1.20)	
Class*treatment (mother)					-.59 (1.53)						-.10 (1.26)	
City size					0.93* (0.53)						-.76 (0.49)	
Indicator of class affectedness					-.73 (0.89)						0.73 (0.88)	
Mother upper secondary school				-5.26*** (1.91)	-5.29*** (1.89)	-8.22*** (1.86)				0.18 (2.50)	-.03 (2.41)	0.08 (3.03)
Mother intermediate school				-2.55 (1.68)	-2.31 (1.69)	-2.21 (2.15)				-.56 (1.39)	-.71 (1.40)	0.02 (2.00)
Father upper secondary school				3.07 (2.81)	3.37 (2.87)	7.08 (4.50)				-1.69 (1.40)	-1.45 (1.43)	-3.23* (1.85)
Father intermediate school				1.34 (1.69)	1.46 (1.68)	4.64* (2.37)				1.89 (1.64)	2.43 (1.69)	2.84 (2.40)
Number of brothers				0.52 (0.45)	0.51 (0.43)	0.82 (0.53)				0.49 (0.38)	0.49 (0.37)	0.09 (0.5)
Number of sisters				0.33 (0.4)	0.4 (0.41)	0.6 (0.5)				-1.04*** (0.36)	-1.07*** (0.36)	-.94** (0.47)
Obs.	2088	2088	2088	2088	2088	1195	2120	2120	2120	2120	2120	1250
LL	-7908.18	-7903.34	-7903.19	-7896.62	-7887.06	-4504.98	-8060.08	-8060.04	-8060.01	-8050.86	-8042.91	-4754.61

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 14: Impact of famine during SGP on life satisfaction of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	-.08		-.05	-.02	0.12	0.07	0.005		0.02	0.03	-.07	0.008
	(0.09)		(0.09)	(0.09)	(0.2)	(0.12)	(0.09)		(0.09)	(0.09)	(0.19)	(0.11)
Mother famine in SGP		-.17*	-.16*	-.18*	-.17	-.18		-.05	-.05	-.06	-.12	-.04
		(0.09)	(0.09)	(0.09)	(0.21)	(0.14)		(0.09)	(0.1)	(0.1)	(0.2)	(0.13)
City*treatment (father)					-.11						-.03	
					(0.08)						(0.08)	
City*treatment (mother)					-.17**						0.02	
					(0.08)						(0.08)	
Class*treatment (father)					-.05						0.08	
					(0.14)						(0.13)	
Class*treatment (mother)					0.1						0.04	
					(0.14)						(0.15)	
City size					0.09*						0.02	
					(0.05)						(0.06)	
Indicator of class affectedness					0.24**						0.19*	
					(0.09)						(0.1)	
Mother upper secondary school				0.12	0.12	0.28				0.02	0.04	0.44
				(0.24)	(0.24)	(0.29)				(0.28)	(0.28)	(0.32)
Mother intermediate school				0.29*	0.28*	0.28				0.18	0.19	0.22
				(0.16)	(0.15)	(0.22)				(0.16)	(0.16)	(0.21)
Father upper secondary school				0.53***	0.55***	0.41*				0.36**	0.37**	0.48*
				(0.16)	(0.16)	(0.23)				(0.18)	(0.18)	(0.25)
Father intermediate school				0.4***	0.39***	0.41**				0.07	0.08	0.09
				(0.14)	(0.14)	(0.2)				(0.16)	(0.16)	(0.21)
Number of brothers				-.05	-.04	-.03				-.02	-.02	0.03
				(0.04)	(0.04)	(0.06)				(0.04)	(0.04)	(0.05)
Number of sisters				0.05	0.05	0.08*				0.04	0.05	0.04
				(0.04)	(0.04)	(0.05)				(0.04)	(0.04)	(0.04)
Obs.	2096	2096	2096	2096	2096	1201	2123	2123	2123	2123	2123	1251
$R^2 - adj.$	0.02	0.03	0.03	0.04	0.05	0.03	0.02	0.02	0.02	0.03	0.03	0.02

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 15: Impact of famine during SGP on net actual hourly wage of the second generation

	males						females					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father famine in SGP	-.04 (0.03)		-.04 (0.03)	-.03 (0.03)	-.12 (0.08)	0.003 (0.04)	-.03 (0.04)		-.03 (0.04)	-.02 (0.04)	-.006 (0.09)	-.04 (0.05)
Mother famine in SGP		-.009 (0.04)	-.0009 (0.04)	0.006 (0.04)	0.03 (0.08)	0.009 (0.05)		-.003 (0.04)	0.004 (0.04)	-.001 (0.04)	0.009 (0.1)	0.04 (0.06)
City*treatment (father)					0.02 (0.03)						0.04 (0.03)	
City*treatment (mother)					-.08*** (0.03)						0.02 (0.03)	
Class*treatment (father)					0.07 (0.06)						-.04 (0.07)	
Class*treatment (mother)					0.02 (0.06)						-.02 (0.08)	
City size					0.02 (0.02)						-.05** (0.02)	
Indicator of class affectedness					0.08* (0.04)						0.08 (0.05)	
Mother upper secondary school				0.04 (0.09)	0.04 (0.09)	0.007 (0.11)				0.3*** (0.1)	0.3*** (0.1)	0.34** (0.13)
Mother intermediate school				0.1 (0.06)	0.1 (0.06)	0.09 (0.09)				0.18*** (0.07)	0.18*** (0.07)	0.15 (0.09)
Father upper secondary school				0.31*** (0.07)	0.32*** (0.06)	0.39*** (0.09)				0.18** (0.07)	0.19** (0.07)	0.26*** (0.09)
Father intermediate school				0.23*** (0.06)	0.24*** (0.06)	0.24*** (0.08)				0.06 (0.07)	0.06 (0.07)	0.02 (0.1)
Number of brothers				-.01 (0.01)	-.007 (0.01)	0.003 (0.02)				-.02 (0.02)	-.02 (0.02)	-.02 (0.02)
Number of sisters				0.003 (0.01)	0.006 (0.01)	0.02 (0.02)				-.02 (0.01)	-.02 (0.01)	-.01 (0.02)
Obs.	1361	1361	1361	1361	1361	770	1043	1043	1043	1043	1043	592
$R^2 - adj.$	0.16	0.16	0.16	0.2	0.21	0.2	0.26	0.25	0.25	0.29	0.29	0.32

