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The female-male "health–survival" paradox

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FEMALE – MALE SURVIVAL PARADOX

Gender difference in health:

Women have compared to men

lower mortality => mortality advantage

higher morbidity / disability => disability disadvantage

FEMALE – MALE SURVIVAL PARADOX

The focus of the presentation is on gender differences in

(life expectancy (LE))

healthy life years (HLY)

(unhealthy life years (ULY))

within the EU (26 EU Member States) in 2006

Determinants of gender differences in health

Mortality

- biological
- psycho-social
- lifestyle factors
    - smoking
    - exercise
    - weight

Morbidity

- biological
- psycho-social
- lifestyle factors
- methodological issues
    - selection bias
    - information bias

RESEARCH QUESTIONS

1.

Does the mortality advantage and/or disability disadvantage of women vary between countries with high versus low life expectancy?

RESEARCH QUESTIONS

2.

Is there a shift in the concentration of the mortality advantage and disability disadvantage towards older age groups (50 years and above) when indicators of population health (e.g. life expectancy, (ill-)healthy expectancy) are at a better level?

DATA

26 EU countries

Mortality:

- Number of deaths: 2006
- Population size 2006/2007

Morbidity:

- Statistics of Living and Income Survey (SILC- 2006)
  - Prevalence of people with longstanding limitations (GALI-instrument)

➔ EHEMU Database

DATA – SILC SURVEY

Global Activity Limitation Indicator (GALI):

For at least the last 6 months, have you been limited because of a health problem in activities people usually do?

Yes, very limited
Yes, limited
No

Healthy (HLY) and Unhealthy (ULY) Live Years at age 15 by gender

- **HLY and ULY estimation:** Sullivan method

- Gender differences in HLY (ULY)
  - part due to the gender inequality in mortality
  - part due to the gender inequality in the prevalence of activity limitations

(Nusselder WJ et al. Demography 2004;41315-34
R-macro developed within EHLEIS project (EU Public Health Program Grant Number 2006 109)

Methods: Decomposition of difference in LE, HLY and ULY by gender

Decomposition tool allow assessing if the difference in the health expectancy indicators by gender can be attributed to differences in age specific mortality or to differences in the age specific prevalence of activity limitations

Proportion of differences due to		LE	DFLE	DLE
Inequality in mortality	: Mortality effect	100%	x%	z%
Inequality in prevalence activity limitations	: Disability effect		y%	t%
		100%	100%	100%

Variance estimation of the decomposition indicators

Decomposition macro

Estimation of variance using Bootstrap methods (simulations N = 1000) in order to use the decomposition estimates in a meta-regression analysis

Bootstraps:

Number of deaths: Poisson distribution

Number of disabled: Binomial distribution

Random effect meta-regression analysis

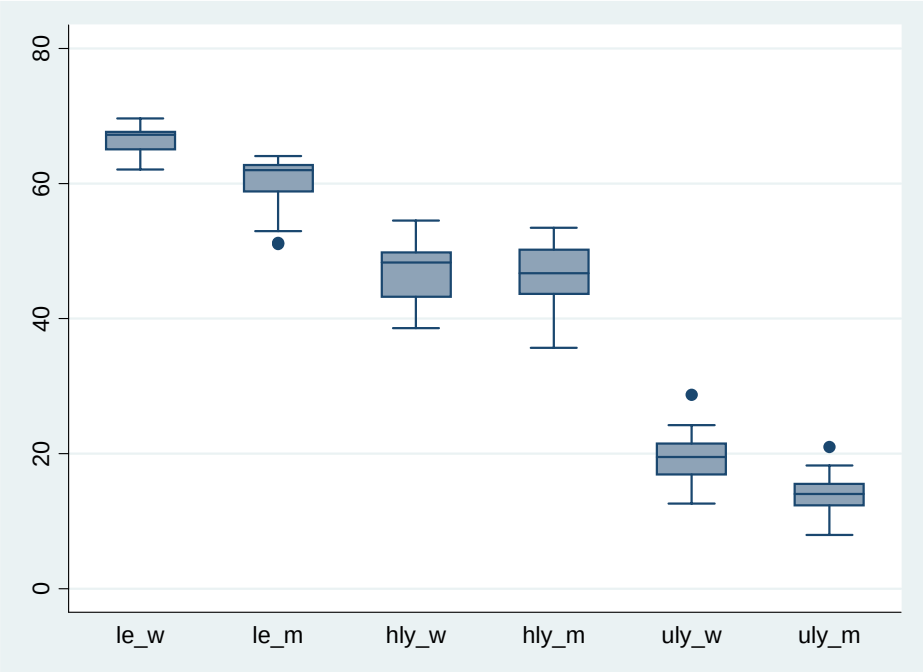
- Relation between
  - Women's mortality advantage or
  - Women's disability disadvantage

