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Course of depressive symptoms and associated factors in people aged65+ in Europe: A two-year follow-up

Josep L. Conde-Sala , Josep Garre-Olmo , Laia Calvó-Perxas ,
Oriol Turró-Garriga , Joan Vilalta-Franch

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Highlights

- The prevalence of relevant depressive symptoms increased over the 2-year period

- Factors associated with incidence were gender, self-rated health and loneliness

- Country-specific factors are relevant regarding to differences in epidemiology

Abstract

Background: The epidemiology of depressive disorders presents notable differences among European countries. The objectives of the study are to determine the prevalence, incidence, persistence and remission rates of depressive symptoms and to identify risk factors and differences between four European regions.

Method: Prospective cohort design using data from waves 5 and 6 (2013-15) of the Survey of Health, Ageing and Retirement in Europe. Sample size included 31,491 non-institutionalized adults aged 65+. Depressive symptoms were assessed using the EURO-D.

Results: The prevalence of depressive symptoms (EURO-D ≥4) was 29.8% and 31.5%in waves 5 and 6, respectively. The risk factors associated depressive symptoms were poorer self-rated health, loneliness, impairment in ADL, female gender and financial difficulties. Incidence was 6.62 (99.9% CI: 6.61-6.63)/100 person-years and the persistence and remission rates were 9.22 and 5.78, respectively. Regarding the differences between European regions, the incidence (4.93 to 7.43) and persistence (5.14 to 11.86) rates followed the same ascending order: Northern, Eastern, Continental and Southern. The remission presented higher rates in the Eastern and Southern (6.60-6.61) countries than in the Northern and Continental (4.45-5.31) ones.

Limitations: The EURO-D scale is unable to distinguish between clinically relevant depressive symptoms and major depression.

Conclusion: The risk factors related to the incidence of depressive symptoms differed across European regions. In countries of eastern and southern Europe the most important predictors were female gender and impairment in ADL. Poorer self-rated health and older age were more relevant in the Northern countries, and chronic diseases were a key factor in the Continental region.

Course of depressive symptoms and associated factors in people aged65+ in Europe: A two-year follow-up

Authors: Josep L. Conde-Sala[a,b], Josep Garre-Olmo[b,c], Laia Calvó-Perxas[b], Oriol Turró-Garriga[b], Joan Vilalta-Franch [b,c]

Institutional affiliations

[a] Institut de Neurociències, Universitat de Barcelona. Spain

[b] Girona Biomedical Research Institute (IDIBGI), Research Unit, Institut d'Assistència Sanitària, Salt, Spain

[c] Department of Medical Sciences, University of Girona, Spain

Corresponding author: Josep Garre-Olmo

Girona Biomedical Research Institute. Parc Hospitalari Martí i Julià Edifici Mancomunitat 1. C/ Dr. Castany s/n; 17190 Salt (Girona) Catalonia, Spain.

Tel.: #34-972-182600 (ext. 1833); Fax: #34-972-189017; E-mail adress: josep.garre@ias.cat

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1. Introduction

Depressive disorders are common and affect more than 40.2 million people across Europe, with a prevalence of 5.1% in women and 3.6% in men (major depression and dysthymia), and they account for 8.1% of all years lived with disability (WHO, 2017). Depression is also the main indicator associated with lower quality of life (Conde-Sala et al., 2017; Portellano-Ortiz et al., 2018).

The review studies indicate that prevalence rates for clinically relevant depressive symptoms in older adults vary widely (7.2-49.0%) due to the different instruments, criteria, settings and methodologies used to collect data (Djernes, 2006). Although major depressive episodes are less common in older age (1-4%), what is referred to as sub-clinical depression is a particularly relevant phenomenon (8-16%), (Alexopoulos, 2005; Blazer, 2003).

In a recent study with a sample of people aged 65+ from 12 European countries, prevalence was 12.6% for cases of depression and 15.2% for sub-threshold depression, assessed with the Geriatric Mental State Examination (GMS-AGECAT) (Braam et al., 2014). However, the WHO study of the European region (WHO, 2016) warned that due to increasing life expectancy the burden of depression will progressively shift towards older age groups, among whom risk factors for depression such as bereavement and comorbid health conditions are more frequent.

Some of the most commonly used instruments to assess depressive symptoms are CES-D (Radloff, 1977), GDS-15 (Sheikh and Yesavage, 1986), and EURO-D (Prince et al., 1999), and they show higher prevalences than other instruments assessing only depressive disorders. Studies that have used the EURO-D scale to assess depressive symptoms in European countries have reported prevalence rates, between 17.8%-38.3% for the over-50s (Castro-Costa et al., 2007; Peytremann-Bridevaux et al., 2008) and 15.8% -41.4% in people aged 65+ (Damian et al., 2013; Conde-Sala et al., 2017; Belvederi Murri et al., 2018). The related factors are poorer self-rated health, female gender,

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financial difficulties, widowhood, fewer social activities and low educational level (Portellano-Ortiz et al., 2017). It is important to note that the prevalence of depressive symptoms varies according to geographical region, with rates being lower in northern Europe (Sweden, Denmark, The Netherlands) and higher in more southern countries (Italy, Spain, France), (Castro-Costa et al., 2007). This variability across different geographical areas is supported by other studies that have highlighted the importance of social and cultural factors such as level of education, income and loneliness (Guerra et al., 2016; Ylli et al., 2016).

Incidence rates for depressive disorders in Europe range between 3.4 and 4.2/100 person- years (Luppa et al., 2012a; Weyerer et al., 2013). Higher incidence has been associated with female gender, physical health problems, functional impairment, poor social networks and, in some studies, with older age (Weyerer et al., 2013).

Persistence rates range between 23.0% and 61.0% (Comijs et al., 2015; Gallagher et al., 2013; Luppa et al., 2012a), the associated factors being chronic disease, functional impairment, female gender, a history of depression and younger age at onset.

Remission rates are also variable (4.8%-60.0%) (Comijs et al., 2015; Houtjes et al., 2014; Luppa et al., 2012a), with the likelihood of remission being linked to less depression at baseline, less anhedonia and fewer neurovegetative symptoms at baseline (Andreescu et al., 2008), and better health and younger age (Kennedy et al., 1991) with respect to persistent cases. Remission has also been shown to be less likely among women (Barry et al., 2008).

The general aim of this study was to determine the course of depressive symptoms in a sample of people aged 65+ from 14 European countries over a two-year period. The specific aims were: 1. To identify the variables associated with depressive symptoms and their prevalence. 2. To determine the incidence, persistence and remission rates and to identify predictor variables and 3. To explore differences between four European regions: Northern, Continental, Eastern and Southern.

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2. Methods

2.1. Study design

This was a prospective population-based study using data from waves 5 and 6 of the Survey of Health, Ageing and Retirement in Europe (SHARE), (Börsch-Supan et al., 2013), corresponding to the years 2013 and 2015 respectively. The data analysed were for people aged 65+. The SHARE study provides information about sociodemographic variables, physical and mental health, quality of life, socioeconomic status and activities. This information was collected by means of a computer-assisted personal interview (CAPI) lasting around 90 minutes and conducted in the participant's home. The analyzed waves include the most recent SHARE data.

