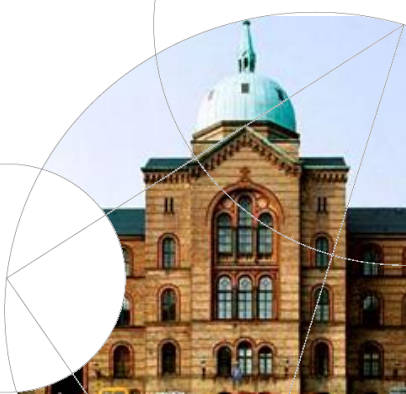
Social differentials in the contributions of mortality and health to the impact of smoking on expected lifetime in good health in Denmark

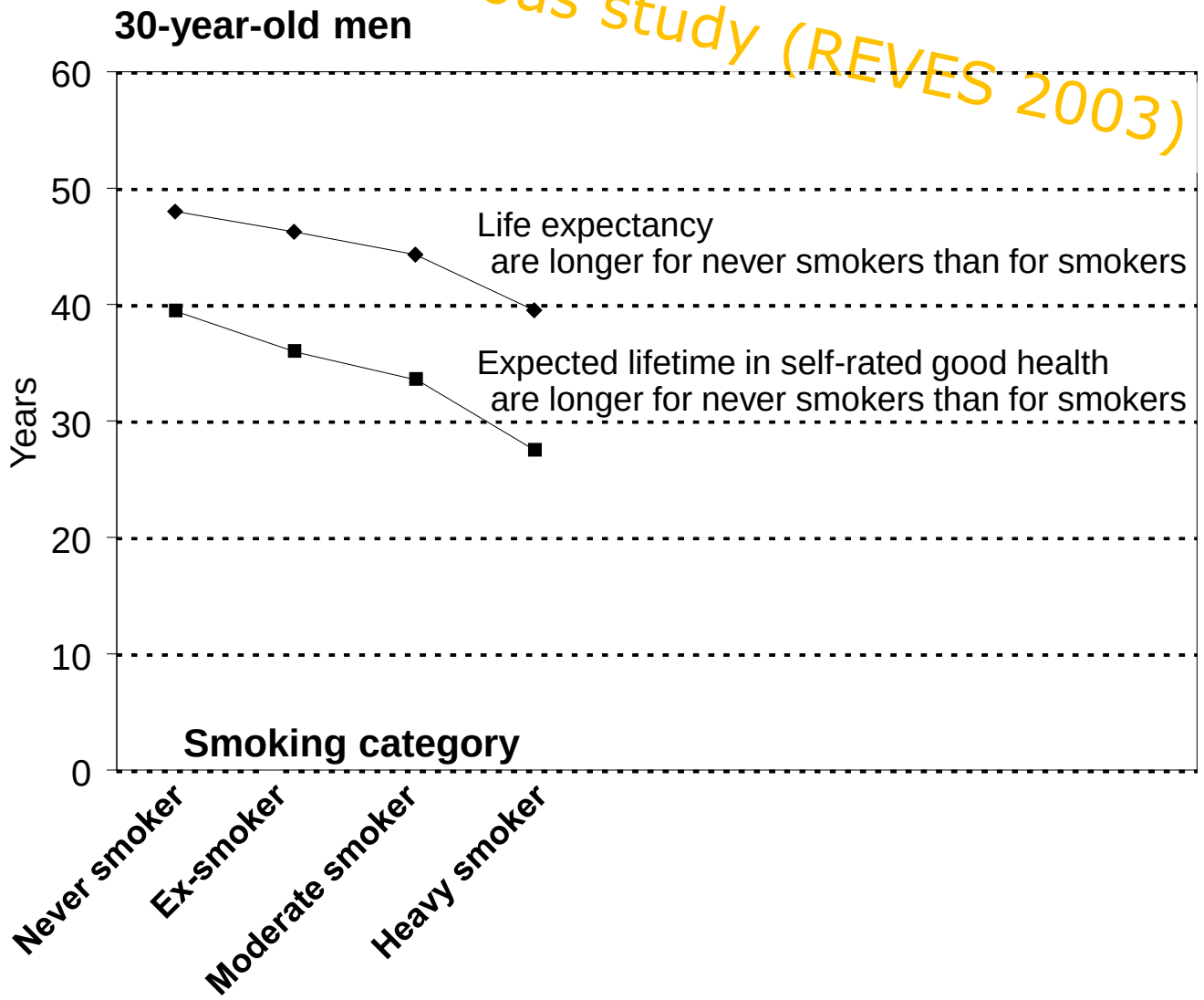
