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Research Article

Differences by union status in health and mortality at older ages: Results for 16 European countries

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Differences by union status in health and mortality at older ages: Results for 16 European countries

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Abstract

BACKGROUND
Married people live longer than the unmarried; micro-level research indicates that they enjoy better health. Macro-level research does not combine mortality, marital status, and health.

OBJECTIVE
We provide international comparisons of healthy and unhealthy life years at ages 50 and higher combining mortality, marital status, and health.

METHODS
We examine differences in healthy and unhealthy life years for married and cohabiting (i.e., partnered) and for single men and women and break these down into mortality and disability. EU-SILC and Eurostat data for 2011 are used for 16 European countries.

RESULTS AND CONCLUSIONS
Our analyses show that partnered people, both men and women, are healthier than singles. However, these differences in unhealthy life are varied. For the length of healthy life, the effect of disability dominates the effect of mortality for women strongly and for men weakly, while the effect of mortality is more important for the length of unhealthy life of women. Populations in Eastern Europe are more disadvantaged than those in Western Europe with respect to length of life and of healthy life; these differences are larger for singles and lower for the partnered.

CONTRIBUTION
We extend previous macro-level studies on healthy and unhealthy life at older ages by introducing the additional dimension of partner status. We provide rich information in

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terms of life expectancies for 16 countries in Europe, with special attention on Eastern European countries and specifically on singles in these countries.

1. Background and objectives

We have known for over 150 years that married people live longer than the unmarried. This inference was first made by the father of the contemporary life table, W. Farr (1858), and continues to be supported today by research. Van Poppel and Joung (2001) analyzed data for the Netherlands; Pechholdová and Šhamanová (2013) for the Czech Republic; Martikainen et al. (2005) for Finland; Abramowska-Kmon (2011) for Poland; Hu and Goldman (1990) suggest an international comparative analysis; and Valkonen, Martikainen, and Blomgren (2004) carried out a comparative analysis for European countries for the 1980s and the 1990s. These and other findings based on macro-level data – derived from vital statistics, population censuses, and registers – report different life expectancies and other macro-level indicators depending on marital status. They all conclude that for both genders the life expectancy of married people is longer than that of the unmarried.

During recent decades, new data and methods have piqued interest in the distribution of life expectancy by health status for men and women. Several topics dominate contemporary research. In addition to gender differences in healthy and unhealthy length of life (Nusselder et al. 2010; Van Oyen et al. 2013; Crimmins, Kim, and Solé-Auró 2010; Luy and Minagawa 2014), particular attention is attributed to the 'male-female survival paradox': the observation that women live longer but their life without disabilities is shorter (Oksuzyan et al. 2009). Another branch of research is directed towards country-level comparisons: Salomon et al. (2012) report findings on 187 countries; Majer et al. (2011), Jagger et al. (2008, 2011), and Minagawa (2013) consider diverse groups of European countries.

The use of micro-level survey data has yielded a significant advancement in explaining the effect of marital status on mortality including the effect of morbidity (Robards et al. 2012 and Lillard and Panis 1996 include a review of related research). The gains of living in a marriage, notably due to positive selection and protection effects, have been discussed. The marriage selection effect (Goldman 1993) is the reduced likelihood that less healthy individuals will marry. Marriage is also found to be protective insofar as partners can help each other economically, emotionally, and in diverse aspects of everyday life (Rendall et al. 2011). Lillard and Panis (1996) discuss adverse selection when unhealthy men tend to remarry in order to regain the protective support of marriage.

Macro-level data examine either the effect of marital status on mortality rates of men and women, or focus on inequalities in healthy life without considering marital status. However, they do not combine the three population characteristics: mortality, marital status, and health. The main objective of this paper is to contribute to filling this gap.

We consider two union states: partnered and single. Partnered people are either married or cohabiting. Marriage has been found to be advantageous to cohabitation because of institutional, economic, and social factors. Institutionally, marriage is supported by the legal system; economically, by the joint budget of the couple (this is not as frequently the case in cohabitation); and socially by the pressure from traditional social norms of non-acceptance of cohabitation, specifically among older couples. However, the rapid spread of cohabitation as a substitute to marriage during the past few decades has led to a decline in differences between cohabitation and marriage, which weakens the validity of these arguments. Musick and Bumpass (2012) for example do not find marriage advantageous to cohabitation with respect to well-being. Hence, combining the two states does not introduce significant heterogeneity.

Single people in this paper are defined as those who do not live with a partner: widowed, divorced, separated, and those who have never had a partner. This group is homogeneous insofar as its members do not exploit the advantages of living with a partner who can provide emotional, economic, and social support in everyday life and in urgent situations. For this group we expected that the inverse of the protective effect of marriage will occur; i.e., singles are expected to be of poorer health. In addition, each one of these groups is subject to its specific reasons for worse health relative to the partnered. For example the never-married might have a disability that prevents them from finding a partner; widowed people are likely to have led the lifestyle of their late partner (diet, exercising, smoking, use of preventive health care, similar housing and economic conditions, etc.) and are therefore more likely to suffer from the same disease that ended their partner's life; divorces can be due to disability in either of the partners (see Robards et al. (2012) for more details).

