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Article

Forced migration in childhood: Are there long-term health effects?

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ABSTRACT

Studies on the health of migrants have increased considerably in number in recent years, but little is still known about the long-term health effects associated with forced migration, and particularly for people who were forced to migrate as children. Data shortcomings together with the methodological challenges of studying migrant populations limit the ability to disentangle the roles of various factors that influence migrant health outcomes. Finland provides an unusual opportunity to study long-term health consequences associated with forced migration. During World War II, twelve per cent of the Finnish population was forced to leave the region nowadays referred to as Ceded Karelia. After the war, these Karelians could not return home because the area was relinquished to the Soviet Union. Using high quality, linked register-based data for the period 1988–2012, we investigate whether this forced migration had long-term health consequences for those who were forced to migrate as children. Comparison groups are non-displaced persons born on the adjacent side of the new border, and people born elsewhere in Finland. Health at ages 43–65 years is measured by receipt of sickness benefit, which is an indicator of short-term illness, and receipt of disability pension, which reflects long-term illness or permanent disability. All-cause and cause-specific mortality is analysed at ages 43–84 years. We find no support for the hypothesis that the traumatic event of being forced to migrate during childhood has long-term negative health consequences. The forced child migrants have lower odds for receipt of sickness benefit, and women also have lower odds for receipt of disability pension. The mortality results are largely driven by patterns specific for eastern-born populations of Finland. A likely reason behind the absence of negative health consequences is that these migrants seem to have integrated well into post-war Finnish society.

1. Introduction

Population mobility is one of the leading policy issues of the 21st century. An estimated one billion persons are on the move either internally or internationally (UNDP, 2009). About one fifth of the world's population today, or more than 1.5 billion people, live in countries affected by conflict. Political instability has a large human cost. By the end of 2012, about 45 million people were displaced due to conflict or persecution, and more than 15 million of them were refugees (UNDP, 2014). Since then the numbers have grown. In 2014, more than 800,000 asylum applications were recorded, whereof more than 600,000 in Europe (OECD, 2015). In 2015, the number of irregular entries into the European Union was over one million (BBC, 2016). Thus the OECD countries face an unprecedented refugee crisis.

There is an extensive body of research on the health of immigrants in a variety of countries, but a dearth of quantitative studies on the subject of the health of forced child migrants. Most of these studies are concerned with populations who originate in severe conflict zones in developing countries. The typical outcome studied is under-five mortality, or other aspects related to health below age five, such as child immunizations (Kristensen, Aaby, & Jensen, 2000; Senessie, Gage, & Von Elm, 2007). Studies of the immediate effects of forced migration demonstrate a mortality disadvantage for children of displaced populations compared to the children of the host population (Guha-Sapir and Gijsbert, 2004; O'Hare and Southhall, 2007). Research concerned with longer-term consequences are less conclusive (Avogo and Agadjanian, 2010; Verwimp and Van Bavel, 2005). Migration itself may pose significant hazards with psycho-social impacts (Hicks, Lalonde, & Pepler, 1993; James, 1997), but it may also increase access to health care and improved environmental conditions (McKenzie, Gibson, & Stillman, 2009; Popkin and Udry, 1998).

To the best of our knowledge, there are no follow-up studies that extend to adulthood in which forced child migrants are observed with respect to health several decades after the move, and for a context outside less developed world regions. Finland provides an unusual

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opportunity to undertake such analyses, and to overcome some of the problems commonly related to the study of the interrelations between migration and later life health outcomes. During World War II, twelve per cent of the country's population was forced to leave the region that is nowadays referred to as Ceded Karelia when it was occupied by the Soviet Union. After the war, these Karelians could not return home because Finland relinquished this region to the Soviet Union. These forced migrants, who primarily were farmers, were relocated elsewhere in Finland and had to prepare for permanent existence in new surroundings. The Finnish population register makes it possible to undertake longitudinal analyses of the health of these migrants several decades after they were forced to move. These data are of high quality with no loss to follow-up, and they avoid methodological challenges present in many data sources.

Migration can in many respects be conceptualised as a process of change (Hertz, 1993). Learning to cope with numerous hardships and anxieties created by settling into a new environment can create psychological distress with long-term consequences also for physical health and mortality. Migration is often viewed as a U-shaped process, in which the migrant's initial elation on arriving in the new society is replaced by feelings of distress and dissatisfaction when difficulties are encountered, while these feelings gradually fade when the person adapts to the new environment (Ritsner and Ponizovsky, 1999). Despite a large body of literature, it is not clear what course distress will take and how long a distress period will last. In this paper, we are particularly concerned with the issue of whether there are any health consequences of forced migration in the very long term.

There is only one previous large-scale study of the long-term health consequences of the forced Finnish migrants (Saarela and Finnäs, 2009a). It analysed mortality at ages 55–79 years of people who were forced to migrate at any age between 0–50 years. Apart from a peak in male mortality around the collapse of the Soviet Union, interpreted as induced by stress, no other mortality differences between migrants and non-migrants were found, and there were no differences by migration status among women. Here, we focus on the children who were forced to migrate, which they did together with their parents at ages 0–17 years, and compare their health and mortality at ages 43–84 years to those of individuals who were born in other parts of Finland, and particularly to those born on the Finnish side of the new border.

The impact of forced migration on those who migrated as children might differ from that of their parents. The children have not been in combat or participated in war-related civilian activities. Also, the early life experiences of child migrants differ from those of their parents in that they have been exposed to the environment in the new destination from a young age. Acculturation to the habits of new surroundings can be assumed particularly strong for the child migrants, although these experiences might differ depending of the specific age at which they migrated. It needs to be emphasised as well that the child migrants grew up under highly similar environmental, economic and social circumstances as the non-displaced children. Thus it is plausible that the child migrants have similar health profiles later in life as people in the comparison group born on the adjacent side of the new border in eastern Finland. If the move was a highly critical life event, however, we would expect to observe worse health and higher mortality later in life of the forced child migrants. The overall aim with this paper is to investigate whether this might be the case.

2. The association between migration and health

The event of migration is known to be associated with stress and processes that may influence health, such as increased stress levels, disrupted social ties, diminished social support and social isolation (Deri, 2005; Jasso, Massey, Rosenzweig, & Smith, 2004). Conventional theory on migrants' adaption to stress suggests that moving imposes stress on the individual because it disturbs the equilibrium between the migrant and the environment (Ben-Sira, 1997). This compels the migrant to readjust, which may negatively affect health and raise subsequent mortality. Although these negative health consequences of migration are likely to become weaker over time (Cornia, 2000), a fundamental issue is whether they are discernible in the longer term.

One of the main challenges in identifying the impact of migration on health lies in the fact that the event of migration itself is likely to be correlated with unobserved characteristics of the migrants, such as biological endowments, personality traits, and random health shocks (Stillman, Gibson, & McKenzie, 2012). Furthermore, migrants often differ from the native population with regard to socioeconomic status, exposure to discrimination that stems from xenophobia or racism, and they may experience poorer working conditions if sorted into more dangerous and strenuous occupations (Orrenius and Zavodny, 2009). In addition, health profiles and epidemiological regimes may differ between origin and destination areas (Cunningham, Ruben, & Narayan, 2008; Rivera et al., 2002).

Numerous studies, particularly those from the United States, nevertheless document better health among most immigrant subgroups than among native-born residents as measured by various indicators such as mortality, morbidity, or self-rated health (Elo, Mehta, & Huang, 2011; Elo, Vang, & Culhane, 2014). These migrant health advantages have been attributed to selective migration, referring to the fact that migration, and long-distance migration in particular, is dominated by people whose health is better than that of the origin country population (Lu and Qin, 2014; Riosmena, Wong, & Palloni, 2013; Wallace and Kulu, 2014). This positive health selection can be reinforced by host country screening of prospective immigrants (Chiswick, Lee, & Miller, 2008; Gushulak, 2007). Whether children of migrants who move with their parents are subject to same selection mechanisms as their parents is less well known. In the case of the present study, selective migration is unlikely to play a role, because all families were forced to move. Similarly, selective return migration, which postulates that unhealthy migrants or migrants who experience deteriorating health have a greater tendency to return to their origin communities than healthier migrants (Abraído-Lanza, Armbrister, Flórez, & Aguirre, 2006; Andersson and Drefahl, 2016), is absent in our case study. None of the families who were forced to migrate could return to Ceded Karelia after World War II.

