



Country and sex differences in (trends in) life expectancy in Europe: the role of lifestyle factors

Fanny Janssen

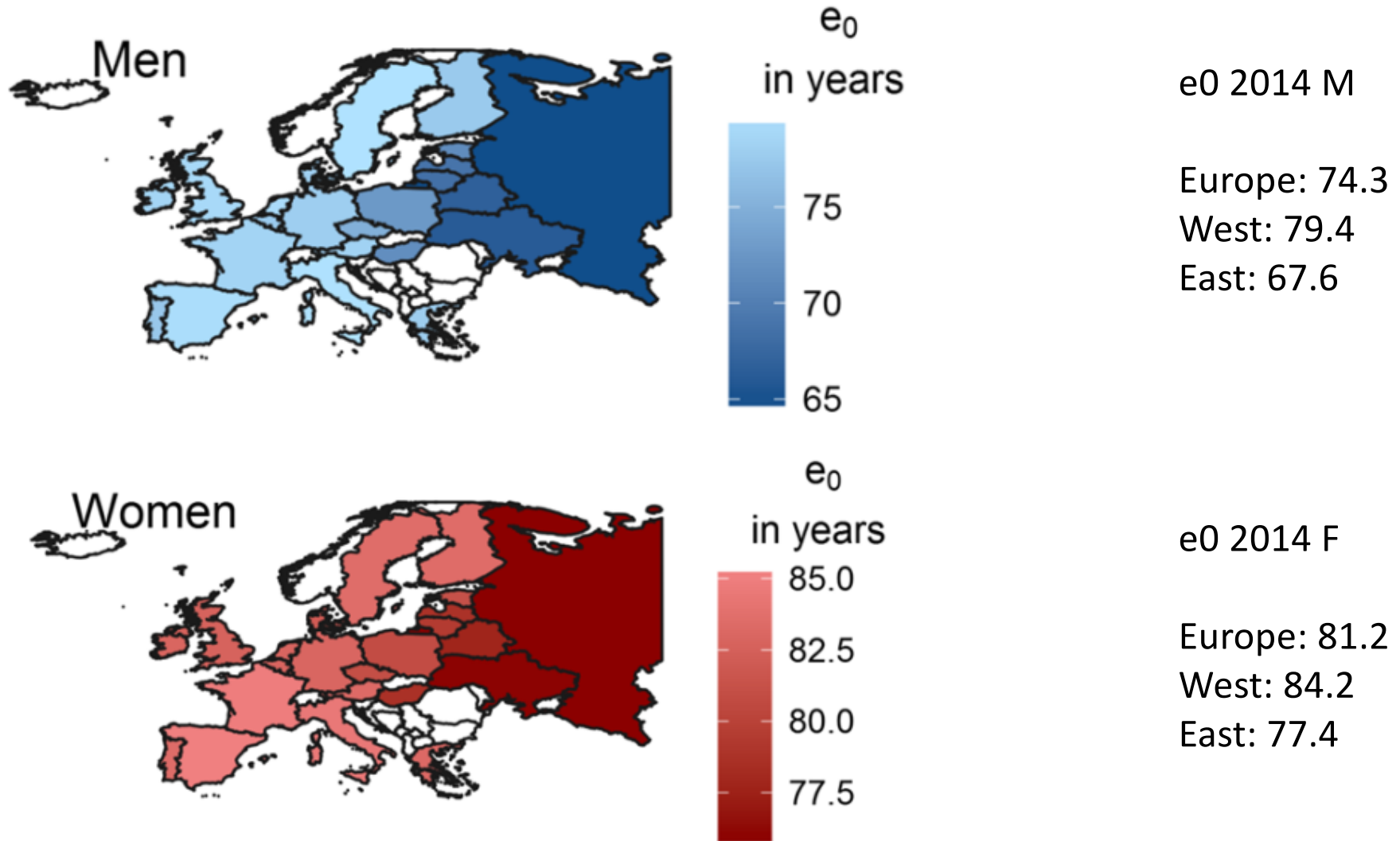
**Netherlands Interdisciplinary Demographic Institute, The
Hague, NL & University of Groningen**

NBER workshop on inequalities in mortality

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improved and robust mortality projections" funded by the Netherlands
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Sex and country differences in life expectancy in Europe - 2012