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Third generation

Table 16: Impact of famine during SGP on body height of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.52				0.45	0.54	0.45	10.38***	0.26				0.5	0.82	0.99	3.84
	(0.68)				(0.72)	(0.74)	(1.69)	(2.40)	(0.63)				(0.68)	(0.71)	(1.42)	(3.71)
Paternal grandmother treated		0.32			0.13	-.35	0.91	-6.28**		-.84			-.99	-.99	-2.79	-5.02*
		(0.7)			(0.75)	(0.77)	(1.90)	(2.59)		(0.69)			(0.75)	(0.79)	(1.85)	(2.88)
Maternal grandfather treated			-.84		-.89	-.88	1.76	-3.79			0.25		0.33	0.48	-2.11	0.62
			(0.75)		(0.79)	(0.84)	(1.82)	(2.98)			(0.76)		(0.79)	(0.79)	(1.89)	(2.77)
Maternal grandmother treated				0.15	0.38	0.73	1.63	3.34				-.56	-.55	-.52	-.78	-.24
				(0.86)	(0.91)	(0.93)	(1.73)	(2.55)				(0.93)	(0.94)	(0.96)	(2.30)	(3.88)
Class*treatment (paternal grandfather)							-.74								-.14	
							(1.47)								(1.24)	
Class*treatment (paternal grandmother)							-1.11								1.99	
							(1.57)								(1.80)	
Class*treatment (maternal grandfather)							-2.51								2.01	
							(1.57)								(1.75)	
Class*treatment (maternal grandmother)							-.84								0.33	
							(1.53)								(2.18)	
City*treatment (paternal grandfather)							1.59**								-.16	
							(0.74)								(0.69)	
City*treatment (paternal grandmother)							-.35								-.36	
							(0.72)								(0.81)	
City*treatment (maternal grandfather)							-.37								0.86	
							(0.86)								(0.74)	
City*treatment (maternal grandmother)							-.19								0.05	
							(1.26)								(1.00)	
Indicator of class affectedness							0.42								-.98	
							(0.74)								(0.85)	
City size							0.24								-.32	
							(0.4)								(0.35)	
Mother upper secondary school						1.73*	1.74*	9.79						-.68	-.64	-10.67**
						(0.92)	(0.93)	(6.26)						(0.86)	(0.87)	(5.40)
Mother intermediate school						-.05	0.06	5.08						0.52	0.32	-4.25
						(0.74)	(0.73)	(3.14)						(0.79)	(0.8)	(3.85)
Father upper secondary school						0.79	0.74	8.14**						-.15	0.007	-2.27
						(0.81)	(0.8)	(3.78)						(0.82)	(0.83)	(4.12)
Father intermediate school						-.63	-.76	-4.17						-.90	-.71	3.48
						(0.93)	(0.96)	(4.45)						(0.95)	(0.95)	(4.52)
Number of brothers						-.40	-.36	-.49						0.01	0.08	-3.93***
						(0.35)	(0.35)	(1.50)						(0.48)	(0.49)	(1.38)
Number of sisters						-.24	-.21	0.44						-.47	-.47	-.33
						(0.34)	(0.36)	(1.67)						(0.45)	(0.43)	(1.32)
Obs.	781	781	781	781	781	723	723	86	623	623	623	623	623	590	590	67
LL	-2547.01	-2547.3	-2546.51	-2547.41	-2545.98	-2342.74	-2334.68	-251.52	-1942.67	-1941.84	-1942.72	-1942.53	-1941.1	-1830.87	-1826.22	-176.97

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 17: Impact of famine during SGP on BMI of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.5				0.59*	0.57	0.62	-.94	-.13				-.13	-.23	-1.19	-.79
	(0.33)				(0.35)	(0.36)	(0.77)	(1.29)	(0.41)				(0.44)	(0.46)	(1.01)	(2.35)
Paternal grandmother treated		-.16			-.33	-.41	-.02	-.33		-.11			-.06	-.004	2.43*	1.93
		(0.39)			(0.41)	(0.44)	(1.02)	(1.39)		(0.44)			(0.47)	(0.48)	(1.26)	(1.62)
Maternal grandfather treated			-.12		-.05	-.05	1.67*	0.34			-.49		-.48	-.10	-.42	0.98
			(0.42)		(0.43)	(0.47)	(1.01)	(1.81)			(0.52)		(0.53)	(0.54)	(1.50)	(1.91)
Maternal grandmother treated				-.30	-.26	-.61	-2.23**	-3.58**				-.18	-.10	-.07	-.49	-1.48
				(0.48)	(0.51)	(0.54)	(0.97)	(1.65)				(0.63)	(0.64)	(0.64)	(1.70)	(2.31)
Class*treatment (paternal grandfather)							0.25								1.07	
							(0.69)								(0.84)	
Class*treatment (paternal grandmother)							-.39								-2.68**	
							(0.91)								(1.24)	
Class*treatment (maternal grandfather)							-1.97**								0.47	
							(0.85)								(1.43)	
Class*treatment (maternal grandmother)							1.83**								0.71	
							(0.75)								(1.61)	
City*treatment (paternal grandfather)							-.41								-.06	
							(0.33)								(0.38)	
City*treatment (paternal grandmother)							-.17								0.1	
							(0.4)								(0.43)	
City*treatment (maternal grandfather)							0.66								-.33	
							(0.42)								(0.42)	
City*treatment (maternal grandmother)							-.32								-.86*	
							(0.41)								(0.46)	
Indicator of class affectedness							0.54								-.004	
							(0.38)								(0.48)	
City size							0.02								-.17	
							(0.19)								(0.22)	
Mother upper secondary school						-.35	-.52	-.12						-.38	-.49	3.38
						(0.49)	(0.5)	(2.44)						(0.65)	(0.65)	(3.66)
Mother intermediate school						-.58	-.55	-.72						-.08	-.17	-1.10
						(0.45)	(0.46)	(2.16)						(0.61)	(0.61)	(2.77)
Father upper secondary school						-.70	-.69	-2.41						-1.76***	-1.67***	-.77
						(0.46)	(0.46)	(2.04)						(0.61)	(0.63)	(2.03)
Father intermediate school						-.22	-.14	-1.15						-2.11***	-1.87***	2.12
						(0.49)	(0.49)	(2.67)						(0.62)	(0.62)	(2.80)
Number of brothers						-.12	-.10	-.94						-.11	0.008	1.27
						(0.21)	(0.21)	(0.78)						(0.28)	(0.29)	(1.42)
Number of sisters						-.14	-.09	-1.24*						-.18	-.16	-.41
						(0.18)	(0.18)	(0.73)						(0.23)	(0.22)	(0.93)
Obs.	781	781	781	781	781	723	723	86	623	623	623	623	623	590	590	67
LL	-2086.89	-2088.03	-2088.08	-2087.88	-2086.2	-1934.7	-1927.53	-200.75	-1701.59	-1701.62	-1701.08	-1701.6	-1700.97	-1599.57	-1588.57	-151.61

