

# Depression in Later Life: a Closer Look at the Gender Gap

## **Abstract (OK)**

In a framework that considers being healthy something more than the mere absence of diseases, the research on well-being in later life needs to provide better insights into the determinants of the disparities in mental as well as physical health and well-being. Depression is a highly disruptive and costly condition, particularly common among the elderly. Despite differences across countries and age groups, a non-trivial and relatively consistent gender gap in depression has been reported, although the reasons for this gap remain unclear. A possible explanation is that the part of the gender gap that is not explained by compositional differences might simply be the result of a reporting bias, as women would be more inclined to report depressive symptoms than men. We test this hypothesis by using a method that decompose the self-reporting of limitations in usual activities in two components, one of which is a proxy for personal response style. Moreover, using the SHARE panel data, we explore whether and how aging shape trajectories of depressive symptoms; specifically, we assess whether the individual trajectories are sex-specific.

## **1. Introduction (FIRST DRAFT - TO DEVELOP)**

Late life depression is a common condition in most developed countries, (Gallagher et al. 2012; Castro-Costa et al. 2007), where it is forecasted to become the leading cause of disability by 2030 (Kok et al. 2011). It is associated with a decline in quality of life, functional disabilities, increased risk of heart disease and stroke (Blazer 2003), and worsening of health status (Gallagher et al. 2012). Depression is a debilitating and often prolonged condition (Ladin 2008), which places a financial burden on public health systems; in fact, depression is one of the most prevalent and costly conditions among the elderly (Verropoulou and Tsimbos, 2007).

Women appear to be at a constantly higher risk of depression than their male counterparts; this gender gap has been regularly found in previous research (Verropoulou and Tsimbos, 2007; Prince et al. 1999); across all the age range, in virtually all Western countries - independently of the overall level of depression - including the U.S. (Mirowski 1996), Canada (Wu et al. 2012), Japan (Tiedt 2010), and all European countries with the exception of Ireland and Finland (Van de Velde et al. 2010). However, the reasons of this association are still unclear (Maciejewski et al. 2001), and even though many studies have attempted to shed light on the puzzle of the gender gap

in depression, the answers they have provided are only partial. In fact, although demographics, socio-economic status, morbidity, and cognitive functions do moderate the relationship between gender and depression, they are not able to explain it completely. In other words, women are more likely to report depressive symptoms than men with the same sets of characteristics. Verropoulou and Tsimbos (2007) suggest that the unexplained part of the gender gap might derive from a gender-specific response bias, as women would “tend to report symptoms with greater frequency than men”. Another possible explanation is that women are more vulnerable to stressful life events, and thus they are more inclined to report depressive symptoms.

Over the life course depression seems to follow a U-shaped trajectory. Unsurprisingly, in our sample of elderly, age, with its relative functional and cognitive decline, is directly related to depression; as shown in figure 1, and consistently with the literature (see Wu et al. 2012) we find that depressive symptoms increase with age<sup>1</sup>, especially after 70. Whether this trajectory vary by sex is a question that has not been answered. In fact, most studies focusing on the gender gap are based on cross-sectional analysis, in which the effect of age might be confounded with a cohort effect.

The goal of our study is threefold: first, we analyze the probability of being depressed and the gender gap at baseline (wave 1); second, we characterize the gender gap in depression by country; and third, using the three available waves of data, we explore the trajectories of depressive symptoms by gender and assess how changes in marital, financial, and health status shape these trajectories. In doing so, we test the hypothesis that the gender gap is in part due to the fact that women are more vulnerable to stressful life events. In fact, under this scenario, the loss of a spouse, a poverty spell, or a significant decline in physical health, should have a deeper effect on women’s trajectories of depression.

## **2. Dataset and Variables (OK)**

We work with the data from wave 1 (2004/2005), wave 2 (2006/2007), and wave 4<sup>2</sup> (2011/2012) of the Survey of Health, Ageing and Retirement in Europe<sup>3</sup> (SHARE), which is a longitudinal multidisciplinary project, modeled after HRS and ELSA, and

---

<sup>1</sup> Although this might vary according to the specific measure of depression.

<sup>2</sup> Wave 3 (“Sharelife”) is not included as it collects only retrospective information.

<sup>3</sup> <http://www.share-project.org/>

implemented in 19 European countries. Some of the domains covered are physical and mental health, demographics, socio-economic status, and social and family networks. SHARE is based on probability samples, which are nationally-representative of the non-institutionalized population aged 50 and older. The data are collected through a computer-assisted personal interviewing technique (CAPI), which ensures an overall satisfying response rate, equals on average to 85.3% (see Borsch-Supan et al. 2005 for further details). Our analytic longitudinal sample includes 48,009 people, from the ten countries that have participated to the study at all points in time: Austria, Belgium, Switzerland, Germany, Denmark, Spain, France, Italy, Netherlands, and Sweden. Our cross-sectional analyses are carried out on the most recent wave (2011/2012) and include 32,222 individuals (14,687 men and 17,535 women) from the same subset of countries. Descriptive statistics relative to wave 4 are reported in table 1.