Sociocultural protective factors, such as close family ties, have been hypothesized to enable migrants to cope with stress and promote better health-related behaviours, e.g., good dietary habits (Landale, Oropesa, & Gorman, 2000). At the same time, most studies document that the health of immigrants often decline with time spent in the host country, and the health status may converge or even fall below that of the native born. The acculturation is consequently a temporal process by which individuals adopt the behaviours and attitudes of the host society. The adoption can be associated with both negative health behaviours, such as uptake of drinking and smoking, and reduced physical activity, and positive health behaviours, such as increased use of preventive health services (Anson, 2004; Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). If the immigrant group remains culturally distinct, the importance of sociocultural protective factors may remain important over time (Franzini, Ribble, & Keddie, 2001). In our study, the forced migrants were culturally similar to the Finnish population prior to their move, especially to those who were living on the Finnish side of the new border in Eastern Finland. Thus, cultural differences are unlikely to play a substantial role in the present study.

Due to potential reporting differences by nativity status, data artifacts have also been cited as potential source of bias in comparing health status of the foreign-born and the native-born populations based on survey data (Riosmena et al., 2013). Loss to follow-up in prospective mortality studies and in longitudinal studies more generally can lead to biased estimates when the foreign born return to their country of origin (Abraído-Lanza, Dohrenwend, Ng-Mak, & Blake-Turner, 1999; Constant, García-Muñoz, Neuman, & Neuman, 2015; Turra and Elo,

2008; Weitoft, Gullberg, Hjern, & Rosén, 1999). The register-based data on which our study is based on are not subject to such biases (see Section 4 below).

Observed health outcomes of migrants as compared to non-migrants or natives may consequently not be evidence of the consequences of migration itself, but arise from the selective features of migration on health. As we argue below, the case of the Finnish forced migration enables us to circumvent many of these confounding factors, and provides an excellent and unusual opportunity to examine the relationship between migration and long-term health outcomes.

3. Context and underpinnings

Three months after the German invasion of Poland in September 1939, the Soviet Red Army attacked Finland. This is known as the outbreak of the Winter War. In the peace treaty ending the battles in March 1940, Finland ceded roughly a tenth of its territory to the Soviet Union. The entire population of these areas was evacuated during the war. The Emergency Settlement Act was enacted in July 1940 in order to settle the displaced population in the rest of the country. This settlement policy was suspended when Finland joined Germany's attack on the Soviet Union in June 1941, known as the outbreak of the Continuation War. The ceded areas were reoccupied, and from the end of 1941 the displaced persons were allowed to return to their pre-war homes. Two thirds of them did so (Sarvimäki, Uusitalo, & Jäntti, 2010). In the summer of 1944, the Soviet Red Army had pushed the Finnish troops back to roughly the same line of defence that they held at the end of the Winter War. The entire population of the ceded areas was again evacuated, and have not been allowed to move back since then.

In this context, forced migration was consequently an exogenously determined migration decision and thus avoids the problem that migrants might be inherently different from non-migrants simply because they had decided to migrate. These underpinnings provide a natural experiment in that all individuals eventually had to leave the area. None were selected on health or any other characteristics, and none had the opportunity to eventually return.

In May 1945, the Finnish parliament approved the Land Acquisition Act that guided the subsequent settlement policy (Pihkala, 1952; Virtanen, 2006). The forced migrants were relocated elsewhere in Finland with the assistance of the Finnish government and were distributed around the country in a manner that was, if not random, at least not dependent on the migrants' own decisions. People from each Karelian village were settled into a designated target municipality. The non-agrarian population was not explicitly allocated, but their destination was mainly determined by the availability of housing and the distance from the ceded areas. The displaced who had owned or rented land in the ceded areas and had received their principal income from agriculture were entitled to receive land from remaining parts of the country. Others received compensation for their lost property in the form of government bonds. So basically all evacuated families had the right to receive a new homestead and they were allocated land in proportion to their former property.

These circumstances resulted in a situation where the migrants had similar socioeconomic profiles immediately before and after relocation, and were similar to people living on the Finnish side of the new border in particular. Many displaced persons moved within Finland after they had been relocated. Five years after evacuation, roughly half of the displaced population lived in their designated placement areas (Waris, Jyrkilä, Raitasuo, & Siipi, 1952). Previous research has documented only small variations between the forced migrants and non-migrants with respect to various observable characteristics, such as education, employment, sector of work, homeownership and marital status, regardless of whether observed only a few years after the evacuation or several decades later (Saarela and Finnäs, 2009a; Sarvimäki et al., 2010). However, a quarter of a century after displacement, the evacuees earned more than the comparison groups of non-migrants (Sarvimäki et al., 2010). It has been hypothesized that these income gains were related to a faster transition from traditional to modern occupations and from rural to urban areas than was the case among other Finns.

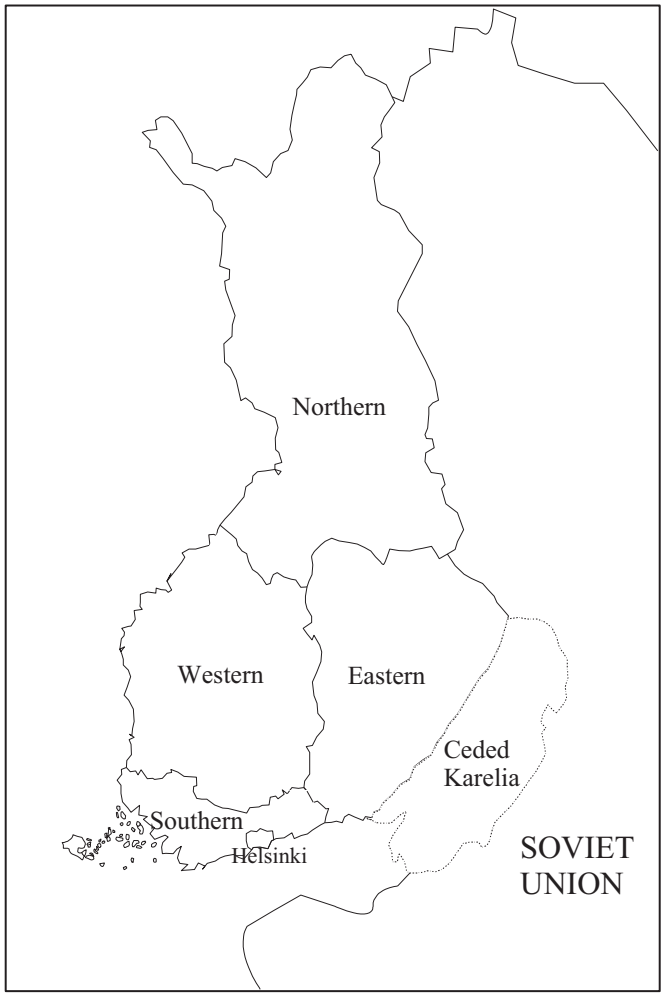

Fig. 1. Map of Finland after World War II.

In terms of chronic health profiles and epidemiological regimes, the population in eastern Finland is similar to the forced migrants (Norio, 2003; Saarela and Finnäs, 2006). Cultural differences, which may affect health behaviours and diet, are also much less pronounced across Finnish regions than is typically the case when individuals move across international borders (Saarela and Finnäs, 2010).

Because it was not possible to move back to the ceded areas after 1944, the forced migrants were encouraged to accustom themselves for permanent residence in their new surroundings, with the expectation that they would participate in all facets of economic, social and political life (Ahonen, 2005). There is consequently no reason to expect that the migrants would have suffered from limited access to services, experienced discrimination or poor working conditions, or to have been sorted into more dangerous or strenuous occupations as compared to non-migrants.