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 18: Impact of famine during SGP on the number of children of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.07*				0.09**	0.12***	0.07	-.07	-.03				-.05	-.05	-.05	-.06
	(0.04)				(0.04)	(0.04)	(0.09)	(0.14)	(0.04)				(0.04)	(0.04)	(0.1)	(0.15)
Paternal grandmother treated		-.05			-.08*	-.10**	-.08	-.18		0.06			0.07	0.07	0.18	-.17
		(0.04)			(0.05)	(0.05)	(0.11)	(0.17)		(0.05)			(0.05)	(0.05)	(0.13)	(0.14)
Maternal grandfather treated			-.07		-.07	-.06	-.16	-.19			-.01		-.02	-.03	0.03	-.18*
			(0.05)		(0.05)	(0.05)	(0.12)	(0.15)			(0.04)		(0.04)	(0.05)	(0.11)	(0.1)
Maternal grandmother treated				0.009	0.04	0.04	0.1	0.2				0.03	0.03	0.03	0.02	0.36**
				(0.06)	(0.06)	(0.06)	(0.12)	(0.15)				(0.06)	(0.06)	(0.06)	(0.18)	(0.16)
Class*treatment (paternal grandfather)							0.08								-.0008	
							(0.09)								(0.09)	
Class*treatment (paternal grandmother)							-.03								-.08	
							(0.09)								(0.13)	
Class*treatment (maternal grandfather)							0.07								-.07	
							(0.1)								(0.1)	
Class*treatment (maternal grandmother)							-.05								-.02	
							(0.1)								(0.17)	
City*treatment (paternal grandfather)							-.07*								0.02	
							(0.04)								(0.05)	
City*treatment (paternal grandmother)							0.05								-.07	
							(0.05)								(0.06)	
City*treatment (maternal grandfather)							0.05								0.03	
							(0.04)								(0.04)	
City*treatment (maternal grandmother)							0.003								0.04	
							(0.05)								(0.05)	
Indicator of class affectedness							-.08*								0.02	
							(0.04)								(0.06)	
City size							-.05**								-.02	
							(0.02)								(0.03)	
Mother upper secondary school						0.16***	0.16***	0.23						0.11**	0.11**	-.40
						(0.06)	(0.06)	(0.22)						(0.05)	(0.05)	(0.25)
Mother intermediate school						0.18***	0.18***	0.66***						0.09*	0.08	-.35**
						(0.05)	(0.05)	(0.12)						(0.05)	(0.05)	(0.18)
Father upper secondary school						-.005	0.01	-.28						-.04	-.04	0.29*
						(0.05)	(0.05)	(0.19)						(0.06)	(0.06)	(0.15)
Father intermediate school						0.04	0.05	0.11						-.06	-.06	0.48***
						(0.05)	(0.05)	(0.28)						(0.05)	(0.06)	(0.15)
Number of brothers						0.01	0.02	0.06						0.02	0.02	-.04
						(0.02)	(0.02)	(0.08)						(0.03)	(0.03)	(0.07)
Number of sisters						0.03	0.03*	0.03						0.06**	0.06**	0.08
						(0.02)	(0.02)	(0.09)						(0.03)	(0.03)	(0.06)
Obs.	781	781	781	781	781	723	723	86	623	623	623	623	623	590	590	67
LL	-1002.52	-1002.79	-1002.6	-1002.97	-1001.65	-927.27	-925.57	-111.78	-837.64	-837.46	-837.7	-837.66	-837.23	-789.69	-789.08	-88.93

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 19: Impact of famine during SGP on the probability of obtaining an upper secondary school degree of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	-.05				-.11	0.13	0.41	37.35***	0.02				0.005	0.18	-.16	1.31
	(0.12)				(0.13)	(0.14)	(0.3)	(0.94)	(0.13)				(0.14)	(0.16)	(0.37)	
Paternal grandmother treated		0.18			0.2	0.05	-.40	13.20***		0.04			0.06	0.13	-.33	2.30
		(0.13)			(0.14)	(0.15)	(0.36)	(0.44)		(0.16)			(0.16)	(0.18)	(0.42)	(27018.65)
Maternal grandfather treated			-.07		-.08	-.02	-.19	-39.99***			0.21		0.24	0.11	-.04	-10.18
			(0.14)		(0.15)	(0.16)	(0.35)	(0.9)			(0.16)		(0.16)	(0.19)	(0.49)	(0.)
Maternal grandmother treated				0.06	0.07	0.34**	1.05***	62.21***				-.22	-.27	-.27	-.30	-9.86
				(0.17)	(0.18)	(0.17)	(0.35)	(1.66)				(0.2)	(0.2)	(0.21)	(0.54)	(0.)
Class*treatment (paternal grandfather)							-.44								0.32	
							(0.27)								(0.3)	
Class*treatment (paternal grandmother)							0.34								0.45	
							(0.31)								(0.38)	
Class*treatment (maternal grandfather)							0.14								0.14	
							(0.31)								(0.42)	
Class*treatment (maternal grandmother)							-.75**								0.1	
							(0.31)								(0.5)	
City*treatment (paternal grandfather)							0.24*								-.01	
							(0.14)								(0.13)	
City*treatment (paternal grandmother)							0.2								0.03	
							(0.15)								(0.18)	
City*treatment (maternal grandfather)							0.01								-.01	
							(0.15)								(0.15)	
City*treatment (maternal grandmother)							0.13								-.06	
							(0.17)								(0.2)	
Indicator of class affectedness							0.28*								-.15	
							(0.16)								(0.19)	
City size							-.07								0.04	
							(0.07)								(0.09)	
Mother upper secondary school						0.39**	0.44**	43.53***						0.59***	0.62***	-15.51
						(0.19)	(0.19)	(1.33)						(0.21)	(0.21)	(0.)
Mother intermediate school						0.41***	0.44***	98.20***						0.1	0.12	2.77
						(0.15)	(0.15)	(2.41)						(0.18)	(0.18)	(0.)
Father upper secondary school						1.19***	1.18***	44.51***						1.48***	1.48***	10.45
						(0.17)	(0.17)	(1.03)						(0.2)	(0.2)	(0.)
Father intermediate school						0.45**	0.45**	-16.04***						0.79***	0.75***	7.84
						(0.18)	(0.19)	(0.84)						(0.2)	(0.21)	(0.)
Number of brothers						-.13	-.16*	-5.81***						-.25**	-.25**	-5.01
						(0.08)	(0.08)	(0.21)						(0.11)	(0.11)	(22822.49)
Number of sisters						-.16**	-.18**	-14.53***						-.19**	-.21**	0.05
						(0.07)	(0.07)	(0.52)						(0.09)	(0.1)	(0.)
Obs.	757	757	757	757	757	698	698	76	600	600	600	600	600	571	571	45
LL	-460.85	-460	-460.8	-460.87	-459.41	-364.67	-356.42	-.04	-329.83	-329.8	-329.1	-329.25	-328.22	-257.35	-254.25	-.06