We examine people aged 50 and over, when mortality rates and morbidity start to increase rapidly with age, widowhood increases, and differences by union status rapidly increase. We use Eurostat 2011 population and mortality data specified by marital status, and 2011 EU-SILC data for 16 European countries.

In this paper we discuss the differences in healthy and unhealthy life expectancies depending on union status and gender, estimated for the age interval 50 to 79 years of age. The analytical approach takes an international perspective based on comparisons of people of the same gender but in different union states. The analyses are demographic, without exploring epidemiological dimensions.

The main objective leads to the following research questions:

(1) How does the healthy life span of partnered and single people differ, and is this the same for both genders?

The answer to this question will also include analysis of the magnitude of these differences measured across countries.

Measuring the length of healthy and unhealthy life years incorporates the joint effect of mortality and health. Nusselder and Looman (2004) discussed the decomposition when differences by gender are considered. We are interested in this decomposition specified by union status. Our second research question is:

(2) What are the decomposed effects of mortality and health on differences in length of healthy and unhealthy life specified by union status?

Research on differences into the effects of partnership on health and mortality usually relate to only one, or a few, countries. International comparisons are rare. In this paper we use data for 16 European countries. This helps decrease the possibility of country-specific idiosyncrasies that might potentially arise in single-country research, but also helps compare European populations with respect to the effects of partnerships on health. Indeed, European countries differ in many respects, new member states of the European Union versus old member states, different welfare regimes, etc. Our third research question is:

(3) How do the effects of partnership on health and mortality for men and women differ in different European countries?

2. Data and methods

Eurostat data for 2011 on population and deaths by marital status were used to derive marital status-specific single-year life tables (Belgium data for 2010). Populations and deaths were grouped in two states: married and unmarried, and four separate life tables specified by gender and marital status were estimated. Multistate life tables could not be estimated because no data on transitions between the two marital states were available. We assumed that the error due to missing data on transitions does not affect the results significantly. Mathers and Robine (1997) found that the Sullivan method which we apply gives prevalence rates that estimate the multistate rates well when populations do not experience any rapid change in mortality or morbidity; in our case we add the assumption of no rapid change in union status.

We use EU-SILC 2011 data for the measurement of disability. We apply the Global Activity Limitation Index (GALI) as an indicator for measuring ability limitations in Europe (Van Oyen et al. 2006). It uses a single question asking about the limitations in daily activities because of a health problem during the last six months before the survey, with answers 'severely limited', 'limited but not severely', and 'not limited'. We applied the dichotomous version of the variable, which has two options: 'limited' and 'not limited'. Two union-specific states were constructed: partnered people (including married and cohabiting) and single people who live without a partner (widowed, divorced, and never-married, excluding those who live with a partner). Prevalence rates for disabilities were derived using logistic regression separately for each union state and gender. The gender- and union-specific single-year disability rates were combined with the single-year marital-status life tables derived from the Eurostat data to estimate the person years at each age in the age interval 50 to 79, for each one of the eight states specified by union and disability (partnered women without disability, partnered women with disability; single women without disability, single women with disability; partnered men without disability, partnered men with disability; single men without disability, single men with disability). The combination of marital-status life tables with union-status prevalence rates introduces the assumption that non-marital and marital unions at age above 50 have much the same patterns of mortality and health. Actually the proportion of non-marital partnerships in the survey data is less than 5%, so our analysis refers by and large to marital unions.

The sum of person years estimated per individual between ages 50 and 79 we term as life years (LY). It equals the life expectancy at age 50 minus that at age 80. Each LY can be divided into two components: healthy life years (HLY) and unhealthy life years (ULY)[3] using the Sullivan method[4] (Sullivan 1971). The life tables were estimated up to age 79, the highest age in the EU-SILC data. Mäki et al. (2013) applied a similar approach with EU-SILC data for the age interval 30–79; Minagawa (2013) used the interval 20–74 years of age. The restriction to the exact age of 80 is needed for two reasons. First, macro-level data quality at very old age can differ across countries, especially where marital status is considered. Second, the EU-SILC data do not include the institutionalized population, whose proportion increases significantly above age 80. Moreover, the greater part of people institutionalized for care are single and of bad health (Herm, Poulain, and Anson 2014).

[3] The terms disability-free life expectancy (DLFE) and disabled life expectancy (DLE) are also used instead of HLY and ULY. We prefer these as they fit better when an age segment like ours is used. In accordance with the terms HLY and ULY we prefer the term LY.

[4] The application of the Sullivan method implies that LY=HLY+ULY; i.e., states of being healthy and unhealthy do not differ by mortality.

Both Eurostat and EU-SILC data were available for 16 countries: Belgium, Czech Republic, Denmark, Finland, Germany, Hungary, Italy, Latvia, Lithuania, the Netherlands, Norway, Romania, Slovakia, Slovenia, Sweden, and Switzerland.

3. Results

Table 1 presents estimates for LY, HLY, and ULY for partnered and single women and men. The last row displays averages across the 16 countries which do not depend on population or sample sizes. The table includes core data used in the construction of the ensuing tables and figures that are summarized by box plots in Figure 1.