In combination with access to high-quality data, which will be described next, the case of the Finnish forced migrants therefore provides us with the opportunity to study the association between migration and long-term health in a context where migrant-selection effects are likely to be small, and in which study and control groups are highly similar in socioeconomic status and cultural practices.

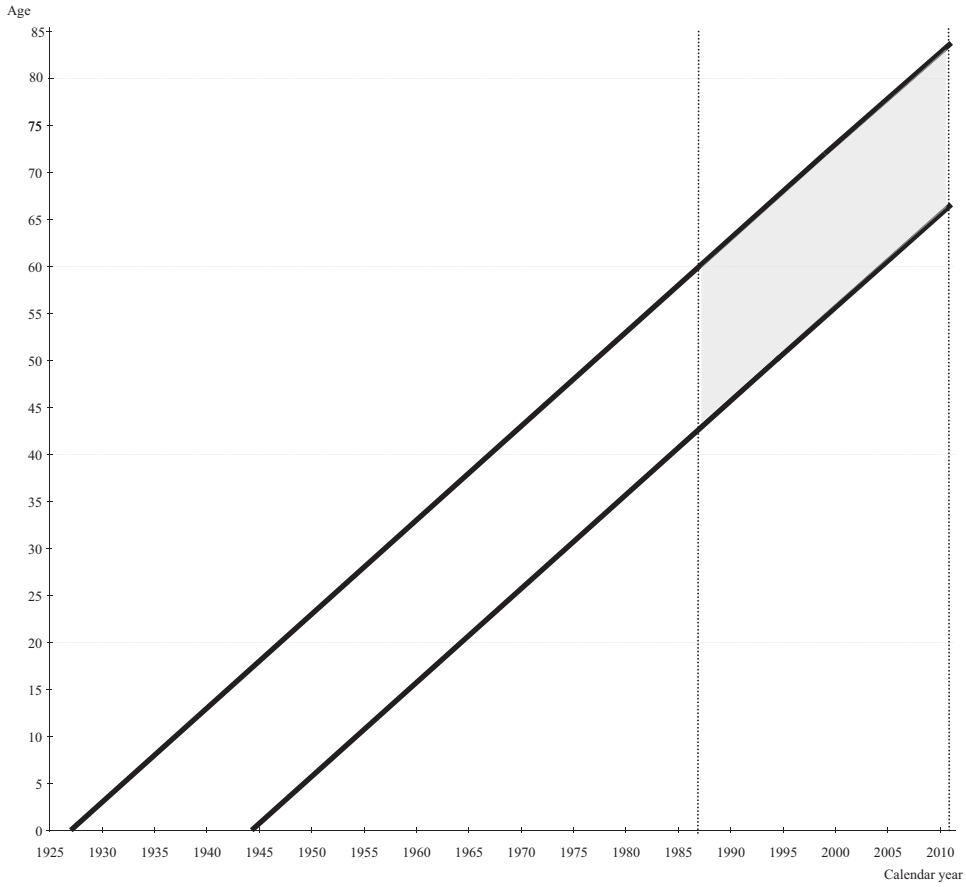

Fig. 2. Lexis diagram of the observation plan (grey-shaded area is the observation window).

Table 1
Data description by age group, sex and birth area (%).

	Ages < 65 years						Ages 65+ years					
	Men			Women			Men			Women		
	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
Number of individuals	2039	6076	15,166	2096	6292	15,218	1697	4998	12,873	1959	5870	14,255
Number of person years	23,064	77,960	200,415	23,611	84,099	205,746	17,660	46,050	118,197	23,618	60,896	145,024
Number of sickness benefit recipients	1422	5649	13,365	1527	6143	14,445						
unstandardised rate	6.2	7.2	6.7	6.5	7.3	7.0						
Number of disability pension recipients	6295	21,091	46,575	5486	19,273	43,531						
unstandardised rate	27.3	27.1	23.2	23.2	22.9	21.2						
Number of deaths	336	1074	2272	137	422	959	625	1592	3657	435	991	2399
unstandardised rate	1.5	1.4	1.1	0.6	0.5	0.5	3.5	3.5	3.1	1.8	1.6	1.7
Deaths by main cause, %												
Ischemic heart disease	34.5	31.1	27.7	18.2	13.5	12.2	28.2	30.5	28.5	22.2	21.8	18.3
Other cardiovascular diseases	11.9	12.2	13.1	16.8	14.0	12.3	16.0	15.6	13.9	19.6	19.5	18.0
Lung cancer and respiratory diseases	11.9	11.4	13.0	5.1	7.3	8.0	13.9	14.4	15.1	8.8	8.1	8.9
Other cancer	15.2	15.9	17.1	31.4	38.4	41.4	19.3	18.5	22.7	24.0	26.7	30.9
Other diseases	9.5	7.6	7.2	13.1	10.4	11.2	13.7	11.8	11.9	21.4	18.2	19.2
Alcohol related and external causes	17.0	21.8	22.0	15.3	16.4	14.9	8.9	9.2	7.9	3.9	5.8	4.7

Notes: (A) Born in Ceded Karelia, (B) Born in Eastern Finland, (C) Born elsewhere in Finland. Number of person years is the number of individuals multiplied with the number of calendar years they were observed. All information refers to the period 1988–2012, except for numbers on main causes of death, which are for 1988–2011.

4. Data and methods

The data come from a five per cent random sample of all persons living in Finland in 1988–2012. The sample unit is the individual, but the data also include some information about the individual's household. Since the data are drawn from the Finnish population register, there are no concerns regarding sample response rates or loss to follow-up, nor any need for imputation of characteristics. In addition, all dependent variables are based on data obtained from linkage to various register-based data sources. Individuals in the data can be observed longitudinally on an annual basis between January 1, 1988 and January 1, 2012 in various Finnish registers, and hence can be linked to employment statistics, death records, and records of the Social Insurance Institute (KELA). The data sources were merged by Statistics Finland using personal identification numbers.

Each person's socioeconomic and demographic characteristics,

Table 2
Distributions of control variables by age group, sex and birth area (%)

