Supplemental material to: Potential gains in life expectancy by reducing inequality of lifespans in Denmark: An international comparison and cause-of-death analysis.

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Table 1. ICD code for the cause-of-death classification.

Cause of Death	ICD-7	ICD-8	ICD-9 (Sweden)	ICD-10
Cancer, smoking-related	A044-A050, A052, 157, 180-181	A045-A051, A055, 157, 188-189	B08, B090-B094, B096, B100-B101, 180, 188-189	C00-C21, C25, C30-C34, C53, C64-C68
Cancer, not smoking-related	A051, A053-A056, A058-A059, 155-156, 158-160, 164-165, 175-176, 178-179, 192-195, 198-199	A052-A054, A056-A057, A059-A60, 155-156, 158-160, 163, 171, 183-184, 186-187, 190-199	B095, B099, B109, B11, B13-B14, 179, 181-187	C22-C24, C26, C37-C39, C40-C41, C43-C52, C54-C58, C60-C63, C69-C97
Cardiovascular	A063, A070, A079-A086	A064, A080-A088	B181, B25-B30	E10-E14, I00-I99
Respiratory, infectious	A087-A092, A095	A089-A092, A095	B310-B312, B320-B322	J00-J06, J09-J18, J20-J22, J34.0, J36, J39.0, J39.1, J85, J86
Respiratory, non-infectious	A093, A094, A096, A097	A093, A094, A096	B313-B315, B319, B323-B327, B329	J30-J33, J34.1-J34.3, J34.8, J35, J37, J38, J39.2, J39.3, J39.8, J39.9, J40-J47, J60-J70, J80-J82, J840-J841, J848-J849, J90-J99
External	A138-A150	A138-A150	B47-B56	S00-T89, V01-Y84
Other	A001-A043, A060-A062, A064-A069, A071-A078, A098-A137	A001-A044, A061-A063, A065-A079, A097-A137	B01-B07, B184-B185, B15-B17, B180, B182-B183, B189, B19-B23, B33-B46	A00-B89, B99, D00-D48, D50-D89, E00-E07, E15-E16, E20-E35, E40-E46, E50-E68, E70-E90, F00-F99, G00-G99, H00-H59, H60-H95, K00-K93, L00-L99, M00-M99, N00-N99, O00-O99, P00-P96, Q00-Q99, R00-R99

1. Details on the classification

Primary malignancies that are sensitive to smoking are found predominantly in the respiratory, digestive and genitourinary tracts, in line with the principle that where smoke or its products pass, the risk of cancer rises. Primary malignancies in the gastrointestinal tract from mouth to anus were classified as sensitive to smoking, with the exception of liver cancer, for which detail could not be reconstructed across ICD versions (see below). Cancer in the respiratory tract was also classified as sensitive to smoking. In addition, it has been proven that smoking causes cancer of the uterine cervix, the ovaries (mucinous carcinoma), the bladder, the kidney (pelvis and body) and the ureter. For mucinous carcinoma of the ovaries, detail could not be reconstructed across ICD versions (see below). Malignancies in the urinary tract were classified as being sensitive to smoking.

The resolution of the ICD classification has grown substantially over the years. As we analyzed deaths from 1960 through 2014, we used ICD-7 through ICD-10. The specifically identified categories "cancer sensitive to smoking" and "respiratory infectious", are based on the smallest common denominator: only if a specific disease could be separately identified across ICD versions did we include it in these groups. For instance, myeloid leukemia is associated with smoking, but ICD-7 and -8 contain only a category 'leukemia', without subclassification. Hence, for reasons of consistency across classifications, myeloid leukemia is considered as not sensitive to smoking throughout. Also, ICD-7 and ICD-8 have an overall rest group for malignant neoplasms, while ICD-9 and ICD-10 have rest groups for each tract, if known. Because ICD-7 and ICD-8 do not have these detailed rest groups, rest groups were classified as not sensitive to smoking for all ICDs.