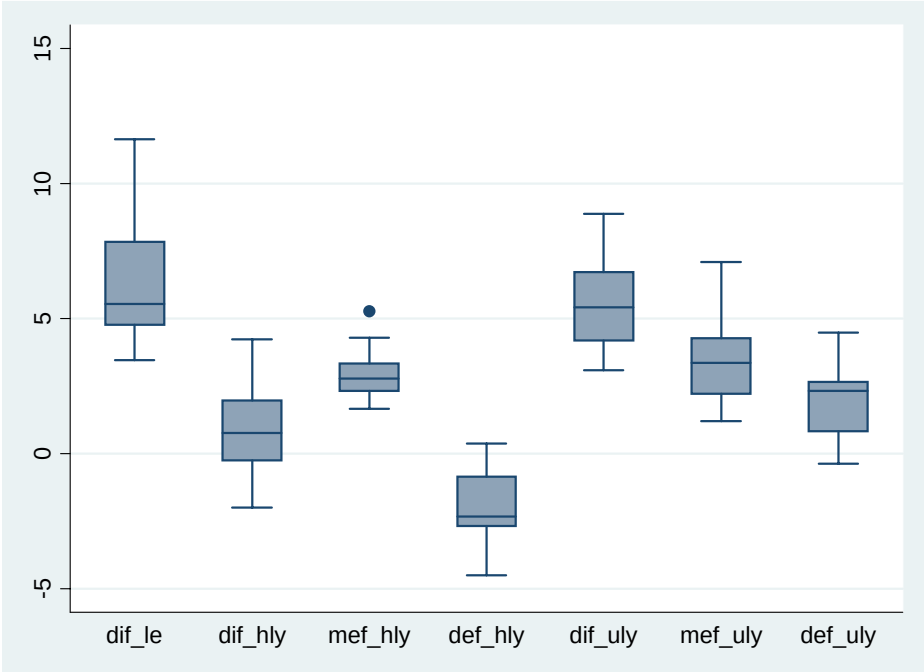
and

  - LE or HLY or ULY
  - Gender difference in LE or in HLY or in ULY

- Meta-regression analysis is similar to simple regression modelling but instead of having data on individuals, you are modelling data at a higher level- e.g. country or study and you account for country specific uncertainty.

Distribution (in years) of LE, HLY, ULY, the gender differences and the decomposition indicators by kind of effect (mortality and disability effect) at age 15 years, EU, 2006



