Paradox or Paradoxes? An overview of the male-female health paradox across different dimensions of health in European Countries

Abstract

It has been widely documented that women live longer than men at all ages, but spend a higher proportion of their total life expectancy in poorer health (Case and Paxson 2005; Crimmins, Kim, and Hagedorn 2002; Crimmins, Kim, and Solé-Auró 2011; Oksuzyan et al. 2009; Robine et al. 2003). As interestingly stated elsewhere, "Men die, Women suffer" (Oksuzyan, Brønnum-Hansen, and Jeune 2010). There has been considerable effort from researchers in the field of mortality and health to explain this phenomenon, coined in the literature as the "male-female health-survival paradox", but to date no single answer has been found and the results are yet inconclusive (Oksuzyan, Gumà, and Doblhammer 2018). However, with the rise in the range and availability of health indicators, as well as the increase in life expectancy for both sexes, it became clearer that morbidity differences between men and women differ considerably across the many dimensions of health, age groups, and social contexts throughout time (Crimmins, Kim, and Solé-Auró 2011). All this complexity leads to very contrasting scenarios of the paradox, which demands a further understanding of the range of these differences. The aim of this paper is to highlight those contrasts, in order to provide an overall picture of the male-female health paradox using different health dimension indicators (activity limitation, chronic morbidity and self-perceived health) and age-specific prevalence from the European Health Expectancy Monitoring Unit Information System (http://www.ehemu.eu). These health indicators are based on the global survey questions forming the Minimum European Health Module (MEHM) that were included in the Statistics of Living and Income Survey (SILC) in all countries of the European Union between 2004 and 2016 (http://circa.europa.eu/public/irc/dsis/eusilc.library). With this broad overview we expect to assess how sensitive is the magnitude of the paradox to particular health dimensions and its implications when analyzing the gender gap in health and mortality.

Introduction

That women live longer than men has been known at least since the middle of the eighteenth century when Kersseboom (1737, 1740) mentioned his observation that the mortality experiences of males and females differ sufficiently to make it worth-while to use separate tables for calculating annuities. The first sex-differentiating life tables by Struyck (1740) and Deparcieux (1746) added corresponding empirical evidence a few years later. The finding of male excess mortality was confirmed with the introduction of official population statistics in all Western societies and has been documented in Sweden from 1751 onwards (Tabutin 1978). Men have higher mortality than women not only in terms of overall measures like life expectancy at birth but also – at least in all industrialized societies – in all

ages and in all leading causes of death. The mortality differences between women and men remained more or less constant until the first half of the 20th century and started to increase thereafter. This increase of the gap coincided with a rise among men in cardiovascular diseases, cancer, and accidents and a fall in maternal mortality and in causes of death related to pregnancy. However, since the beginning of the 1980s the gap between women and men in overall mortality has been slowly narrowing in the developed world with Japan being the only exception (Buettner 1995; Kolodziev, Lopuszanska, and Jankowska 2008; Luy 2002; Newman and Brach 2001; Trovato 2005; Trovato and Heyen 2003, 2006, Trovato and Lalu 1996, 1998). Another important exception is to the oldest-old where the differences between the sexes continue to rise until today (Vallin 2007).

In light of the universal observable male excess mortality it is surprising that studies on sex differences in morbidity report that women are in worse health than men (among many others, (Benyamini et al. 2003; Benyamini and Idler 1999; Deeg and Bath 2003; Spiers et al. 2003) and that women spend a higher proportion of their total life in poor health (Crimmins, Kim, and Hagedorn 2002; Robine, Jagger, and Romieu 2001). Women routinely show higher morbidity from acute conditions and nonfatal chronic diseases and also more short-term disability. Even when reproductive conditions are excluded, a sizable sex difference still remains in acute conditions and short-term disability (Green and Pope 1999; Verbrugge 1985; van Wijk et al. 1992). Further, women show a greater rate of decline in physical function and they are less likely to recover from disability (Beckett et al. 1996; Leveille et al. 2000). Moreover, women are reported to have a higher utilization of health care services (Bertakis et al. 2000; Green and Pope 1999; Ladwig et al. 2000; Redondo-Sendino et al. 2006) and they generally use more prescription and nonprescription drugs than men (Jörgensen et al. 2001; Roe, McNamara, and Motheral 2002; Verbrugge 1982). Last but not least, measurements of physical power reveal that men are stronger in all ages (Frederiksen et al. 2006). These obvious contradictions to the mortality differences between the sexes has led to numerous publications describing this phenomenon with expressions like “gender and health paradox” (Rieker and Bird 2005), “morbidity paradox” (Gorman and Read 2006), “morbidity-mortality paradox” (Kulminski et al. 2008), or “male-female health-survival paradox” (Oksuzyan et al. 2008, 2009). However, several studies have more recently shown that the magnitude of the paradox is far from universal, and that gender differences in health vary by age, morbidity measure, time and social context (Annandale and Hunt 1990; Backhans, Lundberg, and Månsdotter 2007; Clarke 1983; Deeg and Kriegsman 2003; Gijsbers van Wijk et al. 1991; Haavio-Mannila 1986; Kulminski et al. 2008; Lahelma et al. 1999; Macintyre, Hunt, and Sweeting 1996; Matthews, Manor, and Power 1999; Read and Gorman 2006; Rieker and Bird 2005; Sevick, Rolih, and Pahor 2000; Shinberg and Murphy 2007; Verbrugge, Wingard, and Features Submission 1987; Wingard et al. 1989). Furthermore, research has shown that the paradox is usually based on studies that focus on major health traits, but that results are considerably diverse when analyzing minor health deficits throughout the life cycle, indicating less pronounced paradoxes for particular sex-specific

health issues (Kulminski et al. 2008). Nevertheless, despite recent questioning and evaluation of the gender paradox, the idea of a paradoxical relationship between health and mortality among men and women persists until today, and despite the efforts of many demographers, epidemiologists, socio-medical scientists and others still very little is understood about the reasons for the paradox or its mechanisms (Austad 2011; Oksuzyan, Gumà, and Doblhammer 2018).

All this complexity leads to very contrasting scenarios of the paradox, which demands a further understanding of the range of these differences. The aim of this paper is to highlight those contrasts, in order to provide an overall picture of the male-female health paradox using different health dimension indicators (activity limitation, chronic morbidity and self-perceived health) and age-specific prevalence from the European Health Expectancy Monitoring Unit Information System (http://www.ehemu.eu) based on the Statistics of Living and Income Survey (SILC) in all countries of the European Union between 2004 and 2016 (http://circa.europa.eu/public/irc/dsis/eusilc.library). It is not our goal in this work to account for the specific contributions of the components of the paradox, which are the mortality and health effects on the gender gap [1], neither is it our focus to question the paradox itself. We aim at bringing more light into the discussion by specifically highlighting the magnitude of sex differences in mortality and health considering various countries and health indicators. We thus explore the female-male health expectancy differentials by age, year and country considering three dimensions of health. In addition, we analyze the age-specific prevalence of each one of those health conditions, as well as their trend by age between years 2004-2016.

Material and Methods

We use age and sex-specific health expectancies and total life expectancy estimates from the European Health Expectancy Monitoring Unit Information System, from years 2005-2016 (http://www.ehemu.eu). The health expectancies available on the website were estimated using the Sullivan method, an approach which integrates age-specific disability prevalence into the conventional life table (Jagger, Oyen, and Robine 2014; Sullivan 1971). In this way, health expectancies have a similar interpretation to total life expectancy: they indicate the number of remaining years that a person expects to live in a health state given that he or she survived to a given age. It has been shown that health expectancies are summary measures of population health that combine information on the quantity and quality of life, making them suitable for quantifying and monitoring population health,

[1] See workings of Van Oyen et al. (2013) for a very thorough decomposition approach that focuses on the role of mortality advantage and disability disadvantage of women on the health and mortality paradox for the same set of countries we are presenting here. The authors focus on the interaction between health and mortality through the assessment of the relationship between Healthy Life Years and total life expectancy. Overall, the authors conclude that the mortality advantage of women over men imply a longer life with activity limitation, which in turn is a resultant of women's higher prevalence of activity limitation.

and also for comparing countries (Berger et al. 2016; Murray et al. 2002; Robine 2006). However, such comparisons are only effective if the data used are equivalent, which considerably limits global analysis in health differences. Nonetheless, since 2005, three harmonized health expectancies have been annually monitored in the European Union: life expectancy with (out) activity limitation— also known as (Un-) Healthy Life Years—, life expectancy in good (bad/fair) self-rated health and life expectancy with (out) chronic morbidity. Each indicator is based on the global survey questions forming the Minimum European Health Module (MEHM) (Berger et al. 2016; Cox et al. 2009; Robine 2003) and that were included in the Statistics on Income and Living Conditions (EU-SILC)[2]. The validity and reliability of these questions have been widely documented and the SILC survey was specifically designed to enhance the comparability between countries (Jagger et al. 2010; Van Oyen et al. 2006)[3]. We focus then on the European context in order to take full advantage of this set of harmonized health indicators and illustrate the magnitude of the gender paradox within these countries.