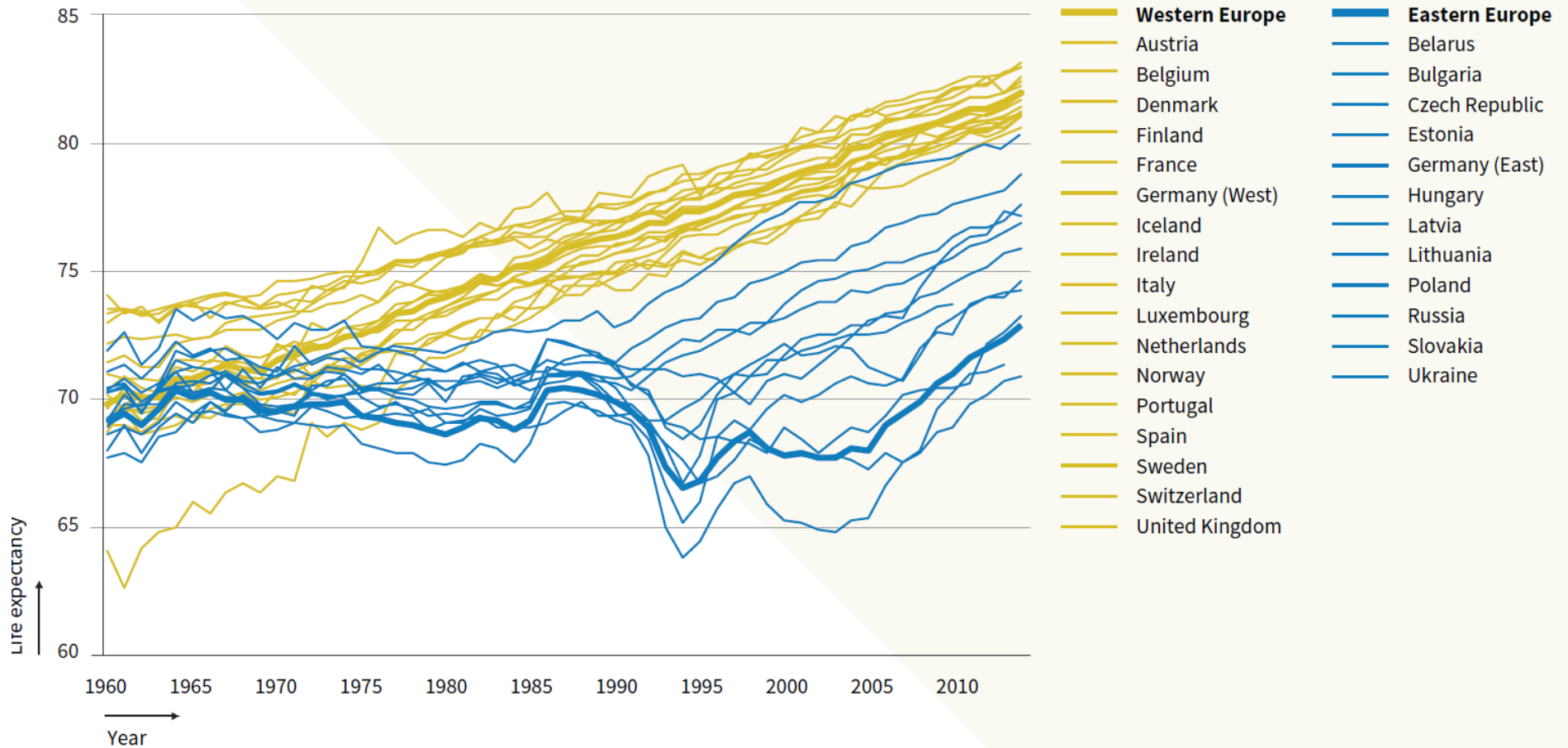


2012 => Trias-Llimós et al. 2018 IJE; 2014 => Janssen et al. 2021 IJE. Source data: HMD.



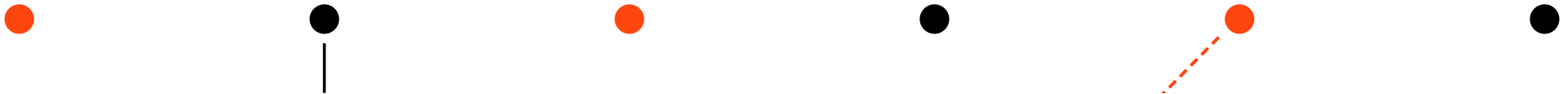
Country differences in trends in life expectancy in Europe

FIGURE 1: PAST TRENDS IN LIFE EXPECTANCY AT BIRTH, 1960-2014, EASTERN EUROPE AND WESTERN EUROPE COMPARED



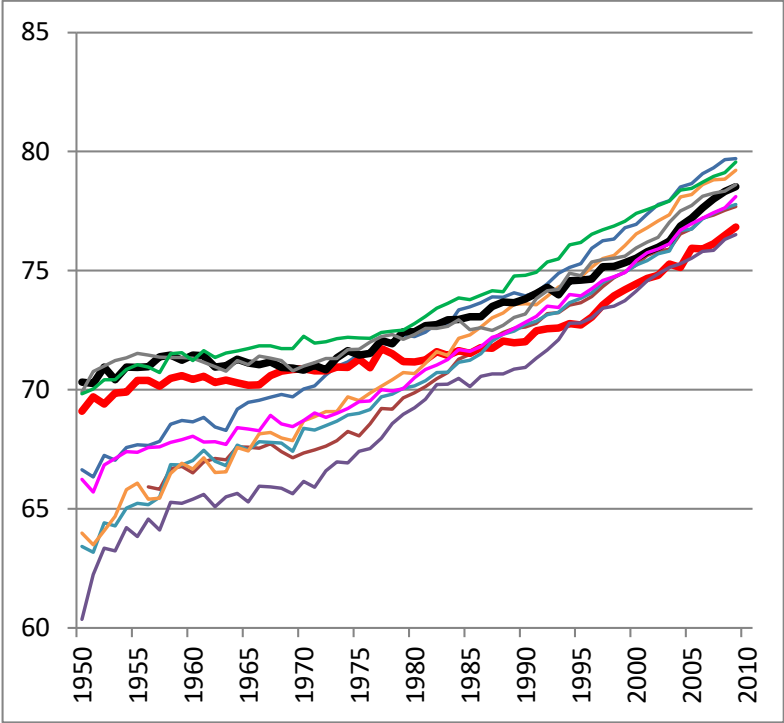
Source data: Human Mortality Database, accessed 26/8/2018

Janssen (2018), Differences in longevity in Europe. *The European Actuary*.