3.1 Prevalent differences in HLY and ULY between the partnered and single

First consider the differences between men and women LY. LY to be lived in the age interval 50 to 79 confirm that women live longer than men: 27.0 versus 24.4 years on average (Table 1). Differences in the same direction are observed when union states are considered: Partnered women live longer that partnered men, and the same holds true for singles. This observation is consistent across all 16 countries. Partnership also has a significant effect on LY, both within and between genders: Partnered individuals live longer than singles. In some countries the differences are immense: In Romania partnered men live more than 8 years longer than do singles (7 years in Slovakia), while for women in the same countries this difference is about 2 years and is larger than in other countries.

Single women's LY are shorter than those for partnered women, yet on average they are longer than either partnered or single men's LY. However, this observation does not hold for all countries, the exceptions being the Nordic countries and the Netherlands.

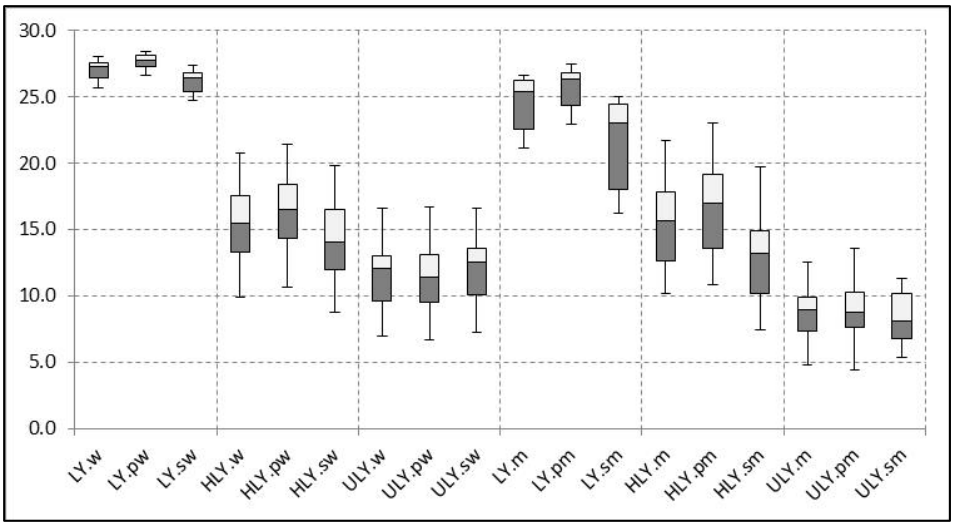
Dispersion of LY across countries is considerably larger for men compared to women and remarkably large for single men (Figure 1). The interquartile range (IQR) is 6.4 years for single men and only 1.4 years for single women.

Table 1: Life years, healthy and unhealthy life years for women and men by union status and disability, 16 European countries, ages 50–79

Women	LY	LY.p	LY.s	HLY	HLY.p	HLY.s	ULY	ULY.p	ULY.s
BE	27.3	27.8	26.4	17.2	18.1	15.3	10.1	9.7	11.0
CZ	26.8	27.4	26.0	17.1	17.8	16.3	9.7	9.6	9.7
DE	27.5	27.9	26.7	14.7	15.0	14.0	12.8	12.9	12.7
DK	26.9	27.6	25.9	18.7	19.5	17.1	8.2	8.0	8.7
FI	27.6	28.2	26.9	15.4	16.3	14.4	12.2	11.9	12.5
IT	28.0	28.2	27.3	15.6	16.4	14.0	12.4	11.8	13.4
HU	25.7	26.6	24.7	13.5	14.7	12.1	12.2	11.9	12.6
LT	26.2	26.9	25.3	15.5	16.8	14.1	10.7	10.2	11.2
LV	26.0	26.7	25.4	12.4	13.2	11.5	13.6	13.5	13.9
NL	27.3	27.7	26.5	15.4	16.7	13.1	11.9	11.0	13.4
NO	27.6	28.1	26.8	18.6	20.1	17.1	9.0	8.0	9.7
RO	26.0	27.0	24.7	11.6	12.5	10.4	14.4	14.5	14.3
SL	26.5	27.3	25.4	9.9	10.6	8.7	16.6	16.7	16.6
SI	27.5	27.9	26.8	12.4	13.2	11.6	15.0	14.7	15.1
SE	27.7	28.1	27.1	20.7	21.4	19.8	6.9	6.7	7.3
CH	28.0	28.4	27.3	18.5	19.1	17.1	9.5	9.2	10.3
Average	27.0	27.6	26.2	15.5	16.3	14.2	11.6	11.3	12.0
Men	LY	LY.p	LY.s	HLY	HLY.p	HLY.s	ULY	ULY.p	ULY.s
BE	25.4	26.2	23.3	17.4	18.5	14.4	8.0	7.8	8.9
CZ	23.9	25.1	21.0	16.3	17.2	14.1	7.6	7.9	6.9
DE	25.6	26.4	23.6	13.8	14.4	12.3	11.8	12.0	11.3
DK	25.4	26.6	23.0	18.9	20.5	16.4	6.5	6.1	6.6
FI	25.3	26.7	23.0	15.0	16.8	12.4	10.3	9.9	10.6
IT	26.4	26.7	24.6	16.7	17.2	14.3	9.7	9.6	10.3
HU	21.6	23.3	18.0	12.6	13.6	10.4	9.0	9.7	7.7
LT	21.1	22.9	16.6	13.6	15.3	9.6	7.4	7.7	7.0
LV	21.1	22.9	17.9	11.7	12.7	9.3	9.5	10.1	8.6
NL	26.2	26.8	24.4	17.4	18.9	14.3	8.8	7.9	10.1
NO	26.3	27.2	24.4	20.5	22.3	17.6	5.8	4.9	6.8
RO	22.3	24.2	16.2	12.6	13.4	9.5	9.6	10.8	6.7
SL	22.7	24.4	17.3	10.1	10.8	7.4	12.5	13.6	9.9
SI	24.9	25.7	22.8	12.6	12.7	12.2	12.3	13.0	10.6
SE	26.5	27.4	25.0	21.7	23.0	19.7	4.8	4.4	5.3
CH	26.6	27.2	24.9	19.4	19.8	18.5	7.2	7.4	6.4
Average	24.4	25.6	21.6	15.6	16.7	13.3	8.8	8.9	8.4