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 20: Impact of famine during SGP on the physical health score of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.07				-.25	0.15	-1.39	0.92	0.97				1.12	1.02	2.66*	1.18
	(0.7)				(0.75)	(0.81)	(2.19)	(2.71)	(0.71)				(0.71)	(0.74)	(1.51)	(3.72)
Paternal grandmother treated		0.97			0.98	0.95	2.48	-2.69		-.31			-.64	-.45	-.36	-1.77
		(0.73)			(0.79)	(0.82)	(1.93)	(3.38)		(0.78)			(0.78)	(0.81)	(1.66)	(3.08)
Maternal grandfather treated			-1.16		-1.23	-1.43*	-2.00	-4.85			0.34		0.45	0.02	-2.74	-.58
			(0.77)		(0.79)	(0.83)	(1.70)	(3.14)			(0.87)		(0.89)	(0.92)	(2.16)	(3.42)
Maternal grandmother treated				0.19	0.43	1.14	2.77	-3.18				-.67	-.69	-.44	2.90	0.33
				(0.95)	(0.97)	(1.00)	(1.96)	(2.40)				(1.12)	(1.16)	(1.18)	(2.79)	(4.14)
Class*treatment (paternal grandfather)							1.84								-2.06	
							(1.81)								(1.32)	
Class*treatment (paternal grandmother)							-2.28								0.1	
							(1.63)								(1.63)	
Class*treatment (maternal grandfather)							0.38								1.78	
							(1.45)								(1.79)	
Class*treatment (maternal grandmother)							-1.39								-2.79	
							(1.77)								(2.50)	
City*treatment (paternal grandfather)							-.79								0.96	
							(0.68)								(0.66)	
City*treatment (paternal grandmother)							1.82**								-.47	
							(0.78)								(0.89)	
City*treatment (maternal grandfather)							0.24								1.12	
							(0.86)								(0.73)	
City*treatment (maternal grandmother)							-.25								-1.06	
							(0.84)								(0.85)	
Indicator of class affectedness							-.13								-.81	
							(0.75)								(0.91)	
City size							-.05								-.25	
							(0.39)								(0.44)	
Mother upper secondary school						-2.08**	-2.26**	-1.53						1.04	0.95	-1.91
						(1.03)	(1.05)	(4.86)						(0.94)	(0.94)	(6.09)
Mother intermediate school						-.17	-.20	5.65**						-1.66*	-1.94*	2.11
						(0.8)	(0.81)	(2.69)						(0.98)	(1.00)	(4.42)
Father upper secondary school						1.32	1.58*	-4.51						0.97	1.27	4.93
						(0.83)	(0.85)	(3.51)						(0.97)	(0.99)	(4.23)
Father intermediate school						0.77	0.84	-6.18						1.33	1.63	-3.74
						(0.97)	(0.99)	(4.87)						(1.10)	(1.13)	(5.21)
Number of brothers						-.09	-.03	2.79*						-.004	0.04	-.91
						(0.38)	(0.4)	(1.58)						(0.49)	(0.5)	(1.91)
Number of sisters						-.54	-.52	-.66						0.2	0.26	2.11
						(0.4)	(0.41)	(1.65)						(0.46)	(0.46)	(1.68)
Obs.	769	769	769	769	769	715	715	85	605	605	605	605	605	574	574	67
LL	-2553.81	-2552.73	-2552.29	-2553.79	-2551.05	-2369.86	-2364.78	-254.48	-1980.85	-1981.93	-1981.92	-1981.75	-1980.08	-1872.91	-1866.46	-189.85

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 21: Impact of famine during SGP on the mental health score of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	1.38*				1.51*	1.79**	-.88	1.94	0.2				0.33	0.79	-2.01	-4.36
	(0.82)				(0.84)	(0.9)	(2.15)	(2.55)	(1.01)				(1.01)	(1.07)	(2.63)	(6.77)
Paternal grandmother treated		-.03			-.44	-.34	5.43***	1.17		-.14			-.39	-.39	-1.82	3.00
		(0.89)			(0.9)	(0.93)	(2.09)	(2.99)		(1.17)			(1.18)	(1.22)	(3.21)	(4.46)
Maternal grandfather treated			-.12		0.11	0.03	4.93**	1.55			-.55		-1.07	-.12	-1.56	-.61
			(0.93)		(0.94)	(0.97)	(2.09)	(3.70)			(1.33)		(1.32)	(1.34)	(3.98)	(4.43)
Maternal grandmother treated				-.85	-.87	-.12	1.73	5.38*				3.91***	4.13***	3.72**	11.59**	5.97
				(1.13)	(1.16)	(1.14)	(2.22)	(2.96)				(1.42)	(1.43)	(1.46)	(4.78)	(6.62)
Class*treatment (paternal grandfather)							2.95								2.84	
							(1.85)								(2.21)	
Class*treatment (paternal grandmother)							-6.01***								0.72	
							(1.69)								(2.88)	
Class*treatment (maternal grandfather)							-5.06**								0.66	
							(1.97)								(3.48)	
Class*treatment (maternal grandmother)							-1.87								-6.05	
							(2.07)								(4.50)	
City*treatment (paternal grandfather)							-.57								0.03	
							(0.81)								(0.91)	
City*treatment (paternal grandmother)							0.81								1.12	
							(0.91)								(1.09)	
City*treatment (maternal grandfather)							0.36								0.47	
							(1.01)								(1.11)	
City*treatment (maternal grandmother)							0.34								-3.04**	
							(1.25)								(1.26)	
Indicator of class affectedness							1.00								1.11	
							(0.96)								(1.27)	
City size							-.48								0.31	
							(0.51)								(0.58)	
Mother upper secondary school						-1.99	-2.31*	0.09						0.93	0.87	-6.93
						(1.32)	(1.36)	(6.86)						(1.33)	(1.35)	(8.36)
Mother intermediate school						-.91	-.71	-2.48						-1.67	-1.68	1.21
						(1.04)	(1.01)	(3.80)						(1.27)	(1.27)	(6.18)
Father upper secondary school						1.82*	2.25**	6.52						-.54	-.47	-1.85
						(1.11)	(1.14)	(4.50)						(1.29)	(1.32)	(7.38)
Father intermediate school						-.67	-.39	-7.62						1.92	1.76	-4.95
						(1.35)	(1.39)	(5.03)						(1.46)	(1.43)	(7.11)
Number of brothers						0.2	0.39	3.17*						0.81	0.82	-1.11
						(0.61)	(0.6)	(1.69)						(0.65)	(0.67)	(2.95)
Number of sisters						0.6	0.82**	3.03						-.06	-.05	-1.64
						(0.41)	(0.4)	(2.29)						(0.65)	(0.64)	(2.65)
Obs.	769	769	769	769	769	715	715	85	605	605	605	605	605	574	574	67
LL	-2724.9	-2726.53	-2726.52	-2726.16	-2724.36	-2519.52	-2506.31	-259.88	-2184.16	-2184.18	-2184.06	-2179.58	-2179	-2057.41	-2047.84	-214.85