2. Brief description of the indicator

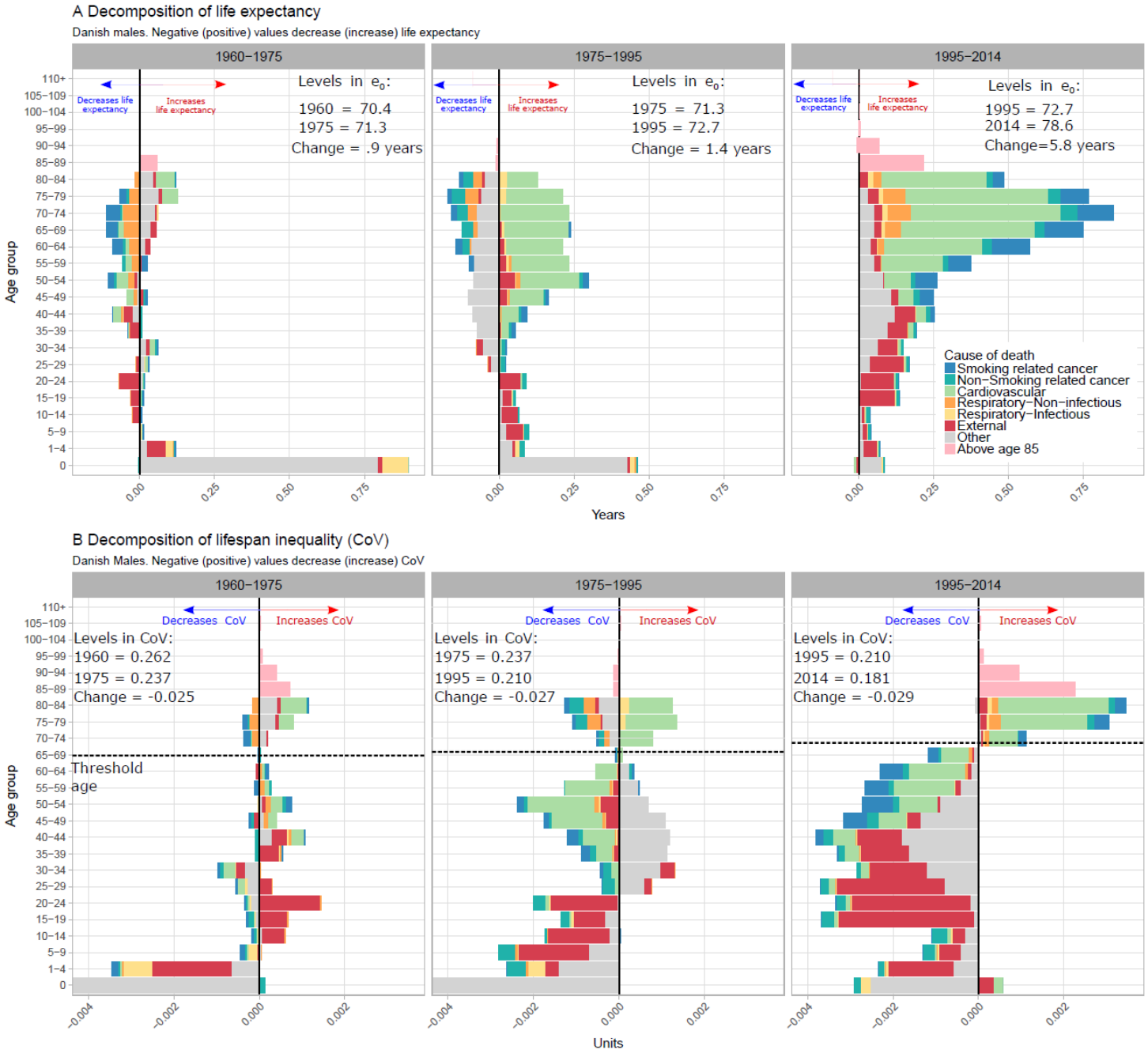
In lifetable notation, it is:

$$CoV_a = \frac{\sqrt{\int_a^{\omega}(x-e_a)^2 f(x)\mathrm{d}x}}{\int_a^{\omega}\ell(x)\mathrm{d}x} = \frac{\sigma_a}{e_a}. \qquad (1)$$