REVES 2014, Edinburgh

Henrik Brønnum-Hansen
Department of Public Health



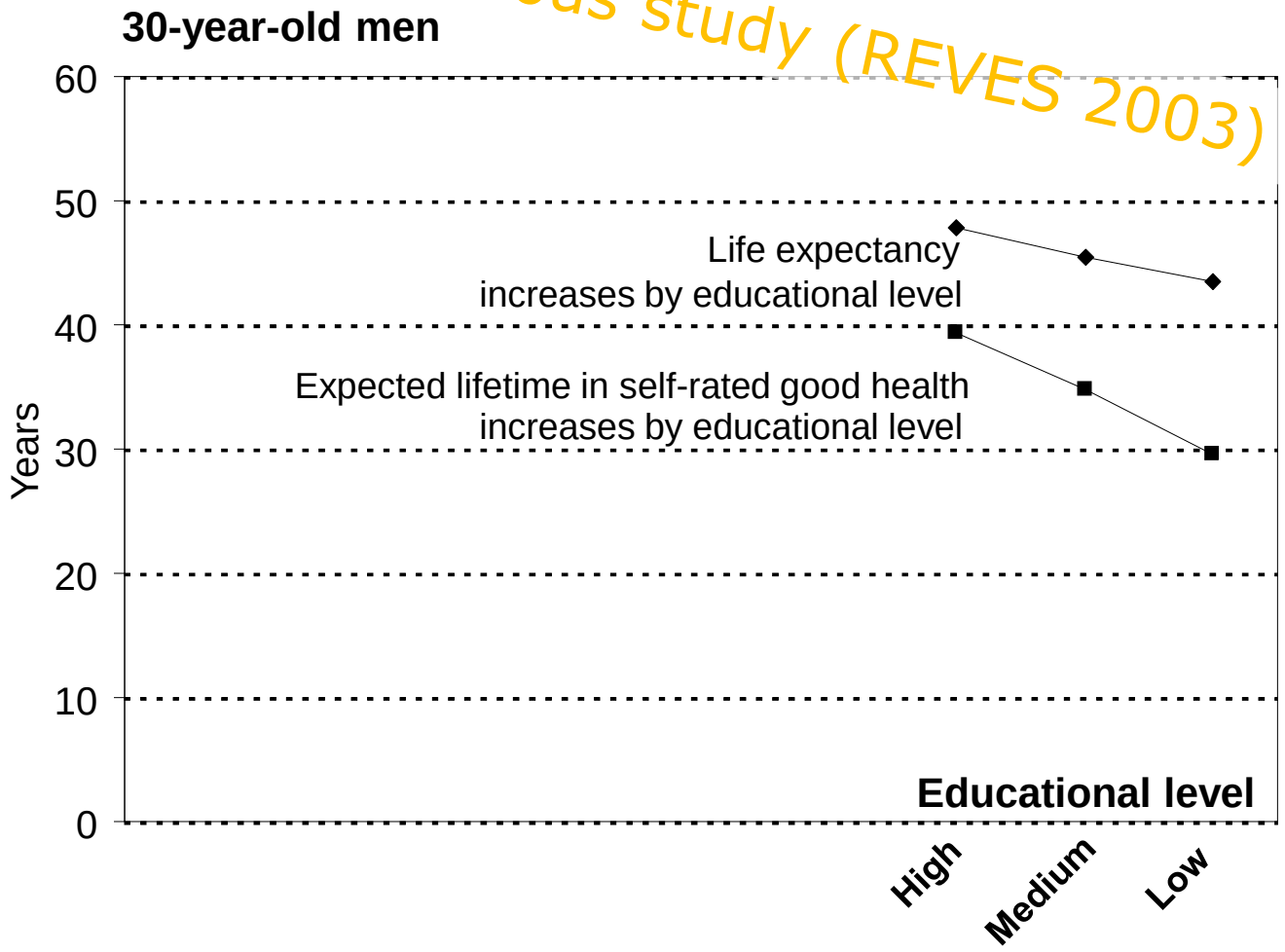
Life expectancy and expected lifetime in self-rated good health by smoking category