For the present study we considered countries for which longitudinal data were available in waves 5 and 6: Denmark, Sweden, Switzerland, Luxembourg, Austria, Germany, Belgium, France, Slovenia, Czech Republic, Estonia, Spain, Italy and Israel. Mean individual response rates with respect to the number of eligible participants in longitudinal samples were 69.4% in wave 5 and 67.1% in wave 6. Response rates by country in the two waves (5 / 6) ranged from 57.9% / 48.0% in France to 85.0% / 79.2% in Estonia (Malter and Börsch-Supan, 2015, 2017).

The sample for the present study comprised 23,201 older adults with complete data on the EURO-D in waves 5 and 6, and 31,491 people aged 65+ who were initially available in wave 5 (Figure 1).

2.2. Measures

The SHARE data, variables and instruments considered in the present study were:

- *Sociodemographic data*: Age (<75/≥75years), gender (male/female), marital status (married/unmarried) and years of schooling (<10 years/≥10 years).

- *Socioeconomic data*: Financial difficulties, making monthly ends meet (No

difficulties/Difficult).

- *Physical health*: Subjective rating of health (Very good, Good/Fair, Poor), chronic diseases (heart disease, hypertension, cholesterol, stroke, diabetes, chronic lung disease, cancer, ulcer, Parkinson, fractures, dementia) (0-1/≥2) and impairment in basic and instrumental activities of daily living (ADL) (No/≥1).

- *Loneliness*: Scores on a short loneliness scale (Hughes et al., 2004) comprising three items (lack companionship, feel left out, feel isolated) on which respondents indicate the frequency of the corresponding feeling; total score ranging from 3 to 9. The Cronbach's alpha for the original scale was 0.72, and in the present study 0.76. A score above 3 is considered indicative of loneliness.

- *Depressive symptoms.* Assessed using the EURO-D (Prince et al., 1999a, 1999b; Guerra et al., 2015), which comprises 12 items (depressive symptoms, pessimism, death wish, guilt, irritability, crying, fatigue, sleep problems, loss of interest and appetite, reduced ability to concentrate and capacity to enjoy things over the last month). Items require a yes/no response and the total score ranges from 0-12. The EURO-D was designed using items from other 5 instruments: the GMS-AGECAT (Copeland et al, 1986), the SHORT CARE (Gurland et al., 1984), the CPRS (Åsberg et al., 1978), the CES-D (Radloff, 1977), and the ZSDS (Zung, 1965).

Reliability and validity analyses were performed in 14 different European centers, showing appropriate psychometric yields. Internal consistency was measured using Cronbach alpha with values 0.74-0.80 with the CES-D, and 0.61-0.75 with the GMS and the SHORT-CARE. Regarding validity, Spearman correlations were 0.70-0.92 with the CES-D, 0.84 with the ZSDS, and 0.79 with the SHORT-CARE (Prince et al., 1999a).

The cut-off for clinically relevant depressive symptoms is ≥4, with a mean sensitivity of 74.8% and mean specificity of 82% across different European countries. The reported Cronbach's alpha

was moderate (0.69), as in the present study (0.72).

- *Cognition.* Specific items from the SHARE project were used to assess the cognitive status of participants, based on the items for immediate recall (range = 0-10), delayed recall (range = 0-10), subtraction calculation skills (range = 0-5) and verbal fluency (range = 1-10). We created a combined scale including all these items, with a total score ranging between 0 and 35. This variable was dichotomized with respect to the mean score (≥15/<15 points).

2.3. Statistical analysis

We carried out a descriptive analysis with the whole sample, calculating frequencies for the clinical and sociodemographic variables in waves 5 and 6 and the associated depressive symptoms (EURO-D ≥4). The Chi-square test (χ^2) was used to examine differences. The effect size for differences between proportions was assessed by means of Cramer's V (*V*), the value of which depends on the degrees of freedom: df_1 = small effect (≤0.10), medium effect (0.30), large effect (≥0.50); df_3 = small effect (≤0.06), medium effect (0.17), large effect (≥0.29) (Cohen, 1988).

The same procedure was used to identify in wave 5 the variables associated with depressive symptoms and their prevalence in the four European regions, and to analyse the differences between them. The regions corresponded to country clusters based on the model of social welfare (Whelan and Maître, 2010; Hemerijck, 2013): Northern (Denmark, Sweden), Continental (Switzerland, Luxembourg, Austria, Germany, Belgium, France), Eastern (Slovenia, Czech Republic, Estonia) and Southern (Spain, Italy, Israel).

In order to assess the relative impact of clinical and sociodemographic variables in the sample as a whole and in the four European regions we conducted multivariate binary logistic regression analyses for waves 5 and 6, taking the EURO-D score (≥4) as the dependent variable.

We created a new variable, 'Depression status', using data for the course of depressive symptoms (EURO-D (≥4) and comparing waves 5 and 6: 'No depressive symptoms' (in either wave), 'Incidence' (only in wave 6), 'Persistence' (in both waves) and 'Remission' (only in wave 5).Incidence was defined as the number of persons with a new depressive episode divided by the total person-years at risk x 100 (Rothman, 2002).The confidence intervals (99.9% CI) were based on the exact Poisson distribution. Persistence and remission rates were expressed in the tables as the incidence rates (rate *100 persons-years), but we used percentages in the text in order to ease the comparison with other studies.

A new series of multivariate binary logistic regression analyses was then conducted to identify the predictor variables in wave 5 of incidence and persistence vs. no depressive symptoms, and of remission vs. persistence.

In all the multivariate logistic analyses all the variables were entered in a single step, indicating the odds ratio (OR) and the confidence interval (99.9 % CI). The effect size of the OR was interpreted as follows: small effect, <1.5; medium effect, 1.5-4.9; large effect, ≥5.0 (Chen et al., 2010). Differences between the OR of different European regions were examined by considering the z value, which implies comparison of the regression coefficients and the standard error (z = B1-B2 $/ \sqrt{SE1^2 + SE2^2}$), (Altman and Bland, 2003).

Prior to conducting the multivariate analyses we examined the collinearity of the clinical and sociodemographic variables by means of a linear regression analysis, taking the EURO-D score as the dependent variable. The results indicated moderate collinearity: Tolerance: 0.78-0.96; Variance inflation factor: 1.04-1.28; Condition index: 12.7 (Belsley, 1991). The 'marital status' variable was eliminated from the multivariate analyses as it showed a high degree of collinearity with loneliness and gender.

For all the analyses we used population-weighted data, with the calibrated longitudinal

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individual weights (waves 5-6) provided by SHARE, which compensate for the unequal selection probabilities of the population parameters (Malter and Börsch-Supan, 2017). The level of statistical significance for hypothesis testing was <0.01 with 99.9% confidence intervals, according to the different analyses. Statistical analysis was performed using SPSS v24.0 for Windows (IBM SPSS Corp., Armonk, NY) and STATA v15.1 (Stata Corp LLC, College Station, Texas).

