Long-run Relations between Childhood Shocks and Health in Late Adulthood—Evidence from the Survey of Health, Ageing, and Retirement in Europe

Nicole Halmdienst and Rudolf Winter-Ebmer

University of Linz, Austria. e-mail: nicole.halmdienst@jku.at, rudolf.winterebmer@jku.at

Abstract

In this article, we address the long-run associations between childhood shocks and health in late adulthood. Applying a life-course approach and data from SHARE, we estimate direct and indirect relations of shocks like relocation, dispossession, or hunger and health outcomes after 50 years of age. Having lived in a children's home, in a foster family, or having suffered a period of hunger turn out to be the most detrimental. Using a finite mixture model, which allows to classify the correlations between shocks and later health into a priori unknown groups, we show that some adverse shocks show opposite relations for specific groups. (JEL codes: J1, I12, J13)

Keywords: early-life experience, health, Europe

1 Introduction

Assessing long-run impacts of childhood circumstances, such as socioeconomic conditions, shocks, childhood health, or in-uterus conditions on health in later life has become increasingly topical in recent epidemiological, economic, or sociological research. The importance of this line of research lies, on the one hand, in a life-course perspective: these early events may have both direct or indirect effects—through health in early-life, education, job-choice, or other conditions—on health, wealth, and happiness throughout the whole life of an individual. On the other hand, the prevalence of such long-term or even intergenerational consequences may make potential policy interventions still more important.

This article looks at a variety of adverse events which individuals may have experienced in childhood: starting from dramatic war- or social upheaval-driven events such as dispossession or relocation to more family-driven events, living in a children's home, in a foster family, or suffering from hunger in childhood. To investigate the impact of these shocks, we use data from the Survey of Health, Ageing, and Retirement in Europe (SHARE), a panel study of elderly Europeans born roughly between 1920 and 1955. We exploit detailed retrospective information from specifically collected life histories (SHARELIFE) and observe health at the age of 50+ years. SHARE data have the advantage that they are internationally

comparable and collected in an interdisciplinary effort of epidemiologists, sociologists, and economists, which makes explorations across these domains more fruitful. Moreover, using such significant and well-defined childhood shocks reduces potential recall biases—compared with more petty events: individuals will have fewer problems remembering unique events such as relocation or dispossession during a war or a civil conflict.

In general, there are difficulties in identifying causal relationships between childhood shocks and health later in life owing to the potential presence of unobserved factors, such as early-life experience of socioeconomic environment or genetic predispositions for certain illnesses (Case et al. 2005). Therefore, we concentrate on a more descriptive exercise, combining a variety of hitherto rarely studied childhood shocks.

Given this, we proceed in two steps. At first we present reduced form models, where we use a rich data set on socioeconomic background control variables to estimate associations between childhood shocks and health in later life. These models then are, step by step, enriched by the introduction of intermediate outcomes, that might be influenced by these shocks but also by unobservable childhood variables. In a final step, we use a finite mixture model to classify our individuals into a priori unknown disjoint groups with different associations between selected shocks and later health. This classification will, in addition to our rich set of background controls and intermediate outcomes, remove unobservable heterogeneity in the data.

Previous research, in particular in traumatology, establishes that stressful and traumatic events in early life may have serious short-term health effects, especially on mental health. Most researchers explore the consequences of civil wars or natural disasters in developing countries on children and health. Beegle et al. (2010) study children in Tanzania orphaned between age 7 and 15 years and find that orphanhood results in a long-term welfare loss—due to worse access to food resources and education. Orphanhood is related to a loss in height of about 2 cm and around 1 year less schooling. Orphans of the Genocide in Rwanda, who had lost both parents, are found to suffer even 10 years later from severe mental health problems (Elbert and Schaal 2006). Nuttall et al. (1997) address more generally the impact of conflict and stressful shocks in childhood. They study children during the Salvadorian Civil War, especially children that experienced stressful shocks, such as displacement, losing parents, suffering hunger, and violence. They find that these children are much more likely to suffer from mental health problems than children that did not experience traumatic events even during wartime. Jensen and Shaw (1996), on the other hand, highlight the strong adaptability of young children

to cope with adverse events, which makes forecasts of long-term effects difficult.¹

Another strand of the literature investigates the effect of hunger and malnutrition in early life. In pediatric literature it is well established that childhood hunger is related to mental health of children. Weinreb et al. (2002) highlight the relationship between hunger during childhood and later health outcomes. They establish that among children of families of low social status, severe hunger during school age is related to anxiety and depressive symptoms. Malnutrition and hunger also have a large negative impact on physical health of children (see Alderman 2012). Persons that were children during the great famine in China face poorer health, lower adult height, lower educational attainment, and reduced labor market activity even 30 years later (Meng and Qian 2009). Van den Berg et al. (2011) estimate the causal effect of war-induced hunger in early life in Germany, Greece, and the Netherlands on old-age health outcomes using data from SHARE.² Their results show that malnutrition results in reduced height, an increased risk of obesity, high blood pressure, and hypertension.³

There is a large literature on health and social circumstances in early life, which, in turn, are strongly associated to health and employment outcomes in late adulthood (Currie and Hyson 1999; Hayward and Gorman 2004; Case et al. 2005; Currie 2009; Smith 2009; Case and Paxson 2010). Case et al. (2005) and Smith (2009) discuss possible linkages: health in childhood affects education and future health directly and socioeconomic status and health in later life indirectly via outcomes in young adulthood.

We contribute to the literature by looking at a large range of specific adverse childhood shocks on health outcomes of individuals in retirement age. We apply a life course approach to look at direct and indirect effects of selected childhood shocks. Moreover, by using a finite mixture model, we can distinguish whether these adverse shocks have the same effects for all groups in the population.

¹ See Bohacek and Myck (2011) on the effect of persecution in Central Europe on labor market outcomes later in life.

² See also Havari and Peracchi (2011).

³ Wars or natural disasters may have direct impacts on health and mental health of affected children or young adults, but also indirect ones coming through reduced schooling opportunities (Meng and Gregory 2002; Ichino and Winter-Ebmer 2004; or Akbulut-Yuksel 2009).

Figure 1 Timeline of life events and measured outcomes.

2 Empirical setup

To study direct and indirect effects of adverse childhood experiences, we apply a life course approach. We suppose that external shocks in child age affect childhood health and, in consequence, education. Childhood health and education in turn build an essential basis for future achievements and outcomes in adulthood. The early years of life are therefore considered an important predictor for outcomes in later life. Figure 1 shows the timeline of events and our measured outcomes.

