BMJ Open

Alcohol-related mortality by ethnic origin of natives: a prospective cohort study based on multigenerational population register data from Finland and Sweden

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To cite: Saarela J, Kolk M. Alcohol-related mortality by ethnic origin of natives: a prospective cohort study based on multigenerational population register data from Finland and Sweden. *BMJ Open* 2020;**10**:e042234. doi:10.1136/bmjopen-2020-042234

► Prepublication history and additional material for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2020-042234).

Received 01 July 2020
Revised 03 November 2020
Accepted 04 November 2020

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ABSTRACT

Objectives The aim was to assess alcohol-related mortality of persons with mixed and uniform ethnic origins in two national contexts.

Setting Data were from the multigenerational population registers of the total population of Finland and Sweden observed from 1971 to 2017. Study persons were men and women of ethnic Finnish and Swedish background, born in their country of residence.

Participants Persons were born between 1953 and 1999. In Finland, ethnic origin was assessed through own, mother's and father's Finnish or Swedish ethnolinguistic affiliation. Data on Sweden included persons born in Sweden, with mother and father born in Sweden or Finland. A total of 2 997 867 and 4 148 794 persons were included in the Finnish and Swedish data, respectively. The total number of alcohol-related deaths by main cause was 13 204 and 3336. Cox regressions were used to examine associations.

Outcome measures For the period 1971–2017, we studied alcohol as the main cause of death. For the period 1996–2017, we observed if alcohol was the main or contributing cause of death. Parallel analyses were performed for all-cause mortality.

Results For men in Finland, the hazard rate of alcohol-related mortality of Swedish speakers with uniform Swedish background was 0.44 (95% CI: 0.38 to 0.52) that of Finnish speakers with uniform Finnish background. The corresponding hazard rate for women was 0.40 (95% CI: 0.28 to 0.55). In Sweden, the hazard rate of men with both parents born in Sweden was 0.40 (95% CI: 0.32 to 0.49) that of men with both parents born in Finland. The corresponding hazard rate for women was 0.50 (95% CI: 0.31 to 0.79). In both countries, persons with mixed background had an alcohol-related mortality rate between that of persons with uniform Finnish and Swedish background.

Conclusion The consistent pattern across countries necessitates increased policy attention towards offspring disadvantaged via parental ethnicity to minimise harmful consequences of alcohol consumption across and within ethnic groups.

Strengths and limitations of this study

- Alcohol-related mortality is known to be associated with ethnicity and culture, but empirical evidence on how diversity within ethnic groups relate to alcohol-related mortality is sparse.
- Using multigenerational population register data, we examine how persons with mixed cultural background and those with varying uniform background differ on alcohol-related mortality risks.
- With data from two neighbouring countries, Finland and Sweden, we also study if this variation in alcohol-related mortality risks is consistent across two national contexts.
- Similar differences across the study groups are found in both countries, and persons with mixed ethnic origin have an alcohol-related mortality risk between that of each ethnically uniform group.
- Since the study uses population register data, we cannot measure cultural norms or values, alcohol-related behaviours or family relations in an explicit manner.

INTRODUCTION

Alcohol-related deaths have been estimated to account for 3 million deaths, or more than 5% of all deaths, worldwide every year. The harmful use of alcohol is a causal factor in more than 200 disease and injury conditions, and about 5% of the global burden of disease and injury is attributable to alcohol.[1] Alcohol use is ranked as the seventh leading risk factor for premature death and disability. For people aged 15–49 years, alcohol use is the leading cause of death.[2]

The alcohol-attributable fractions of death vary globally, with many of the countries in Eastern Europe and the former Soviet Union ranked highest.[3] Finland is well below their levels, but at a notably higher rate than that of the neighbouring Nordic country Sweden. In Finland, 9% of all deaths in men and 2.5% of all deaths in women are attributed to alcohol, compared with less than 6% and 1.5%, respectively, in Sweden.