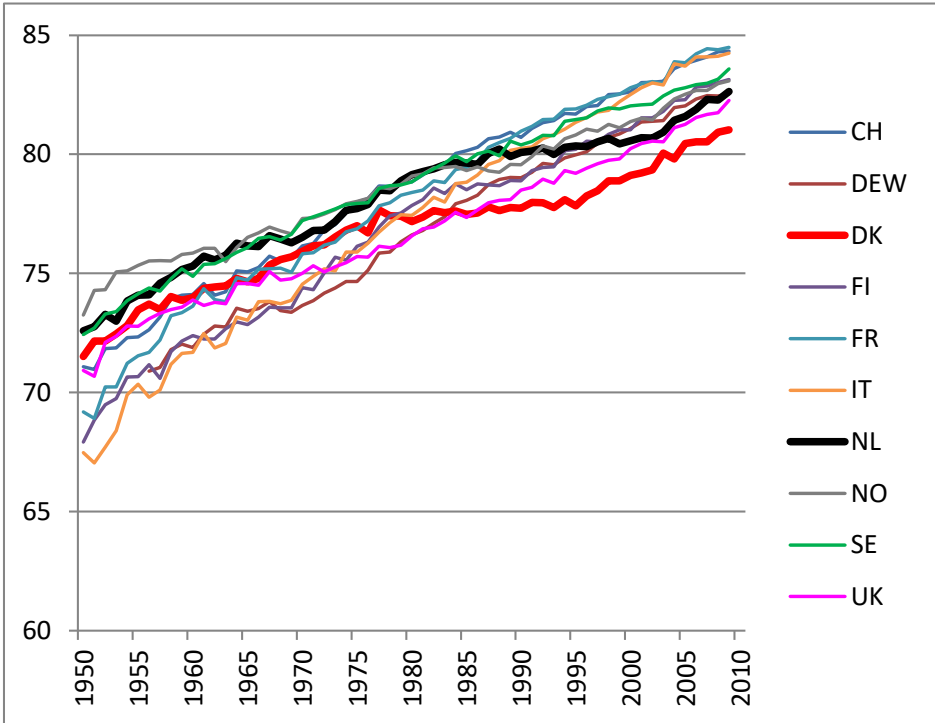


Trends in life expectancy in Western Europe

Men



Women

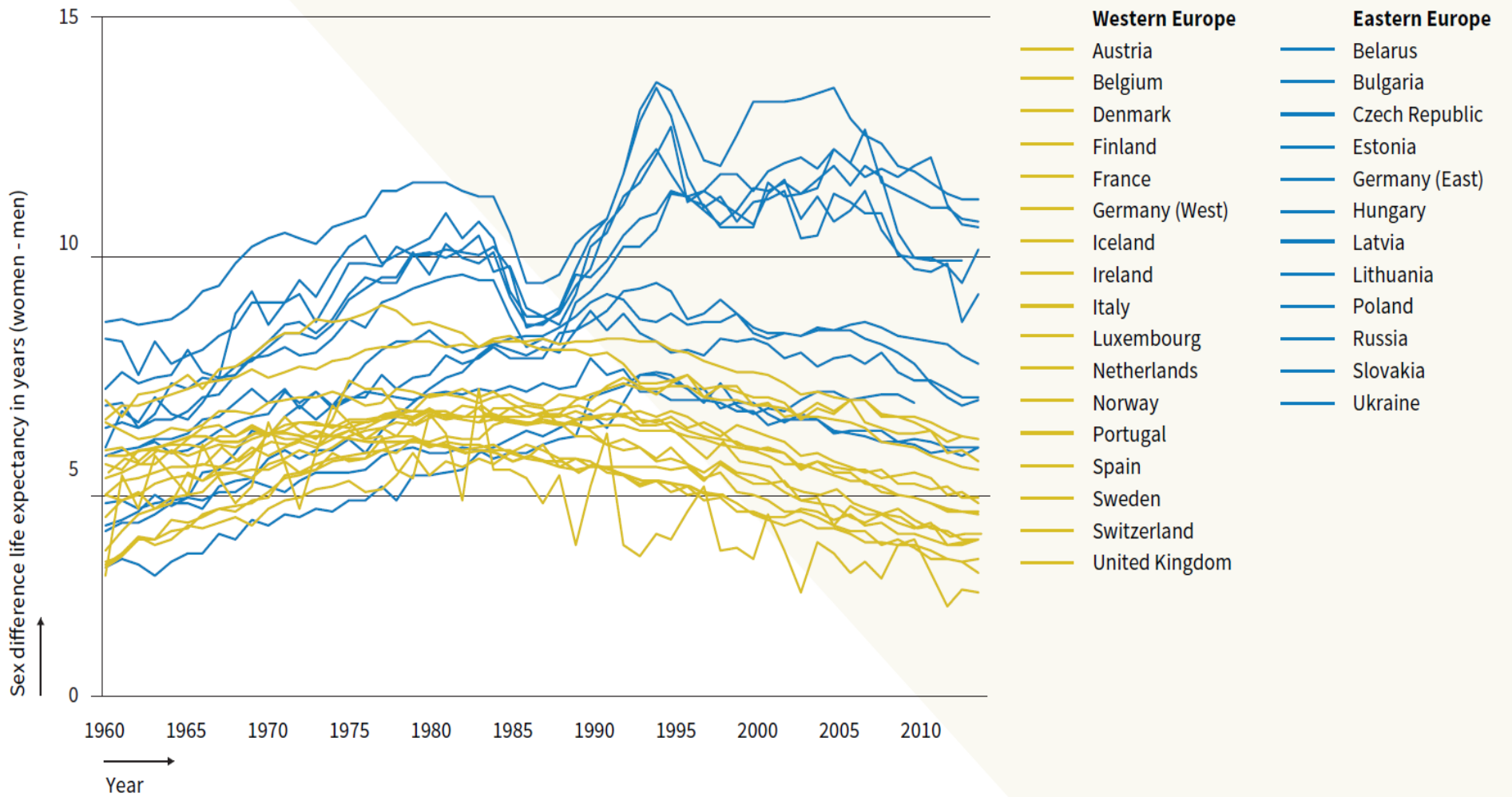


Source data: HMD



Sex differences in trends in life expectancy in Europe

FIGURE 2: SEX DIFFERENCES IN LIFE EXPECTANCY AT BIRTH, 1960-2014, EASTERN EUROPE AND WESTERN EUROPE COMPARED






Janssen (2018), Differences in longevity in Europe. *The European Actuary*.





Importance of lifestyle factors

- In Europe > 85 % of all deaths due to NCDs (WHO 2011)
 - In the EU, smoking, alcohol and obesity are the most important preventable risk factors of premature mortality (WHO 2009)
 - Important differences btwn countries and sexes in the importance of these lifestyle factors
 - Likely important effect on (differences in) trends in life expectancy as well, because smoking, alcohol and obesity tend to evolve as wave-shaped 'epidemics'
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Wave-shaped lifestyle 'epidemics'



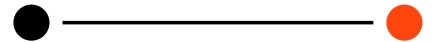
- Smoking epidemic => strong wave pattern (prevalence; mortality); Northwestern European men (Lopez et al. 1994; Janssen et al. 2020 NTR)



- Obesity epidemic => prevalence tripled since 1980 (WHO 2007); current signs of stagnation (Rokholm et al. 2010); wave-shaped epidemic (Xu & Lam 2018)



- Alcohol => strong increases followed by recent declines in East + Northwestern Europe (Janssen et al. 2020 IJERPH)




Objective

To estimate the individual and combined impact of the smoking, alcohol and obesity 'epidemics' on life expectancy levels and trends, and sex and country differences therein