	Ages < 65 years						Ages 65+ years					
	Men			Women			Men			Women		
	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
Age in years												
43–49	7.9	13.1	13.8	6.5	12.6	12.9						
50–54	19.7	21.9	22.2	18.4	21.2	21.5						
55–59	33.2	30.9	30.3	33.0	30.6	30.3						
60–64	39.1	34.2	33.6	42.2	35.6	35.3						
65–69							44.5	49.7	50.0	39.8	45.5	46.3
70–74							32.9	31.3	31.1	33.1	31.5	31.4
75–84							22.6	19.0	18.8	27.1	23.0	22.3
Period												
1988–1992	42.9	37.9	36.9	43.7	37.0	36.5						
1993–1997	32.6	30.7	30.3	32.6	30.5	30.4	9.8	8.1	8.0	9.7	7.7	7.7
1998–2002	17.8	20.2	20.7	17.6	20.6	20.9	23.6	20.5	19.9	22.9	19.9	19.4
2003–2007	5.9	10.1	10.8	5.4	10.6	10.8	33.3	31.7	31.2	32.9	31.5	31.3
2008–2012	0.8	1.2	1.4	0.7	1.3	1.3	33.3	39.6	40.9	34.4	40.9	41.6
Level of education												
Primary	57.2	59.6	56.0	59.2	58.3	58.1	60.5	65.9	63.2	66.0	66.5	66.5
Secondary	20.6	22.7	22.6	23.9	26.2	24.1	17.7	18.7	18.5	20.3	22.2	20.1
Lowest tertiary	11.2	8.8	9.4	8.2	8.4	9.5	10.4	7.7	8.3	5.9	6.0	7.1
Lower-degree tertiary	5.4	4.5	5.5	5.8	4.1	4.9	6.0	3.8	4.7	5.1	3.3	3.9
Higher-degree tertiary	5.6	4.3	6.4	2.9	3.0	3.4	5.4	3.9	5.3	2.7	1.9	2.4
Homeownership												
No	20.2	19.3	17.5	18.0	18.3	16.6	18.1	17.7	16.8	21.8	22.1	20.5
Yes	79.8	80.7	82.5	82.0	81.7	83.4	81.9	82.3	83.2	78.2	77.9	79.5
Income quintile												
1st	13.7	15.5	14.2	26.0	24.8	23.1	10.9	14.3	13.0	26.4	28.8	26.6
2nd	12.9	13.3	12.5	18.1	17.1	17.2	21.8	22.5	22.5	32.4	30.9	31.6
3rd	17.8	18.1	16.2	18.9	19.1	19.1	25.9	25.7	24.5	21.9	22.0	21.5
4th	22.0	21.8	21.5	22.0	23.8	23.9	21.2	20.7	20.7	11.6	11.9	12.7
5th	33.5	31.4	35.7	14.9	15.2	16.7	20.3	16.9	19.4	7.7	6.4	7.6
Family situation												
With partner	75.5	75.0	76.5	64.3	68.4	68.2	74.1	73.1	73.6	45.8	49.6	50.6
Alone, never married	8.4	10.7	9.0	9.3	7.5	7.7	7.0	9.0	8.9	9.5	8.3	8.8
Alone, divorced	11.5	9.7	10.0	11.2	10.8	10.4	10.9	10.1	10.4	14.0	13.1	12.2
Alone, widow(er)	1.7	1.4	1.3	8.2	7.1	6.8	6.6	6.7	5.9	26.2	25.2	24.4
With parent or child	2.9	3.2	3.2	7.1	6.3	6.9	1.4	1.2	1.2	4.4	3.8	4.0
Region of residence												
Helsinki area	19.2	14.6	15.2	19.1	17.6	16.0	16.6	11.4	12.5	17.2	15.2	13.6
Southern Finland	19.3	7.3	17.7	19.1	8.5	17.5	19.8	6.6	17.9	19.7	7.4	17.1
Western Finland	35.4	11.5	44.5	35.7	12.6	44.7	36.9	10.9	46.1	36.1	12.3	47.6
Eastern Finland	20.3	64.4	4.1	20.9	58.7	4.4	21.9	69.2	3.7	22.3	62.6	4.0
Northern Finland	5.7	2.1	18.6	5.1	2.6	17.3	4.7	1.9	19.8	4.7	2.5	17.7

Notes: (A) Born in Ceded Karelia, (B) Born in Eastern Finland, (C) Born elsewhere in Finland. Distributions refer to percentages of total time under risk in person years. Chi-square tests indicate differences in distributions (at the 5% level of statistical significance) between (A), (B) and (C), and between (A) and (B), respectively, on all variables except homeownership when (A) and (B) are compared in women aged 65 years, in men aged 65+ years, and in women aged 65+ years.

together with the region of birth, come from the population register, which makes it possible to distinguish forced migrants. We study people born in Ceded Karelia in 1927–1944, and compare them with non-displaced people born on the adjacent side of the new border in Eastern Finland. In addition, we compare them to people born elsewhere in Finland (Figs. 1 and 2). This regional categorisation is the same as that used by Saarela and Finnäs (2009a) who studied mortality at ages 55–79 years of those born in 1895–1944. The last male cohort that was mobilised for army service during the war period consists of people born in 1926 (Saarela and Finnäs, 2012). Thus none of our study subjects had participated in combat during the war. People with mother tongue other than Finnish were excluded from the analyses. This group accounted for only two percent of all individuals born in Ceded Karelia. Most of them were Swedish speakers and thus had a different sociodemographic profile, because Swedish speakers in the area at that time had a non-agrarian background and lived in the city of Viipuri.

We examine health and mortality at ages 43–84 years, although the data structure places emphasis on ages 55–70 years. Health is proxied by three outcomes: whether a person (a) received a sickness benefit before age 65, (b) received disability pension before age 65, or (c) died. We study all-cause mortality as well as mortality from six main causes of death; ischemic heart disease, other cardiovascular disease, lung cancer or respiratory diseases, other cancers, any other disease, and alcohol related or external causes. In the data, there is no information about psychiatric morbidity.

The information on sickness benefit and disability pension comes from linkage to the records of KELA. These are screened cases since allowance for each benefit is conditional on a statement from a general practitioner in medicine. After the tenth day of sickness, KELA pays sickness benefit as compensation for loss of earnings caused by illness. To qualify, a person must be of working age and unfit for work for medical reasons. Individuals eligible for sickness benefit include employees, self-employed persons, full-time students, unemployed jobseekers, and people on sabbatical, but not pensioners. The sickness benefit is approximately 70 percent of income received in the two previous calendar years. Disability pension is paid by KELA to disabled or chronically ill persons aged 16–64 years if their ability to function has remained diminished for at least a year, and if their illness or injury causes impairment, need of assistance and/or additional financial

Table 3
Odds ratios for receipt of sickness benefit and disability pension, respectively, by sex.

	Sickness allowance				Disability allowance			
	Men		Women		Men		Women	
Birth area								
Ceded Karelia	1		1		1		1	
Eastern Finland	1.11	(1.04–1.19)	1.08	(1.02–1.15)	1.02	(0.98–1.06)	1.19	(1.14–1.24)
Rest of Finland	1.09	(1.03–1.15)	1.06	(1.00–1.12)	0.89	(0.86–0.92)	1.04	(1.00–1.08)
Age group								
43–49	1		1		1		1	
50–54	1.20	(1.15–1.26)	1.26	(1.20–1.31)	1.78	(1.70–1.87)	1.95	(1.84–2.06)
55–59	1.15	(1.10–1.21)	1.12	(1.07–1.17)	3.79	(3.63–3.97)	4.21	(4.00–4.44)
60–64	0.51	(0.48–0.54)	0.42	(0.40–0.44)	6.44	(6.15–6.74)	6.39	(6.06–6.73)
Period								
1988–1992	1		1		1		1	
1993–1997	0.86	(0.83–0.89)	0.83	(0.81–0.86)	1.35	(1.31–1.38)	1.33	(1.30–1.37)
1998–2002	0.70	(0.66–0.73)	0.67	(0.64–0.70)	1.16	(1.13–1.19)	1.18	(1.15–1.22)
2003–2007	0.76	(0.71–0.81)	0.69	(0.64–0.74)	0.93	(0.90–0.96)	0.89	(0.86–0.92)
2008–2012	0.45	(0.36–0.57)	0.49	(0.39–0.62)	0.87	(0.80–0.94)	0.77	(0.71–0.84)
Level of education								
Primary	1		1		1		1	
Secondary	0.97	(0.93–1.00)	0.97	(0.93–1.00)	0.79	(0.78–0.81)	0.79	(0.77–0.81)
Lowest tertiary	0.47	(0.44–0.50)	0.56	(0.53–0.60)	0.74	(0.71–0.77)	0.79	(0.75–0.82)
Lower-degree tertiary	0.34	(0.31–0.37)	0.40	(0.36–0.44)	0.73	(0.69–0.77)	0.85	(0.79–0.90)
Higher-degree tertiary	0.25	(0.22–0.28)	0.45	(0.40–0.50)	0.62	(0.58–0.66)	1.01	(0.94–1.10)
Homeownership								
No	1		1		1		1	
Yes	0.96	(0.92–0.99)	0.99	(0.95–1.03)	0.75	(0.73–0.77)	0.75	(0.73–0.77)
Income quintile								
1st	1		1		1		1	
2nd	0.76	(0.71–0.80)	1.03	(0.98–1.08)	1.56	(1.52–1.61)	1.25	(1.22–1.28)
3rd	0.90	(0.85–0.95)	1.45	(1.39–1.52)	1.60	(1.55–1.65)	0.73	(0.71–0.75)
4th	1.27	(1.21–1.33)	1.29	(1.23–1.34)	0.78	(0.76–0.81)	0.25	(0.24–0.25)
5th	1.12	(1.06–1.17)	1.23	(1.16–1.30)	0.30	(0.29–0.32)	0.13	(0.13–0.14)
Family situation								
With partner	1		1		1		1	
Alone, never married	0.75	(0.71–0.80)	0.68	(0.64–0.73)	1.51	(1.47–1.56)	2.20	(2.13–2.27)
Alone, divorced	1.09	(1.04–1.15)	1.10	(1.05–1.15)	1.24	(1.20–1.28)	1.50	(1.46–1.55)
Alone, widow(er)	1.09	(0.96–1.24)	0.85	(0.80–0.91)	1.11	(1.04–1.20)	1.65	(1.60–1.71)
With parent or child	0.88	(0.81–0.95)	0.89	(0.85–0.94)	1.23	(1.17–1.30)	1.08	(1.03–1.12)
Region of residence								
Helsinki area	1		1		1		1	
Southern Finland	1.06	(1.00–1.12)	1.07	(1.01–1.12)	0.96	(0.93–1.00)	0.94	(0.91–0.97)
Western Finland	1.11	(1.06–1.17)	1.18	(1.12–1.23)	0.95	(0.92–0.98)	0.92	(0.90–0.95)
Eastern Finland	1.19	(1.13–1.26)	1.18	(1.12–1.24)	1.05	(1.01–1.09)	0.90	(0.87–0.93)
Northern Finland	1.11	(1.05–1.18)	1.13	(1.07–1.20)	1.30	(1.25–1.35)	1.15	(1.11–1.19)

