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BRIEF REPORT

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ABSTRACT

Background
Women now outlive men throughout the globe, a mortality advantage which is very longstanding in developed European countries. Debate continues about the causes of the gender gap, although smoking is known to have been a major contributor to the difference in earlier decades.

Objectives
To compare the magnitude of the gender gap in all-cause mortality in 30 European countries, and assess the contribution of smoking-related and alcohol-related deaths.

Methods
Data on all-cause mortality, smoking-related mortality and alcohol-related mortality for 30 European countries were extracted from the World Health Organisation-Health for All database for the year closest to 2005. Rates were standardised by the direct method using the European population standard, and were for all age groups. The proportion of the gender gap in all-cause mortality attributable to smoking-related and alcohol-related deaths was calculated.

Results
There was considerable variation in the magnitude of the male 'excess' of all-cause mortality across Europe, ranging from 188 per 100,000 per year in Iceland to 942 per 100,000 per year in Ukraine. Smoking-related deaths accounted for around 40% to 60% of the gender gap, whilst alcohol-related mortality typically accounted for 20-30% of the gender gap in Eastern Europe and 10- 20% elsewhere in Europe.

Discussion
Smoking continues to be the most important cause of gender differences in mortality across Europe, but its importance as an explanation for this difference is often overshadowed by presumptions about other explanations. Changes in smoking patterns by gender suggest that the gender gap in mortality will diminish in coming decades.

What this paper adds

What is already known on this subject?

- Over the last century there has been variation in the magnitude of the gender gap in mortality within countries over time, and between countries at any given time. The cause of women's mortality advantage has long been debated.
- A higher uptake of more 'risky' behaviours is thought to contribute to men's higher mortality. Differential uptake of smoking and drinking has been shown to contribute to gender differences in mortality in the USA.
- Smoking and drinking are both linked to gender in complex ways. For example, the four-stage model of the adoption of smoking in developed countries suggests that smoking has typically been adopted first by elite men in Stage 1, then by less advantaged men and by women, before gender differences diminish as levels of tobacco consumption fall in both genders in Stage 4.

What does this study add?

- This study uses contemporary data to examine the contribution of smoking-related and alcohol-related mortality to the gender gap in all-cause mortality in 30 European countries.
- Despite large variation in the magnitude of the gender gap in all-cause mortality in these countries in 2005, and the fact that the countries are at different stages of the smoking epidemic, smoking-related deaths accounted for a large proportion of the gender gap in all countries examined (typically 40-60%).
- It may still be several decades before profound changes in gender differences in smoking in some of these countries are reflected in a smaller contribution of smoking-related deaths to a reduced gender gap in mortality .

INTRODUCTION

Since the late 1990s there is evidence that women now outlive men in all countries of the world.[1] Historical records show that in Sweden, Denmark, England and Wales, the Netherlands, and Italy, female life expectancy has exceeded that of men since the mid-late eighteenth cent and there has been speculation about the causes of gender differences since that time.[2] Different explanations have been postulated for this gender gap, including biological factors. However, there is considerable variability, and sometimes rapid change, [3] in the magnitude of women's mortality advantage over time and in different countries, a variability which poses challenges for simple biological explanations for the gender gap. Earlier research suggested that health behaviours, and particularly men's higher prevalence of smoking, were a major cause of gender differences in the United States. [4] Here we utilise contemporary mortality data for 30 European countries to examine the extent to which men's higher mortality can be explained by smoking-related and alcohol-related deaths.

METHODS

All-cause mortality, smoking-related mortality (defined as cancers of the respiratory tract, ischaemic heart disease, cerebrovascular disease and chronic obstructive pulmonary disease; ICD10 codes C00-C14, C32-C34, C15, 120-125, 160-169 and J40-J47) and alcohol-related mortality (defined as cancers of the oesophagus and larynx, alcohol dependence syndrome, alcohol psychosis, chronic liver disease, liver cirrhosis and external causes; ICD10 codes C15, C32, F10, K70, K73, K74, V00-99, W00-W99, X00-X99 and Y00-Y99) were extracted from the World Health Organisation-Health for All database.[5]

All mortality rates were standardised by the direct method using the European population standard, and were for all age groups. Data were used for the year

closest to 2005 (range 2003/4 to 2006). The proportion of the gender gap in all-cause mortality that was smoking-related and alcohol-related was calculated for each country as the gender gap for each cause divided by the gender gap for all causes.