Previous study (REVES 2003) – revisited



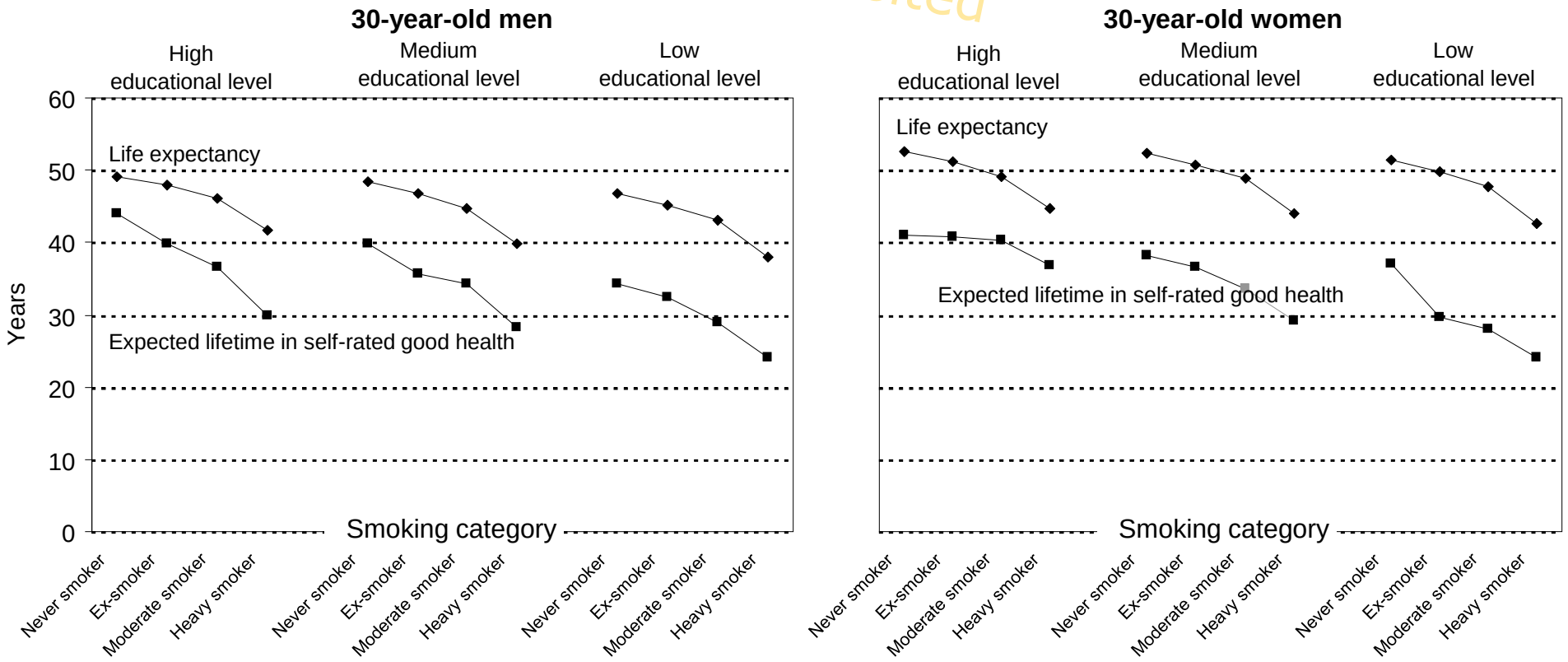
Life expectancy and expected lifetime in self-rated good health by educational level

Previous study (REVES 2003) – revisited



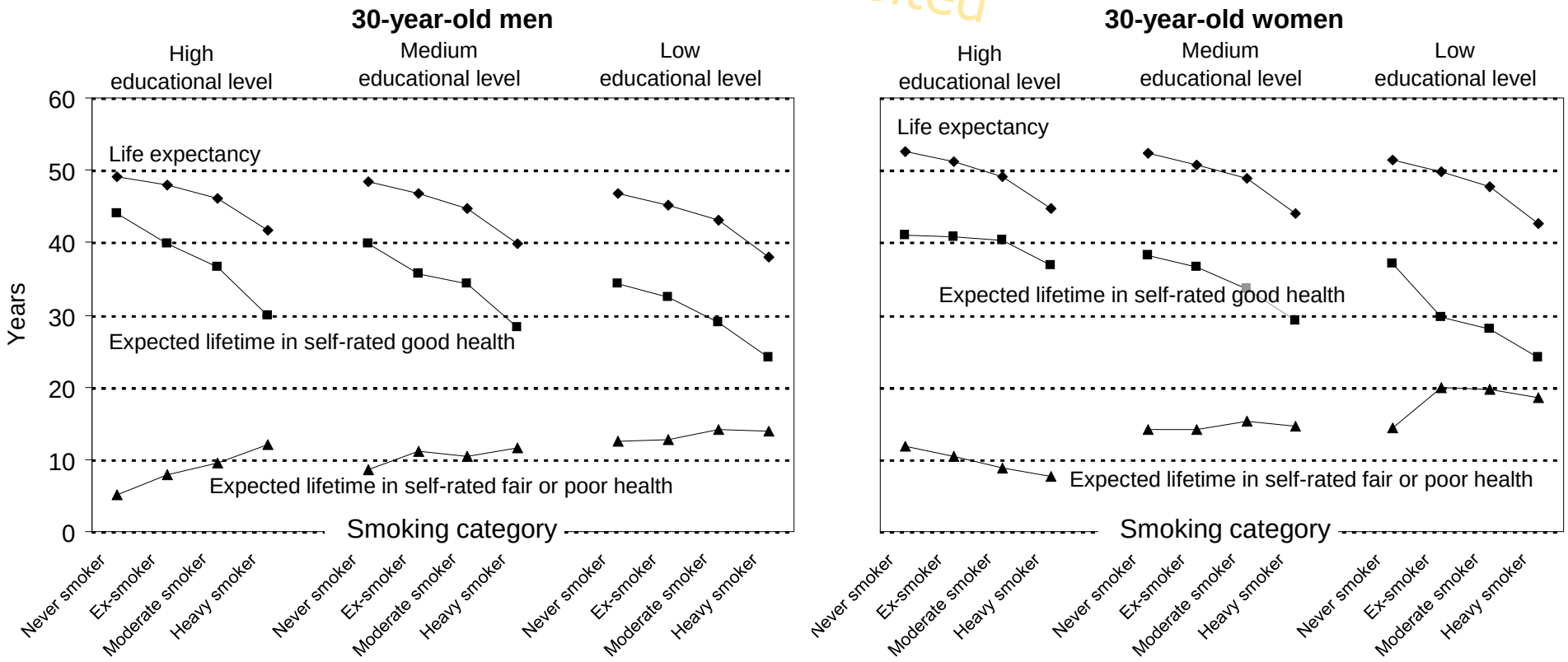
Life expectancy and expected lifetime in self-rated good health by educational level and smoking category