Notes: All variables are time-varying. Numbers within parentheses are 95% confidence intervals.

expenses. The allowance is payable at three fixed rate levels depending on the need for assistance, guidance and/or supervision. It can be paid during a specific period of time or without a time limit.

Hence if a person becomes unqualified for work, he or she first seeks sickness benefit. If the illness lasts for more than 300 days, the person can apply for disability pension. Sickness benefit is thus a proxy for temporary illness that makes one unfit for work, whereas disability pension refers to prolonged poor health or permanent illness, although it is possible for individuals on disability pension to return to work.

The data are split into calendar year observations. For the receipt of sickness benefit and receipt of disability pension, respectively, we estimate discrete-time logistic regression models. The time-varying approach is motivated by the fact that benefit receipt and the control variables can change from year to year. Almost 98 per cent of all persons who had received sickness benefit had eventually moved out of that state before age 65 (and only about 1.5 per cent of the population received this benefit at age 64). For disability pension the situation is different, as only 6.5 per cent of all persons who had received this benefit had moved out of this state before age 65. Most of the people who became disability pensioners consequently remained as disability pensioners until they received old-age pension at age 65.

Discrete-time hazard models are used to estimate the risk of all-cause and cause-specific mortality, as they can account for time-varying characteristics of individuals. In the mortality models, individuals are censored at the time of death or at the end of the follow-up period.

Our analytic sample consists of 4146 individuals who were forced to migrate as children, 12,390 individuals born in Eastern Finland, and 30,452 individuals born elsewhere in Finland. Each group contributes 87,953, 269,005, and 669,382 person years of follow-up, respectively (Table 1).

The control variables are age, period, educational attainment, homeownership, income quintile, region of residence, and family type. Family type combines information about marital status and whether or not a person lives alone. The distribution of the control variables by region of birth is shown in Table 2.

5. Results

As seen from the unstandardised numbers in Table 1, people born in Ceded Karelia were less likely to receive a sickness benefit (6.2 percent of the men and 6.5 per cent of the women) than people born in Eastern Finland (7.2 percent of the men and 7.3 per cent of the women) or elsewhere in Finland (6.7 percent of the men and 7.0 per cent of the women). The percentage receiving disability pension was similar among the forced migrants and those born in Eastern Finland (approximately 27 per cent of the men and 23 per cent of the women), but lower among those born in other parts of the country (approximately 23 percent of the men and 21 per cent of the women). The unstandardised death rate was highest for the group of people born in Ceded Karelia.

With regard to socioeconomic and demographic characteristics, the three groups were highly similar, although the large dataset implies that there were differences in a strict statistical sense (Table 2). Given this similarity by region of birth, we would expect that their inclusion explains only a modest part of the small variation in health outcomes by region of birth. Some differences are nevertheless notable. People who were forced to migrate as children were less likely to live in Eastern Finland than those who were born there, but still more likely to live in Eastern Finland than those who were born elsewhere in the country. Also, the forced migrants were more likely to have some tertiary-level education compared to those born in Eastern Finland, and more similar in this respect to those born elsewhere in Finland.

The results of the fully adjusted multivariate models for sickness benefit and disability pension are shown in Table 3. These results were very similar when estimated without adjustment for explanatory variables other than age and year of observation. Overall, they suggest

Table 4
Risk ratios for all-cause and cause-specific mortality, men.