Data

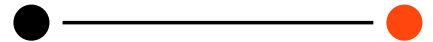
- 30 European countries, by sex and age, 1950-2016
 - Age and sex-specific lifestyle-attributable mortality fractions
 - Smoking (1950-2014; 35-100 M; 40-100 F) => indirectly estimated using lung cancer mortality data from WHO (Peto et al. 1992; Janssen et al. 2013)
 - Alcohol (1990-2016; 20-100) => rates from Global Burden of Disease Study 2017 (20-64) and age pattern at highest ages using cause-specific mortality data from WHO (Janssen et al. 2020 IJERPH).
 - Obesity (1975-2016; 20-100) => PAF formula applied to prevalence data (NCD Risk Factor Collaboration study 2017) and RRs of dying from obesity (Lobstein et al. 2010)
 - Three lifestyle factors combined => multiplicative approach (Ezzati et al. 2003)
 - All-cause mortality and exposure from HMD (August 27, 2018)
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Methods

- Estimation potential gains in life expectancy (PGLE) by means of associate single decrement life tables
 - Examination trends in age-standardised lifestyle-specific attributable mortality fractions over time (standard = pop. specific death distribution in 2010)(smoothed over time)
 - Comparison past trends e_0 all-cause mortality and e_0 non-lifestyle-attributable mortality
 - Decomposition technique (Andreev et al. 2002) to assess the role of lifestyle in sex and country differences in e_0
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Results