Revisited



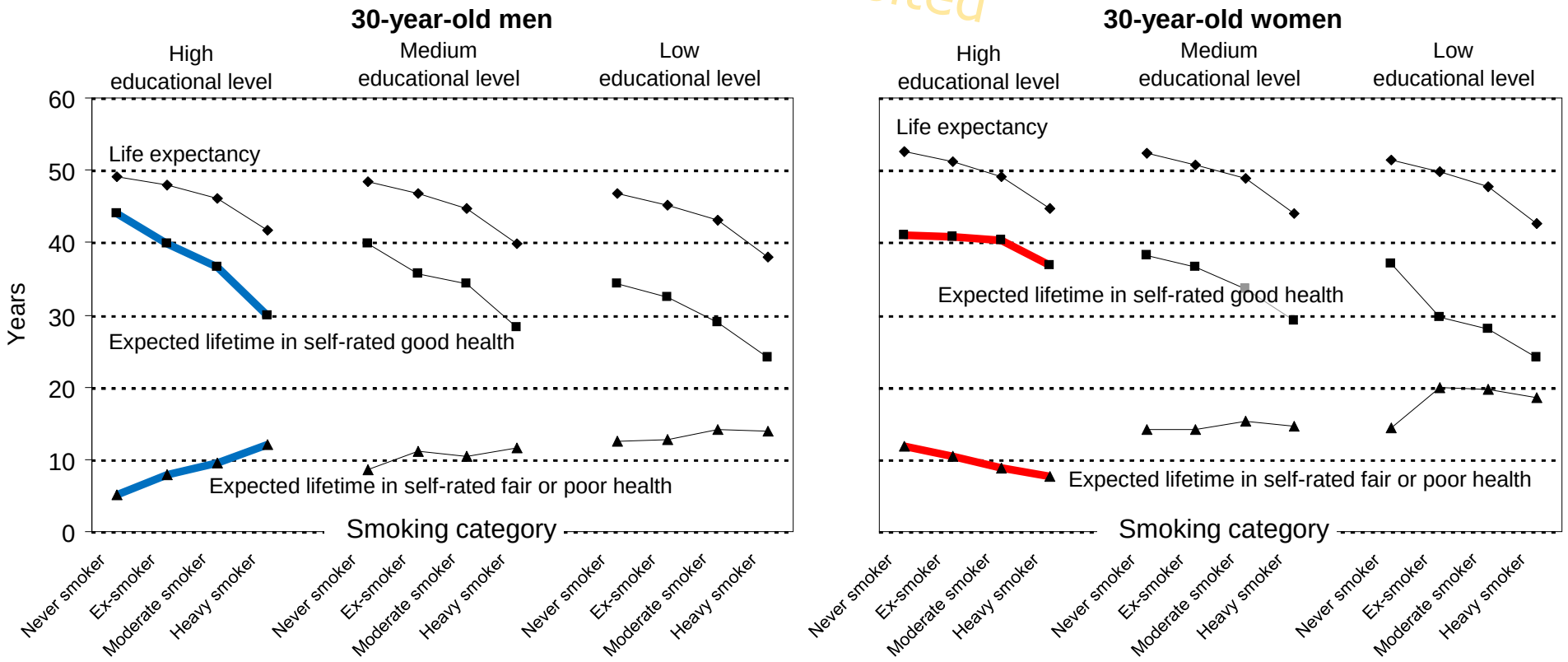
Life expectancy and expected lifetime in self-rated good health by educational level and smoking category