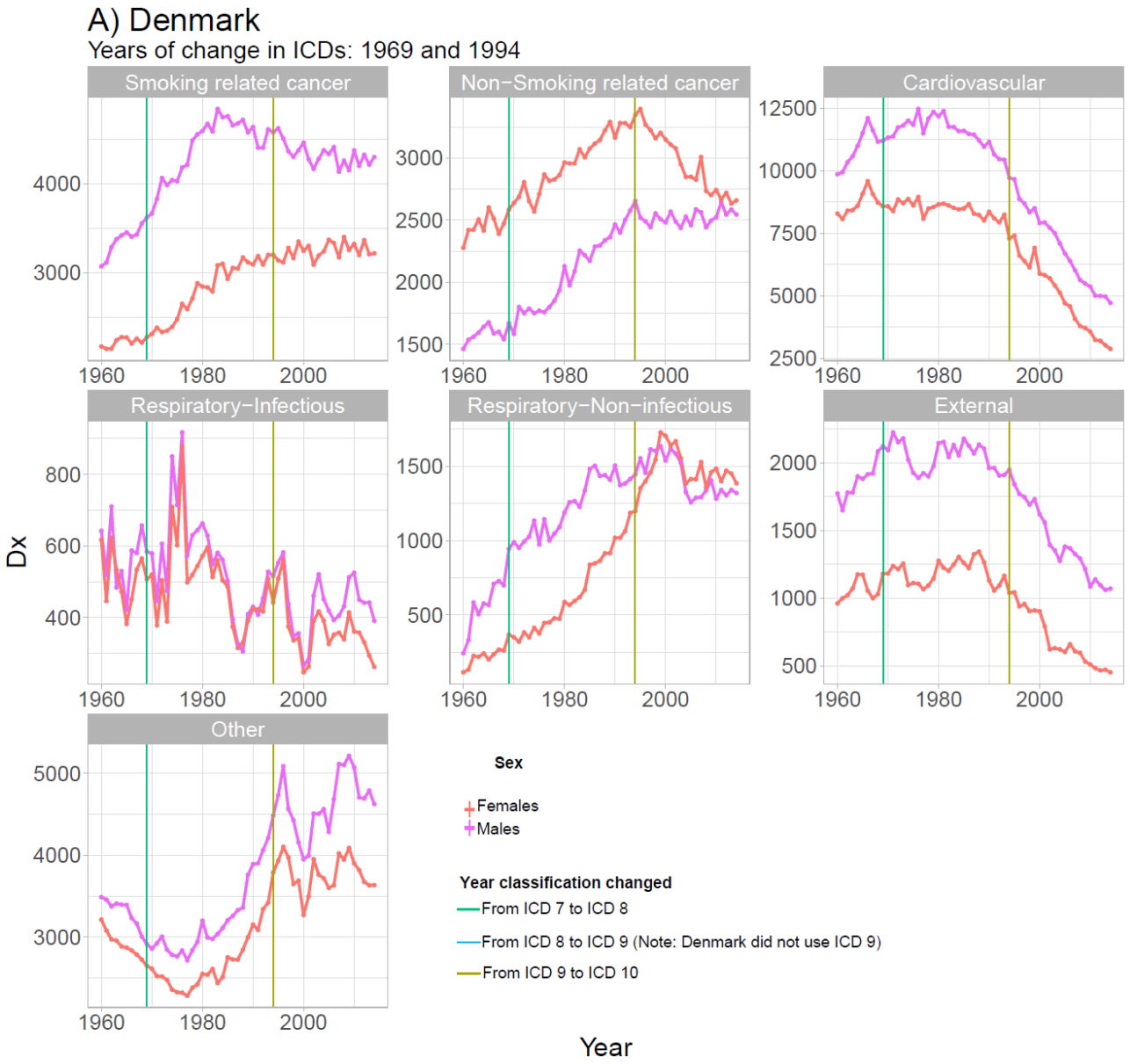
Where a, e_a, σ_a and ω denote the starting age at death of the density function, life expectancy at age a, the standard deviation at age a, and the open-aged interval (110+ in our case), respectively. We study the coefficient of variation from birth, i.e. $a = 0$.