#### *Dependent Variables.*

Depression is based on the EURO-D scale, which includes 12 items (depressed mood, pessimism, suicidality, guilt, trouble sleeping, loss of interests, irritability, appetite, fatigue, concentration, enjoyment, and tearfulness), and assigns a score of 1 for each item selected by the respondent. The EURO-D scale has been developed in order to enhance cross-country comparisons in a European setting (Prince et al. 1999, Kok et al. 2011); its criterion validity has been demonstrated (Gallagher et al. 2012), and its psychometric properties have been established (Castro-Costa et a. 2007). In our study, the estimate of Chronbach's alpha of the EURO-D scale is 0.70, which indicates good internal consistency.

From the EURO-D scale, two measure of depression can be derived. The first measure is a count of depressive symptoms, which ranges from 0-12. The second is a binary measure of major depression; people who report 4 or more symptoms are considered depressed, while those with 3 or less symptoms are considered not depressed. This threshold has been validated "against a variety of criteria for clinically significant depression" for the EURODEP studies (Prince et al. 1999), and has been largely used in cross-European studies (Castro-Costa et al. 2007; Ladin 2007; Ladin et al. 2009; Kok et al. 2011; Gallagher et al. 2012). Although the gender gap in depression emerges from both measures, and the main covariates operate similarly (Wu et al. 2011) -which we have confirmed through exploratory work- for our analysis we use the number of depressive symptoms, as it is a more nuanced measure that seems to be particularly appropriate for the elderly (Baltes 1998), as they "often fail to meet the conventional criteria for major depression, despite experiencing higher levels of psychological distress than

younger people” (Wu et al. 2011). Moreover, in our longitudinal analysis we look at individual growth trajectories in depression, and for this matter the count variable fits our purposes better than the binary indicator of depression. In fact, with the latter, individual changes that take place either below or above the threshold would not be detected.

In our sample (at wave 4) and consistent with previous literature (Van de Velde, 2010), women are almost as twice as likely to suffer from major depression than men (37.6% vs. 20.1% -- see table 1). The gender difference in number of depressive symptoms is a little smaller, with women on average reporting 50% more symptoms than men (3.1 vs. 2.0). This reflects the fact that women tend to report more often every EURO-D item (see table 2); the only two items for which the gender ratio<sup>4</sup> is less than 1.20 and not significant at the 0.001 level are pessimism and irritability (see table 2). The gender ratio is highly significant in every country, ranging from 1.34 in Denmark to 1.79 in Spain, meaning that in Spain on average women score almost 0.8 points higher on the EURO-D scale than men. There is also evidence that the gender ratio tends to increase with the overall level of symptoms; in fact, the linear correlation is 0.57 and, although our sample includes only 10 country, is highly significant. The results of the gender gap across countries are not reported, but are available upon request.

*Dependent Variables.* In our analyses we included a number of covariates that have been found to have an association with depressive symptoms (Wu et al. 2012; Gallagher et al. 2007; Verropoulou and Tsimbos 2007; Maciejewski et al. 2001). Our principal dependent variable is gender, which we enter into our model as a proxy indicating whether the respondent is female. We control for other demographic characteristics, socio-economic status, health conditions, history of depression, cognitive functions, and three attitude variables on financial and health situation. We calculated age by subtracting the month and the year of birth from the month and the year of interview and we have recentered it so that 0 indicates age 50. Marital status is included in the model as a three category variable: married or in a registered partnership; divorced, separated, or never been married; and widowed. After exploratory analyses we verified that in terms of depressive symptoms married individuals do not differ from those in a partnership, as well as divorced, separated, and never been married do not differ from each other. Our final demographic control is country of residence, which we inserted in the model as a

---

<sup>4</sup> Calculated by dividing the proportion of women reporting the item considered by the proportion of men reporting the same item.

set of dummy variable, given the relatively low numbers of countries in our sample. Household income had to be adjusted in two ways; we use a PPP (purchasing power parity) index, which turn nominal incomes into real incomes, adjusting not only for different currency but also for different price level. We used the PPP index provided in SHARE, which has been calculated from OECD data and uses as a reference the price level of Germany in 2005 (see Borsch-Supan et al. 2005 for further details). At this point all monetary values are comparable across countries and time, but since we consider income and wealth at the household level – assuming that resources are equally shared among all members – we need a further adjustment, as households can be of different sizes. Following previous research (OECD 2008; Jürges H. 2007) we divide the household income by the square root of the number of its members, under the assumption that bigger households need more resources but that there are some economies of scale in consumption (OECD 2006); in this way we obtain the equivalent ppp-adjusted household income (hereafter simply household income) which we use in our analyses. Household net worth is generated as the sum of material and financial assets, which include home value in case of home ownership, minus debt. As income, it is adjusted for household composition and PPP. To adjust for the notable positive skewness of both income and worth, we transformed both of them using the natural logarithm. The level of education, which has been standardized by using the ISCED (International Standard Classification of Education) scale<sup>5</sup>, ranges from 0 (No formal education) to 6 (Second stage of tertiary education). Our final indicators of SES are two binary variables, indicating whether the respondent is employed or unemployed.