Revisited

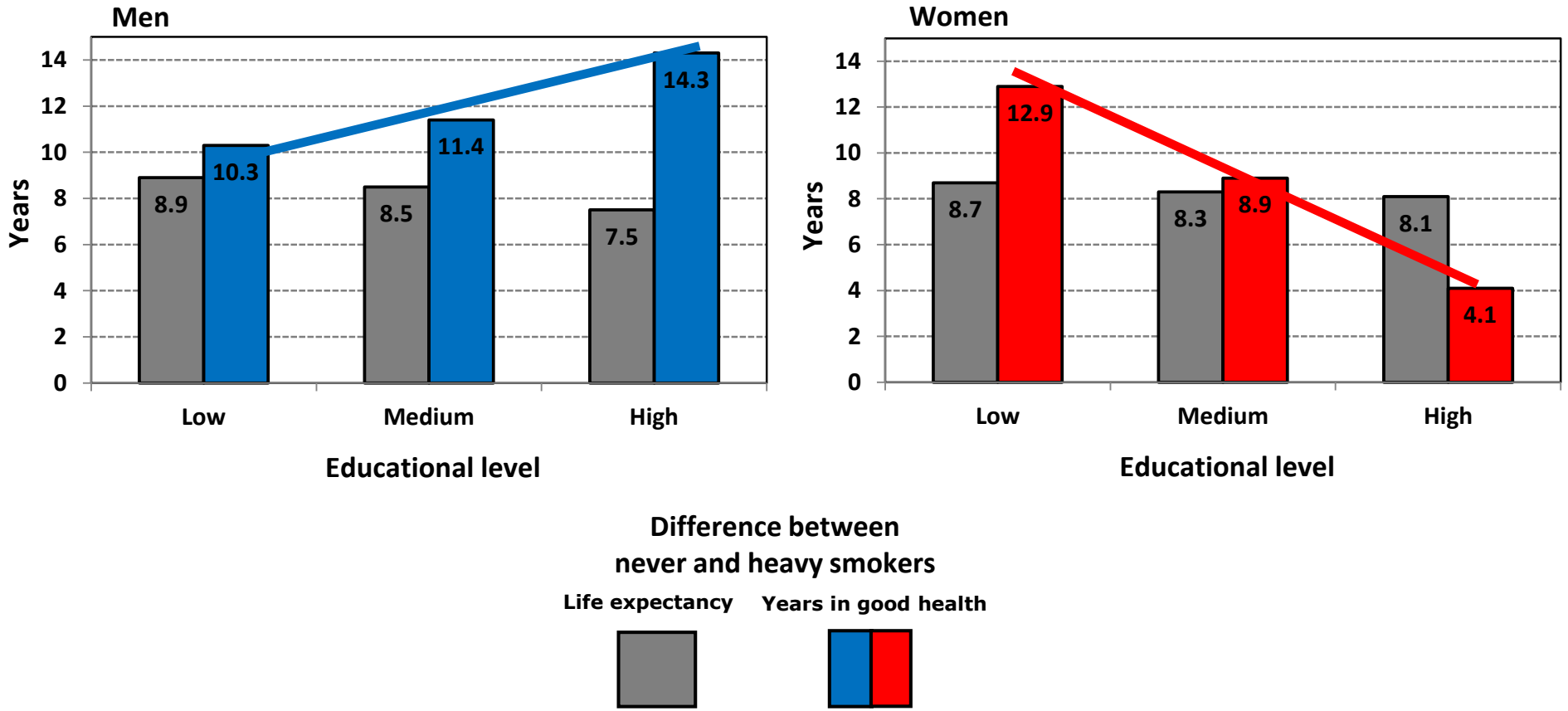


Life expectancy and expected lifetime in self-rated good health by educational level and smoking category

Revisited



Difference in life expectancy and expected lifetime in self-rated good health at age 30 between never smokers and heavy smokers by educational level



Purpose

To estimate the contributions of the mortality and the health effects on differences between never smokers and smokers in expected lifetime in self-rated good and less than good health

by educational level

How will gender difference turn up?

Data sources

Life tables and cause of deaths rates (nationwide register data)

Lung cancer death rates among never smokers (CPS II †)

Prevalence of smoking (Danish health interview surveys)

Prevalence of self-rated health (Danish health interview surveys)

Relative risks for death, smokers versus never smokers

(Register linkage to survey data)

† second prospective Cancer Preventive Study
of the American Cancer Society on smoking and mortality

Methods

Life tables by smoking category – Peto, Lopez et al.

Health expectancy – Sullivan

Decomposition – Nusselder and Looman

Construction of life tables by smoking category

Peto, Lopez et al. method

L ~ Danish lung cancer death rates
A ~ lung cancer death rates among never smokers, CPS-II
C ~ lung cancer death rates among smokers, CPS-II

L is sex-, age- and educational level-specific
A and C are sex- and age-specific†

$$\mathbf{L = CP + A\times(1 - P) \Leftrightarrow P = (L - A)/(C - A)}$$

P "synthetic smoking prevalence"
(sex-, age- and educational level-specific)

† Assumption: A and C do not differ between educational levels

Construction of life tables by smoking category

Peto, Lopez et al. method

The **etiological fraction** for smoking-related causes of death other than lung cancer:

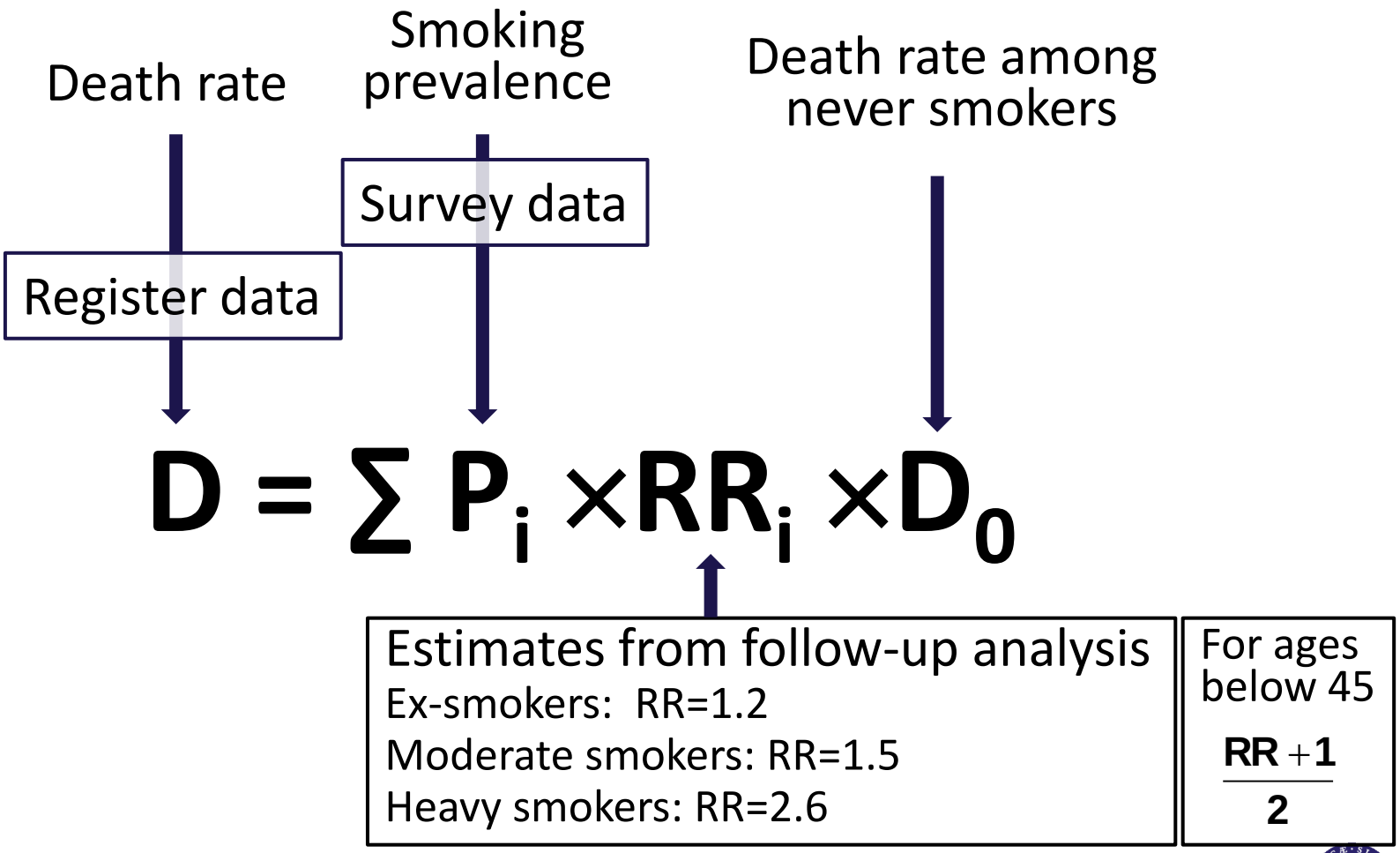
$$\frac{P(RR-1)}{2+P(RR-1)}$$

where RR is the relative risk (CPS-II).

conservative estimate

From this deaths caused and not caused by smoking were calculated by sex and educational level

Construction of life tables by smoking category



$D = \sum P_i \times RR_i \times D_0$

Exposure, level i: $D_i = P_i \times RR_i \times D_0$

Expected lifetime in self-rated good and less than good health by educational level and smoking category

Sullivans method

Well-known

Decomposition of difference between never smokers and smokers health expectancy into contributions from mortality and health and smoking category