Early childhood shocks are defined as relocation, dispossession, living in a children's home, in foster care, or suffering from hunger. Each of these events may have detrimental effects on both health and other outcomes. As a first step, we look at the association between these early-life shocks and measures of childhood health—measured between age 0 and 15 years. As the timing of childhood health outcomes and early life shocks is unclear in SHARELIFE data, a strict causal analysis cannot be provided. Instead, we explore a simple correlation approach to assess the association between these factors in Equation (1):

$$Health_C = \alpha_0 + \alpha_i Shock_i + \alpha_2 SES_C + \rho_j X_j + \epsilon_{Health_C} \quad (1)$$

We also control for the social status of parents, (SES_C), include country and year dummies, and other controls (X_j). The specification in Equation (1) serves as a first test if there is an association between these early-life shocks and health in childhood. Early-life shocks can also have detrimental effects on education and socioeconomic status and health in mid-life, measured at the age of 30 years. While these intermediate outcomes may be interesting in themselves, we concentrate on long-term impacts of early-life shocks on health outcomes measured at age 50 years or later. We propose two strategies: a reduced-form approach [Equation (2)] will provide a total effect of early childhood shocks on health at age 50 years or later. In this equation, we include only childhood shocks together with other strictly exogenously determined variables such as cohort and country effects. In a further specification [Equation (3)], we include, step-by-step, socioeconomic status in childhood and other

intermediate outcomes: childhood health, education, socioeconomic status, as well as health in mid-life. These indicators typically are important predictors of health at older age and are themselves affected by adverse childhood shocks. Not including these indicators, Equation (2) gives us the total effect of early-life shocks—including both direct and indirect effects via intermediate outcomes.⁴ Equation (3) provides a separation of these direct and indirect effects.⁵ Insofar, as these intermediate outcomes are both related to our interesting childhood shocks and to omitted unobservable childhood characteristics, controlling for them can reduce this potential omitted variables bias.

$$Health_{50+,i} = \gamma_{0i} + \gamma_{xi} Shock_x + \rho_{ji} X_j + \epsilon_{Health_{50+,i}} \quad (2)$$

$$Health_{50+,i} = \gamma_{0i} + \gamma_{xi} Shock_x + \gamma_{1i} SES_C + \gamma_{2i} Health_C + \gamma_{3i} Edu \\ + \gamma_{4i} SES_{30} + \gamma_{5i} Health_{30} + \rho_{ji} X_j + \epsilon_{Health_{50+,i}} \quad (3)$$

3 Data

3.1 Sample

We are using data from SHARE; using release 1 from SHARELIFE (collected in 2008/09), SHARE Waves 1 (2004) and 2 (2006/07) data release 2.5.0. The sample consists of Europeans born between 1920 and 1955 originating from Europe and currently living in Austria, Germany, the Netherlands, Spain, Italy, France, Denmark, Greece, Belgium, the Czech Republic, and Poland.

We keep only persons where all health outcome variables are available in the data. Missing values in explanatory variables are flagged and controlled for in the regressions with binary indicators. After data processing, 17,916 observations are left for analysis.

3.2 Variables

From the health information in SHARE, we choose the following health outcome variables: self-assessed childhood health (measured from 1 to 5; the higher the worse), the number of illnesses in childhood (including typical children's illnesses as well as bone fractures, etc.) the number of health conditions diagnosed by a medical doctor, number of health symptoms, the number of depressive symptoms (Euro-D Scale), the

⁴ Results in this analysis yield lower bound estimates of the effect of childhood shocks. The reason is selective mortality in two dimensions. First of all, we only observe persons that have already reached the age of 50 years. The second issue are childhood shocks; those severely hit during child age are less likely to reach an extensive age.

⁵ See Brunello et al. (2011) for a recent decomposition of direct and indirect effects of education on health in later life.

number of activities of daily living limitations (ADL), and disability. Table 1 describes and defines all variables used.

Explanatory variables of major interest are childhood shocks: relocation or evacuation during a war, dispossession for the reason of persecution or war, having been fostered with another family, having lived in a children's home, and having suffered from hunger.

Information about dispossession due to persecution or war and suffering from hunger is provided in SHARELIFE. The question about dispossession reads as follows: 'There may be cases when individuals and their families are dispossessed of their property as a result of war or persecution. Were you or your family ever dispossessed of any property as a result of war or persecution?' In case the respondent answers in the affirmative, it is asked about the time the property was taken away, which property, and whether the family has been compensated. At maximum, respondents reported three different cases of dispossession, only the first dispossession of the respondent or family is considered in this study. Two final variables are generated: dispossession of a close family member before birth of the respondent and dispossession after birth but before the age of 16 years.

The question about hunger reads as follows: 'Looking back on your life, was there a period during which you suffered from hunger?' When the respondent answered in the affirmative, it is asked in which year the hunger period started and stopped. Again, the age limit is 16 years.

Relocation and having lived with a foster family, or in a children's home, are derived from a question on special events concerning living arrangements. 'Have you ever experienced any of these events?' Provided answer categories are: (i) Lived in a children's home, (ii) Been fostered with another family, (iii) Evacuated or relocated during a war, ... For these events, no exact timing is possible.

Figure 6 shows the pattern of relocations for all sample persons over birth cohorts and countries. Relocations are mainly reported by cohorts born around World War II, with high relocation rates for persons from the former Soviet Union. Note that these individuals only come into the SHARE survey if they have left their country of origin. Rates of relocation for individuals born between 1920 and 1945 are relatively high, if they were born in Germany, Poland, the Netherlands, Belgium, or France. As we are only interested in childhood shocks, we have to assign these relocations to a childhood event, by comparing the birth date with the war events. So we assign a wartime childhood relocation only to individuals who were less than 16 years of age after the war (in 1945), which might lead to some underestimation of the number of victims of relocation in childhood due to a war. This contamination of the relocation indicator could in the econometric model lead to underestimation of the impact of relocation on health outcomes.

Table 1 Summary statistics

Variable	Description	Observations	Mean	SD	Min	Max
Year of birth		17,916	1942	8.8682	1920	1955
<i>Childhood shocks</i>						
Dispossession before birth ^a	Year of event before birth year of respondent	17,909	0.0114	–	0	1
Dispossession 0–15 ^a	Dispossession during the age of 0–15 years	17,909	0.0239	–	0	1
Hunger 0–15 ^a	Hunger during the age of 0–15	17,912	0.0643	–	0	1
Relocation 0–15 ^b	Relocation during the age of 0–15 years	17,916	0.0354	–	0	1
Children's home ^b	Lived in a children's home	17,916	0.0150	–	0	1
Foster family ^b	Been fostered with another family	17,916	0.0132	–	0	1
<i>Childhood social status controls</i>						
Number of features of accommodation ^a	Sum of reported features of accommodation	17,893	1.8246	1.6556	0	5
Rooms per person ^c	Number of rooms/number of persons in household at the age of 10 years	17,743	0.7088	0.3959	0	4
Number of books	Number of books in household at the age of 10 years; measured in shelves	17,798	2.0422	1.1829	1	5
Rural ^a	Area of first residence	17,909	0.6350	–	0	1
High-skilled white collar	Legislator, Senior Official or Manager; Professional; 4 th skill level; main breadwinner in household	17,564	0.0730	–	0	1

(continued)

Table 1 Continued

Variable	Description	Observations	Mean	SD	Min	Max
High-skilled blue collar	Technician or associate professional; Armed forces; 3 rd skill level; main breadwinner in household	17,564	0.0600	–	0	1
Low-skilled white collar	Clerk; Service, Shop or Market Sales Worker; 2 nd skill level; main breadwinner in household	17,564	0.1305	–	0	1
Low-skilled blue collar	Plant/machine operator or assembler; elementary occupation; and craft or related trades worker; 1 st or 2 nd skill level; main breadwinner in household	17,564	0.4537	–	0	1
Farmer	Skilled agricultural or fishery worker; 2 nd skill level; main breadwinner in household	17,564	0.2659	–	0	1
No main breadwinner	No main breadwinner in household	17,564	0.0169	–	0	1
<i>Childhood health and educational attainment</i>						
Child health ^a	Self-assessed health in childhood; the higher, the worse	17,875	2.0666	1.0025	1	5
Number of illnesses	Number of illnesses until the age of 15 years (from W1 and W2)	17,742	1.2251	0.8470	0	7

(continued)