RESULTS

Although all-cause mortality rates are higher for men than for women in all countries, there continues to be considerable variation in the extent of the gender difference in contemporary Europe. The gender gap in all-cause mortality rates varied from 188 (per 100,000 per year) 'excess' deaths amongst males in Iceland to 942 in Ukraine (see Table 1). The gender gap showed some geographical patterning such that all of the countries with a gender gap in excess of 400 per 100,000 per year were located in Eastern Europe. Three Northern European countries (Iceland, UK and Sweden) and two Mediterranean countries (Greece and Cyprus) had a gender mortality gap of 230 per 100,000 per year or less. Outside the former Soviet block, Belgium (323 per 100,000 per year), Spain (332), France (336), Finland (362) and Portugal (367) had the highest gender gaps in all-cause mortality.

There was a 5-fold difference between the countries with the lowest (Iceland; 97 per 100,000) and highest (Ukraine; 495 per 100,000) gender gap in smoking-related deaths. Despite this variation, smoking-related deaths accounted for between 40% and 60% of the gender gap in all countries except Denmark (39%), Portugal (38%) and France (38%) where smoking-related deaths accounted for a slightly lower proportion, and Malta (74%) where smoking-related deaths accounted for a higher proportion (see Table 1). Smoking-related mortality was high in both men and

women in Eastern European countries where the absolute difference in the gap was also high.

There was an 8-fold difference between the countries with the lowest (Iceland - 29 per 100,000) and highest (Lithuania - 253 per 100,000) gender gap in alcohol-related deaths. As expected[6], alcohol-related deaths were particularly high in men in the Eastern European countries (where female rates were also high in comparison with other European countries). Alcohol-related deaths also accounted for a substantial proportion of the gender gap in all-cause mortality (typically for around 20%), although the proportion tended to be higher in Eastern Europe. Despite large gender differences in alcohol consumption across societies and the huge variation in alcohol-related deaths across Europe, the contribution of smoking-related mortality to the gender gap in all-cause mortality was greater than that for alcohol-related mortality in all countries examined (see Table 1).

DISCUSSION

Mortality is higher in males than females across Europe, but there is considerable variation in the magnitude of this gap (from an 'excess' of 188 deaths per 100,000 per year in Iceland to 942 per 100,000 per year in Ukraine). Smoking-related deaths accounted for around 40% to 60% of the gender gap, whilst alcohol-related mortality typically accounted for around 20% of the gender gap. The range in the contribution of smoking-related deaths reflects gender differences in the uptake of smoking by gender in earlier decades.[7]

The strengths of this analysis are: the use of best available data from the WHO, who do their best to quality-assure the data, and the inclusion of most large European countries (with the exception of Turkey). There are some limitations to consider. First, alcohol and tobacco use contribute to some shared causes of

mortality and morbidity and so any division into alcohol-related and smoking-related will underestimate the scope of influence of each on mortality. For example, liver cancer has been linked with excessive alcohol consumption for some time, but more recently smoking has also shown to be associated with this malignancy. Similarly both tobacco and alcohol consumption contribute to the development of cancers of the aero-digestive tract .[8] This is the rationale behind "Peto's method" of benchmarking smoking-related deaths within each country against lung cancer deaths, [9] as one method of estimating smoking related deaths. The WHO's definitions acknowledge that both smoking and alcohol contribute to some causes of death (oesophageal and throat cancer) but not others. Unfortunately, the cause-specific data required for applying any alternative definitions were not available from the WHO-HFA database and so we were constrained by the WHO's definitions. A second limitation is the potential for differential coding practices to bias the cause-specific death rates between countries despite the use of the International Classification of Diseases system. Thirdly, the WHO-HFA database only provides these data by gender for all ages together so we were unable to examine relationships in specific age groups.