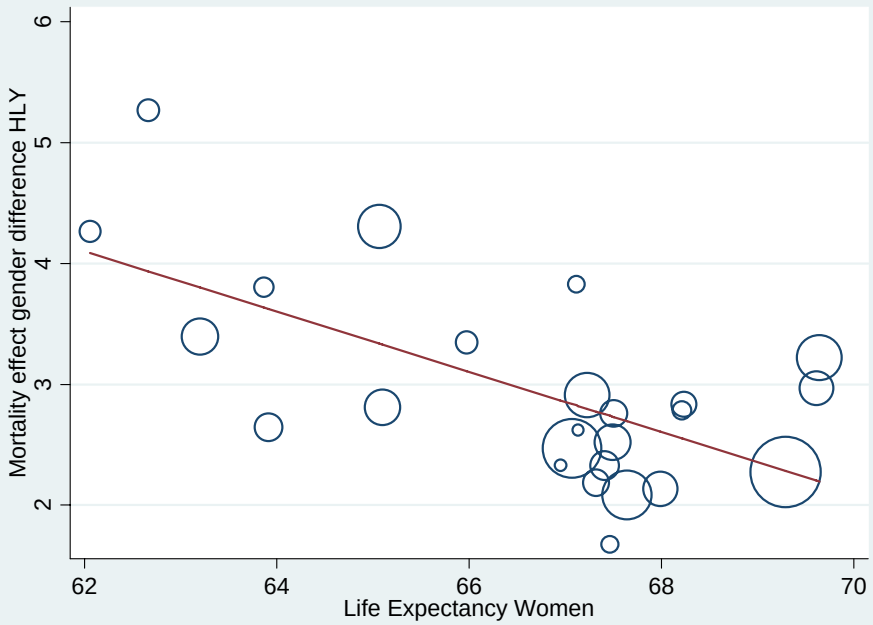


*: m = males, w = women
le_m, le_w: life expectancy men, women
hly_m, hly_w: healthy life years men, women
uly_m, uly_w: unhealthy life years men, women

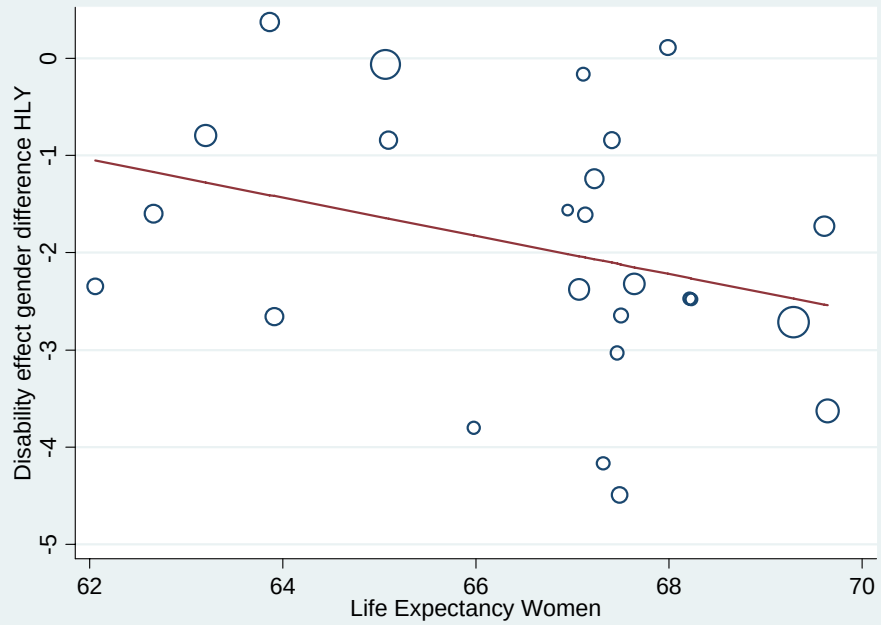
*: dif_le: gender difference (women minus men) in LE
dif_hly: gender difference in HLY
mef_hly: mortality effect gender difference in HLY
def_hly: disability effect gender difference in HLY
dif_uly: gender difference in ULY
mef_uly: mortality effect gender difference in ULY
def_uly: disability effect gender difference in ULY

Association between the LE in women and decomposition indicators by kind of effect of the gender differences in HLY at age 15 years