Table 1 Continued

Variable	Description	Observations	Mean	SD	Min	Max
Years of schooling ^d	Total years of full-time education (from W2)	16,462	10.2321	4.4086	0	25
<i>Intermediate outcomes at the age of 30 years</i>						
Health	Number of health conditions diagnosed by a medical doctor (from W1 and W2)	17,916	0.0440	0.2505	0	6
High-skilled white collar	Legislator, Senior Official or Manager; Professional; 4 th skill level	17,726	0.0967	–	0	1
High-skilled blue collar	Technician or associate professional; Armed forces; 3 rd skill level	17,726	0.0951	–	0	1
Low-skilled white collar	Clerk; Service, Shop or Market Sales Worker; 2 nd skill level	17,726	0.2069	–	0	1
Low-skilled blue collar	Plant/machine operator or assembler; elementary occupation; and craft or related trades worker; 1 st or 2 nd skill level	17,726	0.2959	–	0	1
Farmer	Skilled agricultural or fishery worker; 2 nd skill level	17,726	0.0715	–	0	1
Not employed	Not employed	17,726	0.2328	–	0	1

(continued)

Table 1 Continued

Variable	Description	Observations	Mean	SD	Min	Max
<i>Outcome variables at the age of 50+ years</i>						
Self-assessed health	Self-reported health status; the higher, the worse	17,916	3.2626	1.0569	1	5
Health conditions	Number of health conditions diagnosed by a medical doctor (from W1 and W2)	17,916	1.6139	1.4979	0	14
Health symptoms	Number of health symptoms (from W1 and W2)	17,916	1.5913	1.7304	0	12
Depressive symptoms	Number of depressive symptoms (EURO-D Scale; from W1 and W2)	17,916	2.2137	2.1734	0	12
ADL limitations	Number of limitations in activities of daily living (ADL, from W1 and W2)	17,916	0.1551	0.6389	0	6
Ever disability	Ever disability reported in disability module in W3	17,916	0.1960	–	0	1

Notes: Number of observations not consistent—in estimations we control for missing values using binary indicators.

^aMales with missing values in this variable are dropped from the sample.

^bAll observations with missing values in this variable are dropped from the sample.

^cRooms per person greater than four are set to missing.

^dFor Denmark raw data are used.

Summary statistics in Table 1 inform about the prevalence of these childhood experiences among SHARE respondents. Around 834 respondents (4.7%) indicate a relocation or evacuation during a war, 635 of them had been less than 16 years at the time of the event. A total of 815 individuals (4.6%) report a dispossession, 204 of them suffered from dispossession related to their inner family circle before their own birth, 428 were less than 16 years old at the time of that event. A total of 470 (2.6%) individuals had lived in a children's home or with a foster family and around 6.5% of respondents had suffered from hunger as a child. For more detailed information about prevalence of events over time, see Figures 2–7. Our indicators for childhood shocks are relatively independent from each other; the highest correlation coefficient is 0.19 for dispossession and relocation during child age. All other correlations are much lower.

We employ childhood health, education, health, and social status at the age of 30 years as intermediate outcome variables. Educational attainment is measured in years of full-time education. Outcomes—at the age of 30 years—are the number of health conditions diagnosed by a doctor as reported by the respondents, and socioeconomic position (high-skilled white collar, low-skilled white collar, low-skilled blue collar, etc.) derived from ISCO type of occupation and the corresponding skill level.

Figure 2 Year of first dispossession of close family before birth of respondent.

Figure 3 Year of first dispossession of close family or respondent during child age.

Figure 4 Children's home by birth cohort and country of origin.

Figure 5 Foster family by birth cohort and country of origin.

All reported relocations.

Figure 6 Relocation by country of origin and birth cohort.

Figure 7 Year hunger period during child age started.

Finally, our childhood social status controls—all associated with the age of 10 years—include the following: the number of books in the household as a proxy for intellect of parents, rooms per person, the number of features of the accommodation (e.g. central heating, indoor bath room, and warm water), and the socioeconomic position derived from the type of occupation of the main breadwinner in the household. In addition, we include information on the area of living, the variable rural takes the value one if the first residence reported has been in a rural area or a small town. Moreover, in all estimations, birth year and country of origin dummies to control for fixed cohort effects, like a specific war-effect all members of a birth cohort are exposed to, are included. As there are, typically, small individual correlations of the childhood shocks and these childhood social status variables, it is necessary to thoroughly control for these. In any case, our results should be interpreted with caution—they should be seen as carefully derived associations rather than causal effects.

4 Results

4.1 Health at the age of 50+ years

Due to the fact that we can only estimate associations between childhood shocks and health in early life, estimation results for health in early life are

not reported here in any detail. Results using self-assessed childhood health and the number of illnesses until the age of 15 years⁶ show that childhood shocks are negatively associated with childhood health. Looking at self-assessed health in childhood we find strong and consistent effects for relocation, having lived in a children's home and having suffered from hunger with odds ratios ranging from 1.2 to 1.6. Concerning the number of illnesses, dispossession during child age is related to worse health in childhood as well. In this specification dispossession during child age can be associated with an increased number of health conditions by around 0.2. Foster family and hunger may have an impact on childhood health, though foster family is only significant for women.

Tables 2 and 3 display regression results of health outcomes at the age of 50+ years for men and women. In the first columns, we report a reduced form approach where we relate self-assessed health at the age of 50+ years only to adverse childhood shocks. These estimates capture all effects of these childhood shocks, irrespective of the transmission mechanism, that is, all direct and indirect effects. In column (II) we add indicators for childhood social status as control variables.

Columns (III) and (IV) extend the specification of model (II) by including, in a first step, childhood health and years of schooling, and then also outcomes at the age of 30 years—health and social status—as intermediate effects. Columns (III) and (IV) include increasingly more intermediate outcomes, outcomes which themselves may be influenced by childhood shocks. Controlling for these intermediate outcomes is meant to purge as far as possible the childhood shocks from indirect effects via childhood health, schooling, or outcomes in mid-life. If—as expected—the effects are going in the same direction, the direct impact of childhood shocks on health at age 50+ years should become smaller. This is indeed what we find at least to some extent.

We first present the results for men in Table 2. Comparing these different specifications, we find consistently negative relations of having lived in a children's home, having been in a foster family, and having suffered from hunger as a child with health later in life. The strongest correlations are found for having suffered from hunger. Hunger is increasing the odds to be in a worse self-assessed health state by some 30%—as compared to be in any better health state. These associations are large and somewhat higher in the first two columns, where we include both direct and indirect effects, but the differences across columns are not statistically significant. The negative correlation between health and having been fostered by

⁶ Self-assessed childhood health is measured according to a Likert-type scale and thus estimated using an ordered Logit model. The number of illnesses in childhood is a count data type and estimated with Poisson regression.