	All causes		Ischemic heart disease		Other cardio-vascular diseases		Lung cancer and other respiratory		Other cancer		Other diseases		Alcohol and external causes	
Birth area														
Ceded Karelia	1		1		1		1		1		1		1	
Eastern Finland	0.99	(0.91–1.07)	0.99	(0.85–1.15)	0.99	(0.80–1.24)	0.97	(0.77–1.22)	0.99	(0.82–1.21)	0.88	(0.69–1.12)	1.07	(0.85–1.35)
Rest of Finland	0.90	(0.84–0.97)	0.83	(0.73–0.95)	0.85	(0.70–1.03)	0.99	(0.81–1.21)	1.01	(0.85–1.19)	0.77	(0.62–0.95)	0.96	(0.78–1.18)
Age group														
43–49	1		1		1		1		1		1		1	
50–54	1.30	(1.11–1.52)	2.09	(1.47–2.97)	1.10	(0.68–1.76)	1.53	(0.91–2.58)	1.46	(0.94–2.27)	1.01	(0.59–1.74)	0.97	(0.74–1.26)
55–59	2.01	(1.74–2.34)	3.92	(2.82–5.46)	2.15	(1.40–3.29)	2.26	(1.39–3.69)	2.45	(1.61–3.71)	1.64	(1.00–2.70)	1.00	(0.78–1.30)
60–64	2.88	(2.48–3.34)	6.00	(4.31–8.36)	3.30	(2.15–5.06)	4.53	(2.80–7.35)	3.15	(2.07–4.78)	2.59	(1.58–4.26)	1.00	(0.77–1.31)
65–69	3.93	(3.36–4.59)	8.52	(6.03–12.0)	4.67	(2.98–7.32)	6.86	(4.16–11.3)	4.86	(3.16–7.48)	4.24	(2.52–7.16)	0.83	(0.62–1.13)
70–74	5.64	(4.80–6.62)	13.6	(9.52–19.3)	7.50	(4.72–11.9)	9.60	(5.76–16.0)	6.37	(4.10–9.90)	7.10	(4.15–12.1)	0.78	(0.56–1.10)
75–84	9.94	(8.00–11.2)	21.5	(14.9–31.0)	13.8	(8.57–22.3)	13.2	(7.78–22.4)	10.2	(6.53–16.1)	16.4	(9.51–28.4)	0.77	(0.53–1.13)
Period														
1988–1992	1		1		1		1		1		1		1	
1993–1997	0.89	(0.82–0.96)	0.76	(0.66–0.88)	1.07	(0.85–1.34)	0.88	(0.70–1.11)	1.22	(0.98–1.52)	0.75	(0.55–1.01)	0.83	(0.69–0.99)
1998–2002	0.86	(0.79–0.94)	0.62	(0.53–0.73)	0.88	(0.69–1.12)	0.98	(0.78–1.25)	1.31	(1.05–1.64)	0.80	(0.59–1.09)	0.97	(0.79–1.18)
2003–2007	0.78	(0.71–0.86)	0.52	(0.44–0.61)	0.72	(0.56–0.94)	0.76	(0.58–0.98)	1.53	(1.21–1.93)	0.84	(0.60–1.16)	1.04	(0.83–1.31)
2008–2012	0.79	(0.72–0.88)	0.41	(0.34–0.50)	0.63	(0.47–0.84)	0.62	(0.46–0.82)	1.14	(0.89–1.47)	0.71	(0.50–1.01)	0.99	(0.75–1.30)
Level of education														
Primary	1		1		1		1		1		1		1	
Secondary	0.91	(0.87–0.96)	0.88	(0.79–0.97)	0.79	(0.68–0.93)	0.80	(0.68–0.93)	0.94	(0.83–1.07)	1.19	(1.01–1.40)	0.90	(0.78–1.04)
Lowest tertiary	0.96	(0.88–1.05)	1.01	(0.86–1.20)	1.07	(0.84–1.35)	0.66	(0.49–0.89)	0.99	(0.81–1.20)	1.02	(0.76–1.36)	0.86	(0.67–1.11)
Lower-degree tertiary	0.97	(0.86–1.10)	0.77	(0.59–1.01)	1.17	(0.85–1.62)	0.84	(0.56–1.24)	0.91	(0.70–1.20)	1.28	(0.87–1.87)	1.08	(0.78–1.48)
Higher-degree tertiary	0.85	(0.74–0.98)	0.63	(0.46–0.87)	1.09	(0.76–1.57)	0.69	(0.43–1.10)	1.00	(0.77–1.31)	0.98	(0.62–1.55)	0.71	(0.47–1.05)
Homeownership														
No	1		1		1		1		1		1		1	
Yes	0.56	(0.54–0.59)	0.63	(0.58–0.69)	0.62	(0.55–0.71)	0.43	(0.38–0.48)	0.65	(0.58–0.73)	0.38	(0.33–0.44)	0.60	(0.53–0.68)
Income quintile														
1st	1		1		1		1		1		1		1	
2nd	0.90	(0.85–0.96)	1.00	(0.90–1.12)	0.91	(0.77–1.07)	0.83	(0.71–0.97)	1.01	(0.87–1.17)	0.75	(0.62–0.90)	0.85	(0.72–0.99)
3rd	0.80	(0.75–0.85)	0.87	(0.77–0.98)	0.80	(0.68–0.95)	0.69	(0.59–0.82)	0.86	(0.74–1.01)	0.70	(0.57–0.85)	0.71	(0.60–0.84)
4th	0.64	(0.59–0.68)	0.65	(0.57–0.75)	0.68	(0.56–0.82)	0.55	(0.45–0.66)	0.73	(0.62–0.86)	0.67	(0.54–0.83)	0.48	(0.40–0.58)
5th	0.47	(0.43–0.51)	0.48	(0.41–0.57)	0.45	(0.36–0.58)	0.29	(0.22–0.37)	0.69	(0.57–0.84)	0.41	(0.31–0.55)	0.38	(0.31–0.48)
Family situation														
With partner	1		1		1		1		1		1		1	
Alone, never married	1.63	(1.54–1.74)	1.81	(1.61–2.03)	1.78	(1.51–2.11)	1.49	(1.26–1.76)	1.12	(0.96–1.32)	1.96	(1.61–2.38)	2.10	(1.78–2.48)
Alone, divorced	1.75	(1.65–1.85)	1.82	(1.63–2.03)	1.81	(1.54–2.13)	1.58	(1.34–1.85)	0.98	(0.83–1.14)	2.27	(1.90–2.70)	2.94	(2.53–3.41)
Alone, widow(er)	1.51	(1.39–1.65)	1.67	(1.43–1.96)	1.51	(1.20–1.91)	1.37	(1.07–1.74)	1.04	(0.84–1.29)	1.45	(1.11–1.90)	2.78	(2.17–3.57)
With parent or child	1.34	(1.16–1.54)	1.38	(1.06–1.80)	1.77	(1.25–2.51)	1.30	(0.87–1.94)	0.89	(0.61–1.31)	1.63	(1.03–2.58)	1.56	(1.11–2.21)
Region of residence														
Helsinki area	1		1		1		1		1		1		1	
Southern Finland	0.96	(0.89–1.04)	1.01	(0.86–1.18)	1.03	(0.82–1.28)	0.80	(0.64–0.98)	1.12	(0.94–1.35)	0.88	(0.69–1.12)	0.84	(0.68–1.02)
Western Finland	0.94	(0.88–1.00)	1.01	(0.88–1.15)	1.12	(0.93–1.37)	0.74	(0.62–0.89)	1.07	(0.91–1.26)	0.93	(0.75–1.14)	0.71	(0.59–0.84)
Eastern Finland	0.97	(0.90–1.05)	1.08	(0.93–1.26)	1.09	(0.87–1.37)	0.82	(0.66–1.02)	1.02	(0.84–1.23)	0.85	(0.67–1.09)	0.83	(0.67–1.01)
Northern Finland	0.96	(0.89–1.05)	1.17	(1.00–1.37)	1.04	(0.82–1.32)	0.85	(0.69–1.05)	0.96	(0.79–1.17)	0.78	(0.60–1.01)	0.80	(0.64–0.99)

no support for the argument that forced migration in childhood has malicious long-term health consequences. In contrast, we find that the displaced persons were somewhat healthier than non-displaced persons born in Eastern Finland. The displaced men had approximately ten per cent lower standardised odds of receipt of sickness benefit as compared to men born in Eastern Finland (1/1.11-1 in Table 3). They were also slightly less like to have received sickness benefit compared to men born elsewhere in Finland. Differences for women were in the same direction. Women who were forced to migrate as children were 6–7 per cent less likely than other Finnish women to receive sickness benefit (1/1.08-1 and 1/1.06-1). In addition, they had 16 per cent lower odds of receiving disability pension as compared to women born in Eastern Finland (1/1.19-1), and approximately four per cent lower odds as compared to women born elsewhere in Finland (1/1.04-1). Displaced men, on the other hand, were equally likely to receive disability pension as men born in Eastern Finland (1/1.02-1), and twelve per cent more likely to receive this allowance as compared to men born elsewhere in Finland (1/0.89-1).

The results with respect to the other explanatory variables were consistent with previous findings regarding the association between health and socioeconomic variables (Saarela and Finnäs, 2002; Sumanen, 2016). People with higher levels of education were significantly less likely to receive sickness benefit or disability pension than those with lower levels of education. Similarly, those with the highest levels of income were significantly less likely to receive disability pension, but more likely to take advantage of the sickness benefits.

The results for all-cause and cause-specific mortality are shown in Table 4 for men and Table 5 for women. As was the case for sickness benefit and disability pension, these results were similar when estimated without adjustment for explanatory variables other than age and year of observation. Among men, forced migrants had the same all-cause mortality risk as men born in Eastern Finland, but somewhat higher mortality than men born in the rest of the country. This elevation related primarily to their higher mortality from cardiovascular diseases, and from ischemic heart disease in particular. The results were similar for women. Cardiovascular mortality contributed to over 40 per cent of all male deaths in the age range studied, and to roughly 30 per cent of all female deaths (Table 1).

The results reported were found to be highly stable across several alternative model specifications. We set the follow-up to start at the same age for all study participants, and also considered receipt of sickness benefit and disability pension, respectively, as a time-constant event, meaning that once a person received the benefit, he or she was considered a recipient thereafter. For the mortality models, we ran regressions for different age groups separately. Various interaction terms were tested; for instance, between region of birth and current region of residence. None of these models changed the conclusions discussed above. Also, we found no violations of the standard assumption of discrete-time models, that differences in the predictors correspond to fixed differences in the odds or logit hazard. Estimates of the control variables were multiplicative on the odds and hazard scales, respectively.

Potentially the most important factor not discussed above is age at migration. We tested whether the results varied by age at migration by introducing interaction terms between birth cohort and region of birth, and by stratifying the analyses by birth cohort. Table 6 summarises results from regressions where we, according to birth cohort, have separated those who were at most age 7 when migrated from those who were older. As seen, there is no evidence to suggest that long-term health outcomes were affected by age at migration. Results of the other specifications mentioned above were similar and are available upon request.