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 22: Impact of famine during SGP on number of nights in hospital (past year) of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.11				0.12	0.03	-.04	0.17	-.14				-.13	-.25**	-.10	-.43***
	(0.09)				(0.09)	(0.09)	(0.18)	(0.19)	(0.11)				(0.11)	(0.11)	(0.2)	(0.13)
Paternal grandmother treated		0.05			0.003	0.004	-.12	0.48*		-.08			-.04	-.07	0.02	-.25**
		(0.11)			(0.1)	(0.1)	(0.24)	(0.25)		(0.12)			(0.12)	(0.12)	(0.23)	(0.13)
Maternal grandfather treated			0.34***		0.33***	0.37***	0.34	0.81***			-.23**		-.27**	-.27**	-.05	-.14
			(0.11)		(0.11)	(0.11)	(0.25)	(0.26)			(0.11)		(0.11)	(0.12)	(0.26)	(0.14)
Maternal grandmother treated				0.15	0.05	0.05	-.32	0.5**				0.18	0.23	0.2	-.17	-.57***
				(0.13)	(0.13)	(0.13)	(0.27)	(0.2)				(0.15)	(0.15)	(0.14)	(0.32)	(0.15)
Class*treatment (paternal grandfather)							0.13								-.09	
							(0.17)								(0.16)	
Class*treatment (paternal grandmother)							0.14								-.04	
							(0.24)								(0.2)	
Class*treatment (maternal grandfather)							0.17								-.13	
							(0.23)								(0.19)	
Class*treatment (maternal grandmother)							0.39								0.16	
							(0.29)								(0.29)	
City*treatment (paternal grandfather)							-.03								-.15*	
							(0.07)								(0.08)	
City*treatment (paternal grandmother)							0.008								0.04	
							(0.07)								(0.12)	
City*treatment (maternal grandfather)							-.33***								-.06	
							(0.09)								(0.1)	
City*treatment (maternal grandmother)							-.22**								0.42***	
							(0.11)								(0.12)	
Indicator of class affectedness							-.09								0.12	
							(0.08)								(0.1)	
City size							0.08								0.03	
							(0.05)								(0.06)	
Mother upper secondary school						0.15	0.13	0.45						0.1	0.09	-.65***
						(0.14)	(0.13)	(0.4)						(0.13)	(0.14)	(0.24)
Mother intermediate school						-.17*	-.17*	-1.32***						0.18	0.22*	0.36**
						(0.09)	(0.09)	(0.36)						(0.11)	(0.11)	(0.18)
Father upper secondary school						-.11	-.08	0.94**						-.25*	-.29**	0.18
						(0.11)	(0.11)	(0.37)						(0.14)	(0.14)	(0.2)
Father intermediate school						0.03	0.06	0.96						-.15	-.16	0.02
						(0.11)	(0.11)	(0.61)						(0.13)	(0.14)	(0.23)
Number of brothers						0.07	0.05	-.27*						0.08	0.05	0.17**
						(0.06)	(0.06)	(0.16)						(0.07)	(0.07)	(0.08)
Number of sisters						0.08*	0.07	-.19						0.31***	0.3***	0.08
						(0.05)	(0.04)	(0.15)						(0.07)	(0.07)	(0.06)
Obs.	722	722	722	722	722	671	671	82	597	597	597	597	597	567	567	63
LL	-1122.23	-1122.8	-1117.38	-1122.15	-1116.48	-1034.42	-1024.82	-103.27	-1034.02	-1034.63	-1033.59	-1034.25	-1031.9	-965.27	-958.15	-68.13

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 23: Impact of famine during SGP on self-rated health status of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.13*				0.14*	0.12	0.37**	-.13	-.07				-.07	-.11	-.12	-.59
	(0.08)				(0.08)	(0.08)	(0.19)	(0.22)	(0.09)				(0.09)	(0.09)	(0.21)	(0.61)
Paternal grandmother treated		0.04			0.001	0.002	-.35	0.6***		-.06			-.03	-.04	-.01	0.15
		(0.08)			(0.09)	(0.09)	(0.22)	(0.23)		(0.09)			(0.1)	(0.1)	(0.26)	(0.39)
Maternal grandfather treated			0.12		0.14	0.15	0.05	0.26			-.03		-.009	-.03	-.04	0.35
			(0.09)		(0.09)	(0.1)	(0.19)	(0.36)			(0.1)		(0.1)	(0.1)	(0.28)	(0.38)
Maternal grandmother treated				-.003	-.04	-.11	-.05	-.07				-.19	-.19	-.18	-.56*	-1.02**
				(0.11)	(0.11)	(0.11)	(0.23)	(0.23)				(0.12)	(0.13)	(0.13)	(0.33)	(0.5)
Class*treatment (paternal grandfather)							-.26								0.02	
							(0.17)								(0.2)	
Class*treatment (paternal grandmother)							0.36*								-.04	
							(0.21)								(0.23)	
Class*treatment (maternal grandfather)							0.19								0.11	
							(0.17)								(0.25)	
Class*treatment (maternal grandmother)							-.10								0.24	
							(0.19)								(0.33)	
City*treatment (paternal grandfather)							0.02								-.07	
							(0.07)								(0.09)	
City*treatment (paternal grandmother)							0.007								0.05	
							(0.09)								(0.11)	
City*treatment (maternal grandfather)							-.16*								-.10	
							(0.1)								(0.09)	
City*treatment (maternal grandmother)							0.01								0.24**	
							(0.1)								(0.12)	
Indicator of class affectedness							0.02								-.03	
							(0.09)								(0.11)	
City size							0.04								-.03	
							(0.05)								(0.05)	
Mother upper secondary school						0.35***	0.37***	0.26						-.24**	-.24**	0.61
						(0.11)	(0.12)	(0.53)						(0.11)	(0.11)	(0.5)
Mother intermediate school						0.03	0.03	-.47						0.06	0.08	-.14
						(0.1)	(0.1)	(0.34)						(0.1)	(0.11)	(0.43)
Father upper secondary school						-.16*	-.17*	-.08						0.05	0.03	-.93*
						(0.09)	(0.1)	(0.33)						(0.12)	(0.11)	(0.48)
Father intermediate school						-.09	-.09	1.27***						-.05	-.04	0.13
						(0.11)	(0.12)	(0.46)						(0.13)	(0.13)	(0.65)
Number of brothers						0.02	0.001	-.10						-.03	-.04	-.06
						(0.05)	(0.05)	(0.21)						(0.06)	(0.06)	(0.25)
Number of sisters						0.006	-.009	-.13						0.05	0.05	-.07
						(0.04)	(0.04)	(0.14)						(0.05)	(0.05)	(0.17)
Obs.	719	719	719	719	719	669	669	82	593	593	593	593	593	564	564	63
LL	-810.28	-812	-810.83	-812.13	-808.76	-729.72	-724.15	-57.12	-646.43	-646.66	-646.87	-645.3	-644.67	-605.93	-600.39	-34.58