Table 2 Self-assessed health at the age of 50+ years: males

	I	II	III	IV
<i>Childhood shocks</i>				
Relocation 0–15	0.9782 (0.1064)	1.0567 (0.1156)	1.0206 (0.1125)	1.0428 (0.1149)
Dispossession before birth	1.1671 (0.2415)	1.2233 (0.2534)	1.1715 (0.2422)	1.1564 (0.2386)
Dispossession 0–15	0.8231 (0.1104)	0.8611 (0.1153)	0.8704 (0.1172)	0.8789 (0.1182)
Children's home	1.3248* (0.2212)	1.3617* (0.2363)	1.2797 (0.2202)	1.2804 (0.2205)
Foster family	1.3585* (0.2520)	1.4238* (0.2649)	1.4015* (0.2595)	1.3691* (0.2548)
Hunger 0–15	1.4710*** (0.1169)	1.4429*** (0.1153)	1.3189*** (0.1061)	1.3154*** (0.1060)
<i>Childhood social status</i>				
Number of features of accommodation		0.9810 (0.0159)	0.9916 (0.0161)	0.9973 (0.0163)
Rooms per person		0.8400*** (0.0504)	0.8458*** (0.0508)	0.8559*** (0.0515)
Number of books in household		0.8832*** (0.0194)	0.9153*** (0.0205)	0.9276*** (0.0209)
Rural		0.9988 (0.0454)	0.9912 (0.0452)	0.9907 (0.0453)
High-skilled white collar		0.8240** (0.0714)	0.8897 (0.0775)	0.9374 (0.0829)
High-skilled blue collar		0.8807 (0.0791)	0.9434 (0.0850)	0.9923 (0.0903)
Low-skilled white collar		0.7750*** (0.0504)	0.7944*** (0.0519)	0.8349*** (0.0554)
Farmer		1.0105 (0.0517)	0.9762 (0.0502)	0.9316 (0.0506)
No main breadwinner		0.7655 (0.1262)	0.7043** (0.1154)	0.7014** (0.1147)
Base: Low-skilled blue collar				

(continued)

Table 2 Continued

	I	II	III	IV
<i>Childhood health and education</i>				
Self-assessed childhood health 0–15			1.4173*** (0.0303)	1.4103*** (0.0303)
Years of schooling			0.9533*** (0.0051)	0.9634*** (0.0054)
<i>Outcomes at the age of 30 years</i>				
Number of health conditions				1.4037*** (0.1201)
High-skilled white collar				0.6978*** (0.0507)
High-skilled blue collar				0.7991*** (0.0509)
Low-skilled white collar				0.7755*** (0.0463)
Farmer				1.1598* (0.0905)
Not employed				1.0067 (0.0982)
Base: Low-skilled blue collar				
Pseudo R^2	0.0517	0.0571	0.0708	0.0735
N	8802	8802	8802	8802

Odds ratios from ordered Logit regression. Standard errors in parenthesis.
Controlled for country of origin and year of birth.
*10%, **5%, and ***1% significance.

Table 3 Self-assessed health at the age of 50+ years: females

	I	II	III	IV
<i>Childhood shocks</i>				
Relocation 0–15	0.8811 (0.0997)	0.9285 (0.1058)	0.9239 (0.1061)	0.9456 (0.1088)
Dispossession before birth	0.9096 (0.1554)	1.0507 (0.1805)	1.0567 (0.1818)	1.0229 (0.1753)
Dispossession 0–15	0.9053 (0.1258)	0.9494 (0.1318)	0.9257 (0.1289)	0.9533 (0.1327)
Children's home	1.2179 (0.1988)	1.0575 (0.1790)	0.8878 (0.1509)	0.8819 (0.1501)
Foster family	1.4052** (0.2333)	1.3975** (0.2338)	1.3789* (0.2317)	1.3828* (0.2321)
Hunger 0–15	1.3573*** (0.1213)	1.3183*** (0.1185)	1.1585 (0.1052)	1.1632* (0.1058)
<i>Childhood social status</i>				
Number of features of accommodation		0.9423*** (0.0148)	0.9474*** (0.0150)	0.9516*** (0.0151)
Rooms per person		0.7625*** (0.0451)	0.8101*** (0.0482)	0.8215*** (0.0490)
Number of books in household		0.8932*** (0.0188)	0.9370*** (0.0201)	0.9496** (0.0205)
Rural		0.9201* (0.0414)	0.9236* (0.0418)	0.9118** (0.0413)
High-skilled white collar		0.7528*** (0.0626)	0.7921*** (0.0665)	0.7984*** (0.0676)
High-skilled blue collar		0.8981 (0.0767)	0.9494 (0.0815)	0.9668 (0.0832)
Low-skilled blue collar		0.8502*** (0.0532)	0.8769** (0.0552)	0.8985* (0.0567)
Farmer		0.9455 (0.0492)	0.9527 (0.0498)	0.9101* (0.0488)
No main breadwinner		0.9718 (0.1432)	0.9440 (0.1402)	0.9638 (0.1436)
Base: Low-skilled blue collar				

(continued)

Table 3 Continued

	I	II	III	IV
<i>Childhood health and education</i>				
Self-assessed childhood health 0–15			1.5256*** (0.0315)	1.5138*** (0.0315)
Years of schooling			0.9492*** (0.0056)	0.9577*** (0.0059)
<i>Outcomes at the age of 30</i>				
Number of health conditions				1.6833*** (0.1329)
High-skilled white collar				0.7305*** (0.0676)
High-skilled blue collar				0.6516*** (0.0690)
Low-skilled white collar				0.7134*** (0.0458)
Farmer				1.2777** (0.1311)
Not employed				0.8377*** (0.0487)
Base: Low-skilled blue collar				
Pseudo R^2	0.0545	0.0624	0.0820	0.0858
N	9114	9114	9114	9114

Odds ratios from ordered Logit regression. Standard errors in parenthesis.

Controlled for country of origin and year of birth.

*10%, **5%, and ***1% significance.

another family in childhood is comparably large. The negative correlations between having lived in a children's home and health are comparable at around 30% higher odds; these coefficients are quite equal in size, but not statistically significant any more once we include all intermediate health and social outcomes.

It may seem remarkable that our effects of childhood shocks are not mitigated to a large extent once we include intermediate health outcomes—either in childhood or at age 30 years. One reason may be that, on the one hand, health in early life is, in general, fairly good; most individuals have excellent health. On the other hand, all intermediate health indicators are based on retrospective questions, so there might be higher measurement error.

As expected, there is a strong positive correlation between childhood health, health at age 30 years, and health at age 50+ years. Results for education are similar. Individuals with one additional year of schooling have 4% lower odds to be classified in a worse health category. Our control variables for social status of the family—the number of rooms per persons and the number of books—have the expected effects to decrease the odds to be in poor health.

Looking at outcomes for women in Table 3 we find fairly similar results to those for men, although somewhat smaller in size. The largest negative relations between childhood shocks and later health are obtained for having been in a foster family: the odds to be in a worse state of health increases by around 40%. Likewise, we do find a negative impact for having suffered from hunger, but the size of this negative effect for women is only half as big as for men. Hunger increases the odds to be in a worse health category by 16% only. In this model—for hunger—we do find sizeable indirect effects: When we compare Column (II) with Column (IV) we do see that the total effect tends to be twice as large as the direct effect we measure in Column (IV). No detrimental impact of having spent some time in a children's home can be examined.

Havari and Mazzonna (2011) show that retrospective information in SHARE is fairly reliable. If recall bias is an issue, it is most likely to occur in case of events at very young age. To test this, we split up hunger periods which—presumably—happened at age 0–2 years versus age 3–15 years in main estimations. Detailed regression results are available upon request. Recall bias—leading to an attenuation bias—should give us lower coefficients for the age-group 0–2 years. We find the exact opposite: significantly higher coefficients for events happening in the early years of childhood. On the other hand, real effects of hunger on later-life health could be higher, in the first place; so we can also measure a combination of both effects.

Self-assessed health is often used as the prime indicator for health because it is comprehensive and internationally comparable (Lochner 2011). Still, it is a subjective indicator and can be prone to measurement errors—in particular over time.⁷ Therefore, in Table 4 we report results using more objective measures of health in later life: the number of health conditions diagnosed by a medical doctor, the number of health symptoms, the number of depressive symptoms (measured using the Euro-D Scale), the number of activities of daily living limitations (ADL), and the fact that the person was ever diagnosed as being disabled.