It is no surprise that two of the most important health behaviours, smoking and hazardous drinking continue to account for substantial proportions of the gender gap in mortality because health behaviours have long been a powerful way of portraying gendered identities.[10-15] For example, it has been suggested that cultural portrayals of drinking keep shifting to maintain a gendered distinction in drinking behaviours, so that as men and women both modify their drinking behaviours, considerable effort is devoted to constructing men's drinking in different ways to women's drinking.[16] The balance of the contribution of smoking- and alcohol-related deaths and the degree of consistency of the pattern across Europe is

perhaps more of a surprise given the complexity of associations between gender, smoking and drinking over the preceding decades, the long lag time between exposure to smoking and disease (estimated to be between 20 and 35 years for lung cancer, [17] and three to four decades for other cancers such as colorectal cancer[18]), the considerable variation in the magnitude of the gender gap in all-cause mortality, and the different stages in the smoking epidemic that countries of northern, western, southern and eastern Europe have reached. What is clear is that smoking accounts for a substantial part of the gender difference in mortality in contemporary Europe. The importance of health behaviours (and in particular smoking) in accounting for a large proportion of the gender gap in mortality is often lost in discussion of gender and health. For example, it is often suggested that other factors (such as differences in consultation for illness) account for a much of this difference (see e.g.[19]) despite a paucity of robust evidence.[20]

The continuing uptake of smoking amongst a significant minority of young people, and increases in detrimental patterns of alcohol consumption, point to the ongoing need for public health measures to reduce health-damaging behaviours. However, the continuing links between smoking and drinking and cultural constructions of gender demonstrate that action to reduce smoking and harmful drinking cannot be tackled at an individualistic level alone. These behaviours are culturally bound and these cultural constructions of behaviours are partially shaped by and exploited by the alcohol and tobacco industries (see e.g. [11],[21]), in addition to people's structural opportunities and constraints. [22]

Profound changes in the population level of smoking and in the magnitude of the gender gap in smoking should contribute to smaller gender differences in mortality in coming decades, beginning first in countries in western and northern Europe

which reached the fourth stage of the tobacco epidemic first.[7] However, the extent to which this is realised will depend on the ways in which other health risk behaviours are patterned by gender.

REFERENCES

1. Barford A, Dorling D, Davey Smith G, Shaw M. Life expectancy: women now on top everywhere. *BMJ* 2006;332:808-08.
2. Gjonca A, Tomassini C, Toson B, Smallwood S. Sex differences in mortality, a comparison of the United Kingdom and other developed countries. *Health Statistics Quarterly* 2005;26:6-16.
3. Chenet L. Gender and socio-economic inequalities in mortality in central and eastern Europe. In: Annandale E, Hunt K, editors. *Gender Inequalities in Health*. Buckingham: Open University Press, 2000:182-207.
4. Waldron I. Contributions of biological and behavioural factors to changing sex differences in ischaemic heart disease mortality. In: Lopez A, Valkonen T, Caselli G, editors. *Adult Mortality in Developed Countries*. Oxford: Oxford University Press, 1995:161-78.
5. World Health Organisation. European Health for All database (HFA-DB): WHO REgional Office for Europe, 2009.
6. Leon DA, Shkolnikov VM, McKee M. Alcohol and Russian mortality: a continuing crisis. *Addiction* 2009;104(10):1630-36.
7. Lopez AD, Collishaw NE, Piha T. A descriptive model of the cigarette epidemic in developed countries. *Tobacco Control* 1994;3:242-47.
8. Pelucchi C, Gallus S, Garavello W, Bosetti C, LaVecchia C. Alcohol and tobacco use, and cancer risk for upper aerodigestive tract and liver. *European Journal of Cancer Prevention* 2008;17(4):340-4.
9. Peto R, Lopez AD, Boreham J, Thun M, Heath C. Mortality from tobacco in developed countries: an indirect estimation from national vital statistics. *Lancet* 1992;1992(339):1268-78.
10. Courtenay W. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Soc. Sci. Med.* 2000;50:1385-401.
11. Amos A, Haglund M. From social taboo to "torch of freedom": the marketing of cigarettes to women. *Tobacco Control* 2000;9:3-8.
12. Hunt K, Hannah MK, West P. Contextualising smoking: masculinity, femininity and class differences in smoking in men and women from three generation in the west of Scotland. *Health Education Research Theory and Practice* 2004;19:239-49.
13. Elliot R. *Women and Smoking since 1890*. Abingdon: Routledge, 2008.
14. de Visser R, Smith JA. Alcohol consumption and masculine identity among young men. *Psychol. Health* 2007;22(5):595-614.
15. Lyons AC, Willott SA. Alcohol consumption, gender identities and women's changing social positions. *Sex Roles* 2008;59:694-712.
16. Lyons A, Dalton SI, Hoy A. 'Hardcore drinking': portrayals of alcohol consumption in young women's and men's magazines. *Journal of Health Psychology* 2006;11:223-32.
17. Proctor RN. Tobacco and the global lung cancer epidemic. *Nature Reviews Cancer* 2001;1:82-86.
18. Giovannucci E. An updated review of the epidemiological evidence that cigarette smoking increases risk of colorectal cancer. *Cancer Epidemiology Biomarkers and Prevention* 2001;10:725-31.
19. White A, Witty K. Men's under use of health services - finding alternative approaches. *Journal of Men's Health* 2009;6(2):95-97.
20. Hunt K, Adamson J, Galdas P. Gender and help-seeking: towards gender-comparative studies. In: Kuhlmann E, Annandale E, editors. *Palgrave Handbook of Gender and Healthcare*: Palgrave, 2010:207-21.
21. Toll BA, Ling PM. The Virginia Slims identity crisis: an inside look at tobacco industry marketing to women. *Tobacco Control* 2005;14:172-80.