MORTALITY EFFECT

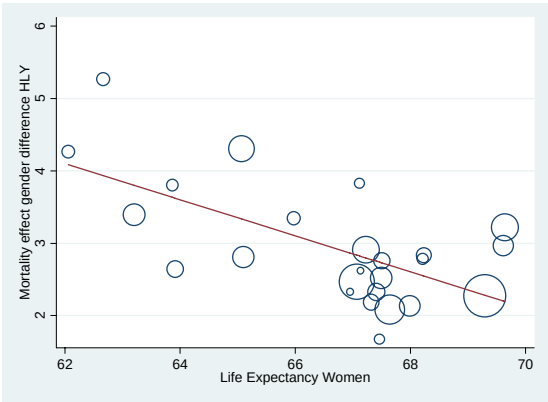


DISABILITY EFFECT

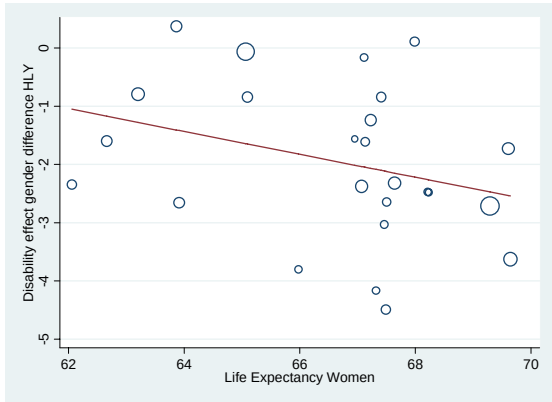


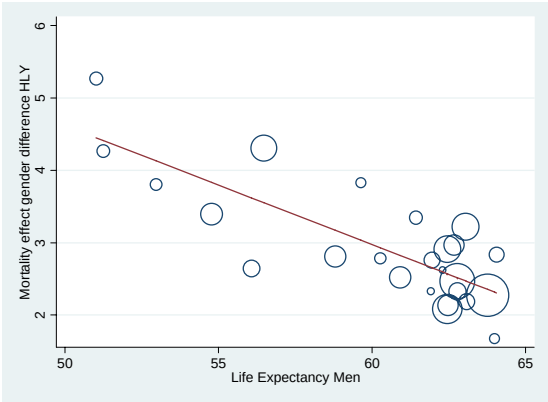
Association between the LE and decomposition indicators by kind of effect of the gender differences in HLY at age 15 years