These indicators, although given by the respondents themselves, can be considered to be more objective because they refer to a more detailed and more easily definable health condition. In particular, the question ‘Did your doctor tell you that you have...?’ should be less prone to varying self-assessment moods. We present two versions, respectively: following Table 2, column (II) we control only for childhood social status (the reduced form) and following column (IV) we control for intermediate outputs (only direct effects). Whereas the first four outcomes are modeled as a Poisson regression model, the last dependent variable (disability) is modeled as a Logit regression.

Looking at the Table as a whole, we see that results for the number of health conditions, symptoms, and depression are closely related to the ones for self-assessed health: for men, generally, having suffered from hunger and having lived with a foster family have a strong relation to all of these outcomes; the results for children’s home are similar, but smaller and not always statistically significant. Interestingly, we see that dispossession before birth is strongly correlated with negative health outcomes.⁸ The results are different for the rest: limitations in activities of daily living are not related to childhood shocks. It seems that these daily life activities are more loosely related to classical health diagnoses or symptoms. The probability of having ever been diagnosed as disabled is significantly higher if the person was relocated in childhood or dispossessed before birth; likewise for persons that have been living in a children’s home.

For women and the outcomes of health conditions, health and depressive symptoms, we establish almost exactly the same relations. A woman is

⁷ The recent literature finds self-assessed health rather reliable: Heiss (2011) finds strong autocorrelation in self-reported health across waves and a strong correlation with future mortality for the Health and Retirement Study (HRS). Brunello et al. (2011) show for SHARE that there is a strong correlation between self-assessed health and more objective measures. See also Bopp et al. (2012).

⁸ Note that dispossession before birth is negatively related to the health of men but not to the health of women in later life, which may be related to a different impact of family resources vs. partner resources among the genders.

Table 4 Health measures at the age of 50+ years

	Males											
	Number of health conditions				Number of health symptoms				Number of depressive symptoms			
	II	IV	II	IV	II	IV	II	IV	II	IV	II	IV
Relocation 0–15	0.0182 (0.0640)	0.0316 (0.0635)	0.0258 (0.0605)	0.0368 (0.0599)	–0.0716 (0.0745)	–0.0693 (0.0743)	0.0100 (0.0307)	0.0135 (0.0300)	0.0376* (0.0221)	0.0376* (0.0221)	0.0395* (0.0219)	0.0395* (0.0219)
Dispossession before birth	0.2431* (0.1272)	0.1875 (0.1261)	0.2821*** (0.1085)	0.2386** (0.1075)	0.4020*** (0.1232)	0.3726*** (0.1226)	0.0879 (0.2462)	0.0830 (0.1690)	0.1033*** (0.0362)	0.1033*** (0.0362)	0.0977*** (0.0360)	0.0977*** (0.0360)
Dispossession 0–15	–0.0940 (0.0770)	–0.0573 (0.0763)	0.0153 (0.0690)	0.0397 (0.0684)	–0.0104 (0.0864)	0.0029 (0.0861)	–0.0265 (0.0758)	–0.0229 (0.0490)	0.0111 (0.0267)	0.0111 (0.0267)	0.0165 (0.0266)	0.0165 (0.0266)
Children's home	0.1494 (0.1053)	0.1654 (0.1045)	0.2039** (0.0951)	0.2057** (0.0944)	0.0887 (0.1151)	0.0636 (0.1147)	0.0361 (0.1028)	0.0381 (0.0796)	0.0579* (0.0333)	0.0579* (0.0333)	0.0522 (0.0332)	0.0522 (0.0332)
Foster family	0.2047** (0.1044)	0.1925* (0.1036)	0.2803*** (0.0940)	0.2656*** (0.0932)	0.3812*** (0.1117)	0.3643*** (0.1113)	0.0481 (0.1355)	0.0439 (0.0904)	0.0018 (0.0376)	0.0018 (0.0376)	–0.0002 (0.0374)	–0.0002 (0.0374)
Hunger 0–15	0.2156*** (0.0441)	0.1513*** (0.0439)	0.2482*** (0.0412)	0.1963*** (0.0410)	0.4199*** (0.0484)	0.3747*** (0.0485)	0.0375 (0.1049)	0.0320 (0.0653)	0.0212 (0.0165)	0.0212 (0.0165)	0.0108 (0.0164)	0.0108 (0.0164)
Pseudo R^2	0.0407	0.0521	0.0405	0.0498	0.0378	0.0427	0.0924	0.1034	0.0457	0.0457	0.0606	0.0606
Mean LHS	1.4710	1.4710	1.2853	1.2853	1.7388	1.7388	0.1278	0.1278	0.2036	0.2036	0.2036	0.2036
N	8802	8802	8802	8802	8802	8802	8802	8802	8802	8802	8802	8802

(continued)

Table 4 Continued

	Females							
	Number of health conditions		Number of health symptoms		Number of depressive symptoms		Number of ADL limitations	
	II	IV	II	IV	II	IV	II	IV
Relocation 0–15	0.0937 (0.0695)	0.1061 (0.0688)	–0.0620 (0.0766)	–0.0315 (0.0757)	–0.1735* (0.0969)	–0.1303 (0.0963)	–0.0190 (0.0192)	–0.0129 (0.0202)
Dispossession before birth	–0.0240 (0.1323)	–0.0717 (0.1311)	–0.0126 (0.1302)	–0.0485 (0.1287)	0.1270 (0.1476)	0.0966 (0.1468)	0.0421 (0.0357)	0.0361 (0.0434)
Dispossession 0–15	0.0085 (0.0850)	0.0257 (0.0842)	0.0137 (0.0890)	0.0388 (0.0878)	–0.0745 (0.1162)	–0.0557 (0.1154)	0.0499* (0.0289)	0.0493 (0.0472)
Children's home	0.3141*** (0.1035)	0.2190** (0.1027)	0.4122*** (0.1075)	0.2905*** (0.1065)	–0.0596 (0.1445)	–0.1872 (0.1439)	–0.0272 (0.0314)	–0.0379 (0.0441)
Foster family	0.2861*** (0.1002)	0.2720*** (0.0992)	0.3774*** (0.1049)	0.3684*** (0.1036)	0.3042** (0.1368)	0.2946** (0.1359)	0.0618* (0.0359)	0.0574 (0.0553)
Hunger 0–15	0.1743*** (0.0528)	0.1385*** (0.0524)	0.3088*** (0.0548)	0.2430*** (0.0543)	0.3992*** (0.0687)	0.3287*** (0.0685)	0.0366* (0.0202)	0.0281 (0.0273)
Pseudo R^2	0.0582	0.0714	0.0513	0.0653	0.0413	0.0498	0.1260	0.1363
Mean LHS	1.7518	1.7518	1.8869	1.8869	2.6723	2.6723	0.1815	0.1815
N	9114	9114	9114	9114	9114	9114	9114	9114

Marginal effects at means after Poisson regression. Ever disability: marginal effects at means after Logit regression.

Model II: Controlled for childhood social status.

Model IV: Controlled for childhood social status, health, education, and outcomes at the age of 30 years.

Model II and IV: Controlled for country of origin and year of birth.

Standard errors in parenthesis. *10%, **5%, and ***1% significance.

predicted to be diagnosed with more conditions or symptoms if she had suffered from hunger in childhood or if she had lived in a foster family or children's home.⁹ In contrast to the results for men, there are no relations of any form of relocation or dispossession. The probability to suffer from limitations in activities of daily living is higher if a woman was dispossessed in childhood, has been living in a foster family, or has suffered from hunger. For disability there are only weak effects: there is some evidence that the probability to be disabled is somewhat higher if a woman was relocated in childhood or if she has suffered from hunger.