Health status is closely related to depressive symptoms, therefore it is important to control for a battery of health measures. In our analysis we include chronic conditions (0-15), number of symptoms (0-12), mobility limitations (0-10), limitations with Activities of Daily Living (ADL), limitations with Instrumental Activities of Daily Living (IADL). The first three are continuous variable that indicates the number of items (read by the interviewer from a list) that the respondent selects. ADL and IADL can range from 0-7, but since the majority of our sample (over 90% of men and 80% of women) does not report any, we operationalize these indicators as two binary variable, indicating whether the respondent reports one or more limitations, or none. For the complete lists of items that each of these health measure includes see appendix 1. Finally, we control for history of depression, with a 3 category variable, indicating

---

<sup>5</sup> This scale is maintained by the UNESCO (United Nations Educational, Scientific and Cultural Organization), and has the purpose of cross-country comparability. For additional information see: <http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx>.

whether the respondents have ever suffered from depression in the past, and if they have, whether they have been treated or not.

The cognitive functioning indicators are measures of Verbal Fluency, numeracy, and memory. Verbal fluency is a count of the number of different animals that the respondent is able to recall in one minute and ranges from 0 to 99, although only 5% of respondents score equal to or higher than 31. To adjust for this skewness we use its natural logarithm transformation. Memory is based on the number of words the respondent can name from a list of ten words read by the interviewer and ranges from 0 to 10. In our analysis we use the “first recall”, which corresponds to a short-term measure of memory, rather than long-term memory (measured through a second recall, further along during the interview). Exploratory work showed that these two variables are highly correlated, so we dropped the long-term memory measure on the basis of best model fit. Numeracy measures mathematical ability and is a count of the number of correct answers to a set of five questions.

Table 1 reports the descriptive statistics by gender. Statistical tests (t-tests for continuous variables and Chi-square test for categorical variables) confirm that men and women are significantly different in terms of demographics, SES, health conditions, and for some of the cognitive measures. Women are on average older, more likely to be widowed, less educated, and less likely to be employed; accordingly, they tend to be worse off financially. In addition, their health outcomes as well as their cognitive functions are constantly worse than their male counterparts; with the measure of memory being the only exception. They also report worse self-rated health, more severe limitations in usual activities, and greater difficulties in making ends meet. Exploratory work showed us that in our sample, consistent with the literature, virtually all characteristics that are more prevalent among women also tend to be associated with depressive symptoms; for instance, depression increases with age, and is higher among widowed, among people in worse health, and those with lower SES. On the other hand the factors that can be considered protective against depression, like being educated, married, in good health and in a good financial condition are more common among men. Therefore, the compositional differences between men and women might account for at least a part of the observed gender gap in depression.

### **3. Analytic Method**

#### **3a. Longitudinal Analysis**

$$Y_{ti} = \pi_{0i} + \pi_{1i}Age_{ti} + \pi_{2i}AgeSq_{ti} + e_{ti} \quad (1)$$

$$\pi_{0i} = \gamma_{00} + \gamma_{01}Female_i + r_{0i} \quad (2)$$

$$\pi_{1i} = \gamma_{10} + \gamma_{11}Female_i + r_{1i} \quad (3)$$

$$\pi_{2i} = \gamma_{20} + \gamma_{21}Female_i + r_{2i} \quad (4)$$

$$Y_{ti} = \pi_{0i} + \pi_{1i}Age_{ti} + \pi_{2i}AgeSq_{ti} + \sum_c \pi_c X_{cti} + e_{ti} \quad (1b)$$

### 3b. Cross-sectional Analysis

## 4. Results

### 4a. Longitudinal Analysis

### 4b. Cross-sectional Analysis - Step 1

### 4c. Cross-sectional Analysis - Step 2

### 4d. Cross-sectional Analysis - Step 3

## 5. Conclusion (TO DEVELOP)

In a framework that considers being healthy something more than the mere absence of diseases, the research on well-being in later life needs to provide better insights of the determinants of the disparities in physical as well as in mental health. Depression is a highly invalidating and costly condition, particularly common among the elderly.

Despite differences across countries and age groups, a non-trivial gender gap in depression is almost universally observed. As of now its causes still remain unclear; and unlike for other health outcomes, compositional differences are able to only partially explain it. By looking at the trajectories of depression, separately for men and women, we aim at discerning what are, not only the characteristics associated with the gender gap in depression at a fixed point in time, but also what are the processes linked to its evolution over time. The first step to eliminate disparities is to understand what generates them; with our study we hope to provide sensible notions that may contribute to this arduous goal.



