Extended abstract

Language group mortality differentials in Finland:
The effects of local language proportions

Introduction

The Swedish-speaking minority in Finland goes longer back in time than the actual Swedish rein over Finland from fifteenth century till the beginning of nineteenth century when Finland was affiliated under the rule of Russia. However, the long time span as a part of Sweden has still its effects on the characteristics of the Swedish-speaking minority in Finland. During the Swedish rein, and long time after, the aristocracy, clergy and state officials were practically exclusively Swedish speaking. Partially as a heritage from that, the Swedish-speaking minority, nowadays comprising less than 6 % of the total population, is still well overrepresented in economic and academic positions. In traditional socioeconomic terms Swedish-speakers on average have higher income, education and occupational socioeconomic standing than the majority. Moreover, they also are more often married and less often unemployed than the Finnish-speakers and live predominantly in the western and southern parts of the country.

All of the differences outlined above are likely to affect mortality as well. Indeed, it has been well established (Fougstedt, 1951; Sauli, 1979; Valkonen, 1982; Koskinen & Martelin, 2003) that the age-adjusted mortality is lower among the Swedish-speaking than among the Finnish-speaking Finns. However, the difference in mortality is somewhat larger than can be attributed to the known structural explanations (Koskinen & Martelin, 2003; Sipilä & Martikainen, 2009). Furthermore, the mortality difference is by far largest in external and alcohol-related causes of death (Sipilä & Martikainen, 2009).

Additional explanations include possible genetic differences, yet these have been shown to be fairly modest (Virtaranta-Knowles et al., 1991) and differences in social environment (Hyyppä & Mäki, 2001a; 2001b; Nyqvist et al., 2008). In this study we take the latter set of explanations under investigation.

Data and methods

Aims

About a half of the Swedish-speaking population in Finland live in areas where they actually form a majority in a local perspective. The general idea of this study is to assess whether their advantage in external and alcohol-related mortality when compared to the Finnish-speakers is partly due to better socio-cultural characteristics of these specific locations.

The specific aims of this study are:

1) To assess the effects of local language-group proportions on mortality due to causes closely related to health behaviour
2) To assess whether these effects are different for each language group
3) To assess whether these effects are genuine contextual effects or produced by structural differences in population composition between the areas.

All analyses are performed separately for males and females and for those aged 30 to 49 and 50 or over.

Study population
The data are based on an 11% sample of Finns aged 30 years or more obtained from the annual Statistics Finland Labour Market data file (Työssäkäyntitilasto) covering all Finns for the period 1996-2005. The data set is complemented with an additional 80% random sample from the register of all deaths for the same period. The data comprises information on more than 42 000 external and alcohol-related deaths from the follow-up period. Given the nature of the sampling procedure, appropriate weights are used in all analyses.

Measurements
Finnish-speaking areas were defined as less than 1 % of inhabitants speak Swedish as their mother tongue; Finnish-dominated areas (1-6 %); mixed areas (6-50 %) and Swedish-dominated areas (50-100 %). The four-scaled area variable was used as a categorical measure in the analyses, Finnish speakers living in Finnish-speaking areas defined as the reference group.

Our list of covariates includes occupational SES; household income; education; marital status; economic activity; level of urbanity and a broad area measure.

We analyse alcohol-related causes (including cases in which alcohol is determined as a contributory cause) and accidents and violence (including suicide). These causes are merged into a single measure, in order to gain sufficient statistical power.

Statistical analyses
The primary analysis is conducted using regression models in order to account for exact risk-time and a range of potential confounders. In the models we take the variable measuring language-group proportions at area-level to our primary interest and plot the relative mortality by language-group against it. All other variables are seen as potential confounders to this association of interest. The confounders are introduced in four phases according to how causally distal we view them to the actual association of interest.

Results
In younger males the relative age-adjusted mortality of Swedish-speakers ranged from 0.40 to 0.49 as compared to the reference group of Finnish-speakers living in the Finnish speaking areas but formed no association according to the language composition of areas. The Finnish speakers had a hazard ratio of 0.68 in the Swedish dominated areas, but this association was removed by the introduction of full set of explanatory covariates. Overall, the local language compositon had no strong or consistent effect on mortality for either Finnish or Swedish speakers.