There is a long tradition of alcohol research in the Nordic countries, and much of it has been of comparative nature.[4] Over the period covered in the current study, starting in the early 1970s, alcohol sales and import used to be highly regulated, but were gradually relaxed.[5 6] In an international perspective, both Sweden and Finland have had strict alcohol policies, with only slight differentials.[7] Both societies have traditionally been described as 'dry' drinking cultures, with a focus on more sporadic and heavy drinking, oriented towards intoxication.[8] Alcohol and booze have been perceived as particularly rooted in the Finnish self-perception, although in an international perspective, Sweden and Finland are quite similar in this respect.[9]

A variety of factors that work at both the individual and societal levels affect the patterns of alcohol consumption, drinking behaviours and the magnitude of alcohol-related problems.[10 11] Individual vulnerability factors include age, gender, familial factors and socioeconomic status. Societal factors include the level of development, the drinking context, the production, distribution and regulation of alcohol, and culture.[12]

Empirical evidence on how diversity within ethnic groups, and particularly how mixed ethnic origin, relate to alcohol-related mortality is sparse. The extent to which cultural norms affect alcohol use and, thus, alcohol-related mortality, may vary also by context and place.[13] Culture-related drinking behaviours in immigrant parents may assimilate toward the norms of a new context and cease to affect children's behaviours.[14] If not, and the parents act as role models, certain behaviours such as alcohol use may be abiding and may even become more pronounced within another environment.[15]

The multigenerational population registers of Finland and Sweden provide novel opportunities to study how alcohol-related mortality relates to ethnic background. Both countries have substantial populations of ethnic Swedish and ethnic Finnish origin, who differ notably in alcohol-related mortality. For ages 18–50 years, the ethnolinguistic group of Finnish speakers in Finland have approximately three times higher rates of alcohol-related mortality than the native group of Swedish speakers in the country.[16 17] The Finnish speakers also report more frequent drunkenness, suffer more frequent hangovers and have alcohol-induced pass-outs significantly more often than Swedish speakers.[18 19] Similar differences exist between ethnic Swedes and ethnic Finns in Sweden,[20–22] but little research has been concerned with the issue of whether the ethnic gradient is similar in magnitude across the two national contexts.

Swedish speakers in Finland account for 5% of the total population. Until 2017, Finns constituted the largest foreign-born group in Sweden. Now they constitute the third largest group, or 7.2% of all foreign-born individuals.[23] Both these minority groups have managed to keep their cultural roots and identities in spite of a substantial degree of intermarriage.[24–26] Swedish speakers in Finland have a very long history, while most ethnic Finns in Sweden are more recent migrants, primarily arriving during the country's economic expansion in the 1960s and 1970s. In each national context, people in the minority group have formed a permanent and stable community.

Socioeconomic, demographic and area-level variables explain only a small part of the differentials in alcohol-related mortality between ethnic Finns and ethnic Swedes. One may therefore assume that they relate to group-specific cultural norms that affect alcohol use, and to variation in social networks and family bonds that protect from unhealthy drinking behaviours.[27 28] Empirical support for such claims can be attained from analyses that examine persons by ethnic background, that is, by using data that include information about parental ethnicity.

There have been many studies on alcohol-related mortality in both Finland and Sweden.[29–33] In the working-aged population, the alcohol-related mortality rate is more than twice higher in Finland compared with Sweden, and roughly four times higher in men than in women in each country. Many of the underlying factors are nevertheless similar, particularly the educational gradient associated with health-related behaviours.

However, not much is known about the inter-relation between parental ethnicity and offspring's alcohol-related mortality, and in particular about the issue of how people with mixed heritage are positioned. We used population register data from two generations of the population in Finland and Sweden to examine individuals who are the children of majority-culture parents, minority-culture parents and those with mixed cultural origin. Based on these settings, the study sought to answer two major research questions:

1. Do persons with mixed ethnic background and those with varying uniform background differ with respect to alcohol-related mortality risks?
2. Is any such variation consistent across national contexts?

METHODS

Study populations

The study base includes the total population of Finland and Sweden observed from 1971 to 2017. In the population registers, persons born in each country can be linked to the mother and the father. We restricted the study to persons born between 1953 and 1999. This was to ensure that both parents in the data from Finland could be identified,[34] and that all persons were at least 17 years old when they entered the study window. All study persons in Finland, and their mother and father, were registered as a Finnish speaker or as a Swedish speaker. Foreign-born immigrants and their children were consequently excluded, because immigration and intermarriage across other ethnic lines in Finland has been rare until recently. The data on Sweden were restricted to index persons born in Sweden, whose mother and father were born in

Sweden or in Finland. Index persons born abroad were consequently excluded.