Results

Activity limitation

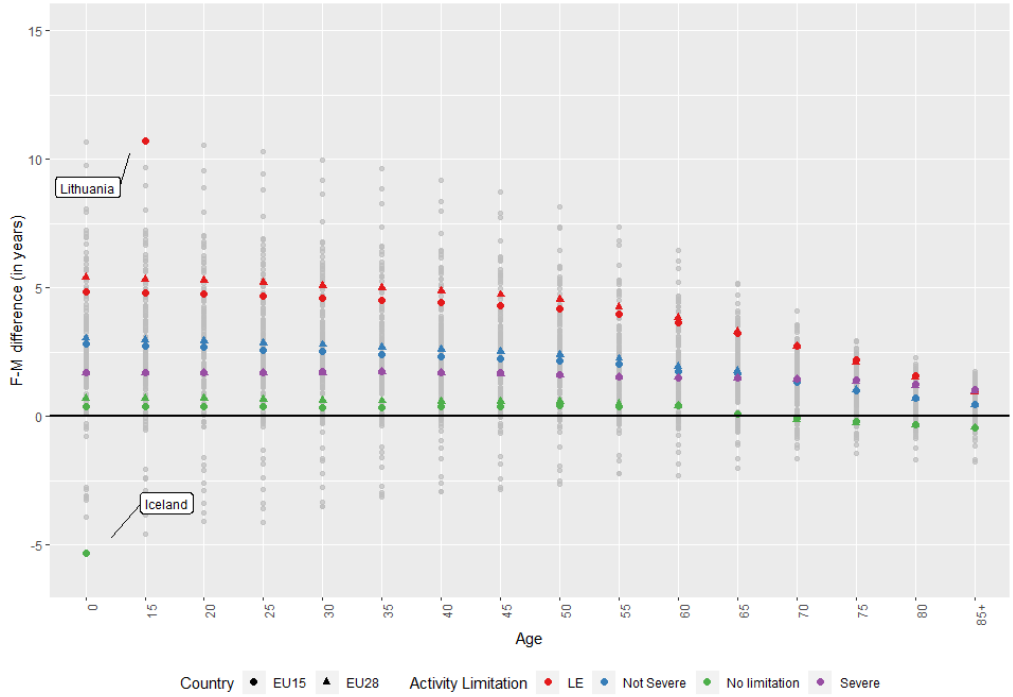
This health expectancy indicator is estimated based on the SILC survey question PH030: "For at least the last 6 months have you been limited in activities people usually do, because of a health problem?" The answer allows for no limitation, severe limitation and not severe limitation. This question corresponds to the Global Activity Limitation (GALI) developed by the Euro-REVES group for the European Union and is currently used for the calculation of the Healthy Life Years (HLY).

Figure 1 shows the absolute difference in the number of years spent in each activity limitation state between females and males, together with the total life expectancy at each age. The light grey dots on the back are the bulk of all European countries, and the colored dots and triangles are for combined EU-15 and EU-28 countries, respectively. If women and men experienced the same number of years in each activity limitation state or if there were no differences in total life expectancy, then all values would equal to zero (represented here by the straight horizontal black line). When considering combined EU-28 and EU-15 countries, it is clear that not only women live longer than men at all ages, but they also spend more years in practically all states. Following total life expectancy differentials (LE), the highest differentials are found for limitation that is not severe, with women expecting to experience more years with limitation, but not severe.

[2] For a full description of the survey please refer to http://circa.europa.eu/public/irc/dsis/eusilc.library

[3] Nonetheless, one must account for the fact that issues with harmonization still persist and that the survey excludes the institutionalized population.

Figure 1. Female-Male difference (in absolute number of years) in health indicators by limitation status, selected European countries, 2015

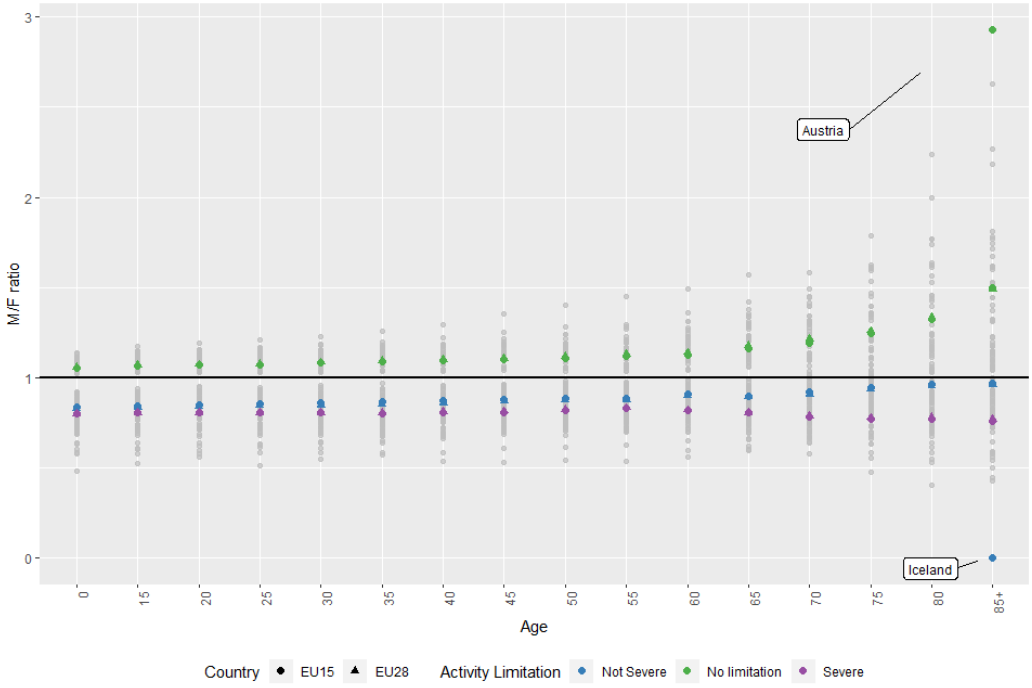


Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

On the other hand, the gender differentials for life expectancy with no limitation are smaller, with the level for combined European countries pivoting around zero. It is only from age 65 on that males expect to spend more years with no limitation relative to females. Despite this overall pattern for combined European countries, the range of different values across countries is not trivial. In year 2015, the highest gender gap considering all countries, health indicators, and age groups was in favor of women, with Lithuanian females expecting to live more than 10 years ahead of men at the age of 15. Conversely, the highest gender differential favoring men was found for newborns in Iceland who expected to experience more than 5 years of life lived with no limitation, compared to women.

However, this differences are not considering the total life cycle and what proportion of the total life span is spent in each condition, which is more the focus of the health-survival paradox. Since women live longer, they are also more exposed to spending more years in each condition. In Figure 2, we take into account the proportion of life expectancy in each state by computing the sex ratios (M/F) of those proportions. All values above one indicate that males present higher values for a given indicator while values below one represent the opposite for women. When accounting for the proportion of total life expectancy that is spent in each one of those states, women stand out as spending a higher portion of their total life span in poorer health (both with no severe and severe limitation), since all those values are under one. Males, on the other hand, spend a higher proportion of their lives with no limitation at all (values above one).