## Tables and Figures

**Table 1 – Descriptive statistics by gender (SHARE wave 4 - 2010)<sup>1,2</sup>**

	Male (N=14,687)	Female (n=17,535)	Difference
Depressive Symptoms	2.0	3.1	***
Major Depression (%)	20.1	37.6	***
Age	64.8	66.7	***
MARITAL STATUS (%)			
Married/Partnership	77.1	58.1	***
Div/Sep/Never Married	15.7	16.2	NS
Widowed	7.2	25.8	***
EDUCATION (%)			
Primary	35.7	49.7	***
Secondary	40.8	32.5	***
Tertiary	23.5	17.7	***
Employed (%)	34.2	24.5	***
Unemployed (%)	4.6	2.6	***
Disabled (%)	3.8	3.3	**
Income (€, PPP)	22,596	19,641	***
Worth (€, PPP)	184,534	171,279	*
Chronic	1.5	1.7	***
Symptoms	1.5	2.3	***
Mobility Limitations	1.2	2.1	***
ADL (% 1 or more)	9.5	13.0	***
IADL (% 1 or more)	9.6	19.9	***
Verbal Fluency	19.0	18.2	***
Numeracy	3.6	3.2	***
Memory	5.2	5.2	NS
PAST DEPRESSION (%)			
No	77.7	63.1	***
Yes, treated	11.2	15.6	***
Yes, untreated	11.2	21.3	***
FINANCIAL DISTRESS			
Great	9.3	11.1	***
Some	25.8	28.0	***
Little	36.3	36.1	NS
None	28.6	24.8	***
SELF-RATED HEALTH (%)			
Poor	8.4	10.4	***
Fair	25.5	29.7	***
Good	40.3	39.2	*
Very Good	17.6	14.8	***
Excellent	8.3	6.0	***
SELF-RATED LIMITATIONS (%)			
Severely Limited	12.9	15.1	***
Limited but not severely	27.6	33.2	***
Not Limited	59.5	51.7	***
SRL_hat	1.4	1.3	***

Error\_SRL 0.0 0.0 NS  
 \* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

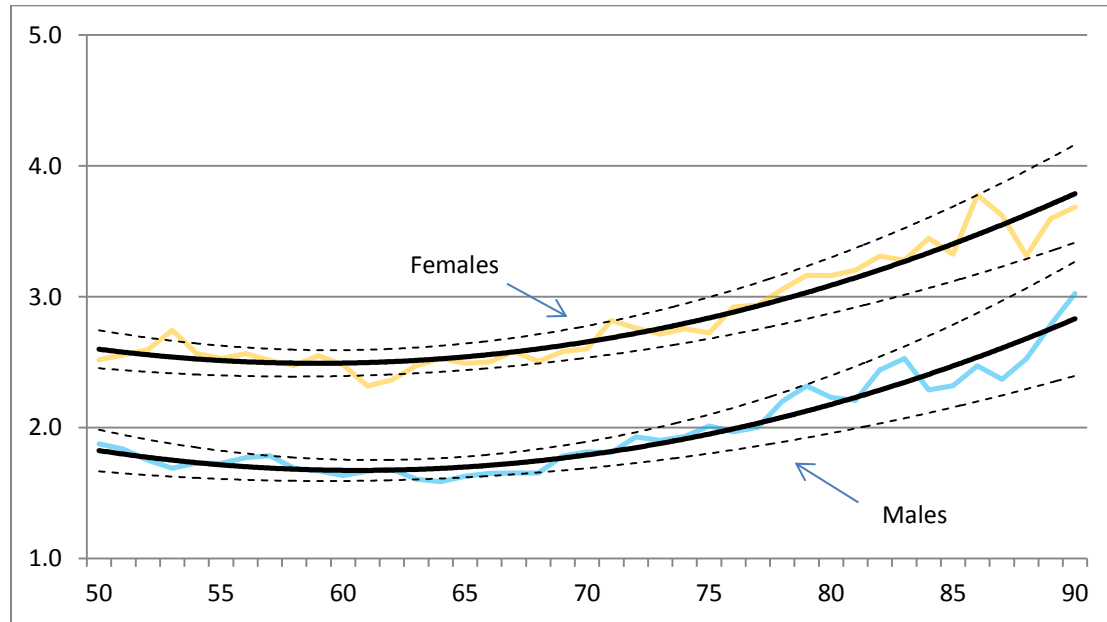
<sup>1</sup> Means for continuous variables, and percentages for categorical variables.  
<sup>2</sup> The total number of observations (N) is 32,222. All our subsequent cross-sectional estimations are based upon this analytic sample.

**Table 2 – Proportion of individuals reporting items from the EURO-D scale, by gender, and relative gender ratio.**

Item	Male	Female	Gender Ratio	Sig.
Depression	0.33	0.51	1.57	***
Pessimism	0.15	0.17	1.17	**
Suicidality	0.05	0.10	1.90	***
Guilt	0.05	0.09	1.67	***
Sleep	0.25	0.42	1.71	***
Interest	0.08	0.12	1.55	***
Irritability	0.29	0.32	1.09	*
Appetite	0.07	0.11	1.64	***
Fatigue	0.28	0.40	1.43	***
Concentration	0.19	0.24	1.28	***
Enjoyment	0.13	0.16	1.23	***
Tearfulness	0.13	0.38	2.83	***
Mean	0.17	0.25	1.51	***

\* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

**Figure 1 – Sex-specific trend in depressive symptoms (y-axis) by age (x-axis): observed values with confidence intervals<sup>1</sup>, and fitted order-2 polynomial.**



<sup>1</sup> In the calculation of the confidence interval we adjust for repeated observations by using the option "cluster" (Stata 13).