Measures

Outcome

Alcohol-related mortality was assessed with the International Classification of Diseases, Eighth revision (ICD-8) codes for deaths from 1971 to 1986 (291, 303, 571, 5728X, E849, E851, E860, E980, N979 and N980), with the ICD-9 codes for deaths from 1987 to 1995 (291, 303, 3050, 3317, 34570, 3457A, 3457X, 3575, 3594, 4255, 535, 571, 5771, 8609, 980, E849 and E851), and with the ICD-10 codes for deaths from 1996 to 2017 (E244, F10, G312, G405, G621, G721, I426, K292, K70, K860, O354, P43, X45, T51, Y90, Y91, Z502, Z714 and Z721). Medical conditions fully attributable to alcohol were consequently covered. For the entire period 1971–2017, we could separate alcohol as the main cause of death. ICD-10 codes X65 (intentional self-poisoning by and exposure to alcohol) and Y15 (poisoning by and exposure to alcohol, undetermined intent) were not included because the first is generally used to identify suicides and the latter to identify (potential) accidents. They cannot be separated by the ICD-8 and ICD-9 terminologies, which we used to identify causes of death that occurred before 1996. For the period 1996–2017, we could additionally observe if alcohol was the main or any contributing cause of death. For the sake of comparison and completeness, we performed parallel analyses for all-cause mortality.

Exposures

The exposures in the data from Finland were the index person's, the mother's and the father's ethnolinguistic registration (Finnish or Swedish). These were combined into one variable with the categories FFF, SSS, FFS, FSF, SFS and SSF, where the first letter refers to the index person, the second to the mother and the third to the father. FFF consequently consisted of persons with a uniform Finnish background, and SSS of persons with a uniform Swedish background. FFS and FSF contained Finnish-registered persons with mixed background, while SFS and SSF contained Swedish-registered persons with mixed background. With this setup, we could determine how the ethnicity of the index person, the mother and the father, separately or jointly, relate to the index person's mortality risk. People categorised as FSS and SFF were included into analyses as well, but since they were rare and difficult to assess, the estimates are not reported (but available on request).

The exposures in the data from Sweden were mother's country of birth and father's country of birth. Given our restrictions, we could combine these into one variable with the categories FF, SS, FS and SF, where the first letter refers to whether the mother was born in Finland or Sweden, and the second to whether the father was born in Finland or Sweden. Since all study persons were native-born, FF consisted of those with a uniform ethnic Finnish background, SS of those with a uniform ethnic Swedish background, and FS and SF of those with ethnically mixed background. Like with the setup for the data on Finland, we could determine if mortality is differently associated with mother's and father's ethnicity.

Control variables

The control variables were year of birth, educational level and region of birth (online supplemental tables A1 and A2). They are important predictors of all-cause and alcohol-related mortality, and region of birth is generally more important than the current region of residence.[35] Year of birth was used as a categorical variable. Educational level referred to the highest level ever attained and separated primary, secondary and tertiary education. Region of birth was based on a regional division with 20 categories in Finland (landskap) and 25 categories in Sweden (län). We did not include income or marital status, as they could not be consistently measured throughout the study period. The age ranges analysed were also wide, which would mean that these variables would be difficult to interpret, and causality may even be disputed, if alcohol problems affect income or marital status, which, in turn, may affect alcohol mortality.

Statistical analyses

Cox regressions were used to estimate the association between ethnic background and mortality, adjusted for the control variables. For each country, we fitted two types of models. One was for persons born between 1953 and 1999, observed in the period 1971–2017. All these persons entered at age 17, that is, in the calendar year they become 18 years old. The highest age of observation, for persons born in 1953, was consequently 64. The other was for persons born between 1953 and 1974, observed in the period 1996–2017. All these persons entered at age 42 years, that is, in the calendar year they become 43 years old, and the highest age of observation was 64.

With the first approach, we could observe the main cause of death. With the second approach, we could also incorporate any contributing cause of death. Right censoring occurred at death, first emigration or end-2017. We analysed alcohol-related mortality as well as all-cause mortality. Separate models were fitted for men and women. The statistical analyses were performed using the softwares SPSS V.26 and Stata V.15.

Patient and public involvement

No patients were involved.