The size of the coefficients is, in general, quite large: for men, having suffered from dispossession or hunger or having lived in a foster family is related to an increase in the number of health conditions by 15%; in the case of women, having lived in a children's home or in a foster family (having suffered from hunger) is related to an increase in the number of health conditions at age 50+ years by approximately 17% (10%). Quantitative effects for the other outcome measures are comparably large. These associations might even be considered to be lower bound estimates due to a potential impact of these shocks on mortality of elderly persons, which might have removed the persons most severely hit from these shocks from our sample.

This empirical strategy does not allow us to convincingly estimate causal effects of selected childhood shocks because the possibility that confounding factors may be driving (part of) the results is remaining.

In regressions available upon request we interact childhood shocks with socioeconomic background. For this purpose, we generate a simple binary social status variable: it takes the value 1 if all three social status indicators measured at the age of 10 years (number of books in household, number of features of accommodation, and number of rooms per person) are higher than their median value. Indeed, it turns out that, there are differences by socioeconomic background: hunger is solely a problem for children from lower socioeconomic background, whereas relocation tends to be only a problem for children from a higher socioeconomic background. This heterogeneity of results warrants some further investigation.

4.2 Finite mixture model

As the relationship between childhood shocks and later health outcomes may be different among subgroups of the sample, we use a finite mixture model (FMM). Heterogeneity in the reaction to shocks may go beyond clearly defined groups, such that a traditional method in dividing the sample into subgroups cannot capture this heterogeneity in full. FMM

⁹ Having lived in a children's home has no impact on depression later in life, though.

permits the estimation of the interesting parameters of the model for unknown groups, where—in a post-estimation step—the probability of group membership can be calculated for each individual in the sample (Wedel et al. 1993). Moreover, since available childhood socioeconomic controls may not be fully exhaustive, a FMM can help to control for the initial situation.

We estimate a two-component¹⁰ FMM with the ‘number of health conditions at the age of 50+ years’ as outcome variable that follows a Poisson distribution.¹¹ We assume that the random variable *Health* (H) is drawn from a population which is an additive mixture of K distinct subpopulations with proportions π_k (Deb et al. 2011),

$$\rho(H_i | \theta_k) = \sum_{k=1}^K \pi_k f_k(H_i | \theta_k), \quad 0 \leq \pi_k, \sum_{k=1}^K \pi_k = 1, \quad (4)$$

with $f_k(H_i | \theta_k)$ as the density for subpopulation k and θ_k as parameters to be estimated. The component distribution in the Poisson mixture is given by

$$f_k(H_i | \theta_k) = \frac{\lambda_{ki}^H \exp(-\lambda_k)}{H_i!}, \quad (5)$$

where $\lambda_{ki} = \exp(\alpha_{0k} + \alpha_{1k} Shock + \alpha_{2k} SES_C + \rho_{jk} X_j)$.

We can, thus, estimate the probability for each individual of being in one of the latent classes as

$$Pr(H_i \in l | \theta_j, H_i) = \frac{f_l(H_i | \theta_l)}{\sum_{k=1}^K \pi_k f_k(H_i | \theta_k)} \quad \forall k = 1 \dots K. \quad (6)$$

We estimate this finite mixture model using the Stata package fmm (Deb 2012). Posterior probabilities and component membership are estimated using the Stata package fmmle (Lüdicke 2011).

Compared with an analysis of predetermined subgroups, FMM has the advantage that no prior grouping information is necessary; compared with quantile regression, it has the advantage that the sources of heterogeneity can be characterized as well. Moreover, this classification removes

¹⁰ Unfortunately, the attempt to estimate a FMM with three components failed to converge after more than 300 iterations for males and females even in the simplest model definition (i.e. excluding many covariates). It is probably fitting a very small group of outliers as an additional component.

¹¹ Due to convergence problems we use age and age squared as control variables instead of the full list of age dummies.

unobservable heterogeneity in the data, which might otherwise threaten the identification of the childhood shock effects.

FMM estimation results are reported in Table 5, and post estimation component identification is presented in Table 6. We present two component estimates for men and women separately. For men, component one includes 6708 and component two 2094 individuals. The population of women is divided into 6688 and 2426 individuals, respectively. Although the size of these components is quite similar for males and females, it is important to note once more that the classification in such finite mixture models does not follow an a priori given rule: for males and females the two components could be quite different. For comparison reasons, we stick to specification (II) from Table 2 where we control for childhood social status, but not for any intermediate conditions.

Before we discuss a differential coping with childhood shocks in these two components let us start with a characterization of these groups. Despite independent grouping, class characteristics are very similar for men and women. Generally, individuals in component one are of better health at the age of 50+ years. Males in component one suffer on average from one adverse health condition compared with a mean of three health conditions in component two. The same for females with 1.2 and 3.2 mean health conditions. So, where does this difference have its origin? In the component membership determination in Table 6 we see that members of component one come, in general, from better situated families. For both genders, childhood social status characteristics, like rooms per person, the number of features of the accommodation, being in a rural area, or coming from a farmer's family, is negatively associated with membership in component two. Moreover, earlier birth cohorts are more likely to belong to component one. In addition, the prevalence of childhood shocks is different: membership in component two is positively associated with having suffered from hunger or been in a foster family for males and negatively correlated with relocation in childhood.¹²

Next we discuss the effects of childhood shocks on the number of health conditions at the age of 50+ years. At first it has to be mentioned, that some coefficients might be less precisely estimated because of smaller sample size in each of the components. It turns out that the most interesting phenomena relate to relocation during childhood, having lived in a foster family, and having suffered from hunger.

Relocation shows different effects across the two components, both for males and females. In component one the event of relocation and the

¹² Kesternich et al. (2014) also find that lower child socioeconomic status is positively associated with hunger, but negatively associated with dispossession and persecution in countries affected by World War II.

Table 5 Finite mixture estimation of the number of health conditions at the age of 50+ years

	Males		Females	
	Component 1	Component 2	Component 1	Component 2
<i>Childhood shocks</i>				
Relocation 0–15	0.5362*** (0.1771)	–0.7619*** (0.2339)	0.8123*** (0.1768)	–0.8584*** (0.2889)
Dispossession before birth	0.0923 (0.2351)	0.5226 (0.3725)	–0.2510 (0.1907)	0.2084 (0.2885)
Dispossession 0–15	–0.1051 (0.1098)	–0.0194 (0.2019)	–0.0283 (0.1601)	0.0936 (0.2791)
Children's home	0.0426 (0.1946)	0.4205 (0.2945)	0.3007 (0.1904)	0.4894 (0.3311)
Foster family	–0.0595 (0.1741)	0.5357* (0.2749)	0.1667 (0.1981)	0.3509 (0.2657)
Hunger 0–15	0.1243 (0.0766)	0.3321** (0.1294)	–0.1236 (0.0907)	0.6859*** (0.1889)
<i>Childhood social status</i>				
Num. features of accomm.	–0.0074 (0.0174)	–0.0123 (0.0282)	–0.0239 (0.0247)	–0.0827*** (0.0312)
Rooms per person	0.1064 (0.0755)	–0.5083*** (0.1384)	–0.1162 (0.0891)	–0.1047 (0.1319)
Number of books in HH	0.0323 (0.0248)	–0.0546 (0.0379)	0.0031 (0.0294)	–0.0249 (0.0426)
Rural	–0.0351 (0.0467)	0.0591 (0.0785)	0.0865 (0.0695)	–0.3787*** (0.0946)
High-skilled white collar	–0.2944*** (0.0774)	0.2157 (0.1560)	–0.0826 (0.1113)	–0.0716 (0.1640)
High-skilled blue collar	–0.2000** (0.0785)	–0.0167 (0.1493)	–0.1245 (0.1064)	0.1001 (0.1557)
Low-skilled white collar	–0.0877 (0.0668)	–0.1451 (0.1165)	–0.0521 (0.0796)	–0.0431 (0.1157)
Farmer 10	–0.0863* (0.0500)	–0.2247*** (0.0822)	0.0241 (0.0670)	–0.2087* (0.1052)
No main breadwinner	0.0224 (0.1853)	–0.0810 (0.3083)	0.0416 (0.1991)	0.4092 (0.2756)
<i>Base: Low-skilled blue collar</i>				
<i>Other control variables</i>				
Age	0.1856*** (0.0352)	0.2535*** (0.0600)	0.2438*** (0.0453)	0.1240* (0.0651)
Age squared	–0.0011*** (0.0003)	–0.0016*** (0.0004)	–0.0014*** (0.0003)	–0.0006 (0.0005)
Mean LHS	1.0012	2.9761	1.2190	3.2205
N in component	6708	2094	6688	2426
N		8802		9114