22. Graham H. Women's smoking and family health. *Soc. Sci. Med.* 1987;25(1):47-56.

Table 1 – The proportion of the gender gap in mortality related to alcohol and smoking ordered by the all-cause mortality gender gap (2003-5)

	*All cause mortality gap	Male alcohol-related mortality	Female alcohol-related mortality	**Gender gap alcohol-related mortality	Male smoking-related mortality	Female smoking-related mortality	Gender gap smoking-related mortality	Year of data origin	% of mortality gender gap attributable to: ■ Alcohol ▒ Smoking 0% 40% 80%
Iceland	188	59	30	29	255	158	97	2005	
United Kingdom	225	74	32	42	319	187	132	2005	
Sweden	228	74	31	43	256	149	106	2005	
Cyprus	229	78	40	38	228	120	107	2005	
Greece	230	67	18	49	297	167	130	2005	
Malta	234	52	22	30	366	193	173	2005	
Switzerland	245	74	30	44	225	107	118	2005	
Norway	252	74	32	43	254	140	114	2005	
Ireland	257	78	30	48	315	175	141	2005	
Denmark	260	105	40	65	290	189	101	2005	
Netherlands	261	59	26	32	264	134	130	2005	
Luxembourg	288	95	38	57	263	128	135	2005	
Germany	289	86	31	55	297	153	144	2005	
Austria	292	110	34	76	293	156	137	2005	
Italy	299	74	27	46	291	137	155	2003	
Belgium	323	101	40	61	296	128	169	2004	
Spain	332	80	22	58	264	96	168	2005	
France	336	107	39	68	202	75	128	2005	
Finland	362	144	47	96	346	166	179	2005	
Portugal	367	115	32	83	310	171	140	2003	
Czech Republic	420	125	41	84	481	269	211	2005	
Romania	492	170	57	113	648	398	250	2005	
Bulgaria	540	118	27	91	558	311	246	2005	
Poland	551	150	36	113	418	187	230	2005	
Slovakia	560	153	38	115	570	304	267	2005	
Hungary	619	211	62	150	685	354	332	2005	
Estonia	783	274	68	206	668	317	351	2005	
Latvia	833	265	69	196	781	379	402	2005	
Lithuania	833	329	76	253	781	398	383	2005	
Ukraine	942	317	77	240	1081	586	495	2004	

* All mortality rates are deaths per 100,000 population per year
** All gender gaps are calculated by subtracting the female from the male rate

The authors have no competing interests to declare.