RESULTS

A total of 2 997 867 and 4 148 794 individuals were included in the final analyses of the Finnish and Swedish data, respectively (tables 1 and 2). The total number of alcohol-related deaths by main cause was 13 204 in Finland and 3336 in Sweden. In the data from Finland, Finnish-registered index persons with a uniform Finnish background accounted for 92.7%

Table 1 Descriptive statistics of the data from Finland by sex and own (first letter), mother's (second letter) and father's (third letter) ethnolinguistic affiliation, where F is for Finnish-registered and S is for Swedish-registered

	Born 1953–1999, period 1971–2017, observed from age 17						Born 1953–1974, period 1996–2017, observed from age 42							
	Number of individuals	Number of person- years	Number of alcohol-related deaths by main cause only	Number of all-cause deaths	Death rate per million, alcohol-related by main cause only	Death rate per million, all-cause	Number of individuals	Number of person- years	Number of alcohol-related deaths by main cause only	Number of alcohol-related deaths by main or contributing cause	Number of all-cause deaths	Death rate per million, alcohol-related by main cause only	Death rate per million, alcohol-related by main or contributing cause	Death rate per million, all-cause
Men														
FFF	1419616	33244912	10608	68625	0.32	2.06	662904	7571206	7617	14293	35151	1.01	1.89	4.64
SSS	63894	1436213	181	1914	0.13	1.33	31067	359380	141	315	1086	0.39	0.88	3.02
FFS/FSF	26467	583501	148	1039	0.25	1.78	11039	119768	98	175	525	0.82	1.46	4.38
SFS/SSF	22438	404476	62	514	0.15	1.27	7081	66783	46	79	229	0.69	1.18	3.43
Women														
FFF	1358794	31873160	2596	26519	0.08	0.83	639658	7430228	2033	3125	15466	0.27	0.42	2.08
SSS	59981	1311848	38	824	0.03	0.63	28704	334858	37	61	553	0.11	0.18	1.65
FFS/FSF	24762	538158	41	418	0.08	0.78	10215	110418	32	47	256	0.29	0.43	2.32
SFS/SSF	21915	389684	11	214	0.03	0.55	6980	67490	6	13	110	0.09	0.19	1.63

Alcohol-related mortality refers to the International Classification of Diseases, Eighth revision (ICD-8) codes 291, 303, 571, 5728X, E849, E851, E860, E980, N979 and N980 for deaths from 1971 to 1986, to the ICD-9 codes 291, 303, 3050, 3317, 34570, 3457A, 3457X, 3575, 3594, 4255, 535, 571, 5771, 8609, 980, E849 and E851 for deaths from 1987 to 1995, and to the ICD-10 codes E244, F10, G312, G405, G621, G721, I426, K292, K70, K860, O354, P43, X45, T51, Y90, Y91, Z502, Z714 and Z721 for deaths from 1996 to 2017.

Table 2 Descriptive statistics of the data from Sweden by sex and mother's (first letter) and father's (second letter) country of birth, where F is for Finland and S is for Sweden

	Born 1953–1999, period 1971–2017, observed from age 17						Born 1953–1974, period 1996–2017, observed from age 42							
	Number of individuals	Number of person- years	Number of alcohol-related deaths by main cause only	Number of all-cause deaths	Death rate per million, alcohol-related by main cause only	Death rate per million, all-cause	Number of individuals	Number of person- years	Number of alcohol-related deaths by main cause only	Number of alcohol-related deaths by main or contributing cause	Number of all-cause deaths	Death rate per million, alcohol-related by main cause only	Death rate per million, alcohol-related by main or contributing cause	Death rate per million, all-cause
Men														
FF	30921	744428	84	1395	0.11	1.87	16199	146203	50	115	553	0.34	0.79	3.78
SS	2022947	46761800	2385	56976	0.05	1.22	962191	10754768	1757	3975	30009	0.16	0.37	2.79
FS/SF	75981	1690965	137	2546	0.08	1.51	33933	351627	85	207	1164	0.24	0.59	3.31
Women														
FF	29373	711045	19	598	0.03	0.84	15571	143425	11	30	309	0.08	0.21	2.15
SS	1917461	44321881	677	31518	0.02	0.71	914443	10345432	517	1165	19682	0.05	0.11	1.90
FS/SF	72111	1598849	34	1233	0.02	0.77	32128	335439	28	64	677	0.08	0.19	2.02

See the notes of table 1 for International Classification of Diseases codes.