3. Results

3.1. Differences between valid and missing participants

From the total eligible sample of 31,491 participants aged 65+, 8,290 (26.3%) were lost to follow up for unknown reasons. At baseline (wave 5) and compared with cases that were followed up, lost cases were older, 81.3±7.7 vs 74.5±6.6 (t, $p < 0.001$, Cohen's $d = 0.94$), had fewer years of schooling, 7.4±4.3 vs. 9.9±4.4 (t, $p < 0.001$, $d = 0.57$) and were more commonly female, 65.7 vs. 56.9% (χ^2, $p < 0.001$, V = 0.04).More importantly, lost cases had poorer self-rated health, 68.2 vs. 45.2% (χ^2, $p < 0.001$, V = 0.10), more depressive symptoms (EURO-D ≥4), 56.4vs. 29.8% (χ^2, $p < 0.001$, V = 0.13), poorer cognitive status(<15), 57.4 vs. 87.5% (χ^2, $p < 0.001$, V = 0.13) and, especially, greater impairment in ADL (≥1), 55.6 vs. 16.7% (χ^2, $p < 0.001$, V = 0.22). These data suggest that older age, more depressive symptoms, poorer health and deceased individuals may account for these cases being lost.

3.2. Description of the sample

The sample included 31,491 individuals at wave 5 and comprised 23,201 participants with complete data for waves 5 (2013) and 6 (2015). The prevalence of depressive symptoms (EURO-

D ≥4) increased slightly from 29.8% in wave 5 to 31.5% in wave 6 (χ^2, $p < 0.001$, V = 0.02). The variables associated with the highest levels of depressive symptoms (>40%) in the two waves were impairment in ADL, poorer self-rated health, loneliness and financial difficulties. Percentages of depressive symptoms above the mean for the total sample were also associated with female gender, a higher number of chronic diseases, fewer years of schooling, not being married and older age. Differences between the two waves with respect to the presence of depressive symptoms showed a small effect size for all variables (V = 0.00-0.03). The complete data are shown in Table 1.

Table 1

3.3. Clinical and sociodemographic data for European regions in wave 5

Across all the variables the most positive data corresponded to the Northern countries, and the most negative to the Eastern and Southern regions. The main differences between European regions were observed in relation to education (<10 years, Northern = 43.5%, Continental = 39.3%, Eastern = 29.7%, Southern = 78.6%; $p < 0.001$, V = 0.38), financial difficulties (Northern = 14.2%, Continental = 21.9%, Eastern = 46.8%, Southern = 54.4%; $p < 0.001$, V = 0.34) and cognition (<15), (Northern = 42.6%, Continental = 47.1%, Eastern = 48.8%, Southern = 77.8%; $p < 0.001$, V = 0.30).The complete data are shown in Supplementary Table 1.

3.4. Depressive symptoms and the associated variables for European regions in wave 5

Using the cut-off of ≥4 on the EURO-D the prevalence of depressive symptoms by region was as follows: 16.8%, Northern; 27.3%, Continental; 25.4%, Eastern; 36.2%, Southern.

In all four regions the variables associated with more depressive symptoms were poorer self-rated health (V = 0.24-0.35), loneliness (V = 0.22-0.31), impairment in ADL (V = 0.18-0.32), chronic diseases (V = 0.14-0.25), female gender (V = 0.14-0.24), financial difficulties (V = 0.14-

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0.22), marital status (V = 0.07-0.17). In all European regions, widowers had higher depression rates. However, the prevalence of depressive symptoms varied considerably across European regions, the rate being much lower in the North and higher in the South.

Comparison of these two regions also showed a difference of more than 20% on some variables, namely greater impairment in ADL (33.9%), not being married (25.7%), female gender (25.1%), a higher number of chronic diseases (24.3%), greater loneliness (22.9%) and older age (20.9%). The complete data are shown in Table 2.

Table 2

3.5. Multivariate binary logistic regression: Variables related to depressive symptoms

For the sample as a whole the variables most strongly associated with depressive symptoms (EURO-D, ≥4) were poorer self-rated health, loneliness, impairment in ADL, female gender and financial difficulties, this being the case for both waves 5 and 6. In wave 6 the only variable with a higher OR was poorer self-rated health, and female gender also became more relevant.

In terms of the variables associated with depressive symptoms across the four regions, the southern countries had the highest OR with respect to impairment in ADL, loneliness, female gender, financial difficulties and chronic diseases. The Eastern region had the highest OR for poorer cognition and older age, the Northern countries had the highest OR for self-rated health, and the Continental countries the highest OR for less schooling.

In wave 6 it was the Eastern countries that had the highest OR for impairment in ADL, loneliness, female gender, poorer cognition and chronic diseases. The Continental region had the highest OR for financial difficulties and less schooling, the Southern region had the highest OR for self-rated health, and the Northern countries had the highest OR for older age. The complete results are shown in Table 3.

Table 3

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3.6. Depression status: No depressive symptoms, incidence, persistence and remission

The variable 'depression status', established by comparing unweighted data for cases in waves 5 and 6, yielded the following rates: No depressive symptoms, 61.2%; incidence, 12.3%; persistence, 15.6%; remission, 10.8%.

Figure 1 shows the selection of cases (wave 5) and their distribution across the four groups considered in wave 6. It can be seen that a higher proportion of cases were lost from the 'depressive symptoms' group. Based on the number of new cases in wave 6 and the total person-years at risk, the incidence rate using weighted data was 6.62/100 person-years (99.9% CI Poisson: 6.61-6.63).

Figure 1

3.7. Predictors of incidence, persistence and remission in wave 5

We conducted three multivariate binary logistic regression analyses in order to identify predictors (wave 5) of incidence, persistence and remission.

Incidence vs. no depressive symptoms. In the whole sample the strongest predictors of incidence were female gender (OR: 1.78), poor self-rated health (OR: 1.67) and loneliness (OR: 1.63).Regarding the differential predictors of incidence between the four European regions were as follows: Southern: female gender, loneliness, impairment in ADL, poorer self- rated health, older age and less schooling; Eastern: impairment in ADL and female gender; Continental: chronic diseases, older age, financial difficulties and poorer cognition, financial difficulties; Northern: poorer self-rated health, older age and chronic diseases (Table 4).

Persistence vs. no depressive symptoms. The predictors of persistence in the whole sample had higher OR than did the predictors of incidence, this being the case for all the variables. The strongest predictors of persistence were poorer self-rated health, loneliness, impairment in ADL, female gender, financial difficulties, chronic diseases and cognition. As regards

differences by region, the southern countries continued to yield high OR for impairment in ADL, loneliness, female gender, poorer self-rated health and older age, and also in chronic diseases and economic difficulties. In the Eastern region the highest OR corresponded to impairment in ADL, female gender, poorer cognition and older age, and in the Northern countries to poorer self-rated health, economic difficulties and older age. In the Continental region, the differential predictor was less schooling, and with greater similarity of the variables with respect to the global OR (Table 4).