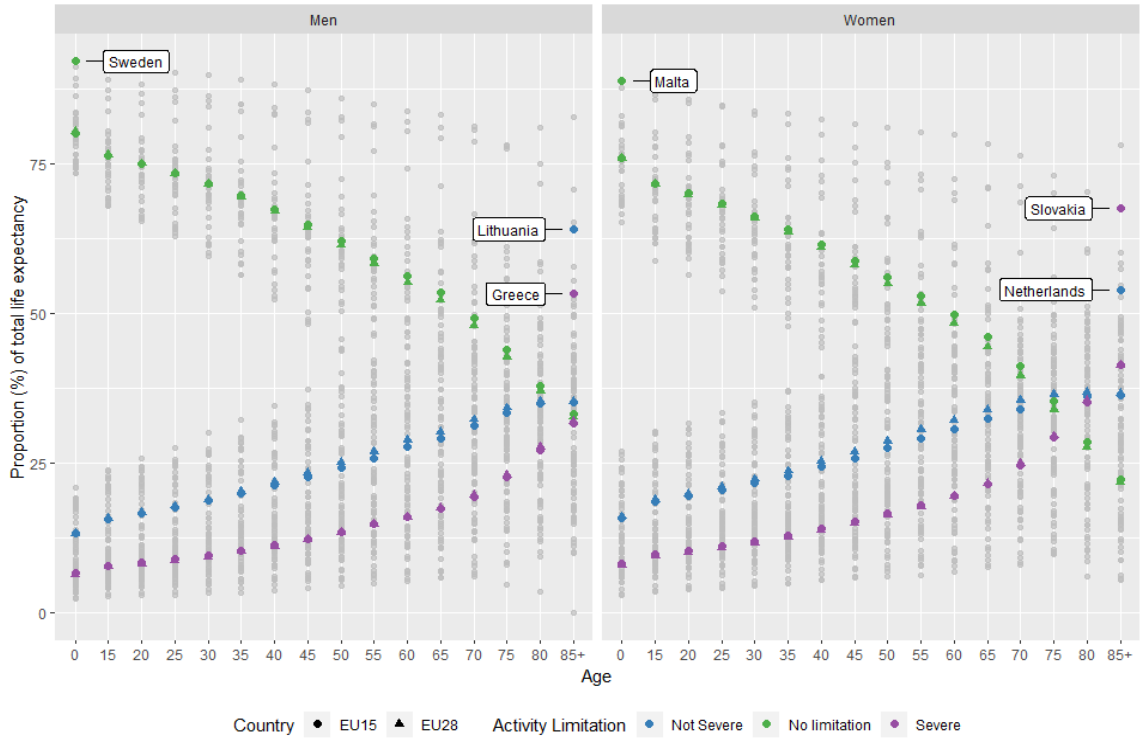
Figure 2. M/F ratios of the proportion (%) of total life expectancy by limitation status, selected European countries, 2015



Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Remarkably, Austria stands out as the country in 2015 with the highest gap in the proportion of total life expectancy with no limitation between males and females surviving ages 85 and above, in favor of males. In Iceland, the greatest gender gap is also found between males and females surviving ages 85 and above, but refer to the proportion of total life expectancy spent with no severe limitation, and with a greater contribution from females. Figure 3 shows the same proportions, but now separately for each sex. The pattern is very similar for males and females, with the proportion of total life expectancy with no limitation decreasing with age, while the proportions of total life expectancy with severe and not severe limitation increase. The main differences are on the levels of limitation status, with women always experiencing lower proportions of no limitation and higher proportions of severe and not severe limitation. In addition, the countries with extreme values are different for women and men: Swedish males present the highest proportion of total life expectancy with no limitation at birth, while for females this same reality applies to Malta. Similarly, males aged 85 and over in Lithuania experience the highest proportions of life expectancy with no severe limitation, while in Greece they experience the highest proportions of life expectancy with severe limitation at the same age. For females the country-specific scenario is different, with Slovakia and the Netherlands presenting the highest figures for severe and not severe limitation, respectively.

Figure 3. Proportion (%) of total life expectancy by limitation status, age and sex, selected European countries, 2015



Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

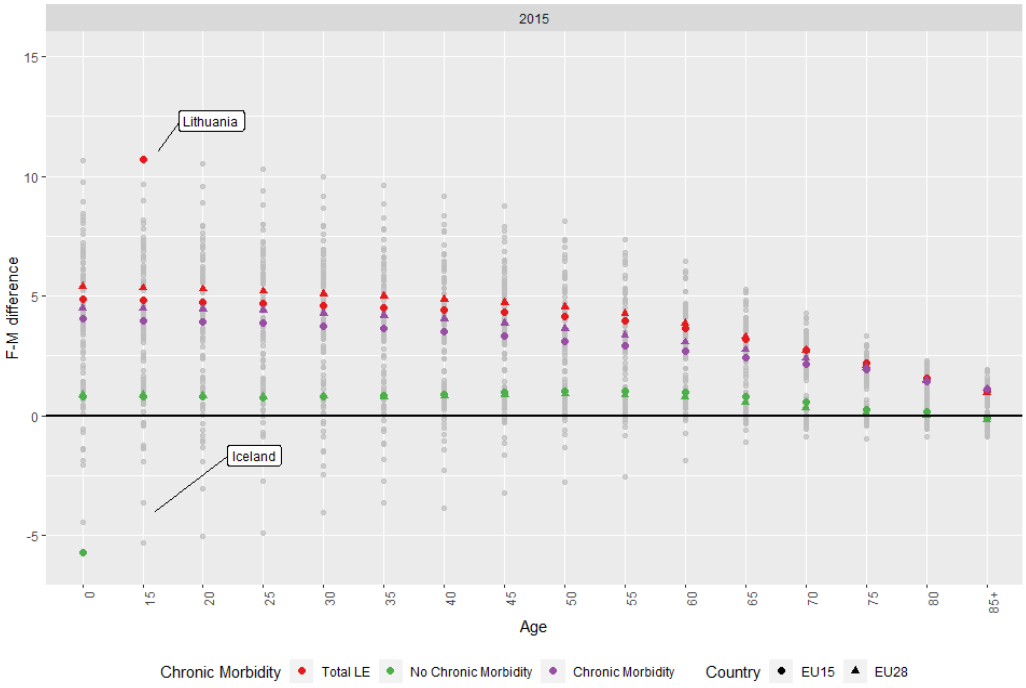
Chronic morbidity

This health expectancy indicator is estimated based on the SILC survey question PH020: "Do you have any long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you over a period of time or that is likely to affect you over a period of time?". The answer allows for yes or no. This question is the same CM question than the one included in the Minimum European Health Module (MEHM).

Figure 4 shows the difference in the absolute difference in the number of years spent in each chronic morbidity state between females and males, together with the total life expectancy at each age. Like with activity limitation, the light grey dots on the back are the bulk of all European countries, and the colored dots and triangles are for combined EU-15 and EU-28 countries, respectively. The main difference of this figure and the one depicted in Figure 1 is how close the curve of chronic morbidity differentials are to total life expectancy differentials, for the main countries composing EU-15 and EU-28. The highest differentials are still for total life expectancy, but health expectancy with chronic morbidity differentials is remarkably high, disfavoring women. Women expect to live more absolute years with chronic morbidity than men at all ages. As with the disability health expectancy, the

differences in gender for health expectancy free of chronic morbidity are lower at all ages, with females presenting lower levels than males only after age 85. Iceland and Lithuania remain the outliers in the set of European countries with the highest differentials at ages 0 and 15, respectively.

Figure 4. F-M difference in health indicators by chronic morbidity status, selected European countries, 2015

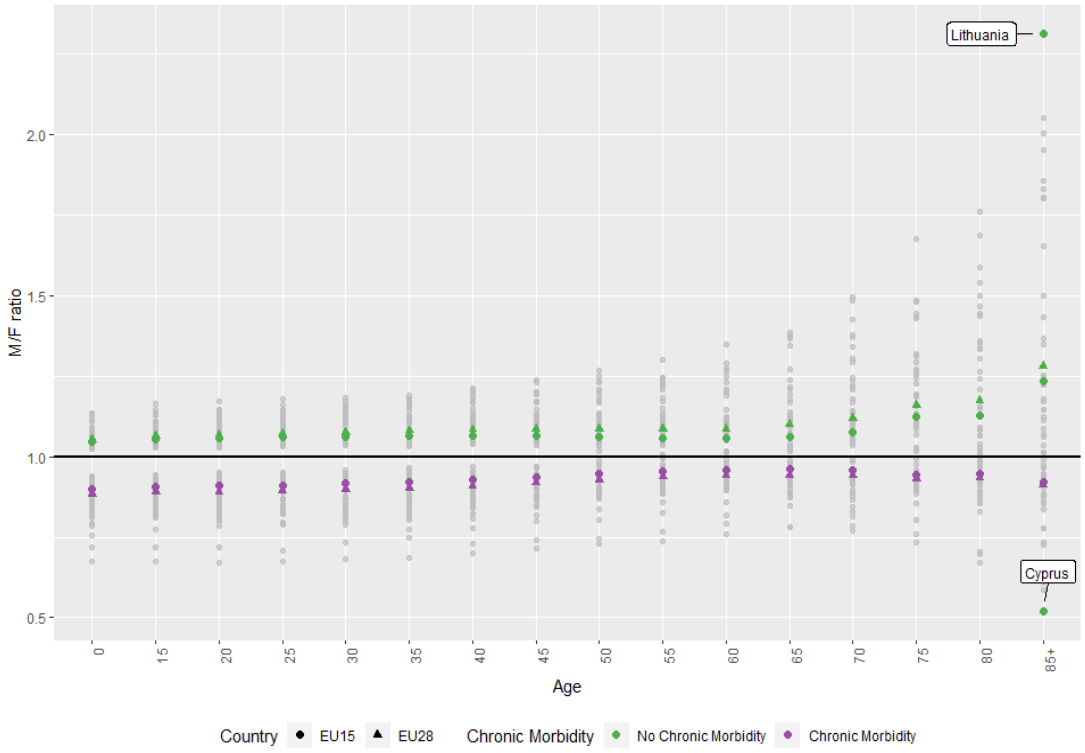


Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

When analyzing these absolute values in terms of proportions of total life expectancy, as shown in Figure 5, again we see the paradox expressed in terms of chronic morbidity, with females expecting to live a higher proportion of their total life expectancy in presence of chronic morbidity at all ages, while males expect to live a higher proportion of their lives free from these conditions. The extreme values in this case was found again for the Baltic Lithuania, with the Male-Female ratio in health expectancy free from chronic morbidity achieving more than 2.5 times in favor of men aged 85 and over. However, strikingly, Cyprus showed a reversed pattern at this age, with females living longer than males but also expecting to live them with less years of chronic morbidity than males.