Table 3 Mortality HRs in Finland by own (first letter), mother's (second letter) and father's (third letter) ethnolinguistic affiliation, where F is for Finnish-registered and S is for Swedish-registered

	Born 1953–1999, period 1971–2017, observed from age 17		Born 1953–1974, period 1996–2017, observed from age 42	
	Men	Women	Men	Women
Alcohol, main cause				
FFF	1	1	1	1
SSS	0.44 (0.38 to 0.52)	0.40 (0.28 to 0.55)	0.43 (0.35 to 0.51)	0.44 (0.31 to 0.62)
FFS/FSF	0.84 (0.71 to 0.99)	0.91 (0.66 to 1.24)	0.78 (0.63 to 0.95)	0.91 (0.64 to 1.31)
SFS/SSF	0.73 (0.57 to 0.94)	0.49 (0.27 to 0.88)	0.78 (0.58 to 1.04)	0.34 (0.15 to 0.77)
Alcohol, main or contributing cause				
FFF			1	1
SSS			0.56 (0.50 to 0.64)	0.48 (0.36 to 0.63)
FFS/FSF			0.81 (0.70 to 0.94)	0.91 (0.68 to 1.21)
SFS/SSF			0.78 (0.63 to 0.98)	0.50 (0.29 to 0.86)
All-cause				
FFF	1	1	1	1
SSS	0.72 (0.68 to 0.75)	0.77 (0.71 to 0.84)	0.72 (0.67 to 0.77)	0.83 (0.75 to 0.92)
FFS/FSF	0.92 (0.87 to 0.98)	0.94 (0.86 to 1.04)	0.96 (0.88 to 1.05)	1.08 (0.95 to 1.22)
SFS/SSF	0.83 (0.76 to 0.91)	0.83 (0.73 to 0.95)	0.87 (0.76 to 0.99)	0.86 (0.71 to 1.04)

Each model includes year of birth, educational level and region of birth as categorical variables.

of all study persons, Swedish-registered index persons with a uniform Swedish background for 4.1%, Finnish-registered persons with mixed background for 1.7%, and Swedish-registered persons with mixed background for 1.5%. In the data from Sweden, persons with a uniform Swedish background accounted for 95.0% of all study persons, those with a uniform Finnish background for 1.5% and those with mixed background for 3.6%. Death rates, and particularly those for alcohol-related mortality, were overall notably higher in Finland than in Sweden.

In Finland, significant differences were observed in alcohol-related mortality between Finnish speakers with a uniform Finnish background and Swedish speakers with a uniform Swedish background in Finland (table 3). For men, the HR of mortality when alcohol was the main cause of death was 0.44 (95% CI: 0.38 to 0.52) over the entire observation period, and almost the same if observing men from age 42. In women, the corresponding HRs were similar to those for men, in spite that the number of alcohol-related deaths was fewer.

Estimates for men in Sweden were almost the same as for men in Finland (table 4). The mortality HR between men with a uniform Swedish background and men with a uniform Finnish background was 0.40 (95% CI: 0.32 to 0.49) over the entire observation period, and 0.45 (95% CI: 0.34 to 0.60) if the persons were observed from age 42. Differences in women were less pronounced, with corresponding HRs of 0.50 (95% CI: 0.31 to 0.79) and 0.62 (95% CI: 0.34 to 1.13), respectively.

When alcohol-related mortality was analysed as the main or any contributing cause, the difference between the two groups with a uniform background diminished somewhat for Finland, while they slightly increased for Sweden. For persons observed from age 42 in Finland, the HR was 0.56 (95% CI: 0.50 to 0.64) for men and 0.48 (95% CI: 0.36 to 0.63) for women. Corresponding numbers for Sweden were 0.44 (95% CI: 0.37 to 0.53) and 0.51 (95% CI: 0.36 to 0.74).

Mortality differentials between each of the two groups with an ethnically uniform background were in both countries less pronounced for all-cause mortality than for alcohol-related mortality. Inclusion of the control variables did not change conclusions about the between-group differentials in alcohol-related and all-cause mortality to any considerable extent (online supplemental tables A3 and A4 in the online supplemental file 1).