Remission vs. persistence. The mean baseline score on the EURO-D was lower among cases of remission compared with those showing persistence (4.95±1.2 vs. 5.83±1.7; $p < 0.001$, $d =$ 0.58). The strongest predictors of remission in the total sample were better self-rated health (OR: 1.80) and male gender (OR: 1.51). In terms of differences across the four regions, the strongest predictors of remission by region were: Eastern: male gender, no impairment in ADL, better self-rated health, more years of schooling and better cognition; Southern: no impairment in ADL, no loneliness, fewer chronic diseases and better cognition; Continental: better self-rated health, male gender and no financial difficulties; Northern: no financial difficulties and younger age (Table 4).

Supplementary tables 2and 3 show, for each country, the variables associated with depressive symptoms and the prevalence, incidence, persistence and remission rates.

Table 4

4. Discussion

4.1. Factors associated with the prevalence of depressive symptoms

Regarding the first study aim, the multivariate analyses showed that the main variables associated with more depressive symptoms were poorer self-rated health, loneliness, impairment in ADL, female gender and financial difficulties.

The relationship between self-rated health and depression has been studied in various cultural contexts: Australia, Mexico, USA and Europe (Ambresin et al., 2014; Bustos-Vázquez et al., 2017; Jang et al., 2012; Portellano-Ortiz et al., 2017), and as in our analysis this variable has been shown to be a strong predictor of depressive symptoms (Ambresin et al., 2014).

Regarding loneliness, studies have reported an association with more depressive symptoms (Harris et al., 2006) and also with a more unfavourable course (Holvast et al., 2015; Houtjes et al., 2014). Functional impairment is one of the factors that has been most strongly linked to depression (Beekman et al, 2001; Djernes et al., 2006; Pagán-Rodríguez and Pérez, 2012), and in line with our results some authors have reported an association that is even stronger than that between depression and chronic diseases (Braam et al., 2005). Our finding that female gender is an important predictor of depressive symptoms is also consistent with a number of previous studies (Beekman et al., 2001; Djernes et al.; 2006; Zunzunegui et al., 2007). The relevance of chronic diseases and of all aspects of physical health has also been widely reported (Beekman et al., 2001; Hegeman et al., 2017; Ylli et al., 2016). Although our analysis suggested that financial difficulties was also an important factor in relation to depression, this variable has been less often cited in previous research (Blazer, 2003; Portellano-Ortiz et al., 2017; Ylli et al., 2016).

Poorer cognitive status, fewer years of schooling and older age are variables of less relevance according to our analysis. Cognitive impairment has been linked to more depressive symptoms

(Kuchibhatla et al., 2012) and to persistent depression (Gallagher et al., 2013).

More years of education has been associated with less depression and may play a protective role (Ladin, 2008), although in our multivariate analyses its effect overlaps with that of other variables such as financial difficulties or cognition. Age was not a relevant factor in our analyses, possibly because, as shown by other studies (Blazer, 2003; Büchtemann et al., 2012), the effect of age disappears or is inconsistent when other variables such as health are controlled for.

4.2. Prevalence rates of depressive symptoms

In our study, the mean prevalence of depressive symptoms in the 14 countries was 29.8% (14.5-39.0) and 31.5% (15.5-39.2) in waves 5 and 6, respectively. These rates are concordant with previous studies that have used the EURO-D (Castro-Costa et al., 2007; Ladin et al., 2010; Portellano-Ortiz et al., 2017).

Other instruments for the detection of depressive symptoms in European studies provide similar results. The Center for Epidemiologic Depression Scale, CES-D (Radloff, 1977), with a cut-off point ≥16 / 20, showed prevalences ranging between 12.9% (Beekman et al., 2001) and 38.0% (Luppa et al., 2012a). The short version of the Geriatric Depression Scale, GDS (Sheikh and Yesavage, 1986), with a cut-off point ≥ 6/15, showed a prevalence of 18.8% (Harris et al., 2006).

In the review studies, the prevalence data for depressive symptomatology, using these instruments, vary enormously, between 7.2 and 49.0% (Djernes, 2006), or 4.5-37.4 in ≥75 years (Luppa et al., 2012b). These differences in the results can be due to several aspects: setting (community, residences), gender, and differences between countries and cultures.

When using categorical diagnostic criteria such as the DSM-IV, the mean prevalence for all depressive disorders is lower, 8.0% (6.3-9.6) in ≥ 65 years, (Andreas et al., 2017) or 7.2% (4.6-9.3) in ≥ 75 years (Luppa et al., 2012b).

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4.3. Incidence, persistence and remission rates for depressive symptoms

Regarding the second study aim, the incidence of depressive symptoms was 13.2% (6.62/100 person-years at risk),a similar figure to that reported in reviews of European countries, 6.8 (Büchtemann et al., 2012) and 6.6 (Chang-Quan et al., 2010), although it should be noted that there is considerable variation (between 1.4 and 14.1%) across studies (Beekman et al., 2001; Harris et al., 2006; Luppa et al., 2012a).The three predictors identified in our study are supported by previous research: female gender (Beekman et al., 2001; Büchtemann et al., 2012; Luppa et al., 2012a), poorer health (Beekman et al., 2001; Harris et al., 2006; Geerlings et al., 2000) and loneliness or poor social networks (Beekman et al., 2001; Luppa et al., 2012a).

Persistence in our analysis was 18.3%, a rate lower than previously reported in European studies with clinical samples (23.0-61.2%) (Comijs et al., 2015; Gallagher et al., 2013; Luppa et al., 2012a). In this respect, it should be noted that we used a population sample and included all participants, regardless of whether they had clinically relevant symptoms of depression at baseline. The most important predictor of persistence in our study was poorer self-rated health, a finding that has been widely reported in the literature (Alpass and Neville, 2003; Ambresin et al., 2014; Chang-Quan et al., 2010; Guthrie et al., 2016). Previous studies also support the relevance of loneliness (Holvast et al., 2015; Houtjes et al., 2014), female gender, impairment in ADL and financial difficulties (Gallagher et al., 2013).

The remission rate in our study was 11.5%, a figure towards the low end of the reported range (12.7-60.0%), (Comijs et al., 2015; Holvast et al., 2015; Luppa et al., 2012a). As in other studies, the likelihood of remission was associated with less chronic diseases (Hegeman et al., 2017) less functional deficits (Geerlings et al., 2000) and male gender (Barry et al., 2008). A lower baseline score on the depressive symptoms compared with that for persistent cases was also a predictor of remission (Andreescu et al., 2008; Comijs et al., 2015).