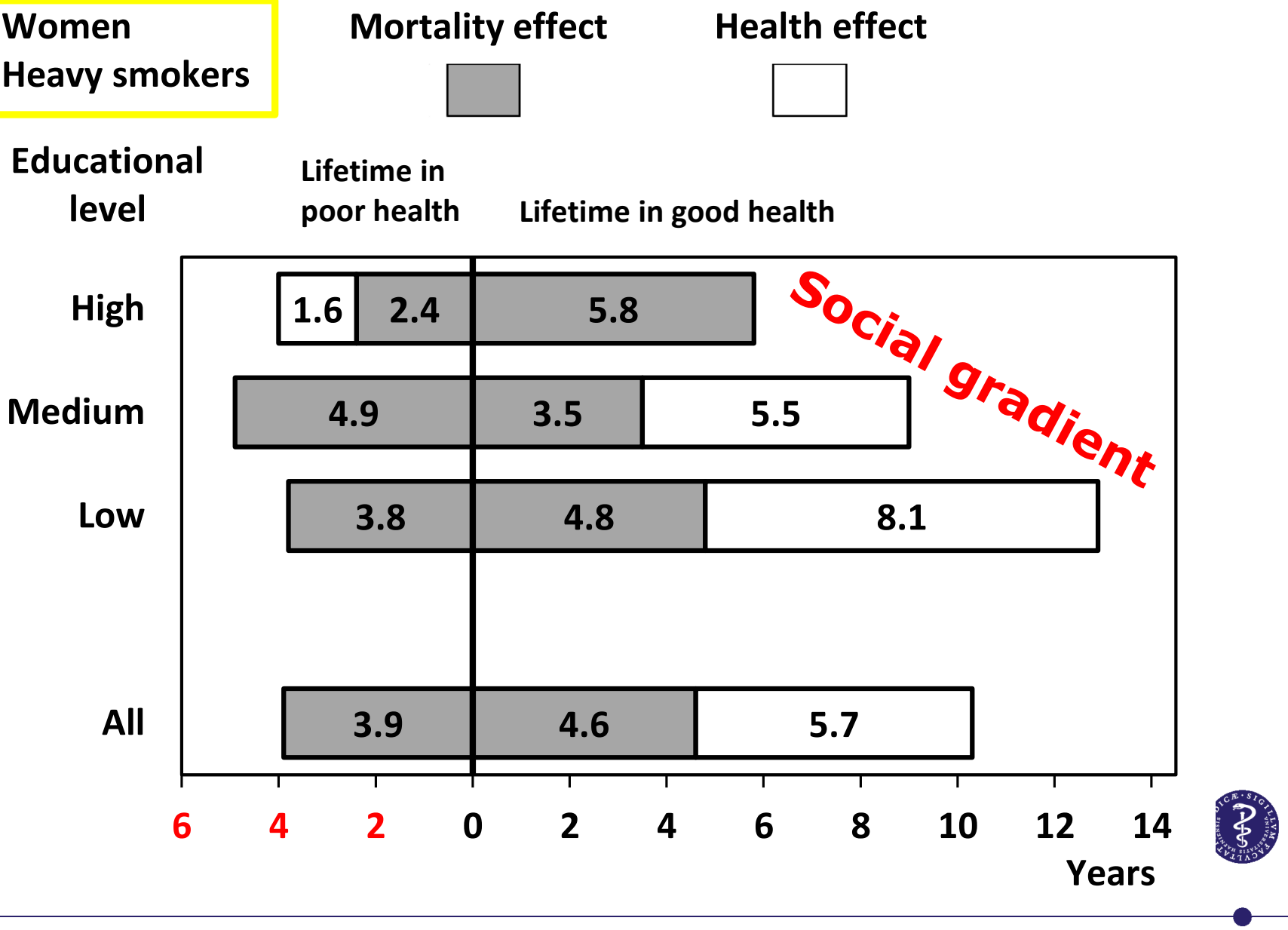
Method by Nusselder and Looman

Well-known…

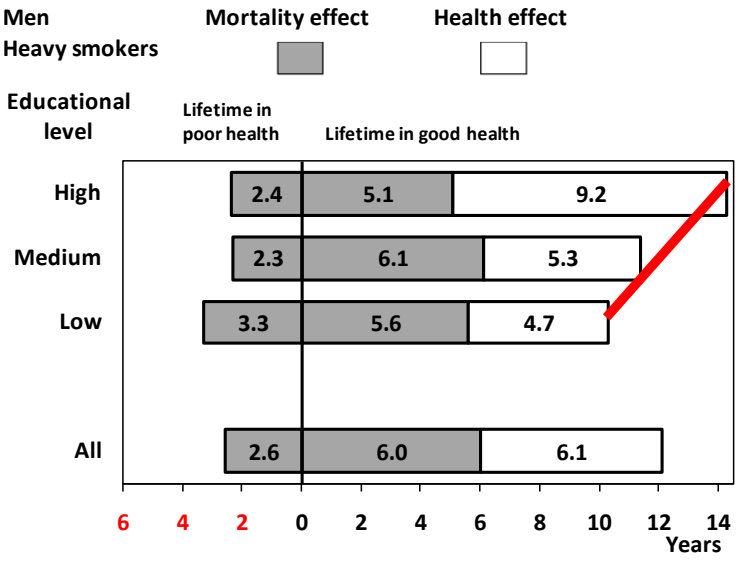
Results

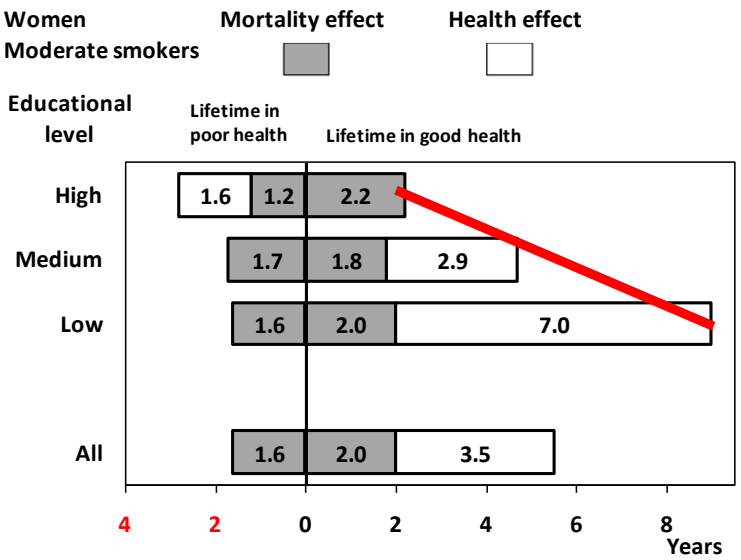
Difference between never smokers and smokers in expected lifetime in good and less than good health decomposed into the mortality and health effects

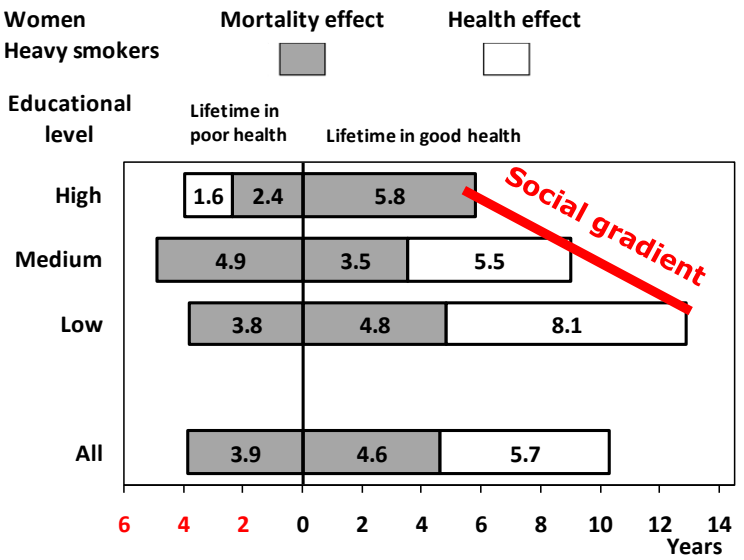
Women
Heavy smokers



Difference between never smokers and smokers in expected lifetime in good and less than good health decomposed into the mortality and health effects







Conclusions

- The mortality component decreased only modestly by educational level when smokers were compared with never smokers
- The social gradient originated from the health component indicated that smoking had an substantial effect among women with a low educational level

  unlike

- Among men the health component was greatest among those with a high educational level

Interpretation

- Clustering of risk factors and exposure to health determinants at work and residential environment varies between gender and socio-economic groups
- Male smokers with a high educational level might be more exposed to stress, divorce, high alcohol consumption and other unhealthy lifestyles than never smokers with a high educational level and this difference between never smokers and smokers might be more pronounced among high educated men than among men with lesser education
- Female smokers with a low educational level are under a heavy load and the difference between never smokers and smokers might be lesser among women with a higher educational level.

Thank you!

Sex and age specific **death rates were calculated exactly for each educational level**. But Statistics Denmark had no data about the educational level of people over 75. This lack was due to the systematic data collection procedure at Statistics Denmark and not a matter of non-response. **Death rates after age 75 was assumed to be the same for all educational groups** implying an underestimate of differences in life expectancy.

Lung cancer death rates among never smokers was to small to be estimated by educational level and we **assumed equal** rates between educational groups. If lung cancer death rates due to other risk factors than smoking differ between educational groups, the Peto et al. method might introduce a bias as to the estimated difference in smoking-attributable mortality between the groups.

Relative risks for other smoking-related causes of death than lung cancer were assumed to be the same among educational groups. However, **smoking-category-aggregated lung cancer death rates by educational level were calculated exactly**, which is why the 'synthetic smoking prevalence' may still reflect differences between educational groups as to smoking habits (quantity, duration, age at smoking onset, inhaling etc.)

Also **other smoking-related cause specific death rates were calculated exactly for each educational group** implying differences between educational groups as to the effect of smoking.