In both Finland and Sweden, persons with mixed background had an alcohol-related mortality risk below that of persons with a uniform Finnish background and above that of persons with a uniform Swedish background. These estimates were in the range 0.73–0.84 for men in Finland, 0.34–0.91 for women in Finland, 0.67–0.72 for men in Sweden and 0.77–1.06 for women in Sweden, and some were statistically not significant. Yet, it was fairly evident that persons with mixed ethnic background were generally positioned between those with uniform ethnic backgrounds. For women in Finland with a mixed background, own ethnic affiliation mattered. Swedish-registered women had a similar risk of alcohol-related

Table 4 Mortality HRs in Sweden by mother's (first letter) and father's (second letter) country of birth, where F is for Finland and S is for Sweden

	Born 1953–1999, period 1971–2017, observed from age 17		Born 1953–1974, period 1996–2017, observed from age 42	
	Men	Women	Men	Women
Alcohol, main cause				
FF	1	1	1	1
SS	0.40 (0.32 to 0.49)	0.50 (0.31 to 0.79)	0.45 (0.34 to 0.60)	0.62 (0.34 to 1.13)
FS/SF	0.68 (0.52 to 0.89)	0.77 (0.44 to 1.34)	0.67 (0.47 to 0.95)	1.06 (0.53 to 2.13)
Alcohol, main or contributing cause				
FF			1	1
SS			0.44 (0.37 to 0.53)	0.52 (0.36 to 0.74)
FS/SF			0.72 (0.57 to 0.91)	0.91 (0.59 to 1.40)
All-cause				
FF	1	1	1	1
SS	0.66 (0.63 to 0.70)	0.81 (0.75 to 0.88)	0.67 (0.61 to 0.72)	0.80 (0.71 to 0.90)
FS/SF	0.83 (0.78 to 0.89)	0.93 (0.84 to 1.03)	0.82 (0.74 to 0.91)	0.90 (0.78 to 1.03)

Each model includes year of birth, educational level and region of birth as categorical variables.

mortality as those with a uniform Swedish background, whereas Finnish-registered women were at a similar level as those with a uniform Finnish background.

There was no consistent pattern related to the combination of parent's sex and parent's ethnicity (online supplemental tables A5–A8). For women in Sweden, having a Finnish-born father and a Swedish-born mother was associated with higher alcohol-related mortality than having a Swedish-born father and a Finnish-born mother, but the estimates came with wide CIs. In Finland, Finnish-registered persons with a Finnish-registered mother and a Swedish-registered father had a higher alcohol-related mortality risk than Finnish-registered persons with Swedish-registered mother and Finnish-registered father, but these differences were statistically not significant. For Swedish-registered persons with a mixed background, no level differences by parental ethnicity could be observed whatsoever.

Finally, it should be noted that the variation in all-cause mortality by ethnic background was overall less pronounced than the variation in alcohol-related mortality by ethnic background.

DISCUSSION

Main findings

We investigated how alcohol-related mortality relates to ethnic origin in two national contexts using population register data. In Finland, we analysed persons by own, mother's and father's Swedish or Finnish ethnolinguistic affiliation. In Sweden, Swedish-born persons were separated according to whether the mother, the father or both, were born in Sweden or in Finland. We found clear evidence that not only own ethnicity, but also parental ethnicity, is inter-related with alcohol-related mortality. Thus, parental ethnic affiliation is important for the alcohol-related mortality risk, net of own affiliation, but so is also own affiliation, net of the parental affiliation.

There was a substantial level difference between persons with a uniform Finnish background and those with a uniform Swedish background. In both countries, and for both sexes, the difference in risk was about 2 to 1, in spite that the overall rate of alcohol-related mortality is notably lower in Sweden than in Finland, and in women compared with men. Another main finding consistent across the two countries was that persons with mixed background had an intermediate alcohol-related mortality risk. This pattern was more evident for men than for women. For Finland, we could observe that Swedish-registered women with a mixed background had a mortality risk close to that of women with a uniform Swedish background, while Finnish-registered women with a mixed background were found close to those with a uniform Finnish background. We could not see that either maternal or paternal parents in mixed unions had any consistent effect.