Unfortunately, it was not possible to separate people who were forced to migrate once from those who were forced to migrate twice (unless the person was born after 1940). There were relatively few children born in Ceded Karelia in 1940–1941, and in 1942 and 1944. The children born in Ceded Karelia in 1940 and 1941, respectively, accounted for only about 12 per cent of the average cohort born in Ceded Karelia in 1927–1939. For the cohorts born 1942 and 1944, this share was approximately 40 per cent. There was no corresponding large drop in the number of births in the rest of the country, including Eastern Finland, in 1940–1944. However, excluding these potentially sensitive birth cohorts from the analyses resulted in estimates that were highly similar to the ones reported here.

6. Discussion and conclusion

We found no support for the hypothesis that the traumatic event of being forced to migrate during childhood would have long-term negative health consequences. At adult ages, the forced child migrants were less likely than non-displaced persons to receive a sickness benefit. Male migrants were more likely to receive disability pension than men born outside Eastern Finland, but equally likely as men born in Eastern Finland. Female migrants were less likely than other Finnish women to receive both sickness benefit and disability pension. Since mortality from cardiovascular diseases has been historically higher in eastern parts of Finland than elsewhere (Saarela and Finnäs, 2009b, 2010), the mortality differences observed were most likely caused by chronic disease patterns related to health behaviours and diet, and exposure to pathogens that are specific to the eastern regions of Finland (including the ceded area). These are factors that remain relevant throughout one's life course, regardless of one's current region of residence (Koskinen, 1994; Norio, 2003; Saarela and Finnäs, 2009c). We found no significant interactions between region of birth and current region of residence, suggesting that the higher risk of death is established relatively early in life. Prior studies have also documented that the regional variation in all-cause mortality in Finland is largely driven by mortality from ischemic heart disease, and that people's birth region is a more decisive determinant of mortality from ischemic heart disease than their current region of residence (Saarela and Finnäs, 2009b, 2009c, 2010; Valkonen, 1987).

One reason why forced migration during childhood does not seem to have negative health consequences may be that, at least according to observable socioeconomic and demographic characteristics, this migrant group appear to have integrated well into post-war Finnish society. The Finns in other parts of the country were also generally supportive of the relocation assistance and the integration of the people who were forced to move into new surroundings.

The results are in line with other studies concerned with long-term mortality effects of critical life events based on Finnish register data. People born during the famine in the 1860s (Kannisto, Christensen, & Vaupel, 1997), male cohorts who fought in World War II (Saarela and Finnäs, 2010), and people who were evacuated as foster children to Sweden during the war period (Santavirta, 2014), have previously been found to have no increase in later-life mortality.

One potential reason why critical life events of the kind studied here have no influence on mortality at older ages may be selective mortality at younger ages, also known as cohort inversion. If this was the case, frailer individuals would have died at an early stage and the healthier members of the cohorts would have survived to older ages. However, there is no evidence in the literature suggesting that the forced migrants experienced elevated mortality or poorer general health status immediately or soon after the evacuation (Saarela and Finnäs, 2009a; Sarvimäki et al., 2010). Cohort life tables also do not reveal increased mortality by age during or recently after the war period (Kannisto, Nieminen, & Turpeinen, 1999; Saarela and Finnäs, 2012).

Nevertheless, our estimates are conditional on survival to the start of the follow-up in 1988 for the cohorts born 1927–1944. Thus, we were unable to examine whether health and/or mortality differed between individuals who were forced to migrate as children and individuals born in Eastern Finland or elsewhere prior to this point in time.

Table 5
Risk ratios for all-cause and cause-specific mortality, women.

	All causes		Ischemic heart disease		Other cardio-vascular diseases		Lung cancer and other respiratory		Other cancer		Other diseases		Alcohol and external causes	
Birth area														
Ceded Karelia	1		1		1		1		1		1		1	
Eastern Finland	0.94	(0.85–1.04)	0.88	(0.69–1.12)	0.91	(0.71–1.18)	0.99	(0.67–1.45)	1.05	(0.86–1.30)	0.79	(0.61–1.02)	1.11	(0.75–1.64)
Rest of Finland	0.95	(0.86–1.04)	0.76	(0.61–0.93)	0.83	(0.66–1.03)	1.00	(0.71–1.40)	1.19	(0.99–1.43)	0.87	(0.69–1.08)	0.88	(0.62–1.26)
Age group														
43–49	1		1		1		1		1		1		1	
50–54	1.48	(1.16–1.88)	1.51	(0.58–3.91)	3.94	(1.66–9.35)	1.23	(0.38–3.95)	1.49	(1.02–2.18)	2.29	(0.93–5.64)	0.87	(0.55–1.39)
55–59	1.56	(1.24–1.98)	3.72	(1.58–8.76)	2.69	(1.13–6.42)	2.17	(0.74–6.42)	1.72	(1.20–2.49)	1.82	(0.75–4.46)	0.67	(0.42–1.07)
60–64	2.23	(1.76–2.81)	6.74	(2.89–15.7)	4.91	(2.08–11.6)	3.34	(1.14–9.83)	2.24	(1.55–3.23)	3.81	(1.59–9.13)	0.52	(0.32–0.85)
65–69	3.02	(2.37–3.86)	10.9	(4.54–26.0)	7.64	(3.81–18.4)	4.95	(1.64–14.9)	3.00	(2.04–4.42)	5.62	(2.30–13.7)	0.42	(0.24–0.73)
70–74	4.44	(3.46–5.71)	19.5	(8.07–47.1)	12.7	(5.21–30.7)	6.87	(2.24–21.0)	3.82	(2.56–5.70)	9.26	(3.75–22.9)	0.39	(0.21–0.71)
75–84	8.08	(6.26–10.4)	39.8	(16.3–97.2)	23.6	(9.63–58.0)	8.98	(2.87–28.0)	5.43	(3.59–8.23)	19.3	(7.74–48.0)	0.32	(0.16–0.62)
Period														
1988–1992	1		1		1		1		1		1		1	
1993–1997	1.00	(0.88–1.14)	0.76	(0.54–1.05)	0.82	(0.58–1.16)	1.61	(0.96–2.70)	1.02	(0.84–1.25)	1.18	(0.79–1.76)	0.97	(0.70–1.36)
1998–2002	1.03	(0.90–1.17)	0.66	(0.47–0.93)	0.99	(0.70–1.41)	1.71	(1.00–2.91)	0.97	(0.78–1.20)	1.30	(0.86–1.96)	1.09	(0.75–1.60)
2003–2007	1.00	(0.87–1.16)	0.59	(0.41–0.85)	0.85	(0.58–1.24)	1.72	(0.99–3.01)	1.05	(0.83–1.33)	1.25	(0.81–1.92)	1.65	(1.08–2.51)
2008–2012	1.11	(0.96–1.29)	0.45	(0.31–0.67)	0.82	(0.55–1.22)	1.34	(0.74–2.41)	0.83	(0.65–1.08)	1.19	(0.76–1.86)	1.56	(0.96–2.54)
Level of education														
Primary	1		1		1		1		1		1		1	
Secondary	0.92	(0.86–0.99)	0.89	(0.74–1.06)	0.86	(0.71–1.04)	0.58	(0.43–0.77)	1.02	(0.90–1.16)	0.85	(0.71–1.03)	0.93	(0.72–1.20)
Lowest tertiary	0.98	(0.87–1.12)	0.86	(0.59–1.24)	0.90	(0.64–1.28)	0.46	(0.26–0.79)	1.13	(0.91–1.39)	1.04	(0.75–1.44)	1.23	(0.82–1.84)
Lower-degree tertiary	0.99	(0.83–1.18)	0.48	(0.24–0.95)	0.90	(0.55–1.47)	0.29	(0.12–0.72)	1.31	(0.99–1.72)	0.99	(0.62–1.60)	1.57	(0.91–2.70)
Higher-degree tertiary	1.13	(0.90–1.41)	0.31	(0.10–1.00)	1.04	(0.57–1.91)	0.45	(0.18–1.17)	1.42	(1.00–2.01)	1.05	(0.57–1.92)	2.26	(1.23–4.15)
Homeownership														
No	1		1		1		1		1		1		1	
Yes	0.49	(0.47–0.52)	0.42	(0.36–0.49)	0.52	(0.44–0.60)	0.42	(0.34–0.52)	0.83	(0.74–0.94)	0.27	(0.23–0.32)	0.55	(0.44–0.69)
Income quintile														
1st	1		1		1		1		1		1		1	
2nd	0.80	(0.75–0.86)	0.74	(0.63–0.87)	0.72	(0.61–0.85)	0.81	(0.63–1.04)	0.91	(0.80–1.04)	0.73	(0.61–0.86)	0.74	(0.57–0.96)
3rd	0.62	(0.57–0.67)	0.45	(0.37–0.56)	0.54	(0.44–0.67)	0.75	(0.56–1.01)	0.74	(0.63–0.86)	0.66	(0.54–0.81)	0.50	(0.37–0.68)
4th	0.54	(0.49–0.60)	0.41	(0.31–0.54)	0.38	(0.29–0.51)	0.72	(0.50–1.04)	0.67	(0.56–0.79)	0.48	(0.36–0.64)	0.44	(0.31–0.61)
5th	0.49	(0.43–0.57)	0.33	(0.21–0.51)	0.45	(0.31–0.66)	0.81	(0.49–1.33)	0.54	(0.43–0.69)	0.56	(0.38–0.81)	0.26	(0.16–0.41)
Family situation														
With partner	1		1		1		1		1		1		1	
Alone, never married	1.57	(1.43–1.72)	1.62	(1.29–2.04)	1.82	(1.45–2.28)	1.88	(1.36–2.60)	1.30	(1.09–1.54)	1.98	(1.58–2.48)	1.70	(1.22–2.35)
Alone, divorced	1.36	(1.25–1.48)	1.28	(1.03–1.58)	1.55	(1.26–1.92)	1.84	(1.39–2.44)	1.12	(0.95–1.31)	1.57	(1.27–1.94)	1.81	(1.36–2.39)
Alone, widow(er)	1.43	(1.33–1.54)	1.61	(1.34–1.94)	1.58	(1.31–1.91)	1.28	(0.96–1.70)	1.24	(1.07–1.43)	1.55	(1.28–1.88)	1.66	(1.21–2.27)
With parent or child	1.12	(0.98–1.28)	1.46	(1.08–1.98)	1.23	(0.88–1.73)	1.52	(0.97–2.36)	1.02	(0.81–1.30)	1.08	(0.74–1.58)	0.64	(0.36–1.16)
Region of residence														
Helsinki area	1		1		1		1		1		1		1	
Southern Finland	0.95	(0.86–1.04)	1.06	(0.81–1.37)	1.03	(0.79–1.35)	0.85	(0.60–1.19)	0.83	(0.69–1.00)	0.98	(0.76–1.26)	0.89	(0.63–1.26)
Western Finland	0.91	(0.84–0.99)	0.91	(0.72–1.15)	1.09	(0.86–1.37)	0.67	(0.50–0.90)	0.89	(0.76–1.03)	0.92	(0.74–1.14)	0.79	(0.58–1.06)
Eastern Finland	0.89	(0.81–0.99)	0.97	(0.75–1.26)	1.00	(0.77–1.30)	0.65	(0.45–0.93)	0.86	(0.72–1.04)	0.93	(0.72–1.20)	0.70	(0.49–0.99)
Northern Finland	0.94	(0.85–1.05)	1.28	(0.98–1.67)	0.99	(0.74–1.32)	1.06	(0.75–1.51)	0.76	(0.62–0.93)	0.93	(0.71–1.23)	0.82	(0.56–1.21)