In the older age group the associations were generally similar, yet the difference was somewhat smaller to begin with. However full set of adjustments revealed that the difference between the language groups remained only in mixed and Swedish-speaking areas (HRs 0.67 and 0.64 respectively). In Finnish-speaking and Finnish dominated areas the difference was much smaller or reverse andnot statistically significant. For the Finnish speaking group area language composition did not matter

much, only Finnish dominated areas differed from the reference group (HR 0.82) when all confounders were adjusted for. In both age-groups adjusting for socioeconomic factors (model 3) made the largest attenuation to the difference between the language groups.

In females the effects of area type were far sharper; actually the Swedish speaking females in Finnish speaking areas had higher mortality than their Finnish speaking neighbours in both age-groups, although the difference was not statistically significant. This difference somewhat further widened with the introduction of socioeconomic variables, indicating that the Swedish-speakers have a higher average standing in this perspective also in Finnish-speaking and Finnish dominated areas. On the other hand the mortality difference in Swedish speaking areas was more striking than in males; after full set of adjustments the mortality of the Swedish was less than half of that of the Finnish speakers in both age-groups. The Finnish-speaking females gained no advantage from living in the Swedish speaking areas. Their relative mortality was actually highest in the Swedish-speaking areas in younger age-group, sharply contrasting the low mortality of the Swedish-speakers of the same areas. The explanatory power of socioeconomic confounding factors was weaker than among males. Only the difference in young age-group living in mixed or Swedish dominated areas was markedly altered by this adjustment.

Conclusion

In general, it seems that the Swedish-speaking areas produce independent health-beneficial value in terms of alcohol related, accidental and violent mortality − for Swedish-speakers. For Finnish-speaking males the effect is restricted to a possible advantageous compositional effect and for females the independent effect is harmful if anything. In this study it was not possible to disentangle the underlying social or cultural mechanisms behind the local language-group composition and mortality differences between the language groups any further. However, any future research on this subject must take into account the specific effect that Swedish-dominated areas have on the mortality advantage of the minority. The case of Swedish-speakers in Finland offers an exceptionally fruitful possibility trying to disentangle the health beneficial processes provided by immediate communities. In order to more fully understand these processes research aiming to assess the specific socio-cultural qualities of these areas is needed.

Table 2. Hazard ratios of mortality by area type and language group (*p<0.05; **p<0.01; ***p<0.001)

MALES age 30-49

		Area type 1	2	3	4
Model1	FIN	1	0.82***	0.96	0.68*
	SWE	0.41**	0.40***	0.49***	0.40***
Model2	FIN	1	0.87***	1.03	0.77
	SWE	0.42**	0.41***	0.53***	0.45***
Model3	FIN	1	0.89*	1.03	0.78
	SWE	0.57	0.50**	0.67***	0.62***
Model4	FIN	1	0.89*	0.97	0.79
	SWE	0.61	0.52**	0.66**	0.64***

MALES age 50+

		Area type 1	2	3	4
Model1	FIN	1	0.89***	1.13***	1.04
	SWE	0.70	0.87	0.67***	0.52***
Model2	FIN	1	0.83***	1.04	1.09
	SWE	0.69	0.81	0.63***	0.55***
Model3	FIN	1	0.83***	1.06	1.07
	SWE	0.86	0.97	0.70***	0.62***
Model4	FIN	1	0.82***	0.98	1.08
	SWE	0.81	0.96	0.67***	0.64***

FEMALES age 30-49

		Area type 1	2	3	4
Model1	FIN	1	0.90	1.22**	1.17
	SWE	2.11	0.71	0.73	0.33***
Model2	FIN	1	0.80*	1.05	1.34
	SWE	2.14	0.63	0.66	0.38**
Model3	FIN	1	0.83*	1.14	1.41
	SWE	2.24	0.68	0.73	0.50*
Model4	FIN	1	0.82*	1.04	1.33
	SWE	2.25	0.63	0.73	0.52*

FEMALES age 50+

		Area type 1	2	3	4
Model1	FIN	1	1.03	1.15*	1.02
	SWE	1.22	1.21	0.80*	0.45***
Model2	FIN	1.00	0.96	1.04	1.05
	SWE	1.19	1.12	0.74**	0.47***
Model3	FIN	1	0.94	1.05	1.06
	SWE	1.3	1.13	0.77*	0.49***
Model4	FIN	1	0.95	1.03	1.07
	SWE	1.3	1.14	0.77*	0.49***

Model1: Adjusted for age
Model2: Model1+, Level of urbanization, geographical measure
Model3: Model2+Ses, education, income, main activity
Model4: Model3+Family type

Area types:
1 Finnish speaking
2 Mainly Finnish speaking
3 Mixed
4 Mainly Swedish speaking