**Table 3 –Hierarchical Linear Models - (SHARE panel sample – wave 1, 2, and 4)<sup>1</sup>**

	Random intercept and slopes models				Same models with cross-level interactions			
	Fixed components		Random Components		Fixed components		Random Components	
	Exp(coeff.)	Sig.	Variance	Sig.	Exp(coeff.)	Sig.	Variance	Sig.
Model 1								
Intercept	4.817	***	0.609	***	4.804	***	0.609	***
Female	1.274	***			1.281	***		
Age	0.992	***	0.074	***	0.992	***	0.074	***
Age Square	1.000	***			1.000	***		
Female*Age					1.000	NS		
BIC	90277				90301			
Model 2								
Intercept	4.820	***	0.613	***	4.810	***	0.613	***
Female	1.274	***			1.279	***		
Age	0.992	***			0.992	***		
Age Square	1.000	***	0.013	***	1.000	***	0.013	***
Female*Age Square					1.000	NS		
BIC	90271				90302			
Model 3								
Intercept	4.820	***	0.613	***	4.826	***	0.613	***
Female	1.274	***			1.272	***		
Age	0.992	***	0.003	NS	0.991	***	0.001	NS
Age Square	1.000	***	0.013	***	1.000	***	0.013	***
Female*Age					1.001	NS		
Female*Age Square					1.000	NS		
BIC	90282				90335			

\* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

<sup>1</sup> The total number of respondents is 48,009; the total number of observations is 77,990.

**Table 4 – Negative Binomial Models<sup>1</sup>; Y = Number of Depressive Symptoms – (SHARE wave 4)**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Female	1.517***	1.434***	1.399***	1.257***	1.256***	1.205***	1.233***
COUNTRY (Austria)							
Germany		1.176***	1.222***	1.095**	1.083**	1.049	0.987
Sweden		0.998	1.055	1.066*	1.069*	1.010	1.008
Netherlands		0.956	0.979	0.978	0.969	0.924**	0.917**
Spain		1.429***	1.335***	1.285***	1.143***	1.101**	1.047
Italy		1.369***	1.293***	1.311***	1.215***	1.208***	1.142***
France		1.432***	1.457***	1.366***	1.307***	1.238***	1.183***
Denmark		0.873***	0.935*	0.933*	0.925**	0.893***	0.945*
Switzerland		0.982	1.067*	1.113***	1.094***	1.065**	1.068**
Belgium		1.215***	1.262***	1.144***	1.098***	1.042	1.041
Age		0.996	0.984***	0.994	0.993	0.994	0.992*
Age square		1.000**	1.000***	1.000	1.000	1.000	1.000
MARITAL STATUS (Married/Partner)							
Divorced/Separated/Never married		1.106**	1.077*	1.001	0.998	0.956	0.952
Widowed		1.195***	1.165***	1.099**	1.094**	1.058	1.056
Education			0.946***	0.977**	1.005	1.001	1.011
Employed (yes/no)			0.819***	0.934*	0.937	0.965	0.983
Unemployed (yes/no)			1.085	1.186**	1.167**	1.159**	1.104
Ln(Income)			0.995	0.994	1.003	0.999	1.008
Ln(Worth)			0.787***	0.929	0.978	0.990	1.072*
Chronic conditions				1.019*	1.019**	1.015*	0.988
Symptoms				1.161***	1.160***	1.135***	1.104***
ADL (yes/no)				1.056	1.045	1.041	0.996
IADL (yes/no)				1.217***	1.171***	1.164***	1.116***
Disabled				1.194***	1.136**	1.086	1.000
Ln(Verbal Fluency)					0.912**	0.904***	0.934**
Numeracy					0.945***	0.943***	0.949***
Memory					0.959***	0.958***	0.966***
PAST DEPRESSION (No)							
Yes, treated						1.316***	1.293***
Yes, untreated						1.505***	1.458***
Financial Distress							0.945***
Self-Rated Health							0.834***
Adjusted R Square (McFadden)	0.012	0.022	0.029	0.075	0.079	0.090	0.100

\* p &lt; 0.05; \*\* p &lt; 0.01; \*\*\* p &lt; 0.001

<sup>1</sup> IRR (Incidence Rate Ratios) are reported.

**Table 5 – Ordered Logit Model; Y = Self-Rated Limitations in usual activities – (SHARE wave 4)**

Self-Rated Limitations	OR
Female	0.824*
COUNTRY (Austria)	
Germany	0.633***
Sweden	0.943
Netherlands	0.520***
Spain	4.626***
Italy	2.108***
France	1.269***
Denmark	1.243***
Switzerland	1.270***
Belgium	0.870*
Age	0.990**
MARITAL STATUS (Married/Partner)	
Divorced/Separated/Never married	1.188
Widowed	1.208*
Education	1.061**
Disabled	0.239***
Ln(Income)	1.115***
PAST DEPRESSION (No)	
Yes, treated	0.832*
Yes, untreated	0.778***
Chronic conditions	0.775***
Symptoms	0.727***
Mobility Limitations	0.672***
ADL (yes/no)	0.752
IADL (yes/no)	0.599***
Chronic*Female	1.084
Symptoms*Female	1.121*
Mobility*Female	1.053
ADL*Female	0.957
IADL*Female	1.353
Cut point 1	0.047***
Cut point 2	0.652
Pseudo R Square	0.2688

\* p &lt; 0.05; \*\* p &lt; 0.01; \*\*\* p &lt; 0.001

<sup>1</sup> OR (Odds Ratios) are reported.