4.4. Differences in rates across European regions

Regarding the third study aim, the prevalence of depressive symptoms was higher in the Southern region (36.2%) and lower in Northern countries (16.8%), a finding that reflects previous studies using the EURO-D (Castro-Costa et al., 2007; Ladin et al., 2010; Portellano- Ortiz et al., 2017). These consistent results suggest that further work may be required to explore the possible influence of differences in the expression of depression in different cultures (Guerra et al., 2016; Ylli et al., 2016).

The incidence rate was lowest in Northern countries and highest in the Southern region; the Continental and Eastern regions yielded a similar, intermediate rate. Although there are fewer studies of the incidence of depression in older adults, our results are consistent with other reports in European countries (Büchtemann et al., 2012; Chang-Quan et al., 2010). However, we have found no studies that specifically examined incidence rates among older adults from countries in the Eastern region. In a study that examined the incidence of DSM-IV major depression across all ages the authors reported a cumulative 12 months' incidence of 4.2% in Slovenia — below the lower bound in the present study — and 5.9% in Estonia, within the range of our data (King et al., 2008).

Our results for persistence follow the same pattern as those for incidence, namely lowest in the Northern countries, highest in the Southern region and a similar, intermediate rate in the Continental and Eastern regions. The overall rate was lower than that reported in other European studies (range between 23.0% and 61.2%) that used different assessment criteria and instruments (Luppa et al., 2012a; Geerlings et al., 2000; Harris et al., 2006). In the study by Gallagher et al. (2013), using the EURO-D, the highest persistence rates corresponded to Belgium, France and Italy (58-64%), and the lowest to Switzerland, Netherlands, Germany and Sweden (37-47%).

Interestingly, the remission rate was also highest in the Southern region, followed in decreasing order by the Eastern, Continental and Northern regions. These data suggest the need for a more detailed analysis of whether depressive symptoms are more widespread but less intense in the Southern region, in comparison with northern European countries.

There is very little research on remission from depression in Europe. The study by Luppa et al. (2012a), in Germany, found no baseline characteristics that could predict whether a case would remit or persist. In a study of older adults in The Netherlands, Comijs et al. (2015) reported that minor depression at baseline was associated with a higher remission rate, a finding consistent with our data.

4.5. Differences in predictors of depression across European regions

In the overall comparison of predictors of incidence and persistence, countries from the Eastern and Southern regions had higher OR on a greater number of factors. The OR for female gender was highest in these two regions. Previous research has linked gender differences in mental disorders to the traditional female role, which is more common in Spain and Italy, especially among people over 65, whereas the gender difference was less marked in younger cohorts (Seedat et al., 2009).

Impairment in ADL was also more strongly associated with depressive symptoms in countries from eastern and southern Europe. Functional impairment has previously been linked to higher levels of depression (Braam et al., 2014, Hajek and König, 2016), and among people with self-reported disability, higher levels of depression were reported in Italy, France,

Spain and Belgium, and lower levels in Switzerland, Sweden and Denmark (Pagán-Rodríguez and Pérez, 2012).

Loneliness was strongly correlated with depressive symptoms and was a strong predictor in countries of southern Europe. In line with these results, a previous study reported higher

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levels of loneliness among older adults in southern and eastern European countries (van Tilburg and Dykstra, 2008). It is possible that in southern European societies, where the family has traditionally been an important source of support and older people are less likely to live alone (Zunzunegui et al., 2001; Daatland, 2011), the experience of loneliness when this support is lost or absent produces a greater depressive effect. In general, in Hispanic-Latin culture, loneliness causes a more negative appreciation of the self-health status, and a study reported more depressive symptoms together with loneliness in Hispanic people than in non-Hispanic people (Russell and Taylor, 2009).

The highest OR for self-rated health corresponded to the Northern countries. The relationship this suggests between poorer self-rated health and more depressive symptoms is surprising given that perceived health was better in the Northern region. A previous European study found that self-rated health was better in Switzerland, Denmark and Sweden, and worse in Spain and Italy (Verropoulou, 2009), and yet in our multivariate analysis the OR for perceived health as a predictor of depression was higher for the Northern than for the Southern region. A question this raises is whether people in Northern countries are more sensitive to changes in perceived health.

Differences were smaller for the remaining predictors, although it should be noted that chronic disease was a relevant factor with regard to incidence in the Continental region and persistence in the Southern region. Financial difficulties were a relevant predictor of persistence in southern European countries, while poorer cognition was a predictor of persistence in the Eastern region. Finally, less schooling was a risk factor for all regions except the Northern countries.

With respect to remission, the relevant factors were male gender and better self-rated health, the opposite poles of two predictors of incidence (i.e. female gender and poorer health). The

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lack of studies on remission from depression in Europe prevents comparisons with the present results.

The existence of worse indicators of depression in Eastern and Southern European countries may be related to the fact that they have less generous welfare state models. These countries rely more on the family to provide the older relatives with the required assistance and financial support. Nowadays, structural changes, the higher prevalence of smaller families, and the fact that most women work outside their homes, may hamper the capacity of the families to appropriately cover the needs of their older relatives.

5. Conclusions, strengths and limitations

Our results highlight important differences between European regions, especially between North and South Europe. The rates of depressive symptoms cannot be explained by individual factors alone, and cultural and socioeconomic aspects, according to the different welfare models, may have also a relevant role. The results of the study highlight the need for countries, especially in Eastern and Southern Europe, to provide greater support, resources and social benefits to the elderly, mainly those who live in situations of loneliness.

This study has also many strengths, such as the fact that we analyzed the main indicators of depressive symptomatology, the prevalence, the incidence, the persistence and the remission using a longitudinal design; The size of the sample, representing 51,849.293 individuals (Weighted data); The amplitude of the sample with participants from 14 European countries, with an analysis of the differences between them, and the main variables associated with depressive symptoms. The instrument used to evaluate depressive symptoms is the same in all 14 countries, and health and socio-demographic variables were assessed following a

harmonized and homogeneous protocol.

However, the study has a number of limitations. The first is that the EURO-D is unable to distinguish between clinically relevant depressive symptoms and cases of major depression. Second, the lack of studies reporting incidence and persistence rates for countries in the Eastern region, and for remission rates across all Europe as a whole prevents an adequate comparison of the present data. Third, the differences between European regions in terms of the variables that were found to be predictors of the incidence and persistence of depression requires more detailed analysis in order to explore the possible influence of cultural and socioeconomic factors, including how depression is expressed, or even differences in biological risk factors. Fourth, we could not rule out a selection bias effect due to the withdraw between wave 5 and 6 among the association between factors and incidence, persistence and remission. And fifth, as in many longitudinal studies, there was a significant number of missing participants between the two waves. In this case it was mainly related to older age, health problems and the greater presence of depressive symptoms, which may suggest that the figures obtained regarding the indicators of depressive symptoms may have been underestimated.

Conflict of interest

All authors declare that they have no conflicts of interest.