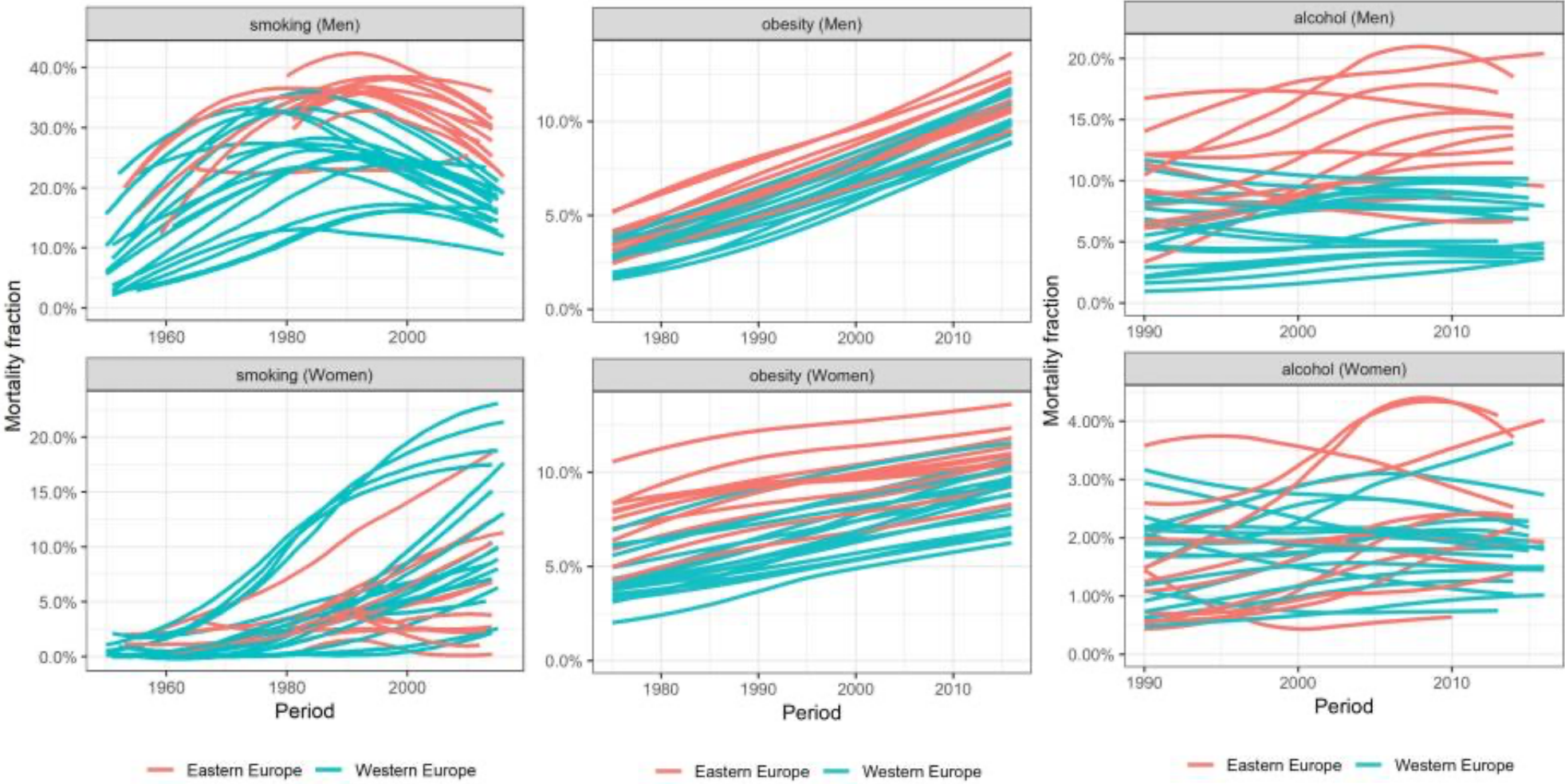
Impact of lifestyle factors on life expectancy in Europe, by sex and region, 2014