**Table 6 – Negative Binomial Models<sup>1</sup>; Y = Number of Depressive Symptoms – (SHARE wave 4)**

<b>Depressive Symptoms</b>	Model 7	Model 8	Model 9	Model 10	Model 11
Female	1.233***	1.245***	1.244***	0.980	0.979
COUNTRY (Austria)					
Germany	0.987	0.970	0.973	0.976	0.976
Sweden	1.008	1.009	1.008	1.009	1.008
Netherlands	0.917**	0.896***	0.893***	0.901***	0.902***
Spain	1.047	1.107**	1.119**	1.109**	1.108**
Italy	1.142***	1.175***	1.182***	1.186***	1.185***
France	1.183***	1.201***	1.206***	1.203***	1.203***
Denmark	0.945*	0.958	0.956	0.951	0.951
Switzerland	1.068**	1.086***	1.087***	1.081***	1.081***
Belgium	1.041	1.040	1.039	1.041	1.042
Age	0.992*	0.992*	0.992*	0.993	0.993
Age square	1.000	1.000	1.000	1.000	1.000
MARITAL STATUS					
(Married/Partner)					
Divorced/Separated/Never married	0.952	0.961	0.962	0.959	0.959
Widowed	1.056	1.068*	1.070*	1.077**	1.076*
Education	1.011	1.014	1.013	1.012	1.012
Employed (yes/no)	0.983	0.986	0.986	0.999	0.999
Unemployed (yes/no)	1.104	1.106	1.104	1.117*	1.116*
Ln(Income)	1.008	1.013	1.013	1.012	1.012
Ln(Worth)	1.072*	1.073*	1.071*	1.067	1.067
Chronic conditions	0.988	0.978**	0.979**	0.981**	0.980**
Symptoms	1.104***	1.087***	1.088***	1.095***	1.095***
ADL (yes/no)	0.996	0.956	0.955	0.965	0.965
IADL (yes/no)	1.116***	1.070*	1.069*	1.088**	1.088**
Disabled	1.000	0.937	0.936	0.951	0.952
Ln(Verbal Fluency)	0.934**	0.937**	0.937*	0.938*	0.937*
Numeracy	0.949***	0.949***	0.949***	0.949***	0.949***
Memory	0.966***	0.967***	0.967***	<b>0.967***</b>	0.967***
PAST DEPRESSION (No)					
Yes, treated	1.293***	1.285***	1.285***	1.284***	1.283***
Yes, untreated	1.458***	1.443***	1.444***	1.447***	1.447***
Financial Distress	0.945***	0.947***	0.947***	0.948***	0.947***
Self-Rated Health	0.834***	0.840***	0.851***	0.853***	0.853***
SRL_hat		0.848***	0.835***	0.782***	0.780***
Error_SRL			0.945***	0.943***	0.908***
Gali_hat*Female				1.199***	1.203***
Error_SRL*Female					1.062
Adjusted R Square (McFadden)	0.100	0.101	0.101	0.102	0.102

\* p &lt; 0.05; \*\* p &lt; 0.01; \*\*\* p &lt; 0.001

<sup>1</sup> IRR (Incidence Rate Ratios) are reported.

**Table 7 – Gender Gap from Model 11**

SRL - Reference category	IRR	Sig.
Severely Limited	0.979	NS
Limited but not severely	1.178	***
Not Limited	1.416	***

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

## **Appendix 1: Health indicators**

### *Depression:*

1. Depressed mood
2. Pessimism
3. Suicidality
4. Guilt
5. Sleep
6. Interest
7. Irritability
8. Appetite
9. Fatigue
10. Concentration
11. Enjoyment
12. Tearfulness.

### *Chronic conditions:*

1. Heart attack including myocardial infarction or coronary thrombosis or any other heart problem including congestive heart failure
2. High blood pressure or hypertension
3. High blood cholesterol
4. Stroke or cerebral vascular disease
5. Diabetes or high blood sugar
6. Chronic lung disease such as chronic bronchitis or emphysema
7. Asthma
8. Arthritis, including osteoarthritis, or rheumatism
9. Osteoporosis
10. Cancer or malignant tumour, including leukaemia or lymphoma, but excluding minor skin cancers
11. Stomach or duodenal ulcer, peptic ulcer
12. Parkinson disease
13. Cataracts

14. Hip fracture or femoral fracture
15. Other conditions, not yet mentioned.

*Symptoms:*

1. Pain in your back, knees, hips or any other joint
2. Heart trouble or angina, chest pain during exercise
3. Breathlessness, difficulty breathing
4. Persistent cough
5. Swollen legs
6. Sleeping problems
7. Falling down
8. Fear of falling down
9. Dizziness, faints or blackouts
10. Stomach or intestine problems, including constipation, air, diarrhoea
11. Incontinence or involuntary loss of urine
12. Other symptoms, not yet mentioned.