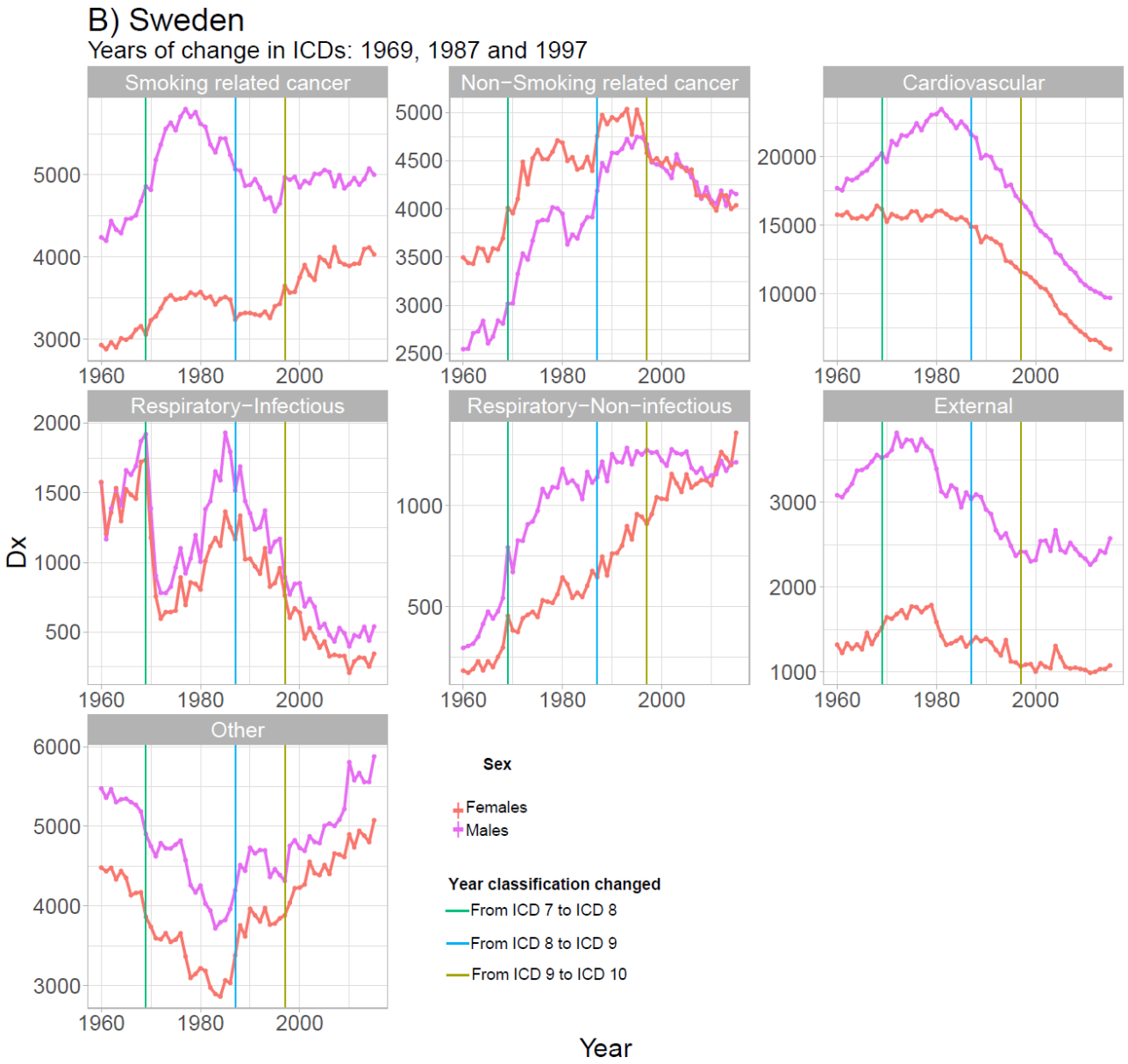
3. Supplementary figures

Figure 1. Age and cause contributions to changes in life expectancy (panel A) and lifespan inequality (panel B) between 1960-1975, 1975-1995 and 1995-2014 for Danish males. Note: Age 0 is truncated in panel B since it accounts for the largest contribution.



Figures 2A and 2B. Death counts by cause-of-death group for Denmark (panel A) and Sweden (panel B). Colored-vertical lines indicate changes in ICD versions. For example, in the case of Denmark, the green vertical line indicates the change from ICD 7 to ICD 8, which was in 1969.