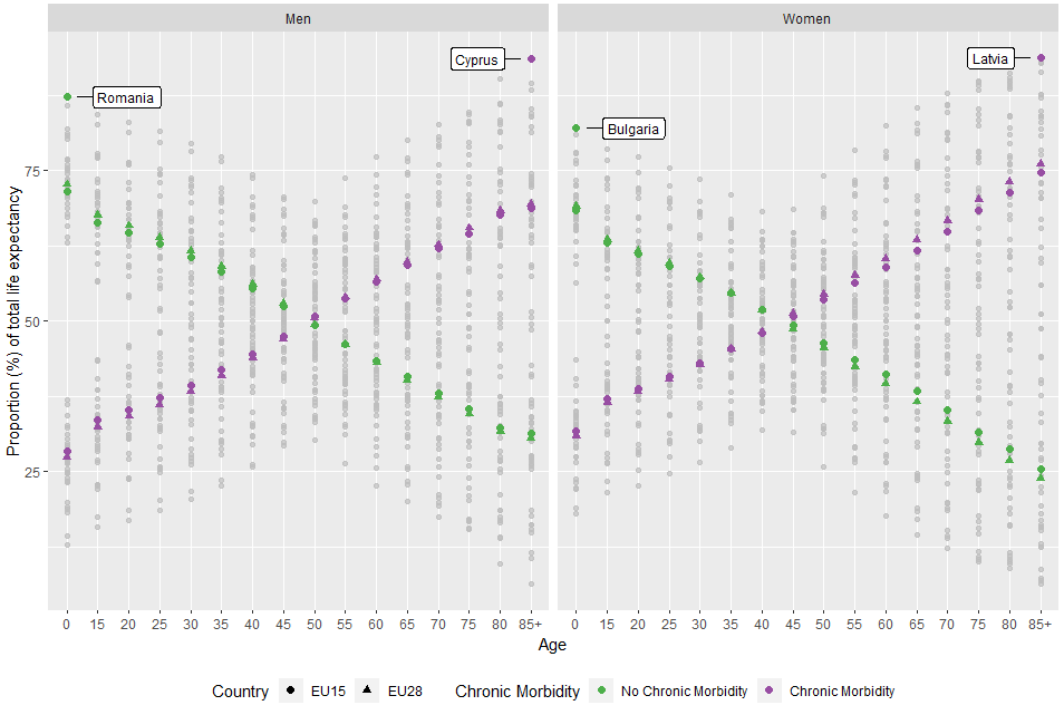
Figure 6 shows the same proportions, but now separately for each sex. The pattern is very similar for males and females, with the proportion of total life expectancy with no chronic morbidity decreasing with age, while the proportions of total life expectancy with chronic morbidity increase. The main differences are on the levels of limitation status, with women always experiencing lower proportions of no limitation and higher proportions of severe and not severe limitation.

Figure 5. M/F ratios of the proportion (%) of total life expectancy by chronic morbidity, selected European countries, 2015



Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Figure 6. Proportion (%) of total life expectancy by chronic morbidity status, age and sex, selected European countries, 2015



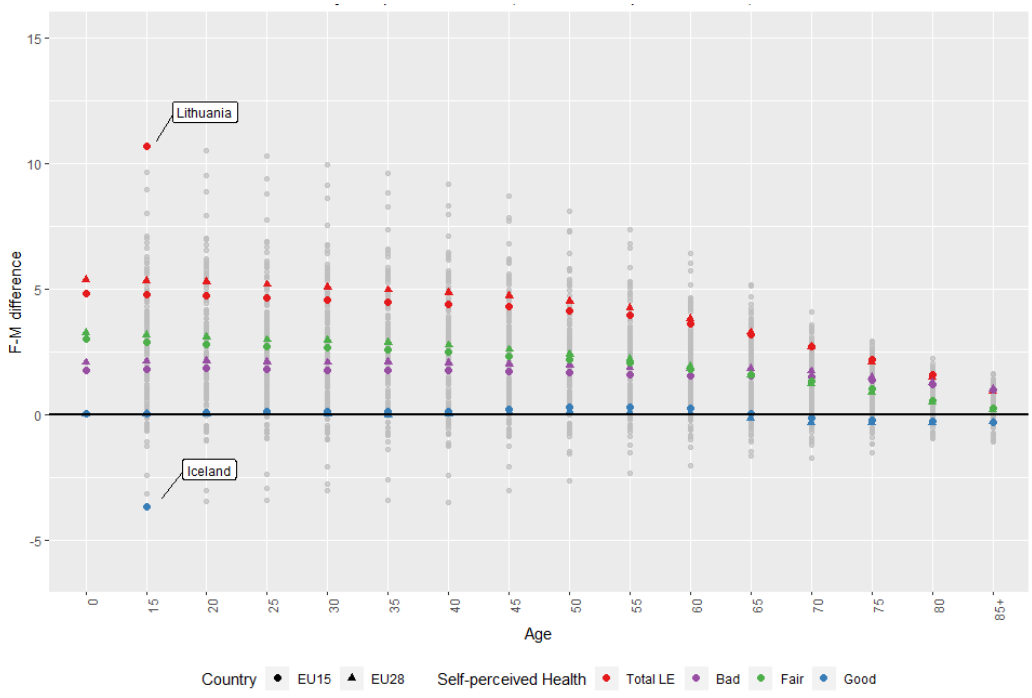
Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

In addition, the countries with extreme values are different for women and men: Swedish males present the highest proportion of total life expectancy with no limitation at birth, while for females this same reality applies to Malta. We can see here that the M/F differential ratio extremely high for Cyprus may be associated to the high proportion of total life expectancy at age 85 and over for males that is expected to be spent with chronic morbidity. Considering all the European countries in 2015, males in Romania were the ones with the highest proportion of their total life expectancy spent free of chronic morbidity. For females, the highest values are found for Bulgaria.

Self-perceived health

This health expectancy indicator is estimated based on the SILC survey question PH010: "How is your health in general? Would you say it was...". The answer allows for bad, fair and good. This question is the same SPH question than the one included in the Minimum European Health Module (MEHM). Figure 7 presents the differentials for health expectancy for self-perceived health. Not surprisingly, females expect to live more years in bad or fair health according to their own perception. The differences for state good health are almost null, favoring males from ages 65 and on. Iceland males at age 15 are the ones who present the highest good self-perceived health expectancy relative to their female counterparts of the same age.

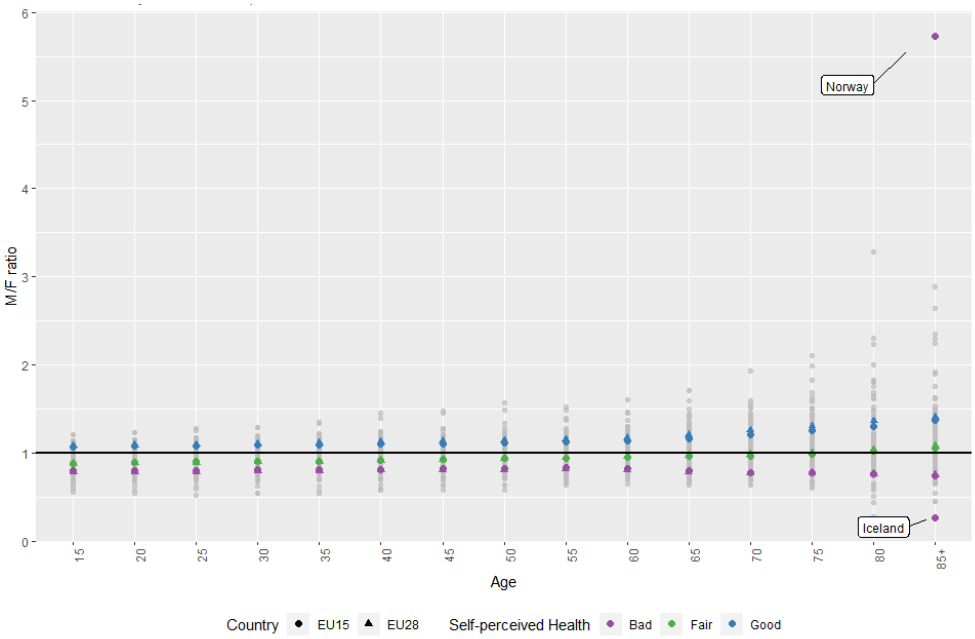
Figure 7. F-M difference in health indicators by self-perceived health, selected European countries, 2015



Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

When we analyze the M/F ratios in proportions in Figure 8, a higher proportion of females expect to spend their total lives with bad health, while the opposite happens for males. The differentials widen with age, as with all the previous health expectancy measures. Remarkably, Norwegians present an extremely high ratio for the proportion of total life expectancy spent in bad health among the oldest-old and over. The lowest value is found for Iceland at the same age group.