Contributors

JL. Conde-Sala designed the study and wrote the manuscript jointly with O. Turró-Garriga. J. Garre-Olmo designed and supervised the statistical analysis. L. Calvó-Perxas, O. Turró-Garriga and J. Vilalta-Franch made significant contributions and a critical review of the manuscript. All authors contributed and approved the final manuscript

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Table 1

Clinical and sociodemographic characteristics and depressive symptoms. Waves 5-6 (2013-15)

	Characteristics	Depressive symptoms. EURO-D (≥4), %			
	Waves 5 / 6	Wave 5	Wave 6	Differences	
	n = 23,201	6134, 29.8%	6480, 31.5%	$\chi^2 (df_1)p$	V
Age, %					
65-74	57.0 / 46.4	26.4	25.5	< 0.001	0.01
≥75	43.0 / 53.6	34.4	36.6	< 0.001	0.02
$\chi^2 (df = 1)$, p, V	< 0.001, **0.11**	< 0.001, 0.09	< 0.001, **0.12**		
Gender, %					
Male	43.1 / 43.1	19.6	21.6	< 0.001	0.03
Female	56.9 / 56.9	37.6	38.9	< 0.001	0.01
$\chi^2 (df = 1)$, p, V	1.000, 0.00	< 0.001, **0.19**	< 0.001, **0.18**		
Marital status, %					
Married	58.3 / 56.1	26.2	27.1	< 0.001	0.00
Widowed	28.2 / 30.4	38.6	42.1	< 0.001	0.04
Separated / Divorced	7.9 / 7.9	27.9	28.6	< 0.001	0.00
Never married	5.6 / 5.6	27.5	24.5	< 0.001	0.03
$\chi^2 (df = 3)$, p, V	< 0.001, 0.02	< 0.001, 0.09	< 0.001, **0.11**		
Schooling, %					
≥10 years	46.7 / 46.7	22.4	25.0	< 0.001	0.03
<10 years	53.3 / 53.3	36.5	37.4	< 0.001	0.01
$\chi^2 (df = 1)$, p, V	1.000, 0.00	< 0.001, **0.15**	< 0.001, **0.13**		
Financial difficulties, %					
None	66.2 / 69.7	22.9	25.3	< 0.001	0.03
Difficulty	33.8 / 30.3	42.2	44.0	< 0.001	0.02
$\chi^2 (df = 1)$, p, V	< 0.001, 0.04	< 0.001, **0.20**	< 0.001, **0.19**		
Loneliness, %					
No	56.3 / 52.5	18.7	19.2	< 0.001	0.00
Yes	43.7 / 47.5	44.1	44.7	< 0.001	0.00
$\chi^2 (df = 1)$, p, V	< 0.001, 0.04	< 0.001, **0.28**	< 0.001, **0.28**		
Self-rated health, %					
Very good, Good	54.8 / 52.1	16.1	16.9	< 0.001	0.01
Fair, Poor	45.2 / 47.9	46.5	47.3	< 0.001	0.00
$\chi^2 (df = 1)$, p, V	< 0.001, 0.03	< 0.001, **0.33**	< 0.001, **0.33**		
Chronic diseases, %					
0-1	56.6 / 56.7	24.0	26.4	< 0.001	0.03
≥2	43.4 / 43.3	37.4	38.2	< 0.001	0.00
$\chi^2 (df = 1)$, p, V	< 0.001, 0.00	< 0.001, **0.14**	< 0.001, **0.13**		
ADL impairment, %					
No	83.3 / 79.2	24.3	25.3	< 0.001	0.01
≥1	16.7 / 20.8	57.4	55.1	< 0.001	0.02
$\chi^2 (df = 1)$, p, V	< 0.001, 0.05	< 0.001, **0.27**	< 0.001, **0.26**		
Cognition, %					
≥15	42.6 / 41.0	20.8	21.2	< 0.001	0.00
<15	57.4 / 59.0	36.1	38.1	< 0.001	0.02
$\chi^2 (df = 1)$, p, V	< 0.001, 0.01	< 0.001, **0.17**	< 0.001, **0.18**		

Note. Weighted data. χ^2 = Chi-square test. df = degrees of freedom. Effect size: V = Cramer's (df_1= small: ≤0.10, medium: 0.11-0.49, large: ≥0.50). Medium and large effect sizes are shown in bold.
ADL: Activities of daily living. EURO-D = Depression scale

Table 2

Depressive symptoms and clinical and sociodemographic data in European regions. Wave 5 (2013)

	Northern	Continental	Eastern	Southern	Differences	
					$\chi^2(df_3)p$	V
n	3627	8696	5801	5077		
EURO-D, mean (*SD*)	1.8 (1.8)	2.4 (2.0)	2.4 (2.1)	3.0 (2.5)	< 0.001	0.02*
≥4, %	16.8	27.3	25.4	36.2	< 0.001	**0.11**
Age, %						
65-74	13.8	24.7	20.7	31.7	< 0.001	**0.10**
≥75	21.4	30.6	34.1	42.3	< 0.001	**0.13**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.10**	< 0.001, 0.06	< 0.001, **0.15**	< 0.001, **0.11**		
Gender, %						
Male	11.1	18.5	15.1	23.0	< 0.001	**0.08**
Female	21.4	33.9	32.6	46.5	< 0.001	**0.14**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.14**	< 0.001, **0.17**	< 0.001, **0.20**	< 0.001, **0.24**		
Marital status, %						
Married	15.1	24.0	20.2	31.6	< 0.001	**0.10**
Widowed	20.9	33.8	34.3	49.4	< 0.001	**0.17**
Separated /Divorced	18.8	27.8	27.1	34.7	< 0.001	**0.08**
Never married	12.0	28.4	25.3	28.3	< 0.001	**0.08**
χ^2 (*df* = 3), *p*, *V*	<0.001,**0.07**	< 0.001, **0.10**	< 0.001, **0.15**	< 0.001, **0.17**		
Schooling, %						
≥10 years	13.7	22.5	21.3	24.1	< 0.001	0.05
<10 years	20.7	34.7	35.3	39.5	< 0.001	**0.08**
χ^2 (*df* = 1), *p*, *V*	<0.001,0.09	< 0.001, **0.13**	< 0.001, **0.15**	< 0.001, **0.13**		
Financial diffic. %						
None	14.2	23.4	19.6	24.2	< 0.001	0.06
Difficulty	31.0	39.6	31.9	45.3	< 0.001	**0.08**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.16**	< 0.001, **0.15**	< 0.001, **0.14**	< 0.001, **0.22**		
Loneliness, %						
No	10.1	17.8	15.3	22.1	< 0.001	**0.08**
Yes	29.1	40.5	34.6	52.0	< 0.001	**0.13**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.24**	< 0.001, **0.25**	< 0.001, **0.22**	< 0.001, **0.31**		
Self-rated health, %						
Very good, Good	9.8	15.6	15.1	18.4	< 0.001	0.06
Fair, Poor	36.2	43.2	36.2	52.6	< 0.001	**0.11**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.31**	< 0.001, **0.31**	< 0.001, **0.24**	< 0.001, **0.35**		
Chronic diseases, %						
0-1	10.9	17.6	16.9	21.1	< 0.001	0.06
≥2	21.5	33.7	30.4	45.8	< 0.001	**0.14**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.14**	< 0.001, **0.18**	< 0.001, **0.15**	< 0.001, **0.25**		
ADL impairment, %						
<1	14.3	22.6	20.1	29.0	< 0.001	**0.09**
≥1	36.2	50.6	52.1	70.1	< 0.001	**0.20**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.18**	< 0.001, **0.23**	< 0.001, **0.27**	< 0.001, **0.32**		
Cognition, %						
≥15	13.0	21.7	18.0	20.9	< 0.001	0.05
<15	21.0	33.7	33.1	39.9	< 0.001	**0.09**
χ^2 (*df* = 1), *p*, *V*	< 0.001, **0.11**	< 0.001, **0.13**	< 0.001, **0.17**	< 0.001, **0.16**		