Table 6
Odds ratios for receipt of sickness benefit and for disability pension, and mortality risk ratios, by sex and birth-cohort group.

	Men				Women			
	Born 1937–1944		Born 1927–1936		Born 1937–1944		Born 1927–1936	
Sickness benefit								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	1.08	(0.99–1.18)	1.14	(1.03–1.26)	1.13	(1.03–1.23)	1.05	(0.96–1.15)
Born in rest of Finland	1.05	(0.97–1.14)	1.11	(1.02–1.21)	1.11	(1.02–1.20)	1.00	(0.93–1.09)
Disability pension								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	1.04	(0.98–1.10)	1.05	(0.99–1.10)	1.25	(1.17–1.33)	1.20	(1.14–1.26)
Born in rest of Finland	0.92	(0.87–0.97)	0.88	(0.84–0.92)	1.14	(1.07–1.21)	1.00	(0.96–1.05)
All-cause mortality								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	0.87	(0.74–1.01)	1.05	(0.96–1.16)	1.00	(0.79–1.28)	0.93	(0.83–1.05)
Born in rest of Finland	0.85	(0.73–0.97)	0.92	(0.85–1.00)	0.97	(0.78–1.21)	0.95	(0.86–1.05)
Ischemic heart disease								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	0.73	(0.55–0.97)	1.10	(0.92–1.31)	0.79	(0.38–1.65)	0.92	(0.71–1.19)
Born in rest of Finland	0.64	(0.49–0.83)	0.90	(0.77–1.04)	0.99	(0.51–1.91)	0.73	(0.58–0.91)
Other cardiovascular								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	0.99	(0.62–1.56)	1.01	(0.79–1.30)	1.13	(0.60–2.11)	0.85	(0.64–1.12)
Born in rest of Finland	0.85	(0.56–1.29)	0.87	(0.70–1.08)	0.64	(0.36–1.15)	0.90	(0.71–1.15)
Lung cancer and other resp.								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	0.95	(0.59–1.53)	0.98	(0.76–1.28)	0.97	(0.43–2.18)	0.96	(0.62–1.49)
Born in rest of Finland	1.01	(0.65–1.56)	0.99	(0.79–1.23)	0.78	(0.37–1.62)	1.09	(0.74–1.60)
Other cancer								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	0.90	(0.61–1.32)	1.07	(0.85–1.34)	0.99	(0.64–1.53)	1.08	(0.85–1.37)
Born in rest of Finland	1.03	(0.72–1.47)	1.00	(0.83–1.22)	1.16	(0.78–1.72)	1.21	(0.98–1.49)
Other diseases								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	0.79	(0.46–1.36)	0.96	(0.73–1.27)	0.75	(0.38–1.47)	0.80	(0.61–1.06)
Born in rest of Finland	0.88	(0.53–1.44)	0.76	(0.60–0.96)	0.79	(0.43–1.45)	0.89	(0.70–1.13)
Alcohol and external causes								
Born in Ceded Karelia	1		1		1		1	
Born in Eastern Finland	0.90	(0.64–1.28)	1.21	(0.89–1.65)	1.29	(0.67–2.50)	0.96	(0.58–1.60)
Born in rest of Finland	0.83	(0.60–1.14)	1.05	(0.80–1.39)	0.90	(0.48–1.67)	0.91	(0.58–1.41)

Notes: The estimates come from 36 different models that adjust for all control variables. Numbers within parentheses are 95% confidence intervals.
For Ceded Karelians, being born in 1937–1944 means that you were at most seven years old at the time of forced migration, whereas those born in 1927–1936 were older child migrants.
Estimates for the two birth-cohort groups are statistically different (at the 5% level) only in the cases of 'men, ischemic heart disease, born in Eastern Finland', 'men, ischemic heart disease, born in rest of Finland', and 'women, disability pension, born in rest of Finland'.

The features of the Finnish displacement policy ensured that the forced migrants were not economically disadvantaged relative to their economic status prior to the move, and the cultural similarities of the migrants and the rest of the Finnish population helps to control for potential confounding factors in estimating the consequences of the move itself. At the same time, the uniqueness of the program weakens the external validity and predictive value of our findings for today's refugee contexts. One should consequently be cautious of generalizing these findings to other settings, such as current migration from war torn areas in the Middle East or Africa to Europe. At the same time, our results point to the importance of the receiving context for long-term consequences of migration.

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