Abbreviations: LY=life years; HLY= healthy life years; ULY= unhealthy life years; p=partnered; s=single; BE=Belgium; CH=Switzerland; CZ=The Czech Republic; DE=Germany; DK=Denmark; FI=Finland; HU=Hungary; IT=Italy; LT=Lithuania; LV=Latvia; NL=The Netherlands; NO=Norway; RO=Romania; SE=Sweden; SI=Slovenia; SL=Slovakia. The fundamental equality LY=HLY+ULY holds up to rounding errors.

Figure 1: Box plots for life years in Table 1*



*The lower side of a box plot represents the first quartile and the upper side the third quartile. The boundary between the two grey colors is the median. The 'whiskers' denote maximum and minimum. Abbreviations: LY=life years; HLY= healthy life years; ULY= unhealthy life years; m=men; w=women; p=partnered; s=single.
Source: Table 1.

The effects of union status on HLY and ULY are clear. Healthy life is longer for partnered women and men compared to singles of the same gender. For women the difference is 2.1 years and for men it is 3.4 years (Table 2). Data in Table 1 show that differences in the same direction are observed for all 16 countries. However, differences in ULY are not consistent across countries. Table 2 indicates that while for men ULY are longer for the partnered by 0.5 years, for women they are longer for the singles by 0.7 years. Country-specific differences can be either positive or negative, i.e., there is no persistent pattern across countries. Dispersion across countries is large for women's and for men's HLY but it is smaller for men's ULY (Figure 1). Countries do not differ much with respect to HLY but they differ significantly with respect to ULY.

Another way to compare discrepancies between partnered and single people's HLY and ULY is to compare their proportions to the total number of LY (Table 2). As mortality does not differ by health status, HLY/LY+ULY/LY add up to 100% for the same group of individuals. Partnered men will spend the highest proportion of their life free of disabilities: 65%. Second best are single men, with 61%. Single women are expected to spend only 54% of their lives in the age interval 50–79 free of disabilities.

Dispersion of the proportions across countries is similar to that observed with the differences; we return to this topic in Section 3.3.

Table 2: Differences in healthy and unhealthy life between partnered and single men and women; averages across 16 European countries, ages 50–79

Differences:	Men	Women
HLY: partnered minus single	3.4	2.1
ULY: partnered minus single	0.5	–0.7
LY: partnered minus single	4.0	1.4
Proportions (in %):		
HLY: partnered to LY	65	59
ULY: partnered to LY	35	41
HLY: single to LY	61	54
ULY: single to LY	39	64

Abbreviations: LY=life years; HLY= healthy life years; ULY= unhealthy life years;
Source: Table 1.

A final issue for discussion in this section is the effect of one unit increase in LY on the HLY and ULY. The data in the lower part of Table 2 can be received also with a univariate regression with no intercept. They indicate that one unit increase in the LY of partnered women causes an increase with 0.6 units in HLY and 0.4 in ULY: HLY increases more quickly than ULY. Single women show a similar pattern, although the increase is not as fast. For men, the increase in HLY per unit increase in their LY is considerably faster: higher than 0.6. This is due to their lower level of LY whose increase gives more room for increase in HLY. A more detailed study of this interesting result – probably based on a non-linear model specification instead of the simple univariate regression – is needed.

Similar patterns for increases in LY and corresponding increases in HLY and ULY are consistent across countries.

3.2 Decomposition of effects of mortality and health

Both HLY and ULY are a composite of two components. The first is mortality: lower mortality infers longer life and hence HLY and ULY could be longer. The second component is defined by the prevalence of disability: The lower it is, the longer HLY

will be. Conversely, when disabilities are higher ULY will be higher. The two components do not necessarily change in the same direction, or at the same pace. Hence their contribution to LY as well as to HLY and ULY can differ for different populations under different circumstances. In order to identify the contribution to each one it is necessary to separate their effects.

We applied the decomposition technique proposed by Nusselder and Looman (2004), which helps us to separate the effects of mortality and disability on differences in HLY and ULY. The results are displayed in Table 3 in two panels, for women and for men. On average, partnered women (Panel A) outlive singles by 1.4 years, as shown in the column headed LY, and this is due only to mortality effects, because disability is not considered in the estimation of the differences in LY. This difference divides into HLY = 2.2 and ULY = –0.7 years (summation subject to rounding error). Further, the partnered women's advantage of 2.2 years in HLY, relative to singles, decomposes into 0.7 years of advantage due to lower mortality and 1.5 due to longer life without disability, while the disadvantage of –0.7 years in ULY decomposes into advantages with 0.7 years due to lower mortality and –1.5 years lost due to higher levels of disability. The disability effect of HLY is equal in absolute value to that of ULY and both have different signs: a result of the application of the Sullivan method. The equal values in the two mortality effects (0.7 each) are coincidental.