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 24: Impact of famine during SGP on the number of doctor visits last year of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.18				0.31***	0.3**	0.36	-.67**	0.1				0.08	0.07	-.06	-.60**
	(0.11)				(0.12)	(0.12)	(0.3)	(0.33)	(0.11)				(0.11)	(0.12)	(0.28)	(0.29)
Paternal grandmother treated		-.33***			-.45***	-.49***	-.80***	-.76**		0.09			0.07	0.04	-.45	0.18
		(0.12)			(0.12)	(0.13)	(0.3)	(0.37)		(0.12)			(0.12)	(0.13)	(0.34)	(0.3)
Maternal grandfather treated			0.18		0.17	0.19	0.2	0.18			-.03		-.02	-.01	-.001	2.07***
			(0.12)		(0.12)	(0.13)	(0.32)	(0.4)			(0.13)		(0.13)	(0.13)	(0.3)	(0.38)
Maternal grandmother treated				0.16	0.14	0.1	0.14	-.23				-.10	-.10	-.08	-.37	-2.02***
				(0.15)	(0.15)	(0.15)	(0.35)	(0.3)				(0.17)	(0.17)	(0.18)	(0.36)	(0.46)
Class*treatment (paternal grandfather)							-.09								0.09	
							(0.28)								(0.23)	
Class*treatment (paternal grandmother)							0.21								0.48*	
							(0.25)								(0.28)	
Class*treatment (maternal grandfather)							0.08								0.05	
							(0.28)								(0.24)	
Class*treatment (maternal grandmother)							-.007								0.2	
							(0.28)								(0.29)	
City*treatment (paternal grandfather)							0.02								-.02	
							(0.11)								(0.11)	
City*treatment (paternal grandmother)							0.22								0.01	
							(0.14)								(0.13)	
City*treatment (maternal grandfather)							-.21*								-.05	
							(0.13)								(0.1)	
City*treatment (maternal grandmother)							-.07								0.19	
							(0.12)								(0.17)	
Indicator of class affectedness							-.16								-.009	
							(0.12)								(0.14)	
City size							0.04								-.0003	
							(0.06)								(0.06)	
Mother upper secondary school						0.24*	0.26*	0.6						-.09	-.03	-.52
						(0.14)	(0.14)	(0.67)						(0.13)	(0.14)	(0.75)
Mother intermediate school						0.21*	0.19	-1.03**						0.06	0.09	-.87
						(0.13)	(0.13)	(0.47)						(0.13)	(0.13)	(0.6)
Father upper secondary school						-.17	-.13	-.97*						0.1	0.08	-1.54***
						(0.13)	(0.13)	(0.56)						(0.13)	(0.13)	(0.48)
Father intermediate school						0.05	0.05	1.21**						0.06	0.04	2.20*
						(0.14)	(0.14)	(0.56)						(0.15)	(0.15)	(1.30)
Number of brothers						-.05	-.07	-.21						-.06	-.09	0.23
						(0.07)	(0.06)	(0.18)						(0.07)	(0.07)	(0.26)
Number of sisters						0.04	0.03	-.37*						-.04	-.04	-.17
						(0.05)	(0.05)	(0.21)						(0.06)	(0.07)	(0.18)
Obs.	716	716	716	716	716	667	667	82	593	593	593	593	593	564	564	63
LL	-2082.22	-2079.5	-2082.54	-2083.12	-2073.53	-1911.62	-1906.36	-216.38	-1979.44	-1979.62	-1979.87	-1979.7	-1979.11	-1887.51	-1883.03	-161.72

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 25: Impact of famine during SGP on life satisfaction of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	0.27*				0.24	0.22	-.08	0.62	-.003				-.02	0.02	-.02	0.09
	(0.15)				(0.16)	(0.17)	(0.38)	(0.56)	(0.17)				(0.17)	(0.18)	(0.38)	(0.83)
Paternal grandmother treated		0.21			0.13	0.18	0.81*	-.29		0.1			0.09	0.15	-.50	-1.45**
		(0.17)			(0.18)	(0.18)	(0.43)	(0.66)		(0.18)			(0.18)	(0.19)	(0.44)	(0.71)
Maternal grandfather treated			0.02		0.002	-.09	-.53	-.28			-.05		-.10	-.10	-.85	-.88
			(0.19)		(0.19)	(0.19)	(0.45)	(0.75)			(0.2)		(0.21)	(0.21)	(0.55)	(0.69)
Maternal grandmother treated				0.17	0.15	0.24	1.76***	0.06				0.4*	0.41*	0.42*	1.54***	1.18
				(0.22)	(0.22)	(0.23)	(0.49)	(0.59)				(0.23)	(0.24)	(0.24)	(0.6)	(0.87)
Class*treatment (paternal grandfather)							0.24								0.23	
							(0.37)								(0.33)	
Class*treatment (paternal grandmother)							-.72*								0.51	
							(0.42)								(0.39)	
Class*treatment (maternal grandfather)							0.29								0.59	
							(0.41)								(0.48)	
Class*treatment (maternal grandmother)							-1.60***								-.95*	
							(0.48)								(0.56)	
City*treatment (paternal grandfather)							-.02								-.37**	
							(0.14)								(0.19)	
City*treatment (paternal grandmother)							0.22								0.26	
							(0.14)								(0.22)	
City*treatment (maternal grandfather)							0.26								0.16	
							(0.21)								(0.19)	
City*treatment (maternal grandmother)							0.27								-.18	
							(0.23)								(0.2)	
Indicator of class affectedness							0.17								-.10	
							(0.15)								(0.24)	
City size							-.25***								0.05	
							(0.09)								(0.1)	
Mother upper secondary school						-.69***	-.66***	-.36						0.38*	0.39*	-2.35*
						(0.24)	(0.24)	(1.37)						(0.23)	(0.23)	(1.29)
Mother intermediate school						-.24	-.25	0.94						-.05	-.07	0.17
						(0.19)	(0.19)	(0.81)						(0.2)	(0.21)	(0.97)
Father upper secondary school						0.23	0.25	-.71						0.13	0.19	1.26
						(0.2)	(0.21)	(0.84)						(0.21)	(0.22)	(1.02)
Father intermediate school						0.02	0.009	-.73						0.53**	0.57**	0.78
						(0.23)	(0.24)	(0.92)						(0.25)	(0.25)	(1.66)
Number of brothers						-.04	-.02	0.45						-.05	-.04	-.42
						(0.1)	(0.1)	(0.47)						(0.12)	(0.12)	(0.45)
Number of sisters						-.03	-.009	0.07						-.12	-.12	0.13
						(0.07)	(0.07)	(0.35)						(0.1)	(0.1)	(0.31)
Obs.	721	721	721	721	721	670	670	82	593	593	593	593	593	564	564	63
LL	-1325.69	-1326.57	-1327.49	-1327.1	-1324.98	-1213.34	-1195.95	-113.18	-1063.21	-1063.01	-1063.17	-1061.55	-1061.25	-999.86	-991.27	-82.49

Source: *GSOEP*, *all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

Table 26: Impact of famine during SGP on net actual hourly wage of the third generation