*ADL limitations:*

1. Dressing, including putting on shoes and socks
2. Walking across a room
3. Bathing or showering
4. Eating, such as cutting up your food
5. Getting in and out of bed
6. Using the toilet, including getting up or down.

*IADL limitations:*

1. Using a map to figure out how to get around in a strange place
2. Preparing a hot meal
3. Shopping for groceries
4. Making telephone calls
5. Taking medications
6. Doing work around the house or garden
7. Managing money, such as paying bills and keeping track of expenses.

*Mobility limitations:*

1. Walking 100 meters
2. Sitting for about two hours
3. Getting up from a chair after sitting for long periods



4. Climbing several flights of stairs without resting
5. Climbing one flight of stairs without resting
6. Stooping, kneeling, or crouching
7. Reaching or extending your arms above shoulder level
8. Pulling or pushing large objects like a living room chair
9. Lifting or carrying weights over 10 pounds/5 kilos, like a heavy bag of groceries
10. Picking up a small coin from a table.

## References

- Bambra C., Pope D. P., Swami V., Stanistreet D. L., Roskam A. J., Kunst A. E., et al. 2008. Gender, health inequalities and welfare state regimes: a cross-national study of thirteen European countries. *Journal of Epidemiology and Community Health* 63, 1:38-44.
- Barefoot J. C., Mortensen E. L., Helms M. J., Avlund K., and Schroll M. 2001. A longitudinal study of gender differences in depressive symptoms from age 50 to 80. *Psychology and Aging* 16:342-345.
- Bebbington P. E. 1998. Sex and depression. *Psychological Medicine* 28:1-28.
- Blazer D. G. 2003. Depression in later life: review and commentary. *The Journal of Gerontology* 58: 249-265.
- Börsch-Supan A., & Jürges H. 2005. The survey of health, Ageing and Retirement in Europe – Methodology. *Mannheim Research Center for the Economics of Ageing* (MEA), Mannheim.
- Castro-Costa E., Dewey M., Stewart R., Banerjee S., Huppert F., Mendonca-Lima C., Bula C., Reisches F., Wancata J., Ritchie K., Tsolaki M., Mateos R., and Prince M. 2007. Prevalence of depressive symptoms and syndromes in later life in ten European countries: The SHARE study. *The British Journal of Psychiatry* 191:393-401.
- Chevron E. S., Quinlan D. M., and Blatt S. J. 1978. Sex roles and gender differences in the experience of depression. *Journal of Abnormal Psychology* 87:680-683.
- Crimmins E. M., Kim J. K., and Solé-Auró A. 2010. Gender differences in health: Results from SHARE, ELSA, and HRS. *European Journal of Public Health* 21, 1:81-91.

- Gallagher D., Savva G., Kenny R., and Lawlor B. A. 2012. What predicts persistent depression in older adults across Europe? Utility of clinical and neuropsychological predictors from the SHARE study. *Journal of affective disorders* 147, 1:192-197
- Gatz M., & Fiske A. 2003. Aging women and depression. *Professional Psychology: Research and Practice* 34, 1:3-9.
- Grol-Prokopczyk, H., Freese, J., & Hauser, R. M. (2011). Using Anchoring Vignettes to Assess Group Differences in General Self-Rated Health. *Journal of Health and Social Behavior*, 52, 246-61.
- Gutierrez-Lobos K., Wöfl G., Scherer M., Anderer P., Schmidl-Mohl B. 2000. The gender gap in depression reconsidered : the influence of marital and employment status on the female/male ration of treated incidence rates. *Social Psychiatry and Psychiatric Epidemiology* 35:202-210
- Hopcroft R. L., and Burr Bradley D. 2007. The sex difference in depression across 29 countries. *Social Forces* 85, 4:1483-1507.
- Hopcroft R. L., and McLaughlin J. 2012. Why is the sex gap in feelings of depression wider in high gender equity countries? The effect of children on the psychological well-being of men and women. *Social Science research* 41:501-513
- Kaplan, G., and Baron-Epel, O. (2003). What lies behind the subjective evaluation of health status? *Social Science and Medicine*, 56, 1669-1676.
- King G., Murray C. J. L M., Salomon J. A., and Tandon A. 2004. Enhancing the validity and cross-cultural comparability of measurement in survey research. *American Political Science Review* 98, 1:191-207.
- King, G., and Wand, J. (2007). Comparing Incomparable Survey Responses: Evaluating and Selecting Anchoring Vignettes. *Political Analysis*, 15, 46-66.
- Kok R., Avendano M., Bago d'Uva T., and Mackenbach J. 2012. Can reporting heterogeneity explain differences in depressive symptoms across Europe? *Social Indicators Research* 105:191-210.
- Jürges H. 2007. Health Inequalities by Education, Income, and Wealth: A Comparison of 11 European Countries and the US. *Mannheim Research Center for the Economics of Ageing (MEA)*, Mannheim.
- Ladin K. 2008. Risk of late-life depression across 10 European union countries: deconstructing the education effect. *Journal of Aging and Health* 20:653-670.