Figure 8. M/F ratios of the proportion (%) of total life expectancy by self-perceived health, selected European countries, 2015

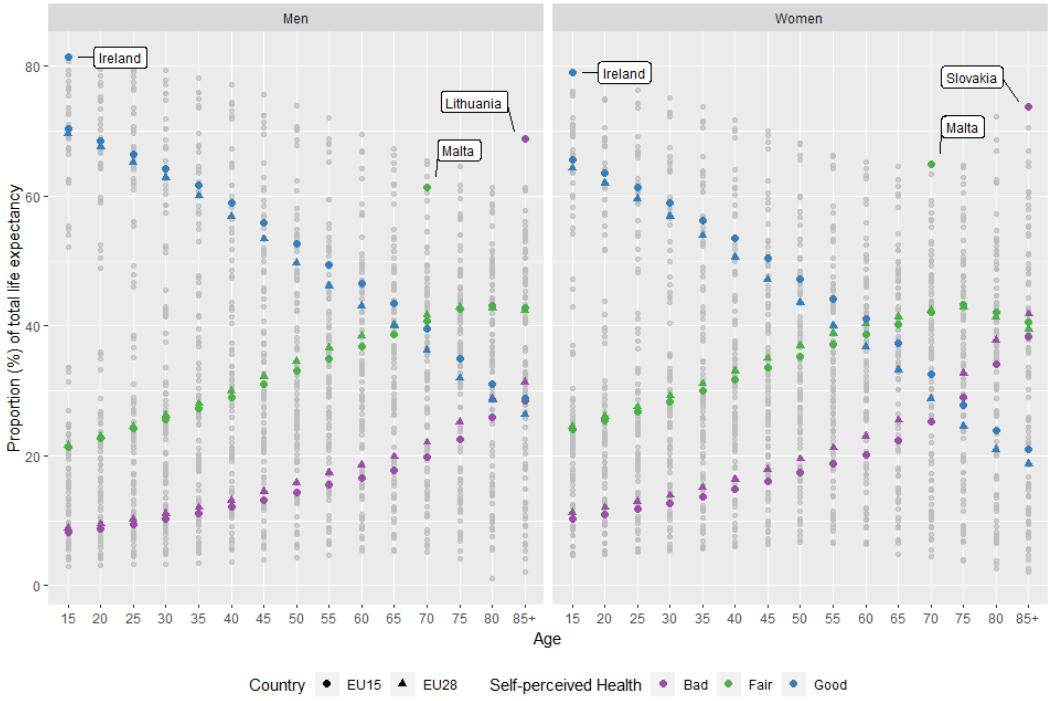


Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

The proportion of total life expectancy spent in each condition of self-perceived health separately by sex is shown in Figure 9. Women consistently expect to spend a higher proportion of their lives with bad self-rated health relative to men. Lithuania stands out as the country in which males aged 85 and over can expect to spend the highest proportion of their lives in bad self-rated health, while this same scenario for females is in Slovakia. Additionally, both males and females from Malta present the highest proportion of health expectancy in fair self-rated health at the age of 70, while 15-year olds from both sexes in Ireland present the highest proportion of health expectancy in good rated health.

All these three health expectancy scenarios corroborate the literature in that women live longer than men in virtually all countries, but spend a higher proportion of their lives in poorer health, with a few exceptions (for instance Cyprus for chronic morbidity). However, the magnitude of the gender paradox throughout European countries is very diverse, and also depends on whether one focuses on the proportion of total life expectancy in good health or in poorer health, as shown on Tables 1, 2 and 3 below.

Figure 9. Proportion (%) of total life expectancy by self-perceived health, age and sex, selected European countries, 2015



Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Healthy or unhealthy gender paradox?

Tables 1, 2 and 3 show how we could rank the countries from lowest to highest sex differentials, or what could we consider the most unequal countries in terms of health expectancy differentials. The first table refers to activity limitations, with the left pane showing the rank for healthy life years, or life expectancy free from activity limitations, whereas the middle pane shows the ranking considering unhealthy life expectancy, or life expectancy lived with severe activity limitation. The right pane is always the differentials for total life expectancy, which is the same for all indicators and for which the countries are also ranked from the lowest gender gap to the highest.

What is most striking is how the countries would be ranked differently if we consider healthy or unhealthy life expectancy as our criteria for rankings and discuss country-specific performance. For instance, Germany is on the 6th place and is one of the countries that experience the lowest differentials in gender gap for health life expectancy free from activity limitation. Nonetheless, it drops to 15th place if we consider the gaps in health expectancy lived with severe limitation. In terms of total life expectancy, Germany is at the 13th place among European countries. It is clear that the absolute difference is not very big, and the gender gap within the country is very similar between the two indicators (5.25% for no activity limitation and around 4% for severe activity limitation). Norway, on the other hand, does not only change considerably across countries, but also within it. It is among the

countries with the highest gender differentials for no activity limitation health expectancy, with males spending more than 10% of their total lives without activity limitation relative to their female counterparts. However, if we focus on severe limitation gap Norway goes up the ladder to be at 5th place in the ranking. Different from Germany, they go from a 10% difference in the case of no activity limitation to a 1.96% difference for severe limitation. As regards total life expectancy, they fare at 7th place as the European country with a below 3-year difference in total life expectancy. This implies that despite the presence of the gender paradox in this country as well as on the others, the magnitude of this paradox is considerably different whether one focuses on the activity limitation free life expectancy or on severe limitation. In sum, males in Norway are performing as poorly as females in terms of severe limitation, but are outperforming in terms of healthy life years.

The rankings for chronic morbidity by state are not very informative, since they are a mutually exclusive category and so one figure mirrors the other. However, it is still interesting to see the case of France, which is the only country in which the F-M gap in the proportion of total life expectancy without chronic morbidity is positive, meaning that females expect to spend a higher proportion of their total life expectancies without chronic morbidity, relative to their male counterparts (almost 2% more).

Self-perceived health expectancy also presents some interesting contrasts, such as Lithuania ranked at the 6th position with the lowest gender gap in good self-perceived health expectancy, but dropping to 31st place when we account for differentials in bad perceived health. Males expect to spend almost 3% more of their total life in good health, according to their own self-perceived health, relative to females. On the other hand, females expect to spend almost 10% more of their lives in bad health. The gender gap in bad health is thus larger than the differential in good health, contrary to what we saw for Norway in the case of activity limitation.

Table 1. Ranking of countries according to different health indicator gender gaps