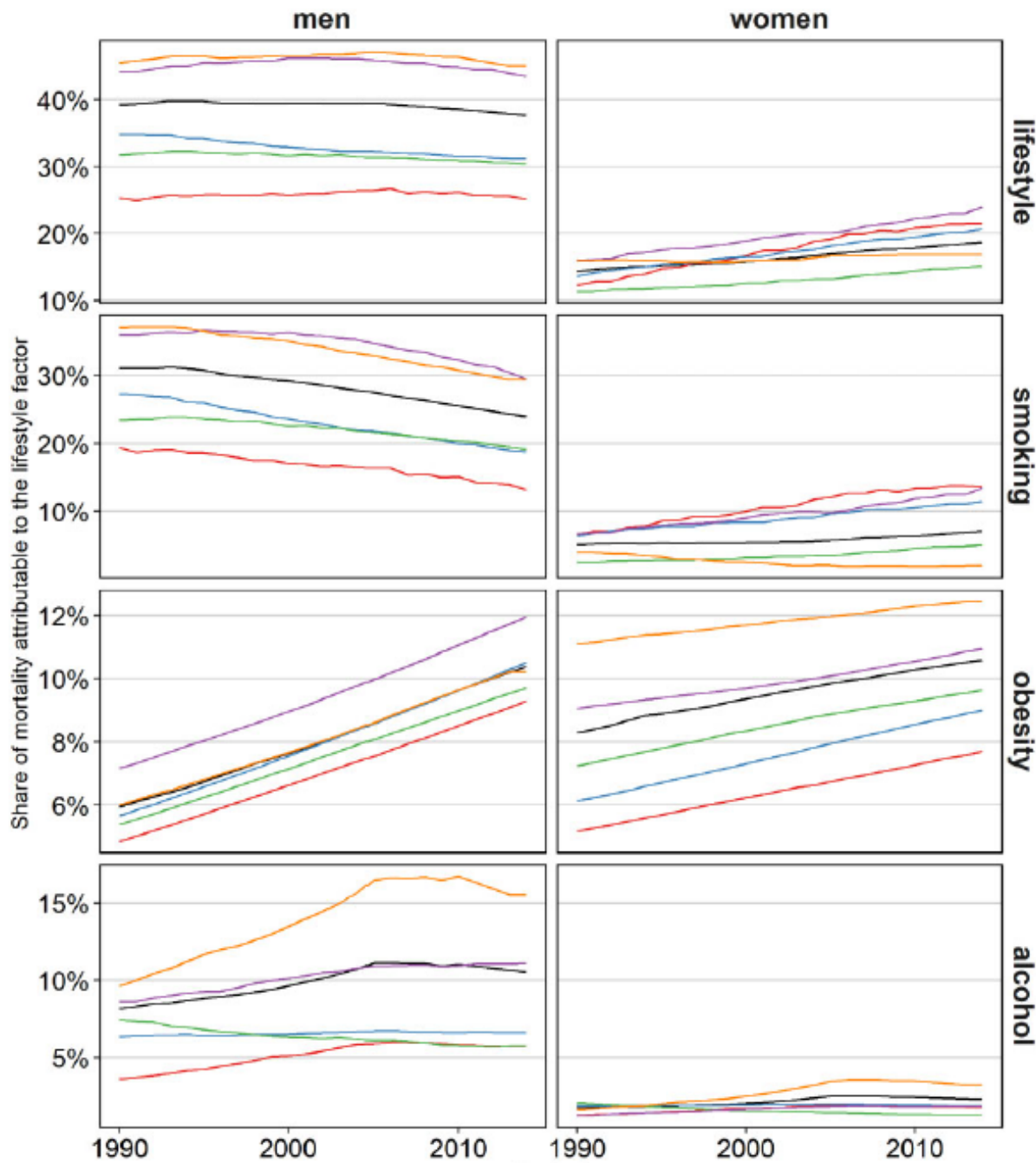
	PGLE 2014 ^a (in years)				
	e0 2014 ^a	Lifestyle	Smoking	Obesity	Alcohol
Men					
Europe	74.3	5.8	3.4	1.3	1.8
West	79.4	3.8	2.2	1.1	0.9
East	67.6	7.8	4.5	1.5	2.7
Women					
Europe	81.2	2.3	0.8	1.2	0.5
West	84.2	2.1	1.0	0.9	0.3
East	77.4	2.4	0.5	1.4	0.6

Janssen et al. 2021 IJE



Trends age-standardised smoking, alcohol, and obesity-attributable mortality fractions