B) Sweden
Years of change in ICDs: 1969, 1987 and 1997
Smoking related cancer
Non−Smoking related cancer
Cardiovascular
Respiratory−Infectious
Respiratory−Non−infectious
External
Other
Dx
Year
Sex
Females
Males
Year classification changed
From ICD 7 to ICD 8
From ICD 8 to ICD 9
From ICD 9 to ICD 10

4. Sensitivity analysis with the standard deviation of the age at death distribution

Figure 3. Trends in the standard deviation for Sweden (green) and Denmark (red).

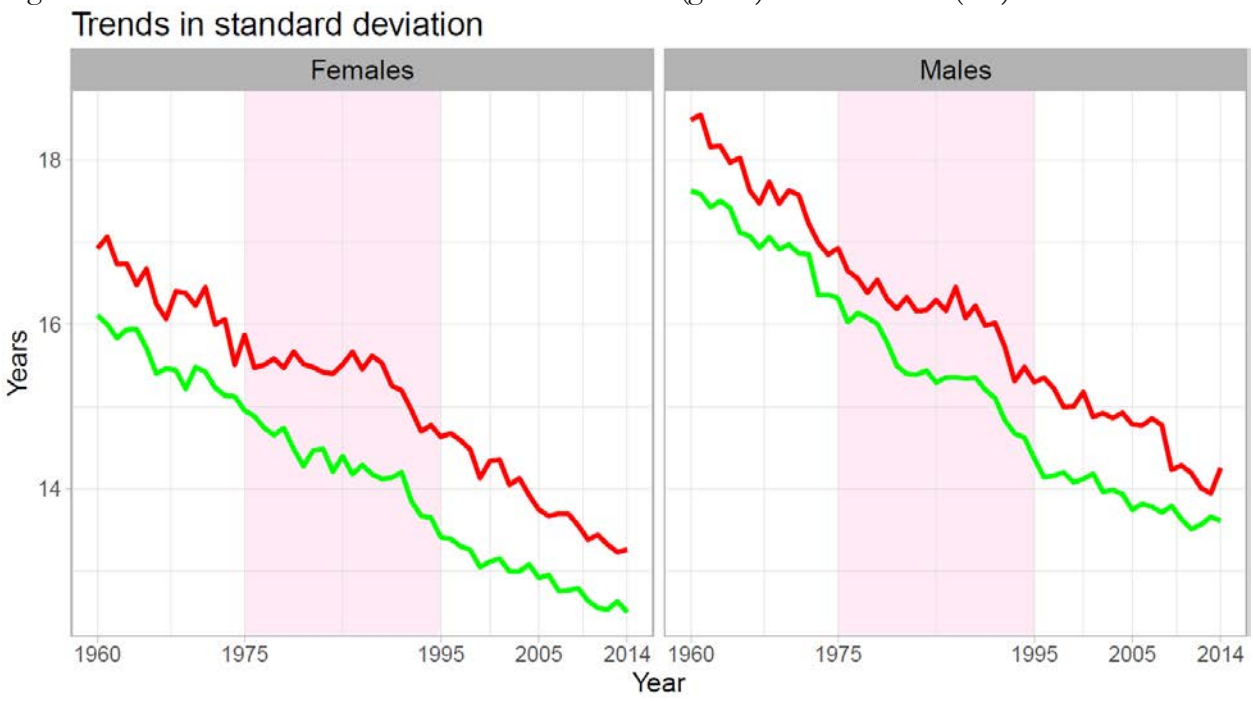


Figure 4. Age and cause-decomposition of the change in the standard deviation over time for Danish females. Note: the age zero is truncated for visualization purposes.