Interpretations

Cultural norms and beliefs that vary across ethnic and racial groups are known to be strong predictors of drinking behaviours.[15 36 37] Our findings are in line with this previous evidence. However, few studies have examined diversity within ethnic groups. We contributed to this specific area by evaluating how alcohol-related mortality depends on ethnicity across two generations and two national contexts, using high-quality population register data. Patterns specific to ethnic groups relate also to how alcohol use is correlated across generations.[38 39] Although parental influence on the offspring diminishes

after adolescence and young adulthood,[40 41] culture-related alcohol behaviours can be expected to influence the risk of alcohol-related mortality over the life course. This fits well also with findings, which say that family support, bonding and parental monitoring are associated with lower levels of alcohol use, and that higher levels of familism and the nuclear family serve as protective factors.[42–44]

We found that taking account for the parental generation emphasises the inter-relation between ethnicity and alcohol-related mortality as observed from one-generation studies only. In the Nordic context, alcohol-related mortality is notably lower among ethnic Swedes than among ethnic Finns, both in Sweden and in Finland. When additionally evaluated on the basis of the parental generation, this presumed cultural influence is strengthened further. In support, persons with mixed background are at an intermediate risk of alcohol-related mortality. These findings are remarkable from the perspective that, apart from the variation in sociohistorical and economic position of the study populations across the two national settings, there is also a difference in terms of generation status.[45] In Sweden, we studied the children of Finnish-born immigrants, while both Finnish speakers and Swedish speakers in Finland constitute the native population of the country. What we find can, thus, be interpreted as strongly reflecting retention of ethnic values and cultural norms across generations and national contexts. These may, in turn, be associated with a strong awareness of own ethnic identity.[15] One support for this claim is that, for women in Finland with mixed background, own ethnicity, which generally reflects the larger ethnic community in which a person has been raised,[17] matters for the risk of alcohol-related mortality. Furthermore, we find an ethnic pattern that is similar in both countries, even though the group in majority in one country is in minority in the other. It is therefore not the minority status per se that affects drinking behaviour, but rather the cultural practices associated with ethnic origin.

Strengths and limitations

Apart from the obvious limitations of population register data, meaning that we cannot measure cultural norms or values in an explicit manner, nor drinking, alcohol-related behaviours of family relations directly, another issue needs to be stressed. Approximately 20% of all Finnish-born immigrants in Sweden are Swedish-speaking Finns.[46] If they have lower alcohol-related mortality than the Finnish-speaking immigrants in Sweden, which seems reasonable, we would expect that any variation as observed here is underestimated. In that case, the difference in alcohol-related mortality between persons who have two Finnish-speaking parents born in Finland and those with two parents born in Sweden would be even larger. Since population register data in Sweden do not separate people by ethnolinguistic affiliation, we cannot address this issue, which is the same when studying mortality from other causes.[47] Furthermore, our study concerns ethnic groups, which are firmly rooted in their non-majority context, and which have good access to social support and government services. This limits the generalisability of the findings to other contexts, in which ethnic minorities exist due to recent migration, where they may be less integrated, and more affected by the migration history. On the other hand, we argue that our setting allows us to assess a more direct association with ethnic background, that is not affected by social and other disadvantages, which often may explain poor health outcomes in other minority contexts.

CONCLUSION

The parental influence on offspring's alcohol behaviours is often claimed to diminish over the life course. We have moved beyond most previous literature in examining not only how own ethnic identity and immigration history affect alcohol mortality, but incorporated the issue of how parental ethnicity relates to offspring alcohol-related mortality. We find strong inter-relations, and that mixed heritage generally implies an intermediate pattern of alcohol-related mortality. Hence, more effective policies and interventions specifically designed for offspring who may be disadvantaged via parental ethnicity are warranted, which may help to minimise the harmful consequences of alcohol consumption across and within ethnic groups.

Contributors Both authors conceived the study, wrote the initial draft and approved the final version of the manuscript. JS prepared the data and ran the regressions for Finland. MK prepared the data and ran the regressions for Sweden.

Funding This work was supported by Stiftelsens för Åbo Akademi Forskningsinstitut, grant number is not applicable.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer-reviewed.

Data availability statement Data may be obtained from a third party and are not publicly available. Data for this article were used with Statistics Finland's permission TK-52-694-18.

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