	Males								Females							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Paternal grandfather treated	-.006				-.005	0.04	0.21**	0.07	0.02				0.006	0.01	-.02	-.01
	(0.05)				(0.05)	(0.05)	(0.1)	(0.2)	(0.05)				(0.05)	(0.06)	(0.11)	(0.22)
Paternal grandmother treated		-.003			-.003	0.004	-.08	-.21		0.05			0.04	0.05	0.03	-.08
		(0.05)			(0.05)	(0.05)	(0.12)	(0.2)		(0.06)			(0.06)	(0.06)	(0.15)	(0.25)
Maternal grandfather treated			0.02		0.01	-.003	0.06	-.09			0.02		0.01	-.03	-.09	0.22
			(0.05)		(0.06)	(0.06)	(0.12)	(0.23)			(0.06)		(0.06)	(0.06)	(0.14)	(0.25)
Maternal grandmother treated				0.03	0.03	0.07	0.02	0.28				0.06	0.06	0.07	0.27*	-.15
				(0.06)	(0.07)	(0.07)	(0.13)	(0.19)				(0.07)	(0.07)	(0.08)	(0.16)	(0.38)
Class*treatment (paternal grandfather)							-.18**								0.02	
							(0.08)								(0.1)	
Class*treatment (paternal grandmother)							0.04								0.03	
							(0.1)								(0.13)	
Class*treatment (maternal grandfather)							-.01								0.11	
							(0.1)								(0.12)	
Class*treatment (maternal grandmother)							0.02								-.24*	
							(0.11)								(0.14)	
City*treatment (paternal grandfather)							0.004								0.02	
							(0.05)								(0.04)	
City*treatment (paternal grandmother)							0.08								-.02	
							(0.07)								(0.05)	
City*treatment (maternal grandfather)							-.09								-.06	
							(0.06)								(0.06)	
City*treatment (maternal grandmother)							0.04								0.07	
							(0.06)								(0.06)	
Indicator of class affectedness							0.08								-.03	
							(0.06)								(0.07)	
City size							-.03								0.004	
							(0.03)								(0.03)	
Mother upper secondary school						-.15**	-.14**	-.08						0.06	0.07	0.3
						(0.07)	(0.07)	(0.27)						(0.07)	(0.07)	(0.49)
Mother intermediate school						-.07	-.06	-.16						-.13**	-.13*	0.07
						(0.06)	(0.06)	(0.22)						(0.06)	(0.07)	(0.36)
Father upper secondary school						0.18***	0.19***	0.2						0.17**	0.15**	0.25
						(0.06)	(0.06)	(0.27)						(0.07)	(0.08)	(0.37)
Father intermediate school						0.12*	0.14**	0.31						0.19***	0.19***	0.62
						(0.07)	(0.07)	(0.3)						(0.07)	(0.07)	(0.59)
Number of brothers						-.03	-.05	0.04						-.06*	-.07*	0.03
						(0.03)	(0.03)	(0.1)						(0.03)	(0.04)	(0.17)
Number of sisters						-.004	-.005	-.15						-.004	-.009	-.01
						(0.03)	(0.03)	(0.12)						(0.03)	(0.03)	(0.1)
Obs.	721	721	721	721	721	680	680	83	576	576	576	576	576	550	550	66
LL	-450.74	-450.74	-450.68	-450.56	-450.53	-402.26	-392.93	-21.03	-326.3	-325.95	-326.29	-325.85	-325.43	-301.46	-298.27	-9.86

Source: *GSOEP, all waves*, own calculations.

All regressions include birth cohort fixed effects. Robust standard errors (clustered at the household level) are reported.

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9 Appendix A: Summary Statistics

9.1 First generation

Table 9.1: First generation males

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	65.88	16.49	2,074	65.37	17.31	2,007	0.33
Age at death	65.77	16.40	2,067	65.20	17.18	1,997	0.28
Birth year	1,906.52	1.72	2,074	1,908.42	4.30	2,007	0.00
Death year	1,972.28	16.47	2,067	1,973.62	17.24	1,997	0.01
Number of daughters	1.53	1.25	2,074	1.43	1.18	2,007	0.01
Number of sons	1.45	1.21	2,074	1.42	1.16	2,007	0.46
Number of children	2.98	1.77	2,074	2.85	1.60	2,007	0.02
Upper secondary school	0.08	0.27	2,074	0.09	0.29	2,007	0.11
Intermediate school	0.08	0.26	2,074	0.08	0.28	2,007	0.34
Secondary school	0.80	0.40	2,074	0.76	0.43	2,007	0.01
School don't know	0.04	0.19	2,074	0.04	0.21	2,007	0.35
Other school	0.01	0.08	2,074	0.01	0.09	2,007	0.32
No school	0.00	0.06	2,074	0.01	0.09	2,007	0.06

Source: SOEP, waves 1984-2009. Treatment is defines as having experienced the German WW1-famine during one or more SGP years.

Table 9.2: Summary statistics first generation treated versus untreated (females)

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	73.85	14.20	1,428	73.52	14.01	1,825	0.51
Age at death	73.74	14.13	1,422	73.36	13.89	1,814	0.44
Birth year	1,907.99	1.41	1,428	1,907.27	4.28	1,825	0.00
Death year	1,981.73	14.18	1,422	1,980.64	14.36	1,814	0.03
Number of daughters	1.46	1.19	1,428	1.49	1.27	1,825	0.45
Number of sons	1.44	1.17	1,428	1.44	1.18	1,825	0.95
Number of children	2.90	1.71	1,428	2.93	1.73	1,825	0.62
Upper secondary school	0.03	0.17	1,428	0.02	0.15	1,825	0.20
Intermediate school	0.10	0.30	1,428	0.09	0.29	1,825	0.54
Secondary school	0.82	0.38	1,428	0.82	0.38	1,825	0.86
School don't know	0.03	0.17	1,428	0.04	0.20	1,825	0.05
Other school	0.01	0.09	1,428	0.01	0.08	1,825	0.68
No school	0.01	0.09	1,428	0.01	0.11	1,825	0.25

9.2 Second generation

Table 9.3: Summary statistics second generation males treated versus untreated, Parent: male

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	69.93	5.78	712	69.61	5.97	510	0.36
Age at death	70.03	5.98	67	71.86	5.23	59	0.07
height	175.59	6.52	712	175.00	6.72	510	0.12
weight	84.23	12.21	712	83.66	13.11	510	0.44
bmi	27.29	3.47	712	27.30	3.89	510	0.97
Number of children	1.98	1.29	712	1.92	1.25	510	0.40
Upper secondary school	0.32	0.47	712	0.35	0.48	510	0.26
Intermediate school	0.11	0.31	712	0.11	0.31	510	0.86
Secondary school	0.51	0.50	712	0.47	0.50	510	0.16
No school degree	0.01	0.07	712	0.00	0.06	510	0.68

Table 9.4: Summary statistics second generation females treated versus untreated, Parent: male

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	70.01	5.77	755	69.84	6.07	515	0.62
Age at death	71.10	4.76	51	72.21	5.23	28	0.34
height	163.43	6.00	755	163.88	5.83	515	0.19
weight	71.18	12.56	755	71.56	13.24	515	0.60
bmi	26.66	4.56	755	26.66	4.76	515	0.99
Number of children	1.98	1.19	755	2.02	1.34	515	0.51
Upper secondary school	0.17	0.38	755	0.18	0.38	515	0.93
Intermediate school	0.17	0.37	755	0.21	0.41	515	0.07
Secondary school	0.42	0.49	755	0.39	0.49	515	0.18
No school degree	0.01	0.11	755	0.01	0.08	515	0.20

Table 9.5: Summary statistics second generation males treated versus untreated, Parent: female