Partnered women have more HLY than single women, and this difference is due mainly to a longer life without disabilities rather than to lower mortality. They have fewer ULY because of a stronger disability effect which overwhelms the effect of lower mortality. For men, decomposed effects indicate that the mortality effect is larger than that of disabilities for both HLY and ULY. These inferences refer to averages across the 16 countries.

The decomposed effects differ significantly across countries. Figure 2 visualizes this country diversity using regression lines for each of the states defined by gender, union status, and health. The upper left graph shows that differences as a result of union status in HLY for women strongly correlate with the disability effects (R^2=0.90), while the correlation with the mortality effects is weak. A unit increase in the difference in HLY increases the disability effect by 0.89 units and the mortality effect by only 0.11 units.

An improvement in mortality of women will therefore not increase the healthy life of partnered women much, relative to single women. For men, however, it would have a significant contribution, as the mortality effect is higher than the disability effect in both HLY and ULY. Progress towards lower mortality of single men can be particularly advantageous for the length of their healthy life.

An improvement in health puts single women in an unfavorable position relative to the partnered; they will increasingly lag behind partnered women in their HLY and are

quicker to gain more ULY. About the same inference holds for men where the association between difference in HLY or ULY and the disability effect is weaker.

Table 3: Decomposition in mortality and disability effects of the differences in LY, HLY and ULY between partnered and single women and men, ages 50–79

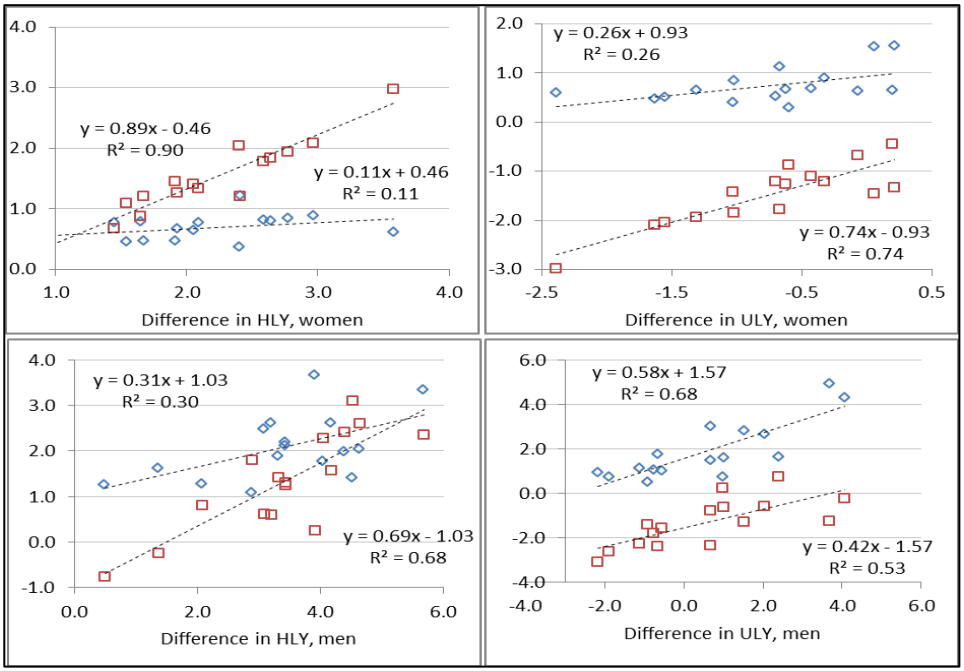
Panel A: partnered women – single women								
Differences in:	LY	Mortality effect in LY	HLY	Mortality effect in HLY	Disability effect in HLY	ULY	Mortality effect in ULY	Disability effect in ΔULY
BE	1.5	1.5	2.8	0.8	1.9	–1.3	0.6	-1.9
CZ	1.4	1.4	1.4	0.8	0.7	–0.1	0.6	-0.7
DE	1.2	1.2	1.0	0.5	0.4	0.2	0.6	-0.4
DK	1.7	1.7	2.4	1.2	1.2	–0.7	0.5	–1.2
FI	1.3	1.3	1.9	0.7	1.3	–0.6	0.6	–1.3
IT	0.8	0.8	2.4	0.4	2.0	–1.6	0.5	–2.0
HU	1.9	1.9	2.6	0.8	1.8	–0.7	1.1	–1.8
LT	1.6	1.6	2.6	0.8	1.8	–1.0	0.8	–1.8
LV	1.3	1.3	1.7	0.5	1.2	–0.3	0.9	–1.2
NL	1.2	1.2	3.6	0.6	3.0	–2.4	0.6	–3.0
NO	1.3	1.3	3.0	0.9	2.1	–1.6	0.5	–2.1
RO	2.3	2.3	2.1	0.8	1.3	0.2	1.5	–1.3
SL	2.0	2.0	1.9	0.5	1.5	0.1	1.5	–1.5
SI	1.1	1.1	1.5	0.4	1.1	–0.4	0.7	–1.1
SE	1.1	1.1	1.7	0.8	0.9	–0.6	0.3	–0.9
CH	1.0	1.0	2.1	0.6	1.4	–1.0	0.4	–1.4
Average	1.4	1.4	2.2	0.7	1.5	–0.7	0.7	–1.5