Note. Weighted data. χ^2 = Chi-square test. *df* = degrees of freedom. Effect size: *V* = Cramer's (df_1 = small: ≤0.10, medium: 0.11-0.49, large: ≥0.50; df_3 = small: ≤0.06, medium: 0.07-0.28, large: ≥0.29). Medium and large effect sizes are shown in bold. * F ANOVA, Eta squared.

EURO-D (≥4) = Depression scale. European Countries = Northern (Denmark, Sweden), Continental (Switzerland, Luxembourg, Austria, Germany, Belgium, France), Eastern (Slovenia, Czech Republic, Estonia), Southern (Israel, Spain, Italy)

Table 3
Multivariate binary logistic regression models. Variables related to depressive symptoms (EURO-D ≥4)

	n	All Cases 23.201			Northern 3627			Continental 8696			Eastern 5801			Southern 5077		
		OR	99.9% CI		OR	99.9% CI		OR	99.9% CI		OR	99.9% CI		OR	99.9% CI	
Wave 5																
1. Self-health	(Fair/Poor)	**2.61**	2.60-2.61*		**3.26**	3.22-3.31*	H	**2.56**	2.55-2.57*		**1.83**	1.81-1.86*	L	**2.75**	2.74-2.76*	
2. Loneliness	(Yes)	**2.53**	2.52-2.53*		**2.59**	2.56-2.62*		**2.45**	2.44-2.45*		**2.16**	2.14-2.20*	L	**2.71**	2.70-2.72*	H
3. ADL impaired	(≥1)	**2.38**	2.37-2.39*		**1.79**	1.76-1.82*	L	**2.01**	2.00-2.02*		**2.41**	2.37-2.44*		**3.27**	3.26-3.29*	H
4. Gender	(Female)	**2.12**	2.12-2.13*		**1.95**	1.92-1.97*	L	**1.95**	1.95-1.96*	L	**2.29**	2.26-2.33*		**2.44**	2.43-2.45*	H
5. Financial	(Difficulty)	**1.63**	1.62-1.63*		**1.69**	1.66-1.71*		**1.45**	1.45-1.46*	L	**1.59**	1.57-1.61*		**1.91**	1.91-1.92*	H
6. Chronic dis.	(≥2)	1.49	1.48-1.49*		1.30	1.28-1.32*	L	1.41	1.41-1.42*		1.36	1.34-1.38*		**1.66**	1.65-1.66*	H
7. Cognition	(<15)	1.46	1.45-1.46*		1.25	1.23-1.26*	L	1.45	1.45-1.46*		**1.69**	1.67-1.72*	H	1.42	1.41-1.43*	
8. Schooling	(<10)	1.19	1.18-1.19*		1.05	1.04-1.06*		1.26	1.25-1.26*	H	1.03	1.02-1.05*		1.02	1.02-1.03*	L
9. Age	(≥75)	0.85	0.85-0.86*		0.95	0.94-0.97*		0.81	0.81-0.82*	L	1.11	1.10-1.12*	H	0.88	0.88-0.89*	
Wave 6																
1. Self-health	(Fair/Poor)	**2.81**	2.80-2.82*		**2.87**	2.84-2.91*		**2.71**	2.70-2.72*		**2.37**	2.34-2.41*	L	**3.08**	3.07-3.09*	H
2. Loneliness	(Yes)	**2.45**	2.44-2.45*		**2.47**	2.44-2.50*		**2.54**	2.54-2.55*		**2.67**	2.63-2.70*	H	**2.30**	2.29-2.31*	L
3. Gender	(Female)	**2.03**	2.02-2.03*		**1.93**	1.90-1.95*	L	**2.08**	2.07-2.08*		**2.40**	2.36-2.43*	H	**1.96**	1.95-1.97*	
4. ADL impaired	(≥1)	**1.93**	1.92-1.93*		**2.27**	2.23-2.30*		**1.65**	1.65-1.66*	L	**2.68**	2.64-2.72*	H	**2.57**	2.56-2.58*	
5. Financial	(Difficulty)	**1.57**	1.57-1.58*		1.45	1.43-1.47*		**1.59**	1.59-1.60*	H	1.31	1.29-1.32*	L	**1.54**	1.53-1.54*	
6. Cognition	(<15)	1.48	1.47-1.48*		1.26	1.24-1.27*	L	1.43	1.43-1.44*		**1.97**	1.93-1.99*	H	1.46	1.45-1.46*	
7. Chronic dis.	(≥2)	1.15	1.14-1.15*		1.24	1.23-1.26*		1.06	1.06-1.07*	L	1.32	1.30-1.34*	H	1.26	1.25-1.26*	
8. Schooling	(<10)	1.11	1.10-1.11*		0.80	0.79-0.81*	L	1.11	1.10-1.11*	H	1.04	1.03-1.06*		1.02	1.02-1.03*	
9. Age	(≥75)	1.02	1.01-1.02*		1.23	1.21-1.24*	H	0.97	0.96-0.97*		0.96	0.94-0.97*	L	1.07	1.07-1.08*	
Prevalence, %																
EURO-D (≥4)	W5 / W6	29.8 / 31.5			16.8 / 17.6			27.3 / 29.3			25.4 / 24.4			36.2 / 37.8		

Note. Dependent variable: EURO-D ≥4. Weighted data. OR, odds ratio; CI, confidence interval. *$p < 0.001$. Effect size for OR: small: <1.5, medium: 1.5-4.9, large: ≥5.0. Medium and large effect sizes are shown in bold. Differences between regions: OR greater than the overall: in grey; H: the highest OR, L: the lowest OR.

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Table 4
Predictors of incidence and remission of depressive symptoms in Wave 5. Binary multivariate logistic regression models.