Rank	Country	%Proportion of total LE without Activity Limitation		F-M Gap	Rank	Country	%Proportion of total LE with Severe Activity Limitation		F-M Gap	Rank	Country	Total LE (in years)		F-M Gap
		Males	Females				Males	Females				Males	Females	
1	Denmark	61.2	57.5	-3.74	1	Denmark	9.0	8.0	-1.01	1	Iceland	19.5	21.3	1.8
2	Ireland	62.0	57.3	-4.72	2	Finland	16.5	17.4	0.89	2	United Kingdom	18.6	20.8	2.3
3	Sweden	83.2	78.3	-4.94	3	Bulgaria	10.9	12.4	1.52	3	Cyprus	18.4	20.8	2.4
4	France	50.7	45.7	-4.97	4	Sweden	5.8	7.6	1.77	4	Sweden	18.9	21.5	2.6
5	United Kingdom	55.1	50.0	-5.17	5	Norway	6.8	8.7	1.96	5	Ireland	18.4	21.0	2.6
6	Germany	63.7	58.5	-5.25	6	Croatia	28.3	30.6	2.29	6	Denmark	18.0	20.7	2.7
7	Czech Republic	50.4	44.2	-6.13	7	Poland	19.2	21.6	2.40	7	Norway	18.9	21.6	2.7
8	Lithuania	35.3	29.0	-6.36	8	Czech Republic	14.0	16.4	2.45	8	Netherlands	18.4	21.1	2.7
9	Poland	48.2	41.6	-6.57	9	France	20.3	23.1	2.79	9	Greece	18.5	21.3	2.8
10	Malta	71.4	64.7	-6.67	10	United Kingdom	21.9	24.8	2.90	10	Malta	18.8	21.6	2.8
11	Slovakia	27.1	20.3	-6.79	11	Latvia	24.7	27.9	3.20	11	Luxembourg	18.9	21.8	2.9
12	Croatia	31.2	23.9	-7.22	12	Ireland	11.7	15.1	3.49	12	Switzerland	19.4	22.4	3.0
13	EU15	53.5	46.1	-7.41	13	Malta	7.0	10.5	3.56	13	Germany	17.9	21.0	3.1
14	Greece	42.9	35.4	-7.48	14	Austria	21.1	25.0	3.93	14	Austria	18.1	21.3	3.2
15	Austria	43.8	36.2	-7.59	15	Germany	13.4	17.4	4.02	15	EU15	18.6	21.8	3.2
16	Italy	41.6	33.9	-7.70	16	Switzerland	6.8	11.0	4.14	16	Belgium	18.2	21.5	3.3
17	EU28	52.2	44.4	-7.84	17	EU15	17.4	21.6	4.19	17	Italy	18.9	22.2	3.3
18	Latvia	29.2	21.2	-8.07	18	EU28	17.5	21.7	4.19	18	EU28	17.9	21.2	3.3
19	Bulgaria	62.4	54.1	-8.29	19	Iceland	14.9	19.5	4.64	19	Croatia	15.2	18.7	3.5
20	Iceland	79.3	70.8	-8.50	20	Netherlands	10.7	15.5	4.80	20	Romania	14.5	18.0	3.5
21	Estonia	34.1	25.4	-8.69	21	Spain	12.6	17.6	5.03	21	Czech Republic	15.9	19.4	3.6
22	Hungary	41.1	32.3	-8.77	22	Lithuania	15.2	20.3	5.11	22	Finland	18.3	21.9	3.6
23	Switzerland	53.1	43.5	-9.61	23	Greece	28.1	33.3	5.26	23	Bulgaria	14.0	17.6	3.6
24	Finland	50.8	41.1	-9.64	24	Slovenia	20.5	26.3	5.79	24	Portugal	18.0	21.7	3.7
25	Norway	81.1	71.0	-10.12	25	Portugal	20.4	26.2	5.87	25	Hungary	14.5	18.2	3.7
26	Cyprus	45.4	35.2	-10.24	26	Italy	21.2	27.1	5.91	26	Slovakia	15.0	18.8	3.8
27	Belgium	61.7	51.3	-10.36	27	Belgium	14.5	20.6	6.15	27	Slovenia	17.6	21.4	3.8
28	Slovenia	46.7	35.7	-11.05	28	Hungary	18.0	24.4	6.42	28	Spain	19.0	23.0	4.0
29	Romania	43.2	31.8	-11.37	29	Romania	16.0	22.4	6.44	29	France	19.4	23.5	4.1
30	Spain	50.0	38.6	-11.43	30	Slovakia	28.9	35.4	6.56	30	Poland	15.7	20.1	4.4
31	Netherlands	57.0	44.5	-12.53	31	Estonia	23.3	29.8	6.56	31	Latvia	14.2	18.9	4.7
32	Portugal	38.9	24.8	-14.13	32	Cyprus	23.5	31.7	8.21	32	Lithuania	13.7	18.9	5.1
33	Luxembourg	56.8	39.9	-16.89	33	Luxembourg	16.2	24.7	8.53	33	Estonia	15.5	20.7	5.2

Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Table 2. Ranking of countries according to different health indicator gender gaps

Rank	Country	% Proportion of total life expectancy Without Chronic Morbidity		F-M Gap	Rank	Country	% Proportion of total life expectancy With Chronic Morbidity		F-M Gap	Rank	Country	Total LE (in years)		F-M Gap
		Males	Females				Males	Females				Males	Females	
1	France	34.6	36.6	1.96	1	France	65.4	63.4	-1.96	1	Iceland	19.5	21.3	1.8
2	United Kingdom	35.9	35.1	-0.83	2	United Kingdom	64.1	64.9	0.83	2	United Kingdom	18.6	20.8	2.3
3	Denmark	60.2	59.2	-1.01	3	Denmark	39.8	40.8	1.01	3	Cyprus	18.4	20.8	2.4
4	Croatia	31.2	29.9	-1.25	4	Croatia	68.8	70.1	1.25	4	Sweden	18.9	21.5	2.6
5	Finland	25.8	24.1	-1.74	5	Finland	74.2	76.0	1.74	5	Ireland	18.4	21.0	2.6
6	Germany	36.9	34.9	-2.04	6	Germany	63.1	65.1	2.04	6	Denmark	18.0	20.7	2.7
7	EU15	40.7	38.3	-2.39	7	EU15	59.3	61.7	2.39	7	Norway	18.9	21.6	2.7
8	Austria	44.0	41.2	-2.78	8	Austria	56.0	58.8	2.78	8	Netherlands	18.4	21.1	2.7
9	Ireland	47.3	44.0	-3.21	9	Ireland	52.8	56.0	3.21	9	Greece	18.5	21.3	2.8
10	EU28	40.2	36.6	-3.67	10	EU28	59.8	63.4	3.67	10	Malta	18.8	21.6	2.8
11	Slovenia	37.8	33.8	-3.94	11	Slovenia	62.2	66.2	3.94	11	Luxembourg	18.9	21.8	2.9
12	Cyprus	22.9	18.9	-3.97	12	Cyprus	77.1	81.1	3.97	12	Switzerland	19.4	22.4	3.0
13	Malta	33.3	29.2	-4.07	13	Malta	66.7	70.8	4.07	13	Germany	17.9	21.0	3.1
14	Netherlands	48.9	44.6	-4.30	14	Netherlands	51.2	55.5	4.30	14	Austria	18.1	21.3	3.2
15	Greece	47.3	42.8	-4.48	15	Greece	52.7	57.2	4.48	15	EU15	18.6	21.8	3.2
16	Italy	50.4	45.8	-4.57	16	Italy	49.6	54.2	4.57	16	Belgium	18.2	21.5	3.3
17	Belgium	62.5	57.3	-5.21	17	Belgium	37.5	42.7	5.21	17	Italy	18.9	22.2	3.3
18	Lithuania	29.2	24.0	-5.21	18	Lithuania	70.8	76.0	5.21	18	EU28	17.9	21.2	3.3
19	Sweden	48.1	42.9	-5.22	19	Sweden	51.9	57.2	5.22	19	Croatia	15.2	18.7	3.5
20	Czech Republic	37.2	31.9	-5.36	20	Czech Republic	62.8	68.1	5.36	20	Romania	14.5	18.0	3.5
21	Estonia	20.0	14.5	-5.45	21	Estonia	80.0	85.5	5.45	21	Czech Republic	15.9	19.4	3.6
22	Bulgaria	54.7	49.2	-5.59	22	Bulgaria	45.3	50.9	5.59	22	Finland	18.3	21.9	3.6
23	Spain	37.9	32.1	-5.77	23	Spain	62.1	67.9	5.77	23	Bulgaria	14.0	17.6	3.6
24	Switzerland	50.7	45.0	-5.77	24	Switzerland	49.3	55.0	5.77	24	Portugal	18.0	21.7	3.7
25	Portugal	30.6	24.7	-5.90	25	Portugal	69.4	75.3	5.90	25	Hungary	14.5	18.2	3.7
26	Hungary	23.5	17.2	-6.30	26	Hungary	76.5	82.8	6.30	26	Slovakia	15.0	18.8	3.8
27	Norway	55.3	49.0	-6.38	27	Norway	44.7	51.0	6.38	27	Slovenia	17.6	21.4	3.8
28	Slovakia	30.9	24.3	-6.60	28	Slovakia	69.2	75.8	6.60	28	Spain	19.0	23.0	4.0
29	Luxembourg	61.1	54.1	-7.02	29	Luxembourg	38.9	45.9	7.02	29	France	19.4	23.5	4.1
30	Latvia	25.4	18.3	-7.05	30	Latvia	74.6	81.7	7.05	30	Poland	15.7	20.1	4.4
31	Poland	32.3	23.6	-8.70	31	Poland	67.8	76.5	8.70	31	Latvia	14.2	18.9	4.7
32	Iceland	63.2	52.9	-10.29	32	Iceland	36.8	47.1	10.29	32	Lithuania	13.7	18.9	5.1
33	Romania	52.2	38.8	-13.42	33	Romania	47.8	61.2	13.42	33	Estonia	15.5	20.7	5.2

Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Table 3. Ranking of countries according to different health indicator gender gaps