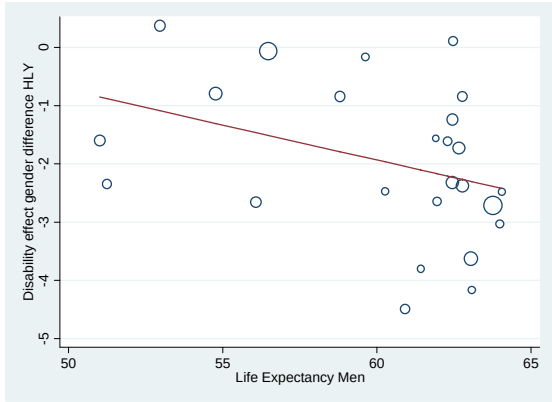
MORTALITY EFFECT

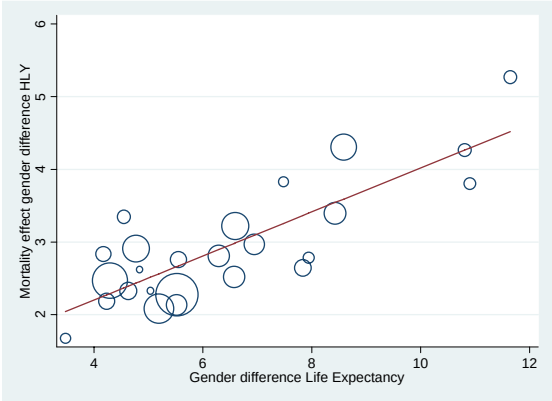


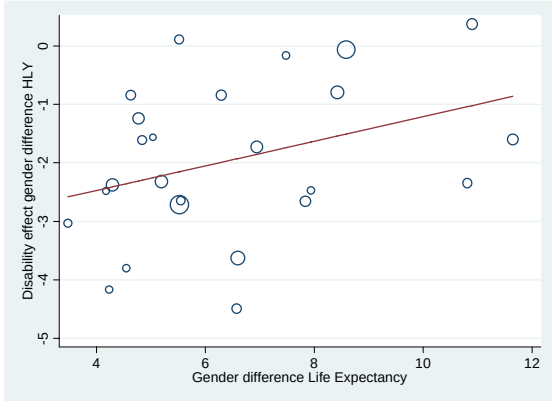
DISABILITY EFFECT



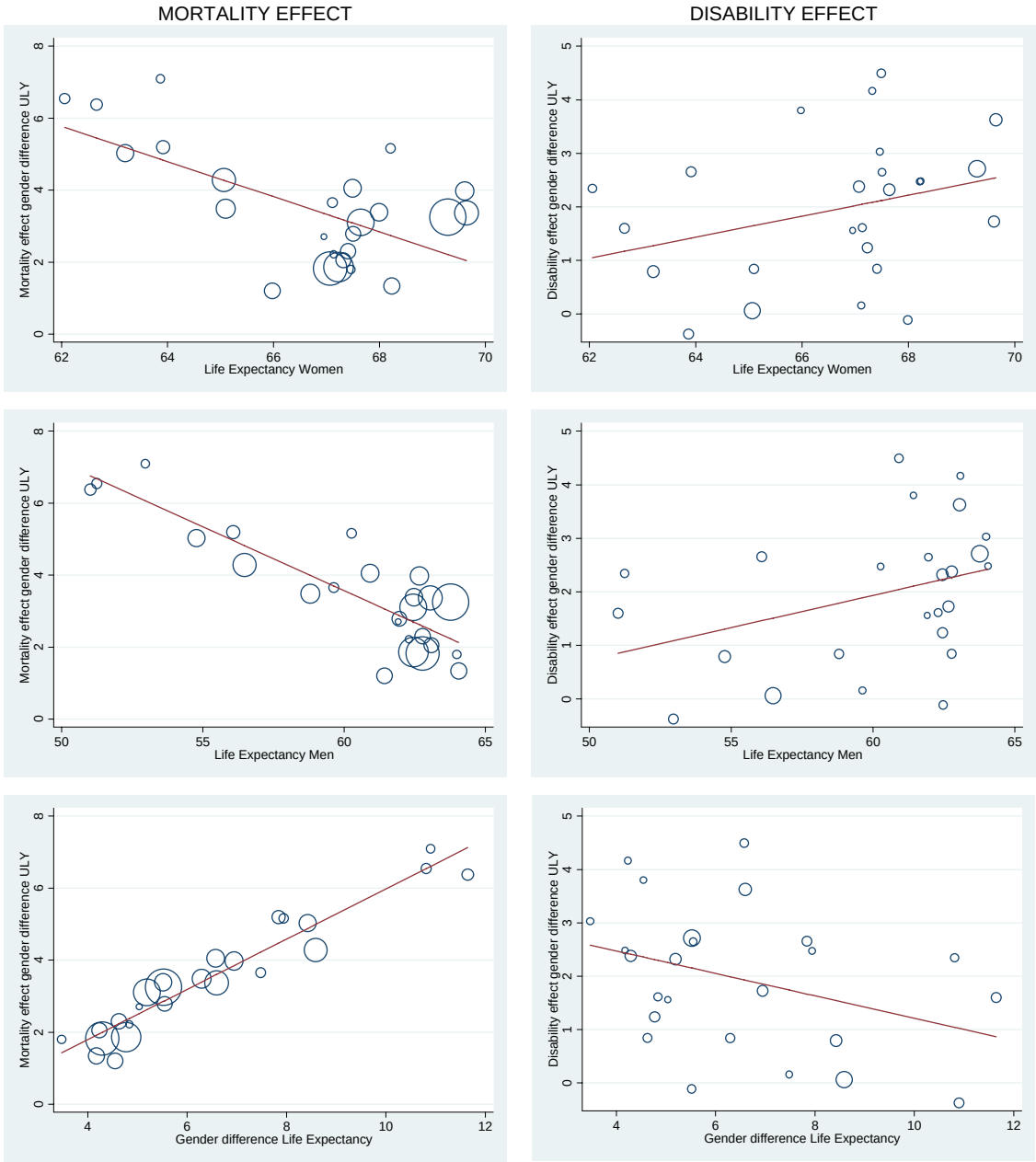








Association between the LE and decomposition indicators by kind of effect of the gender differences in ULY at age 15 years



Association of the mortality and disability effect on gender differences in HLY with the Life Expectancy (LE), HLY and ULY at age 15 years

	Mortality effect		Disability effect	
	Model 1	Model 2	Model 1	Model 2
Le Women	-0.25 **	-0.05	-0.20	-0.08
Le Men	-0.16 **		-0.12	
Gender difference LE	0.30 **	0.27 **	0.21	0.16
HLY Women	-0.06	-0.03	-0.03	0.03
HLY Men	-0.08 **		-0.10	
Gender difference HLY	0.33 **	0.31 **	0.65 **	0.67 **
ULY Women	0.01	-0.08	-0.01	0.19 *
ULY Men	-0.04		0.10	
Gender difference ULY	0.16	0.28 *	-0.35 **	-0.63 **

*: significant at p=0.05, **: significant at p=0.01

Model 1: Univariate meta-regression; Model 2: Multivariate meta-regression (includes both the value of women and the gender difference in same model)

Association of relative contribution of older age (50 yrs-plus) to the mortality and disability effect on gender differences in HLY with the Life Expectancy (LE), HLY and ULY at age 15 years

	Mortality effect		Disability effect	
	Model 1	Model 2	Model 1	Model 2
Le Women	2.96 **	0.99	-1.87	-4.20
Le Men	1.86 **		-0.38	
Gender difference LE	-3.30 **	-2.67 **	-0.44	-3.15
HLY Women	1.32 **	1.15 **	3.97	5.65
HLY Men	1.28 **		1.34	
Gender difference HLY	-2.58 **	-1.87 **	14.74	18.25
ULY Women	-1.04 **	-0.29	-6.39	-2.49
ULY Men	-0.78		-5.24	
Gender difference ULY	-2.82 **	-2.39	-16.11	-12.34
HLY Women		1.12		1.60