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	70.33	5.70	599	69.28	5.98	623	0.00
Age at death	70.76	5.92	59	71.00	5.53	67	0.82
height	175.14	6.68	599	175.55	6.54	623	0.27
weight	83.56	13.01	599	84.41	12.17	623	0.24
bmi	27.22	3.76	599	27.37	3.54	623	0.47
Number of children	1.99	1.31	599	1.92	1.24	623	0.33
Upper secondary school	0.32	0.47	599	0.34	0.47	623	0.54
Intermediate school	0.12	0.32	599	0.10	0.30	623	0.33
Secondary school	0.50	0.50	599	0.49	0.50	623	0.83
No school degree	0.00	0.04	599	0.01	0.09	623	0.11

Table 9.6: Summary statistics second generation females treated versus untreated, Parent: female

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	70.52	5.57	586	69.45	6.11	684	0.00
Age at death	72.59	4.87	39	70.42	4.80	40	0.05
height	163.30	6.08	586	163.89	5.79	684	0.08
weight	71.41	13.74	586	71.27	12.02	684	0.85
bmi	26.79	4.99	586	26.55	4.32	684	0.36
Number of children	2.01	1.25	586	1.98	1.25	684	0.73
Upper secondary school	0.18	0.38	586	0.17	0.38	684	0.76
Intermediate school	0.16	0.37	586	0.20	0.40	684	0.08
Secondary school	0.41	0.49	586	0.40	0.49	684	0.69
No school degree	0.01	0.12	586	0.01	0.09	684	0.26

9.3 Third generation

Table 9.7: Summary statistics third generation (males) treated versus untreated, pgf

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	38.56	7.27	52	40.95	5.77	37	0.10
height	181.71	7.32	52	178.11	5.83	37	0.01
weight	84.79	9.66	52	84.54	15.99	37	0.93
bmi	25.79	3.07	52	26.65	4.89	37	0.31
Number of children	0.71	0.89	52	0.89	1.02	37	0.38
Upper secondary school	0.54	0.50	52	0.41	0.50	37	0.22
Intermediate school	0.33	0.47	52	0.38	0.49	37	0.62
Secondary school	0.12	0.32	52	0.08	0.28	37	0.60
No school	0.00	0.00	52	0.05	0.23	37	0.09

Table 9.8: Summary statistics third generation (males) treated versus untreated, pgm

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	38.86	6.95	49	40.40	6.50	40	0.29
height	180.71	6.17	49	179.60	7.82	40	0.45
weight	85.86	11.20	49	83.25	14.14	40	0.33
bmi	26.33	3.48	49	25.93	4.45	40	0.63
Number of children	0.65	0.83	49	0.95	1.06	40	0.14
Upper secondary school	0.51	0.51	49	0.45	0.50	40	0.58
Intermediate school	0.29	0.46	49	0.42	0.50	40	0.17
Secondary school	0.12	0.33	49	0.07	0.27	40	0.47
No school	0.04	0.20	49	0.00	0.00	40	0.20

Table 9.9: Summary statistics third generation (males) treated versus untreated, mgf

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	40.59	6.31	59	37.50	7.23	30	0.04
height	179.51	6.64	59	181.60	7.40	30	0.18
weight	83.51	12.43	59	87.00	12.83	30	0.22
bmi	25.97	4.04	59	26.50	3.74	30	0.55
Number of children	0.75	0.96	59	0.87	0.94	30	0.57
Upper secondary school	0.42	0.50	59	0.60	0.50	30	0.12
Intermediate school	0.41	0.50	59	0.23	0.43	30	0.11
Secondary school	0.10	0.30	59	0.10	0.31	30	0.98
No school	0.03	0.18	59	0.00	0.00	30	0.31

Table 9.10: Summary statistics third generation (males) treated versus untreated, mgm

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	39.04	7.38	47	40.12	6.01	42	0.46
height	180.26	6.88	47	180.17	7.09	42	0.95
weight	82.79	9.84	47	86.81	14.94	42	0.13
bmi	25.51	2.94	47	26.85	4.74	42	0.11
Number of children	0.85	1.04	47	0.71	0.83	42	0.50
Upper secondary school	0.51	0.51	47	0.45	0.50	42	0.59
Intermediate school	0.34	0.48	47	0.36	0.48	42	0.87
Secondary school	0.11	0.31	47	0.10	0.30	42	0.86
No school	0.04	0.20	47	0.00	0.00	42	0.18

Table 9.11: Summary statistics third generation (females) treated versus untreated, pgf

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	37.18	8.33	39	38.34	5.90	29	0.52
height	170.82	6.87	39	168.03	5.88	29	0.08
weight	68.97	11.62	39	65.76	11.77	29	0.27
bmi	23.66	4.05	39	23.22	3.54	29	0.64
Number of children	0.87	1.03	39	1.41	1.30	29	0.06
Upper secondary school	0.49	0.51	39	0.38	0.49	29	0.38
Intermediate school	0.33	0.48	39	0.48	0.51	29	0.22
Secondary school	0.15	0.37	39	0.10	0.31	29	0.55
No school	0.03	0.16	39	0.00	0.00	29	0.39

Table 9.12: Summary statistics third generation (females) treated versus untreated, pgm

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	36.79	7.68	34	38.56	7.03	34	0.33
height	167.88	6.08	34	171.38	6.65	34	0.03
weight	66.21	12.52	34	69.00	10.84	34	0.33
bmi	23.50	4.44	34	23.45	3.14	34	0.95
Number of children	1.18	1.31	34	1.03	1.03	34	0.61
Upper secondary school	0.50	0.51	34	0.38	0.49	34	0.34
Intermediate school	0.35	0.49	34	0.44	0.50	34	0.46
Secondary school	0.12	0.33	34	0.15	0.36	34	0.73
No school	0.00	0.00	34	0.03	0.17	34	0.32

Table 9.13: Summary statistics third generation (females) treated versus untreated, mgf

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	38.00	7.04	46	37.00	8.12	22	0.60
height	170.22	5.98	46	168.41	7.66	22	0.29
weight	69.09	11.48	46	64.50	11.81	22	0.13
bmi	23.85	3.91	46	22.69	3.58	22	0.25
Number of children	1.17	1.29	46	0.95	0.90	22	0.47
Upper secondary school	0.43	0.50	46	0.45	0.51	22	0.88
Intermediate school	0.43	0.50	46	0.32	0.48	22	0.37
Secondary school	0.11	0.31	46	0.18	0.39	22	0.41
No school	0.00	0.00	46	0.05	0.21	22	0.15

Table 9.14: Summary statistics third generation (females) treated versus untreated, mgm

	μ(t=1)	σ(t=1)	N (t=1)	μ(t=0)	σ(t=0)	N (t=0)	pval
Age or age at death	36.79	6.40	39	38.86	8.46	29	0.26
height	168.92	6.49	39	170.59	6.67	29	0.31
weight	67.23	11.02	39	68.10	12.75	29	0.76
bmi	23.57	3.76	39	23.35	3.95	29	0.82
Number of children	1.13	1.20	39	1.07	1.16	29	0.84
Upper secondary school	0.36	0.49	39	0.55	0.51	29	0.12
Intermediate school	0.44	0.50	39	0.34	0.48	29	0.46
Secondary school	0.18	0.39	39	0.07	0.26	29	0.19
No school	0.00	0.00	39	0.03	0.19	29	0.25