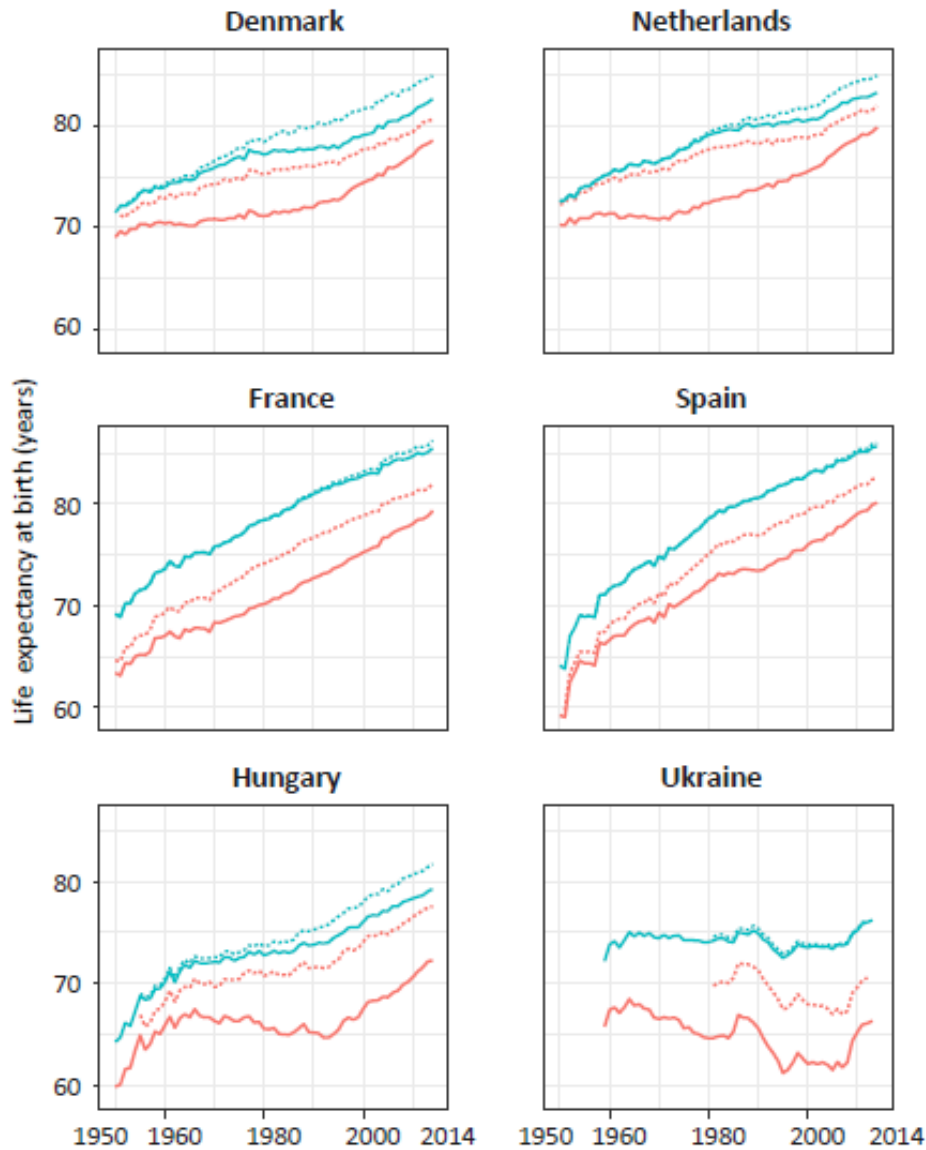


Trends age-standardised lifestyle-attributable mortality fractions, 1990-2016 (20-100)

- Europe
- Northern Europe
- Western Europe
- Southern Europe
- Central Europe
- Eastern Europe