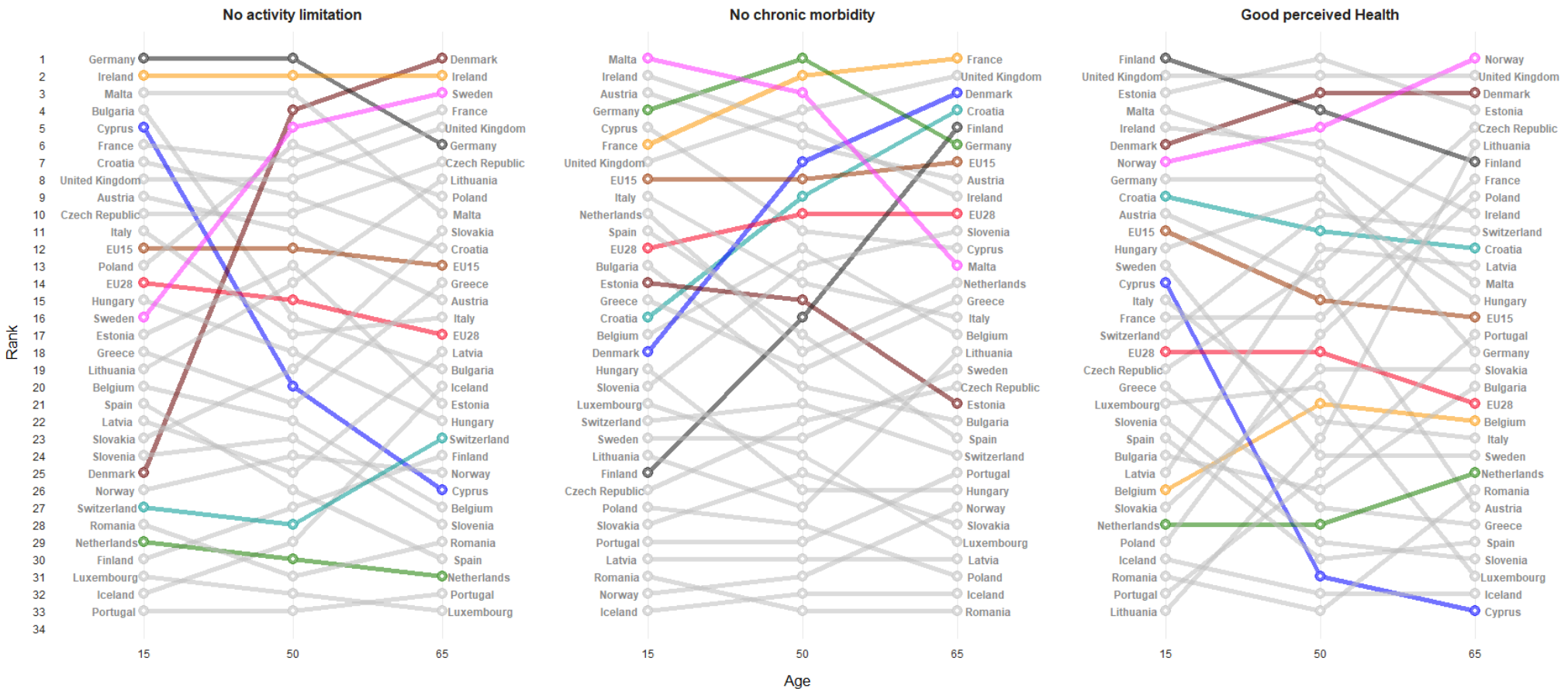
Rank	Country	%Proportion of total LE in Good Self-Perceived health		F-M Gap	Rank	Country	%Proportion of total LE in Bad Self-Perceived health		F-M Gap	Rank	Country	Total LE (in years)		F-M Gap
		Males	Females				Males	Females				Males	Females	
1	Norway	64.0	64.7	0.63	1	Norway	9.8	8.9	-0.90	1	Iceland	19.5	21.3	1.8
2	United Kingdom	51.5	51.7	0.18	2	Denmark	10.3	9.9	-0.45	2	United Kingdom	18.6	20.8	2.3
3	Denmark	58.7	58.3	-0.40	3	France	17.3	17.8	0.50	3	Cyprus	18.4	20.8	2.4
4	Estonia	15.9	14.7	-1.26	4	Switzerland	5.4	6.5	1.13	4	Sweden	18.9	21.5	2.6
5	Czech Republic	23.5	20.9	-2.59	5	Finland	11.8	13.1	1.31	5	Ireland	18.4	21.0	2.6
6	Lithuania	7.8	4.9	-2.89	6	Sweden	5.6	7.1	1.48	6	Denmark	18.0	20.7	2.7
7	Finland	45.7	42.4	-3.34	7	United Kingdom	13.5	15.1	1.62	7	Norway	18.9	21.6	2.7
8	France	42.3	37.9	-4.44	8	Iceland	7.4	9.1	1.66	8	Netherlands	18.4	21.1	2.7
9	Poland	17.9	13.3	-4.63	9	Malta	11.4	14.1	2.71	9	Greece	18.5	21.3	2.8
10	Ireland	66.3	61.6	-4.67	10	Ireland	7.4	10.4	2.98	10	Malta	18.8	21.6	2.8
11	Switzerland	65.1	60.3	-4.83	11	Austria	19.1	22.2	3.17	11	Luxembourg	18.9	21.8	2.9
12	Croatia	19.3	14.4	-4.84	12	Germany	13.5	17.0	3.48	12	Switzerland	19.4	22.4	3.0
13	Latvia	12.1	7.1	-5.01	13	Netherlands	7.9	11.9	4.01	13	Germany	17.9	21.0	3.1
14	Malta	28.3	23.3	-5.04	14	EU15	17.8	22.3	4.53	14	Austria	18.1	21.3	3.2
15	Hungary	18.7	12.9	-5.76	15	Estonia	33.6	38.3	4.67	15	EU15	18.6	21.8	3.2
16	EU15	43.5	37.4	-6.15	16	Greece	27.9	32.9	5.05	16	Belgium	18.2	21.5	3.3
17	Portugal	15.5	9.0	-6.44	17	Poland	35.6	40.8	5.24	17	Italy	18.9	22.2	3.3
18	Germany	42.6	36.1	-6.45	18	Belgium	16.3	21.9	5.53	18	EU28	17.9	21.2	3.3
19	Slovakia	21.3	14.8	-6.47	19	EU28	19.8	25.4	5.60	19	Croatia	15.2	18.7	3.5
20	Bulgaria	23.6	16.9	-6.68	20	Latvia	39.2	44.8	5.66	20	Romania	14.5	18.0	3.5
21	EU28	40.0	33.2	-6.88	21	Czech Republic	24.2	30.1	5.97	21	Czech Republic	15.9	19.4	3.6
22	Belgium	54.9	48.0	-6.95	22	Croatia	46.4	52.5	6.04	22	Finland	18.3	21.9	3.6
23	Italy	32.1	25.1	-7.07	23	Cyprus	17.9	24.3	6.41	23	Bulgaria	14.0	17.6	3.6
24	Sweden	67.2	59.9	-7.30	24	Luxembourg	14.1	20.6	6.57	24	Portugal	18.0	21.7	3.7
25	Netherlands	61.6	54.2	-7.45	25	Spain	17.3	24.9	7.52	25	Hungary	14.5	18.2	3.7
26	Romania	27.1	18.1	-8.98	26	Bulgaria	27.8	35.6	7.77	26	Slovakia	15.0	18.8	3.8
27	Austria	46.0	36.8	-9.20	27	Slovenia	26.5	34.4	7.93	27	Slovenia	17.6	21.4	3.8
28	Greece	41.0	31.7	-9.28	28	Italy	27.5	35.6	8.08	28	Spain	19.0	23.0	4.0
29	Spain	43.8	33.7	-10.02	29	Hungary	35.9	44.6	8.71	29	France	19.4	23.5	4.1
30	Slovenia	36.6	25.5	-11.14	30	Slovakia	36.7	45.9	9.21	30	Poland	15.7	20.1	4.4
31	Luxembourg	49.2	37.7	-11.47	31	Lithuania	38.9	48.3	9.40	31	Latvia	14.2	18.9	4.7
32	Iceland	61.9	49.9	-12.01	32	Romania	19.2	30.2	11.07	32	Lithuania	13.7	18.9	5.1
33	Cyprus	46.1	32.8	-13.24	33	Portugal	36.4	49.8	13.47	33	Estonia	15.5	20.7	5.2

Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Young or older gender paradox?