- Ladin K., Daniels N., and Kawachi I. 2009. Exploring the relationship between absolute and relative position and late-life depression: evidence from 10 European countries. *The Gerontologist* 1:48-59.
- Macintyre S., Hunt K., and Sweeting H. 1996. Gender differences in health: Are things really as simple as they seem? *Social Science & Medicine* 42, 4:617-624.
- Maciejewski P. K., Prigerson H. G., and Mazure C. M. 2001. Sex differences in event-related risk for major depression. *Psychological Medicine* 31:593-604.
- Miech R. A., and Shanahan M. J. 2000. Socioeconomic status and depression over the life course. *Journal of Health and Social Behavior* 41, 2:162-176.
- Mirowsky J. 1996. Age and the gender gap in depression. *Journal of Health and Social Behavior* 37, 4:362-380.
- Mirowsky J., and Reynolds J. R. 2000. Age, depression, and attrition in the National Survey of Families and Households. *Sociological Methods & Research* 28:476-504.
- Mirowsky J., & Ross C. E. 1996. Fundamental analysis in research on well-being: Distress and the sense of control. *The Gerontologist* 36:584-594.
- Mirowsky J., and Ross C. E. 2001. Age and the effect of economic hardship on depression. *Journal of Health and Social Behavior* 42, 2:132-150.
- Newmann J. P. 1989. Aging and depression. *Psychology and Aging* 4, 2:150-165.
- Nolen-Hoeksema S., Grayson C., and Larson J. 1999. Explaining the gender difference in depressive symptoms. *Journal of Personality and Social Psychology* 77, 5:1061-1072
- OECD. 2006. What are equivalence scales? *Organization for Economic Cooperation and Development*. Social Policy Division, Paris.
- OECD. 2008. Growing unequal? Income distribution and poverty in OECD countries. *Organization for Economic Cooperation and Development*. Paris.
- Piccinelli M., and Wilkinson G. 2000. Gender differences in depression. *British Journal of Psychiatry* 177:486-492.
- Prince M. J., Beekman A. T., Deeg D. J., Fuhrer R., Kivela S. L., Lawlor B. A., Lobo A., Magnusson H., Meller I., van Oyen H., Reischies F., Roelands M., Skoog I., Turrina C., Copeland J. R. 1999. Depression symptoms in late life assessed using the EURO-D scale.

- Effect of age, gender and marital status in 14 European centres. *British Journal of Psychiatry* 174:339-345.
- Rueda S., Artazcoz L., and Navarro V. 2007. Health inequalities among the elderly in western Europe. *Journal of epidemiology and community health* 62:492-498.
- Sergeant J., and Firth D. 2006. Relative Index of Inequality: Definition, estimation, and inference. *Biostatistics* 7:213-224.
- Singer J. D., and Willett J. B. 2003. Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence. New York: Oxford University Press.
- Sobocki P., Jonsson B., Angst J., & Rehnberg C. 2006. Cost of depression in Europe. *Journal of Mental Health Policy and Economics* 9:87-98.
- Steer R. A., Beck A. T., and Brown G. 1989. Sex differences on the revised Beck Depression Inventory for outpatients with affective disorders. *Journal of Personality Assessment* 53:693-702.
- Stommel M., Given G. A., Given C. W., et al. 1993. Gender bias in the measurement properties of the Centre for Epidemiologic Studies Depression Scale (CES D). *Psychiatry Research* 49:239-250.
- Tiedt A. D. 2010. The gender gap in depressive symptoms among Japanese elders: Evaluating social support and health as mediating factors. *Journal of Cross Cultural Gerontology* 25:239-256
- Van de Velde S., Bracke P., and Levecque K. 2010. Gender differences in depression in 23 European countries. Cross-national variation in the gender gap in depression. *Social Science and Medicine* 71:305-313.
- Veijola J., Puukka P., Lehtinen V., Moring J., Lindholm T., and Vaisanen E. 1998. Sex differences in the association between childhood experiences and adult depression. *Psychological Medicine* 28:21-27.
- Verropoulou G., and Tsimbos C. 2007. Socio-demographic and health-related factors affecting depression of the Greek population in later life: an analysis using SHARE data. *European Journal of Aging* 4:171-181.

- Weissman M. M., Bland R., Joyce P. R., Newman S., Wells J. E., Wittchen H. U. 1993. Sex differences in rates of depression: cross-national perspectives. *Journal of affective disorders* 29:77-84
- Weissman M. M., and Klerman G. L. 1977. Sex differences and the epidemiology of depression. *Archives of General Psychiatry* 34:99-111.
- Winship C. and Mare R. D. 1992. Models for sample selection bias. *Annual Review of Sociology* 18:327-350.
- Winship C. and Radbill L. 1994. Sampling weights and regression analysis. *Sociological Methods and Research* 22, 2:230-257.
- Wu Z., Schimmele C. M., & Chappell N. L. 2012. Aging and late-life depression. *Journal of aging and health* 24, 1:3-28.
- Yang, Yang. 2007. "Is Old Age Depressing? Growth Trajectories and Cohort Variations in Late-Life Depression." *Journal of Health and Social Behavior* 48:16-32