Table 3: (Continued)

Panel B: partnered men – single men								
Differences in:	LY	Mortality effect in LY	HLY	Mortality effect in HLY	Disability effect in HLY	ULY	Mortality effect in ULY	Disability effect in ULY
BE	2.9	2.9	4.0	1.8	2.3	–1.1	1.2	–2.3
CZ	4.1	4.1	3.1	2.5	0.6	1.0	1.6	–0.6
DE	2.8	2.8	2.1	1.3	0.8	0.7	1.5	–0.8
DK	3.6	3.6	4.2	2.6	1.6	–0.6	1.0	–1.6
FI	3.7	3.7	4.4	2.0	2.4	–0.6	1.8	–2.4
IT	2.1	2.1	2.9	1.1	1.8	–0.8	1.0	–1.8
HU	5.3	5.3	3.2	2.6	0.6	2.0	2.6	–0.6
LT	6.4	6.4	5.7	3.3	2.3	0.7	3.0	–2.3
LV	5.0	5.0	3.4	2.1	1.3	1.5	2.8	–1.3
NL	2.4	2.4	4.5	1.4	3.1	–2.2	0.9	–3.1
NO	2.8	2.8	4.6	2.0	2.6	–1.9	0.7	–2.6
RO	8.0	8.0	3.9	3.7	0.2	4.1	4.3	–0.2
SL	7.1	7.1	3.4	2.2	1.2	3.7	4.9	–1.2
SI	2.9	2.9	0.5	1.3	–0.8	2.4	1.6	0.8
SE	2.4	2.4	3.3	1.9	1.4	–0.9	0.5	–1.4
CH	2.3	2.3	1.4	1.6	–0.3	1.0	0.7	0.3
Average	4.0	4.0	3.4	2.1	1.3	0.6	1.9	–1.3

Abbreviations: LY=life years; HLY= healthy life years; ULY= unhealthy life years; BE=Belgium; CH=Switzerland; CZ=The Czech Republic; DE=Germany; DK=Denmark; FI=Finland; HU=Hungary; IT=Italy; LT=Lithuania; LV=Latvia; NL=The Netherlands; NO=Norway; RO=Romania; SE=Sweden; SI=Slovenia; SL=Slovakia

Figure 2: Decomposition in disability and mortality effects of the differences in HLY and ULY by union status for women and men. Disability effects are marked with red squares, mortality effects with blue rhombs

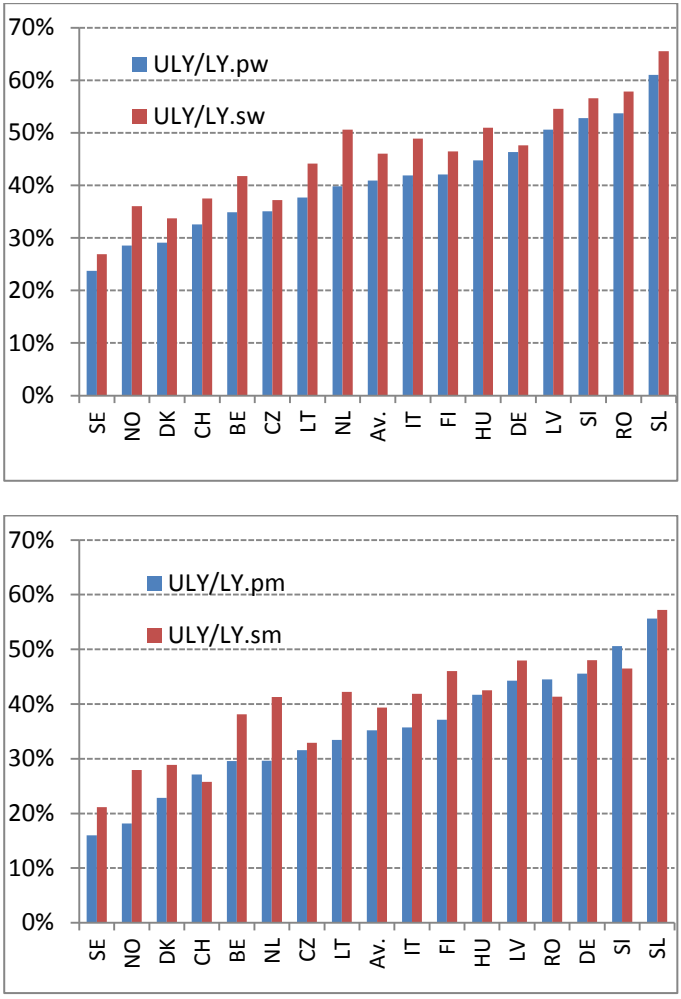


Abbreviations: HLY= healthy life years; ULY= unhealthy life years

3.3 Differences by countries

Figure 3 displays proportions of ULY to LY in percent. Because mortality does not differ by health status the complement of ULY/LY to 100 for the same group of individuals in the same country equals HLY/LY; thus inferences based on ULY/LY are inversely valid for HLY/LY. For this reason the latter are not displayed in the figure.