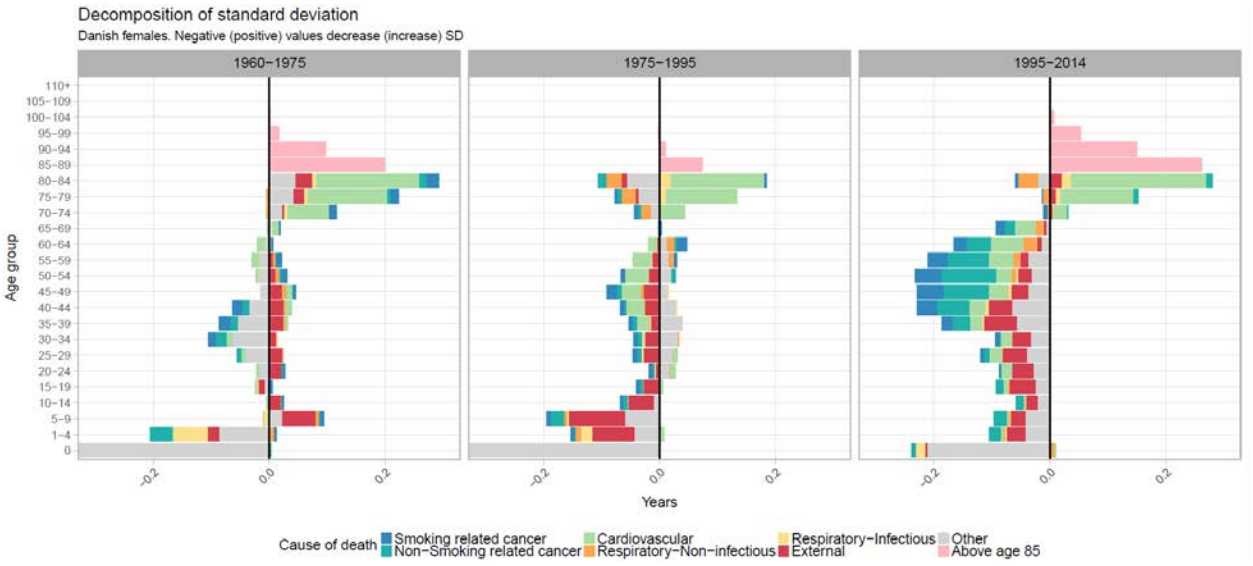


Figure 5. Age and cause-decomposition of the change in the standard deviation over time for Danish males. Note: the age zero is truncated for visualization purposes.

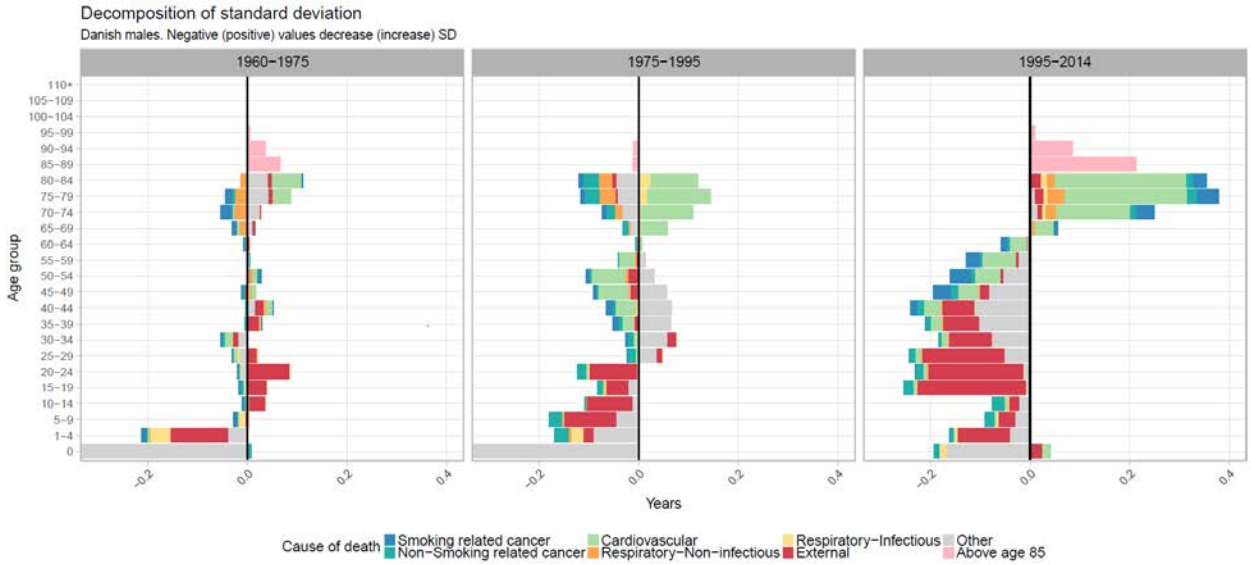


Figure 6. Age and cause-decomposition of the difference in the standard deviation between Denmark and Sweden 2014.