Marginal effects after FMM estimation. Estimated Model II (see Table 2).

Controlled for country of origin, wave indicator, and missing values.

Standard errors in parenthesis. *10%, **5%, and ***1% significance.

Table 6 Probability of being in component 2 in FMM

	Males	Females
<i>Childhood shocks</i>		
Relocation 0–15	–0.2193*** (0.0352)	–0.0460* (0.0276)
Dispossession before birth	0.0042 (0.0451)	0.0171 (0.0399)
Dispossession 0–15	–0.0153 (0.0319)	0.0451 (0.0308)
Children's home	0.0218 (0.0378)	–0.0276 (0.0395)
Foster family	0.0802** (0.0393)	0.0588 (0.0364)
Hunger 0–15	0.0438** (0.0179)	0.0051 (0.0215)
<i>Childhood social status</i>		
Number of features of accomm.	–0.0050 (0.0037)	–0.0101*** (0.0037)
Rooms per person	–0.0692*** (0.0147)	–0.0023 (0.0140)
Number of books in HH	–0.0079 (0.0051)	–0.0032 (0.0049)
Rural	0.0061 (0.0105)	–0.0493*** (0.0107)
High-skilled white collar	0.0283 (0.0202)	–0.0034 (0.0199)
High-skilled blue collar	0.0012 (0.0209)	0.0262 (0.0197)
Low-skilled white collar	0.0020 (0.0150)	–0.0034 (0.0148)
Farmer	–0.0327*** (0.0118)	–0.0284** (0.0127)
No main breadwinner	–0.0256 (0.0382)	0.0465 (0.0330)
Base: Low-skilled blue collar		
<i>Birth cohort</i>		
Born 1930–1939	0.0330* (0.0172)	0.0073 (0.0174)
Born 1940–1945	0.0587*** (0.0176)	0.0230 (0.0176)
Born 1946–1949	0.0863*** (0.0183)	0.0410** (0.0181)
Born 1950–1955	0.0561*** (0.0181)	0.0279 (0.0177)
Base: Born 1920–1929		
<i>Country of origin</i>		
Austria	–0.0348 (0.0282)	0.0217 (0.0269)
The Netherlands	–0.0470** (0.0210)	–0.0111 (0.0211)
Spain	–0.0787*** (0.0230)	–0.1752*** (0.0277)
Italy	–0.0422** (0.0203)	0.0137 (0.0219)
France	–0.1178*** (0.0228)	–0.0553** (0.0218)
Denmark	–0.0073 (0.0212)	0.0359* (0.0212)
Greece	–0.1426*** (0.0217)	–0.1998*** (0.0271)
Belgium	–0.0826*** (0.0207)	–0.0120 (0.0207)
Poland	–0.0237 (0.0225)	0.0716*** (0.0222)
Soviet Union and s.s.	–0.1428** (0.0714)	0.0044 (0.0570)
Czechoslovakia and s.s.	–0.0807*** (0.0225)	0.0095 (0.0213)
Other countries	–0.2119 * (0.1102)	0.0767 (0.0679)
Base: Germany		
Pseudo R^2	0.0237	0.0259
Mean LHS	0.2379	0.2662
N	8802	9110

Marginal effects after Logit regression. Standard errors in parenthesis.

LHS: 0...component 1, 1...component 2.

*10%, **5%, and ***1% significance.

number of adverse health conditions are positively associated, whereas in component two it is the other way around. In the standard Poisson regression the coefficient is positive but not statistically significant for both males and females. It seems that individuals from better situated families suffer more from relocation in childhood, whereas those in component two even seem to profit thereof. While those from richer families simply might have more to lose, those from a poorer background might even profit from being dislocated into a better region with better health care, etc. Moreover, relocation is much more frequent in the first group: for males, for example, there are 294 individuals in component one and only 30 in component two. A negative consequence of relocation, thus, is an empirically much more frequent phenomenon, while a positive outcome can be considered to be the exception. Finite mixture modeling is indispensable in this case to reveal these differences.

While marginal effects for dispossession are not statistically significant, the results for having lived in a children's home or foster family and having suffered from hunger reveal a noteworthy pattern: all these negative childhood shocks may have serious detrimental effects on health in later life, but only for the smaller group of children from less affluent parents. While these associations are only marginally significant in the case of children's home, the effects are stronger for foster families in the case of boys and strongest for both genders in the case of hunger in childhood. It seems that more affluent families are better able to cope with fostering children, which might be caused by the availability of a larger social or family network which can absorb the shock of missing parents more easily.¹³ As it comes to hunger in childhood, there are different explanations for these differing reactions: either more affluent families are better able to absorb periods of malnutrition or these periods of hunger are either shorter and more exceptional, or less severe in the first place.

5 Conclusions

This article investigates the long-run associations between different adverse childhood shocks with health in late adulthood. Using a simple life-course approach and SHARE data from 11 European countries we estimate the direct and indirect effects of shocks, such as relocation,

¹³ Santavirta (2010) also examines that if foster families' social status is below that of biological parents, fostering can have negative long-term effects on employment and welfare. Effects varying by socioeconomic status of the family are also established by Akbulut-Yuksel (2009).

dispossession, having lived with a foster family or in a children's home, or having suffered from hunger in early life. Our major findings are that having lived in a children's home, having been fostered with another family, having suffered from hunger and dispossessions are found to be negatively correlated with health even after the age of 50 years. As dispossession and other adverse shocks typically also happened to the parents of our survey respondents we can speak about long-lasting inter-generational associations here.

Employing a finite mixture model that allows to classify the sample into a priori unknown groups, we find that some adverse shocks have opposite correlations in different groups of individuals. Results suggest that for individuals originating from better situated families, relocation or evacuation during a war is most strongly associated with negative health outcomes. The associations between hunger, periods spent in a children's home, or having lived with a foster family and health outcomes are notably larger for children from less affluent families compared with children from better situated families.

We find that early-life shocks may have long-lasting consequences on well-being of individuals. These outcomes underline the potential significance of early policy interventions in case of dramatic war- or social-upheaval-driven events, or more family-driven events to mediate such long-term impacts and prevent future cost. These results also show evidence for the importance of being more cautious with general assessments of the impact of early-life conditions on health or social circumstances in later life. The use of a finite mixture model offers a simple possibility to control for unobserved factors and to differentiate between a priori unknown groups whose coping possibilities for such severe shocks may be substantially different.