Figure 3: Proportion of life with disabilities to life years in the same union status for partnered and single women (upper panel) and partnered and single men (lower panel), in %



Abbreviations: LY=life years; ULY= unhealthy life years; m=men; w=women; p=partnered; s=single; Av.=Average; BE=Belgium; CH=Switzerland; CZ=The Czech Republic; DE=Germany; DK=Denmark; FI=Finland; HU=Hungary; IT=Italy; LT=Lithuania; LV=Latvia; NL=The Netherlands; NO=Norway; RO=Romania; SE=Sweden; SI=Slovenia; SL=Slovakia.
Source: Table 1.

In all countries, the proportion of LY that women will spend with disabilities is lower for those living in a union as compared to singles. Proportions differ significantly among countries, ranging from below 30% to above 60%. The lowest proportions are observed in the Nordic countries and highest among Eastern European countries. Differences between the partnered and single in the proportions of ULY/LY are large in the Netherlands (over 10%), in Norway (over 7%), and these are closely followed by Belgium (over 6%).

Similar conclusions hold for men, except that ULY/LY is higher among the partnered in Slovenia and Romania than that of single men, while it is lower in other countries. Partnered and single men have roughly equal ULY/LY in Switzerland, the Czech Republic, and Hungary.

The figures indicate that Nordic countries, along with Switzerland and Belgium, have significantly different results for length of unhealthy life compared to countries in Eastern Europe. It is thus convenient to consider differences across these two groups, where Eastern Europe includes Czech Republic, Hungary, Latvia, Lithuania, Slovakia, Slovenia, and Romania, and Western Europe includes the remaining nine countries.

Table 4 synthesizes the results displayed in Table 1 for these two groups of countries. Western Europeans live longer and their healthy life is longer; Eastern Europeans live longer with disabilities. These results support other reported findings (Jagger et al. 2008, 2011). When union status is considered, the differences are larger, especially for the length of unhealthy life.

Table 4: Life years, healthy and unhealthy life years for women and men by union status and disability, two groups of countries in Western and Eastern Europe, ages 50–79

	LY	LY.p	LY.s	HLY	HLY.p	HLY.s	ULY	ULY.p	ULY.s
Women									
WE	27.5	28.0	26.8	17.2	18.1	15.8	10.3	9.9	11.0
EE	26.4	27.1	25.5	13.2	14.1	12.1	13.2	13.0	13.3
Diff.	1.2	0.9	1.3	4.0	4.0	3.6	–2.8	–3.1	–2.3
Men									
WE	26.0	26.8	24.0	17.9	19.0	15.5	8.1	7.8	8.5
EE	22.5	24.1	18.5	12.8	13.7	10.3	9.7	10.4	8.2
Diff.	3.5	2.7	5.5	5.1	5.4	5.2	–1.6	–2.6	0.3

Abbreviations: LY=life years; HLY= healthy life years; ULY= unhealthy life years; p=partnered; s=single; WE=Western Europe; EE=Eastern Europe.
Source: Table 1, averages across countries in each group.

The length of life of single men is considerably shorter for Eastern Europeans compared to those living in the west. The overall length of life plays a role here; decomposition effects are displayed in Table 5.

The table shows that partnered women and men living in Eastern Europe live considerably longer than do singles; these differences are not as large in Western European populations. The disability effect in HLY is high, relative to the mortality effect for women in both parts of Europe. For men the regional differences are significant: In Western Europe this effect is about equal to that of mortality (1.7 each) while in Eastern Europe the mortality effect is about three times as large as that of the disability effect. Differences in healthy life between partnered and single men in Eastern Europe are dominated by the level of mortality. Decomposed differences for the ULY show that the mortality effect is considerably higher for both genders in Eastern Europe as compared to Western Europe. In summary, when the 16 countries are separated in the two groups the inferences change, giving more strength to the role of mortality in Eastern Europe.

Table 5: Decomposition in mortality and disability effects of the differences in LY, HLY and ULY between partnered and single women and men; two groups of countries in Western and Eastern Europe, ages 50–79

Differences in:	LY	Mortality effect in LY	HLY	Mortality effect in HLY	Disability effect in HLY	ULY	Mortality effect in ULY	Disability effect in ULY
Women								
WE	1.2	1.2	2.3	0.7	1.6	–1.1	0.5	–1.6
EE	1.7	1.7	2.0	0.6	1.3	–0.3	1.0	–1.3
Men								
WE	2.8	2.8	3.5	1.7	1.7	–0.7	1.0	–1.7
EE	5.5	5.5	3.3	2.5	0.8	2.2	3.0	–0.8

Abbreviations: LY=life years; HLY= healthy life years; ULY= unhealthy life years; WE=Western Europe; EE=Eastern Europe.
Source: averages across countries in each group from Table 3.

4. Summary and discussion

The overall life of partnered men and women is longer than that of singles: This long-lasting observation for European populations is supported by our recent data. This finding appears to be consistent, although underlying causes of mortality may change in composition and intensity. We found also that the dispersion of differences across the

16 countries is considerably larger for men compared to women. In some Eastern European countries single men are at a particular disadvantage because of their shorter life spans.