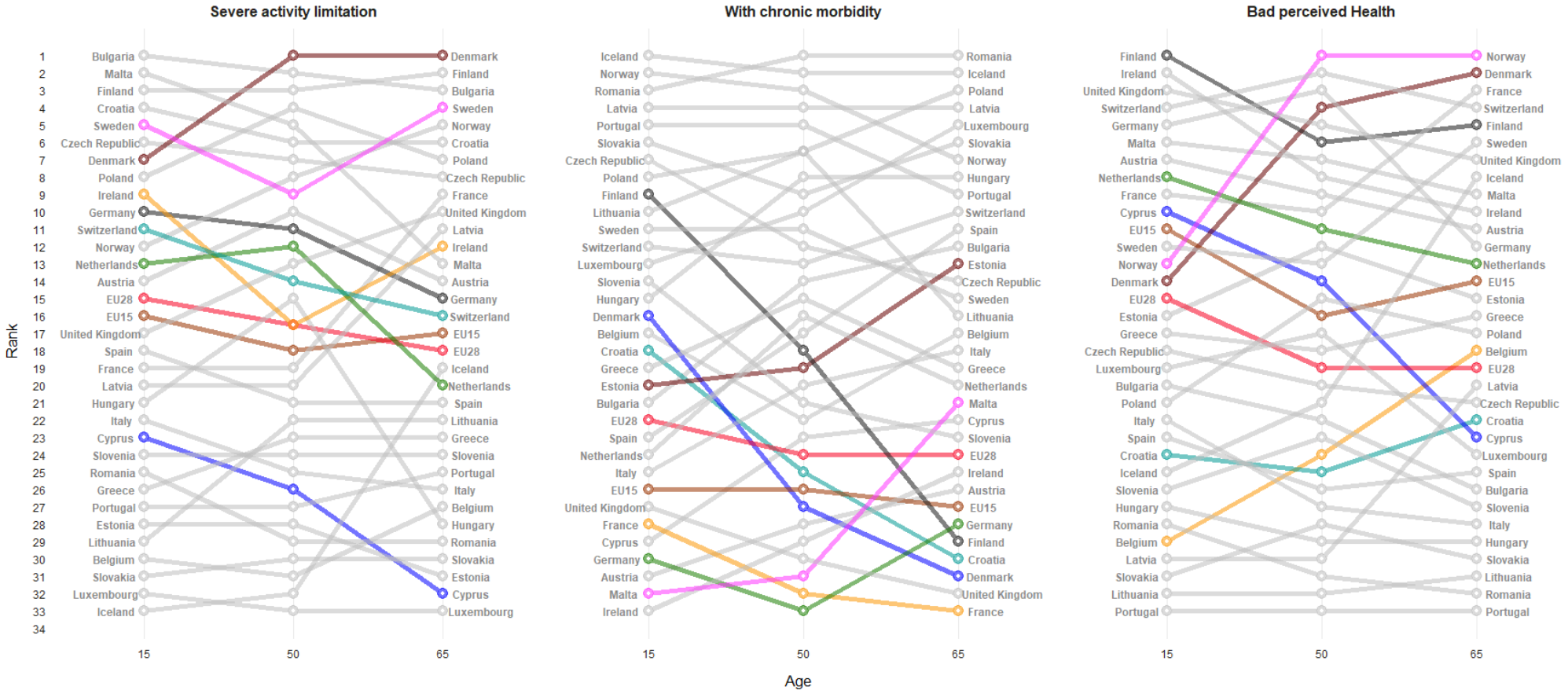
Further, when we consider ranking among countries, not only does the focus on the healthy or unhealthy part counts, but also the age at which we consider. Figure 10 shows the change in country performance once we move on the age axis for gender gaps in healthy expectancy with no activity limitation. Denmark ranks at 25th position at age 15, with one of the highest gender gaps. But it then moves up to 4th place at age 50 and then to 1st place at ages 65 and over. Similarly, Cyprus increases its gender gap with age, going from 5th place at age 15, passing to 20th place at age 50 and then arriving at ranking 26th by the age of 65. For health expectancy free of chronic morbidity, Finland presents the most dramatic case, going from a high gender gap at age 15 (rank 25) to a low gender gap at age 65 (rank 5). In terms of self-perception, Finland goes the opposite way, despite less dramatically, starting with the lowest gap at age 15 (1st rank) and then going to rank 7 at age 65. Cyprus increases its gap from rank 14 at age 15 to the last position (rank 33) at age 65. We also show in Figure11 the same rankings, but now for unhealthy life expectancies. For chronic morbidity the figures are not critically different, since they mirror each other. For severe limitation we can see that Denmark starts in a higher ranking at age 15, compared to no limitation. The destination is the same at age 65: 1st rank with the lowest gender gap. Ireland is also interesting because it has no age changes for no limitation, but for severe limitation it ranks relatively high at position 9 at age 15 and then drops to rank 16 at age 50 and rises again to 12 at age 65. Meaning that age matters more for gender gaps in severe activity limitation expectancy than for no activity limitation. The Netherlands also present overall lower gender gaps for bad perceived health than for good perceived health. Interestingly, the gender gap decreases with age for good perceived health and increases with age for bad perceived health.

Figure 10. Country rankings by age, for different healthy expectancies



Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Figure 10. Country rankings by age, for different unhealthy expectancies



Source: Statistics on income and living conditions (EU-SILC), European Health Interview Survey (EHIS)

Is the gender paradox country-specific?

As Tables 1-3 most notably highlight, the gender differences varies from country to country. However, as a measure of background for a group of countries, we used EU-15 and EU-28 grouping of countries as an indicator of levels of development. It is widely known that EU-15 is composed of more established countries, with higher levels of development, which were composed until year 1994 by Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and United Kingdom. Following year 1995 until 2004, Austria, Finland and Sweden were included. The group forming EU-28 included much less established and considered less developed countries, such as Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia in 2006, Bulgaria and Romania in 2013 and Croatia at last in 2013.

This background difference reflects on the indicators: the highest gender gaps are mostly always found for the EU-28 countries, at least until age 65, as shown in Figures 1-9. The EU-15 group presents lower proportions of total life expectancy spent with no activity limitation from ages 60 on (Figure 3), with chronic morbidity (Figure 6) and in bad self-perceived health (Figure 9). Interestingly, the highest differentials between EU-15 and EU-28 are found for self-perceived health indicators, with EU-15 countries presenting a more optimistic scenario as regards the perception of their own health. In addition, more differences were usually found among females for chronic diseases than males, with females from EU-15 countries presenting lower proportions of chronic morbidity than their EU-28 counterparts, especially after age 60. On all cases, the highest difference between these two groups of countries is for life expectancy. These findings support previous work that showed the associations between the more established EU countries and the newer EU countries, in which the association between structural indicators and the gender gap in years with activity limitations suggests that gender differences can be reduced (Van Oyen et al. 2010). Nonetheless, we consider either the bulk of the 28 European countries together (mixing the less established and the more established) or only the more established ones. Former work that has separated these two groups into the original (EU-15) and new member states (EU-10, before 2013) showed that actually women from the less advantageous countries experienced higher differentials relative to their male counterpart, in terms of more healthy life years (HLY, or healthy expectancy free of activity limitation). The explanation is that higher disability in women only partially offset the effect of lower mortality in the EU-10 countries, while in the EU15 women's higher disability prevalence almost completely offset women's lower mortality (Nusselder et al. 2010).

Concluding remarks: Paradox or paradoxes?

The aim of this work was to point out the differences in magnitude of the gender paradox across European countries. It has been widely documented that women live longer than men at all ages, but spend a higher proportion of their total life expectancy in poorer health (Case and Paxson 2005; Crimmins, Kim, and Hagedorn 2002; Crimmins, Kim, and Solé-Auró 2011; Oksuzyan et al. 2009; Robine et al. 2003). However, the magnitude of the gender paradox varies considerably across countries, age groups, and also on the health dimension chosen. Assessing appropriately these differences is of fundamental importance for a deeper understanding of the paradox and has many implications, especially if the aim is to perform cross-country comparisons. As Figures 9 and 10 most notably show, using gender differentials among countries as an indicator for gender inequality in health and mortality requires caution, since they are sensitive to various health indicators and age groups. There are also important cross-country differences that are fundamental. Some extreme cases have been pointed out in the literature, but are still inconclusive. In Austria, for example, ill health seems to be more compressed into the later years of life. Contrary to Fries' hypothesis (Fries 2005), however, life expectancy does not seem to be approaching a maximum average life span in Austria, as mortality rates at older ages have been continuously decreasing over the last 20 year (Doblhammer and Kytir 2001). However, it is important to emphasize that despite paramount efforts to harmonize data collection instruments in the SILC-survey, cross-country comparisons are still tricky (Van Oyen et al. 2010). Research has shown that some cross-country differences can be entirely explained by methodological differences in data collection instruments, mode of data collection, and patterns of non-response (Ekholm and Brønnum-Hansen 2009), although within-country comparison of sex differences in health expectancy are more robust. Another important limitation not only of the present work, but also of the results yielded from the SILC-survey is the absence of institutionalized persons. Depending on the proportion of persons that are institutionalized in a country, this difference could be negligible or of considerate importance. Nonetheless, this work showed that there is not only one single health-survival gender paradox, but many paradoxes, that are sensitive to age, contextual factors, and, most importantly, to the health dimension analyzed. This has important consequences for overarching policy strategies that aim at reducing gender gaps in health and mortality, since it is not enough to look at one specific gender gap as a target goal, but to account for all the possible differences and which one is the most important in a specific setting.

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