Funding

This article uses data from SHARELIFE release 1, as of 24 November 2010 or SHARE release 2.5.0, as of 24 May 2011. The SHARE data collection has been primarily funded by the European Commission through the 5th framework program (project QLK6-CT-2001-00360 in the thematic program Quality of Life), through the 6th framework program (projects SHARE-I3, RII-CT- 2006-062193, COMPARE, CIT5-CT-2005-028857 and SHARELIFE, CIT4-CT-2006-028812) and through the 7th framework program (SHARE-PREP, 211909 and SHARE-LEAP, 227822). Additional funding from the US National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064, IAG BSR06-11, R21 AG025169)

as well as from various national sources is gratefully acknowledged, for example, the Austrian Ministries of Science and Social Affairs (see www.share-project.org for a full list of funding institutions). Thanks to the Austrian Science Funds (NFN ‘Labor economics and the welfare state’) for funding and to Viola Angelini, Martha Bailey, René Böheim, Martin Halla, Steve Lehrer, Michael Radhuber, Mario Schnalzenberger, Anna Sjogren and seminar participants in Venice, Vienna and Munich for helpful comments.

References

- Akbulut-Yuksel, M. (2009), “Children of War: The Long-run Effects of Large-scale Physical Destruction and Warfare on Children”, IZA Working Paper 4407, Institute for the Study of Labor (IZA).
- Alderman, H. (2012), “The Response of Child Nutrition to Changes in Income: Linking Biology with Economics”, *CESifo Economic Studies* **58**, 256–73.
- Beegle, K., J. De Weerd and S. Dercon. (2010), “Orphanhood and Human Capital Destruction: Is there Persistence Into Adulthood?”, *Demography* **47**, 163–80.
- Bohacek, R. and M. Myck. (2011), “Long Shadows of History: Persecution in Central Europe and its Labor Market Consequences”, IZA Working Paper 6130, Institute for the Study of Labor (IZA).
- Bopp, M., J. Braun, F. Gutzwiller and D. Faeh. (2012), “Health Risk or Resource? Gradual and Independent Association Between Self-rated Health and Mortality Persists Over 30 Years”, *PLoS One* **7**.
- Brunello, G., M. Fort, N. Schneeweis and R. Winter-Ebmer. (2011), “The Causal Effect of Education on Health: What is the Role of Health Behaviors?”, IZA working paper, Institute for the Study of Labor (IZA).
- Case, A., A. Fertig and C. Paxson. (2005), “The Lasting Impact of Childhood Health and Circumstance”, *Journal of Health Economics* **24**, 365–89.
- Case, A. and C. Paxson. (2010), “The Long Reach of Childhood Health and Circumstance: Evidence from the Whitehall II Study”, NBER Working Paper 15640, National Bureau of Economic Research (NBER).
- Currie, J. (2009), “Healthy, Wealthy, and Wise: Socioeconomic Status, Poor Health in Childhood, and Human Capital Development”, *Journal of Economic Literature* **47**, 87–122.
- Currie, J. and R. Hyson. (1999), “Is the Impact of Health Shocks Cushioned by Socioeconomic Status? The Case of Low Birthweight”, *American Economic Review* **89**, 245–50.

- Deb, P. (2012), “FMM: Stata Module to Estimate Finite Mixture Models”, Statistical Software Components, Boston College Department of Economics. <http://ideas.repec.org/c/boc/bo-code/s456895.html>.
- Deb, P., W. T. Gallo, P. Ayyagari, J. Fletcher and J. L. Sindelar. (2011), “The Effect of Job Loss on Overweight and Drinking”, *Journal of Health Economics* **30**, 317–27.
- Elbert, T. and S. Schaal. (2006), “Ten Years after the Genocide: Trauma Confrontation and Posttraumatic Stress in Rwandan Adolescents”, *Journal of Traumatic Stress* **19**, 95–105.
- Havari, E. and F. Mazzonna (2011), “Can We Trust Older People’s Statements on their Childhood Circumstances? Evidence from SHARELIFE”, SHARE Working Paper Series.
- Havari, E. and F. Peracchi. (2011), “Childhood Circumstances and Adult Outcomes: Evidence from SHARELIFE”, EIEF Working Paper 1115, Einaudi Institute for Economic and Finance (EIEF).
- Hayward, M. D. and B. K. Gorman. (2004), “The Long-arm of Childhood: The Influence of Early-life Social Conditions on Men’s Mortality”, *Demography* **41**, 87–107.
- Heiss, F. (2011), “Dynamics of Self-rated Health and Selective Mortality”, *Empirical Economics* **40**, 119–40.
- Ichino, A. and R. Winter-Ebmer. (2004), “The Long-run Educational Cost of World War II”, *Journal of Labor Economics* **22**, 57–87.
- Jensen, P. S. and J. A. Shaw (1996), “The Effects of War and Parental Deployment Upon Children and Adolescents”, in R. J. Ursano and A. E. Norwood, eds., *Emotional Aftermath of the Persian Gulf War: Veterans, Families, Communities, and Nations*, chapter 4. American Psychiatric Press, Washington, DC, pp. 83–109.
- Kesternich, I., B. Siflinger, J. P. Smith and J. K. Winter. (2014), “The Effects of World War II on Economic and Health Outcomes Across Europe”, *Review of Economics and Statistics* **96**, 103–18.
- Lochner, L. (2011), “Non-production Benefits of Education: Crime, Health, and Good Citizenship”, NBER Working Paper 16722, National Bureau of Economic Research (NBER).
- Lüdicke, J. (2011), “FMMLC: Stata Module for Postestimation with Finite Mixture Models”, Statistical Software Components, Boston College Department of Economics. <http://ideas.repec.org/c/boc/bo-code/s457291.html>.
- Meng, X. and R. G. Gregory. (2002), “The Impact of Interrupted Education on Subsequent Educational Attainment: A Cost of the

- Chinese Cultural Revolution”, *Economic Development and Cultural Change* **50**, 935–59.
- Meng, X. and N. Qian. (2009), “The Long Term Consequences of Famine on Survivors: Evidence from A Unique Natural Experiment Using China’s Great Famine”, NBER Working Paper 14917, National Bureau of Economic Research (NBER).
- Nuttall, R., J. Walton and E. Vazquez-Nuttall. (1997), “The Impact of War on the Mental Health of Children: A Salvadorian Study”, *Child Abuse & Neglect* **21**, 737–49.
- Santavirta, T. (2010), “How Large are the Effects from Temporary Changes in Family Environment: Evidence from A Child-evacuation Program During WWII”, SOFI Working Paper 8/2010, Swedish Institute for Social Research (SOFI).
- Smith, J. P. (2009), “The Impact of Childhood Health on Adult Labor Market Outcomes”, *The Review of Economics and Statistics* **91**, 478–89.
- Van den Berg, G. J., P. Pinger and J. Schoch. (2011), “Instrumental Variable Estimation of the Causal Effect of Hunger Early in Life on Health Later in Life”, IZA Discussion Paper 6110, Institute for the Study of Labor (IZA).
- Wedel, M., W. S. Desarbo, J.R. Bult and V. Ramaswamy. (1993), “A Latent Class Poisson Regression Model for Heterogeneous Count Data”, *Journal of Applied Econometrics* **8**, 397–411.
- Weinreb, L., C. Wehler, J. Perloff, R. Scott, D. HOsemr, L. Sagor and C. Gundersen. (2002), “Hunger: Its Impact on Children’s Health and Mental Health”, *Pediatrics* **110**, e41.