Janssen et al. 2021 IJE



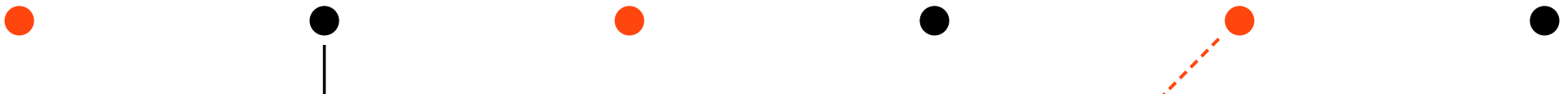


**Comparison trends e0
all-cause mortality vs
trends e0 non-smoking
attributable mortality**

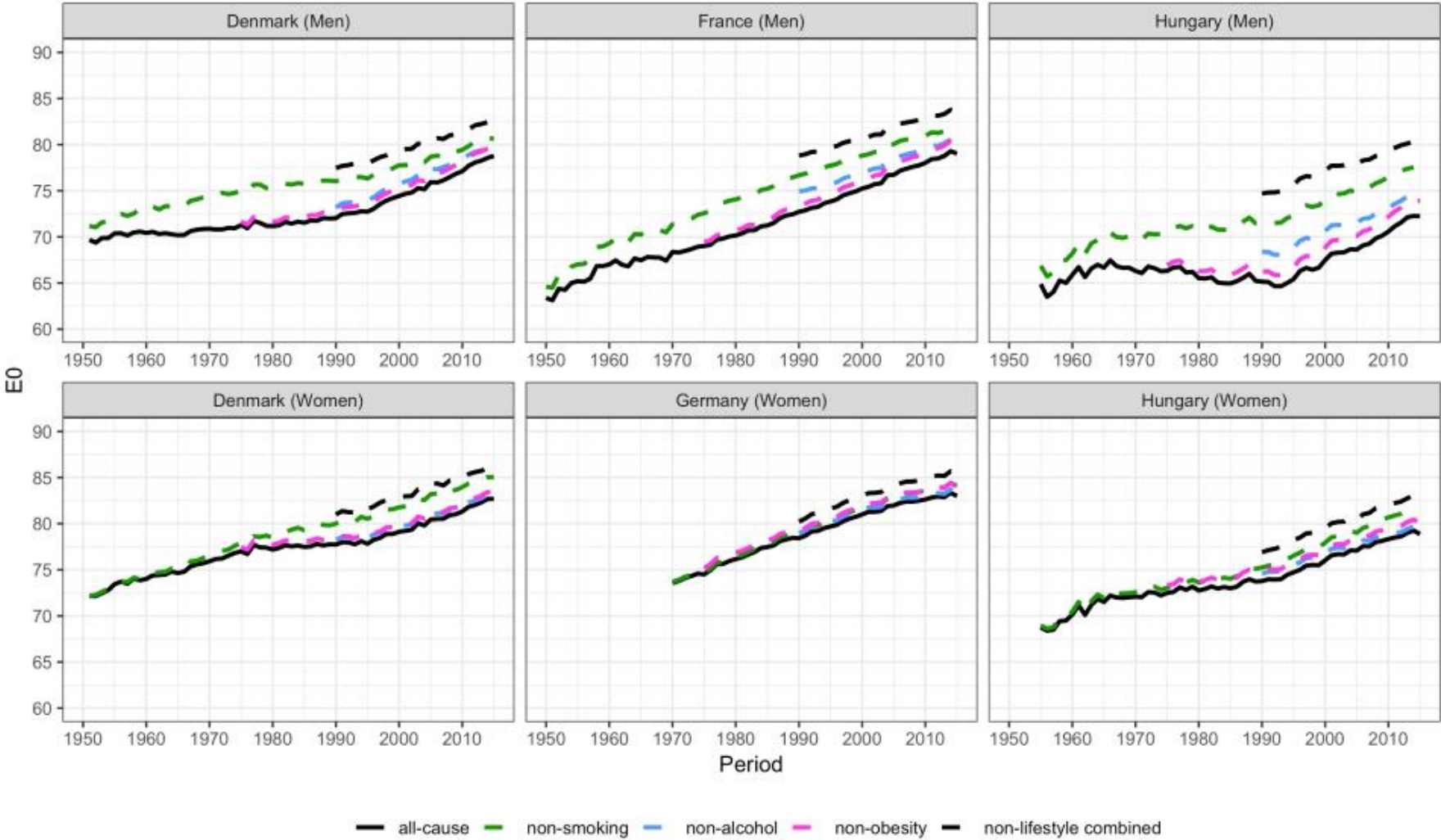
Men —
Women —

All-cause mortality —
Non-smoking-related mortality - - -

Janssen, F. (2019). Smoking's impact on mortality in Europe. *Population & Societies*, 571, 1-4.



Comparison trends e0 all-cause mortality vs trends e0 non-lifestyle attributable mortality



Janssen et al. 2021 IJE



Gain in life expectancy (1990-2014), observed and without smoking, alcohol and obesity, Europe, by sex and region

Country	Gain in e0 1990-2014			
	All-cause mortality		Non-lifestyle attributable mortality	
	Men	Women	Men	Women
Europe	4.98	3.96	4.24	4.32
Northern Europe	6.31	4.34	5.29	4.89
Western Europe	6.51	4.66	4.93	5.10
Southern Europe	6.59	5.03	5.09	5.14
Central Europe	7.52	6.01	6.06	6.71
Eastern Europe	1.20	1.87	1.56	2.14
<i>Variance (30 countries)</i>	4.36	1.81	2.30	1.99


Janssen et al. 2021 IJE






Contribution of lifestyle factors to sex differences in e0

Janssen 2020 IJE

- In 2014 smoking contributed 3 out of 7 years (43.5%) to the sex difference in e0 in Europe.
 - The decline in the sex gap in e0 can be almost fully explained by smoking
- 


Trias-Llimós & Janssen 2018 EJPH

- Alcohol contributed, on average, appr. 20 % to the gender gap in LE in the eight studied CEE countries, 1990-2012.
 - Largest contribution of around 25% in the 1990s in some former Soviet countries
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Contribution of lifestyle factors to country differences in e_0

Janssen 2021 NTR

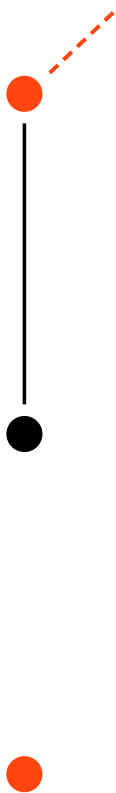

- Smoking contributes on average around one third to the country differences in e_0 in Europe, 1985-2014, stronger for men than women
 - Smoking contributed to both the divergence and the subsequent convergence
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Trias-Llimós et al. 2018 IJE

- In 2012, alcohol contributed on average 20 % to the difference in e_0 between CEE countries and EU-15
 - The relative contribution of alcohol to the East-West difference increased till 2005, but declined thereafter (except Belarus and Poland)
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Conclusion

- Sex and country differences in mortality levels AND mortality trends in Europe are to a large extent driven by lifestyle factors
 - Lifestyle ‘epidemics’ have the tendency to distort the general gradual increase in life expectancy, albeit differently so by lifestyle factor, sex, country and time period.
 - Without the combined impact of smoking, obesity and alcohol, a rather stable increase in e_0 , rather parallel for men and women.
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Implications

- The stagnation in trends in e_0 in several European countries since 2011 (and before COVID-19) likely also partly due to lifestyle factors:
 - Increasing obesity prevalence
 - Increasing alcohol abuse among adults
 - Increasing smoking-attributable mortality among women
- For mortality extrapolations:
 - Extrapolation based on the underlying long-term mortality trend
 - Clubbed with estimates of future lifestyle-attributable mortality (more advanced projection techniques; epidemiological evidence)
 - See: Janssen et al. 2021 eLife
 - For COVID-19: similar approach



Current project

- Assessing the impact of lifestyle ‘epidemics’ on trends in **educational inequalities in mortality** in Europe, and using that information to further improve life expectancy projections
- Forecasting future socio-economic inequalities in longevity: the impact of lifestyle ‘epidemics’
- Funded by the Netherlands Organisation for Scientific research (NWO)
- See: www.futurelongevitybyeducation.com



Thank you for your attention.

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