Results related to the first research question indicate that macro-level indicators for healthy and unhealthy life differ significantly between partnered and single people. In 16 European countries partnered women and men enjoy a longer healthy life than their single counterparts: In other words, partnered people live longer than singles and their healthy life is also longer. Partnered men have a slightly longer life with disabilities, yet single women are expected to live longer with disabilities than partnered women. Results for ULY differ by gender and cannot be considered as parallel, neither to the results for overall life nor to those for healthy life. In general, healthy life is longer than unhealthy life for both partnered and single people.

We found also that HLY increase more quickly than ULY per unit increase in LY, especially for men. With the overall increase of life expectancy expected during the next decades, we would expect that the HLY for men will grow more quickly than those of women, and the differences between the two genders with respect to length of healthy life will decline.

The decomposition of mortality and disability effects refers to our second research question. We examined these effects for the differences in HLY and ULY specified by union status for each gender. For women, the effect of disabilities dominates strongly over the mortality effect in HLY, but mortality is more important for the ULY. For men, the effect of disabilities marginally dominates that of mortality for the HLY but both effects play about an equal role for ULY. As stated above, HLY will increase more quickly for men because the decline in mortality will dominate improvements in health.

The third research question referred to international comparisons. We found that populations in Eastern Europe experience disadvantages compared to those in Western Europe with lower length of life, lower length of healthy life, and longer life with disabilities. These differences are greater for single people than for partnered people. The dispersion of observations in Eastern Europe is high; single men in Romania are in a particularly underprivileged position with their short life and short healthy life. Our results indicate that the Nordic countries lead with respect to length of healthy life and the small differences between partnered and single people. This observation calls for a more thorough examination in order to identify the reasons for these advantages.

In summary, single men and women have a shorter life span without disabilities than do partnered men and women. Being single accentuates "the double burden of men" (Nusselder et al. 2010) with their higher levels of mortality and disability, and single women are not in a much better position.

The analysis presented in this paper is subject to caveats that are usual for similar studies. The main measurement instrument, GALI, although officially accepted by

Eurostat as a central tool for the estimation of healthy life years, bears the inadequacies of a subjective measure which makes it less reliable than objective measures. Life expectancies are a cohort indicator, yet we used their cross-sectional alternative interpreted in a cohort perspective. The application of the Sullivan method was forced because of the lack of transition data between health-union states, which would have allowed the use of multistate methodology. Analogously, the lack of mortality data by health status forces the adoption of the unlikely hypothesis that the overall length of life does not depend on time spent in healthy or in an unhealthy state.

The answers to our questions are not exhaustive; it is likely to expect an extension of the relevant topics at the macro-level. For example, it is important to consider the singles in three separate groups: never in union, divorced/separated and widowed. Gender comparisons by union states can be made. Other substantive potential topics of research follow below.

The results do not demonstrate the validity or magnitude of the effect of the selection or protective hypotheses. We can only note that they dominate over adverse selection. In addition to the conventional understanding of the selective effect, it has been found to hold not only for entering a marriage but also for exiting it, i.e., a divorce. Joung et al. (1998) report for the Netherlands that when a partner's health deteriorates significantly, chances of divorce increase. A break of a partnership, whether due to a separation, divorce, or partner's death, may cause a psychological breakdown and mental health problems. Martikainen and Valkonen (1996) found that the death hazard of a surviving spouse increases sharply during the first six months after the death of the spouse. This effect, however, depreciates with time. In general, the protective effect states that people in a union help and support each other, and our results support this.

When a couple has been living an unhealthy lifestyle that caused an early death of one of the partners, the surviving partner is likely to continue to have deteriorated health. Thus, heterogeneity among couples with respect to healthy lifestyle leads to a gradual survival of those who live healthier, while other couples 'die' leaving a surviving partner to enter the group of singles with poor health. The quantitative effect of this heterogeneity and its causes are unknown; it might be due to frailty (Vaupel, Manton, and Stallard 1979). Even if couples do not differ by lifestyle or frailty, the longer life of women is likely to leave them widowed at an advanced age when health deteriorates; this might be a reason for their higher level of ULY and the 'health-survival paradox'.

Another important direction for future demographic research is the effect of compositional changes. Eurostat data show that in 2001 the proportion of unmarried men and women was 23% and 46% of the total population aged 50 and over. In 2011 it was 28% and 48%. This significant increase in the proportion of single people indicates, all else being equal, a relative increase in disability across the total population

– given that singles have higher levels of disability. This compositional change might explain a part of the delay in the rise of disability-free life expectancy relative to total life expectancy that has been frequently discussed in the epidemiological literature. Valkonen, Martikainen, and Blomgren (2004) discussed a similar population change concerning the effect of marital life expectancy on total life expectancy when the married proportion of the population declines.

In this paper we do not offer explanations for our findings; this is a subject for micro-level research. As Billari (2015) discusses, macro-level research brings 'discoveries' whereas explanations are found with micro-level research.

Our study leads to important policy implications. It confirms the unfavorable situation of single men in particular, and of many single women, in comparison to partnered people. In addition, it reveals substantial diversity across European countries with respect to length of healthy and unhealthy life depending on whether someone is in a union or not. These diversities require profound intercountry analyses with respect to cultural, social, economic, and policy differences.

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