ULY Women		0.98		-2.74
Gender difference HLY	-3.19§ **	-2.36 **	12.28	14.66
Gender difference ULY	-3.42§ **	-2.57 **	-13.83	-6.12

***: significant at p=0.05, **: significant at p=0.01**

Model 1: Univariate meta-regression; Model 2 and §: Multivariate meta-regression (includes both the value of women and the gender difference in same model)

Limitations

- Cross-sectional design – Sullivan method
- Decomposition components do not represent the underlying processes of the incidence and recovery of activity limitations
- SILC-survey 2006
  - participation (95%-60%)
  - community dwelling
  - harmonisation of the instruments

Conclusion

Countries with high LE

- **gender difference in HLY is smaller because of**
  - **the additive effect of a reduced mortality effect and larger disability effect**

Countries with low LE, low HLY and a large ULY

- **Men have a higher mortality difference compared to women**
- **Men have a (high) disability prevalence, more similar to the prevalence of women**
- **Ill-health in these men starts relatively early in live (before age of 50 yrs)**

Conclusion

- **Heterogeneity of the indicators within the EU**
- **Associations of the decomposition components with the level of health within countries**

  $\Rightarrow$ **the health-survival paradox is dynamic phenominon**

Why this paradox - paradox heterogeneity

- Differential participation by gender in function of their health status
- Biological factors have different effect
- Social macro level factors
- Determinants of diseases contributing to
  - Mortality difference
  - Disability difference

The health-survival paradox is dependent on

modifiable

- societal,
- social and
- behavioural factors