		All Cases		Northern			Continental			Eastern			Southern		
		OR	99.9% CI	OR	99.9% CI		OR	99.9% CI		OR	99.9% CI		OR	99.9% CI	
Incidence vs. No-depression, *n*		2862 vs. 14205		311 vs. 2735			1057 vs. 5516			765 vs. 3306			729 vs. 2648		
Gender	(Female)	**1.78**	1.77-1.78*	**1.55**	1.53-1.58*	L	**1.74**	1.73-1.74*		**1.87**	1.84-1.91*		**1.95**	1.94-1.96*	H
Self-health	(Fair/Poor)	**1.67**	1.66-1.67*	**2.50**	2.46-2.55*	H	**1.60**	1.59-1.61*		1.47	1.45-1.50*	L	**1.77**	1.76-1.78*	
Loneliness	(Yes)	**1.63**	1.62-1.64*	**1.54**	1.51-1.56*		**1.53**	1.53-1.54*	L	**1.57**	1.55-1.60*		**1.80**	1.79-1.80*	H
Age	(≥75)	1.44	1.43-1.44*	**1.50**	1.48-1.53*	H	1.47	1.46-1.48*		1.19	1.18-1.22*	L	1.45	1.44-1.46*	
ADL impaired	(≥1)	1.34	1.34-1.35*	1.19	1.16-1.22*		1.13	1.13-1.14*	L	**2.53**	2.47-2.59*	H	**1.80**	1.79-1.82*	
Financial	(Difficulty)	1.30	1.30-1.31*	0.87	0.85-0.89*	L	1.33	1.33-1.34*	H	1.08	1.07-1.11*		1.21	1.21-1.22*	
Cognition	(<15)	1.27	1.27-1.28*	1.17	1.15-1.19*		1.31	1.31-1.32*	H	1.26	1.24-1.28*		1.03	1.02-1.04*	L
Chronic dis.	(≥2)	1.24	1.23-1.24*	1.32	1.30-1.35*		1.48	1.47-1.48*	H	1.12	1.10-1.14*		0.99	0.98-0.99*	L
Schooling	(<10)	1.09	1.09-1.10*	0.78	0.77-0.80*	L	1.04	1.03-1.04*		1.04	1.02-1.05*		1.09	1.08-1.10*	H
Persistence vs. No-depression, *n*		3618 vs. 14205		303 vs. 2735			1259 vs. 5516			1013 vs. 3306			1043 vs. 2648		
Self-health	(Fair/Poor)	**3.73**	3.72-3.75*	**4.57**	4.49-4.66*	H	**3.62**	3.61-3.64*		**2.89**	2.83-2.95*	L	**4.07**	4.05-4.10*	
Loneliness	(Yes)	**3.10**	3.09-3.11*	**3.04**	2.99-3.10*		**2.87**	2.86-2.88*	L	**2.95**	2.90-3.01*		**3.59**	3.57-3.61*	H
ADL impaired	(≥1)	**2.90**	2.89-2.91*	**1.75**	1.71-1.79*	L	**2.26**	2.25-2.27*		**4.31**	4.22-4.40*		**4.66**	4.63-4.70*	H
Gender	(Female)	**2.82**	2.81-2.83*	**2.48**	2.44-2.53*	L	**2.54**	2.53-2.55*		**3.69**	3.61-3.76*	H	**3.40**	3.38-3.42*	
Financial	(Difficulty)	**1.78**	1.77-1.79*	**1.95**	1.91-1.99*	H	**1.70**	1.69-1.71*		**1.67**	1.64-1.70*	L	**1.86**	1.85-1.87*	
Chronic dis.	(≥2)	**1.71**	1.70-1.72*	1.42	1.39-1.44*	L	**1.64**	1.63-1.65*		1.45	1.42-1.48*		**1.91**	1.90-1.92*	H
Cognition	(<15)	**1.53**	1.52-1.53*	1.33	1.31-1.35*		1.47	1.46-1.48*		**1.96**	1.92-2.00*	H	1.49	1.48-1.50*	
Schooling	(<10)	1.34	1.34-1.35*	0.87	0.85-0.88*	L	1.39	1.38-1.39*	H	1.12	1.10-1.14*		1.18	1.17-1.19*	
Age	(≥75)	0.98	0.97-0.98*	1.16	1.14-1.19*	H	0.91	0.90-0.91*		1.04	1.02-1.06*		1.09	1.08-1.09*	
Remission vs. Persistence, *n*		2516 vs. 3618		278 vs. 303			864 vs. 1259			717 vs. 1013			657 vs. 1043		
Self-health	(Good)	**1.80**	1.79-1.80*	**1.59**	1.56-1.63*	L	**1.83**	1.82-1.84*		**2.10**	2.05-2.15*	H	**1.71**	1.70-1.73*	
Gender	(Male)	**1.51**	1.50-1.52*	1.43	1.40-1.46*	L	**1.52**	1.51-1.53*		**2.19**	2.14-2.24*	H	1.49	1.47-1.49*	
ADL impaired	(No)	1.45	1.44-1.46*	1.03	1.00-1.06*	L	1.34	1.33-1.34*		**2.17**	2.12-2.22*	H	**1.62**	1.61-1.63*	
Loneliness	(No)	1.39	1.38-1.39*	1.37	1.34-1.40*		1.33	1.32-1.34*	L	1.36	1.33-1.39*		1.48	1.47-1.48*	H
Chronic dis.	(0-1)	1.16	1.15-1.16*	1.02	0.99-1.05†	L	1.10	1.09-1.10*		1.02	0.99-1.04‡	L	1.27	1.27-1.28*	H
Schooling	(>10)	1.14	1.14-1.15*	0.79	0.77-0.81*	L	1.13	1.13-1.14*		1.23	1.21-1.26*	H	1.13	1.12-1.14*	
Financial	(No diff.)	1.13	1.13-1.14*	1.46	1.42-1.49*	H	1.25	1.24-1.26*		1.11	1.09-1.14*		0.99	0.98-0.99*	L
Age	(<75)	1.10	1.10-1.11*	1.40	1.37-1.43*	H	1.02	1.02-1.03*		0.91	0.89-0.93*	L	1.23	1.22-1.23*	
Cognition	(>15)	0.97	0.96-0.97*	1.09	1.06-1.12*		0.87	0.86-0.87*	L	1.17	1.15-1.20*		1.23	1.22-1.24*	H

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Rates *100 persons-years

Incidence	6.62	6.61-6.63	4.93	4.89-4.96	6.27	6.26-6.28	6.04	6.00-6.08	7.43	7.42-7.45	H
Persistence	9.22	9.21-9.24	5.14	5.11-5.18	8.07	8.06-8.09	6.95	6.91-6.99	11.86	11.84-11.88	H
Remission	5.78	5.77-5.79	4.45	4.42-4.49	5.31	5.30-5.32	6.60	6.55-6.64	6.61	6.60-6.63	H

Note. Binary variables = No depressive symptoms (0) vs. Incidence (1)**,** No depressive symptoms (0) vs. Persistence (1)**,** Persistence (0) vs. Remission (1)**.** Weighted data. OR, odds ratio; CI, confidence interval (99.9 Poisson). *p < 0.001. Effect size for OR: small: <1.5, medium: 1.5-4.9, large: ≥5.0. Medium and large effect sizes are shown in bold. Differences between regions: OR greater than the overall: in grey; H: the highest OR, L: the lowest OR.
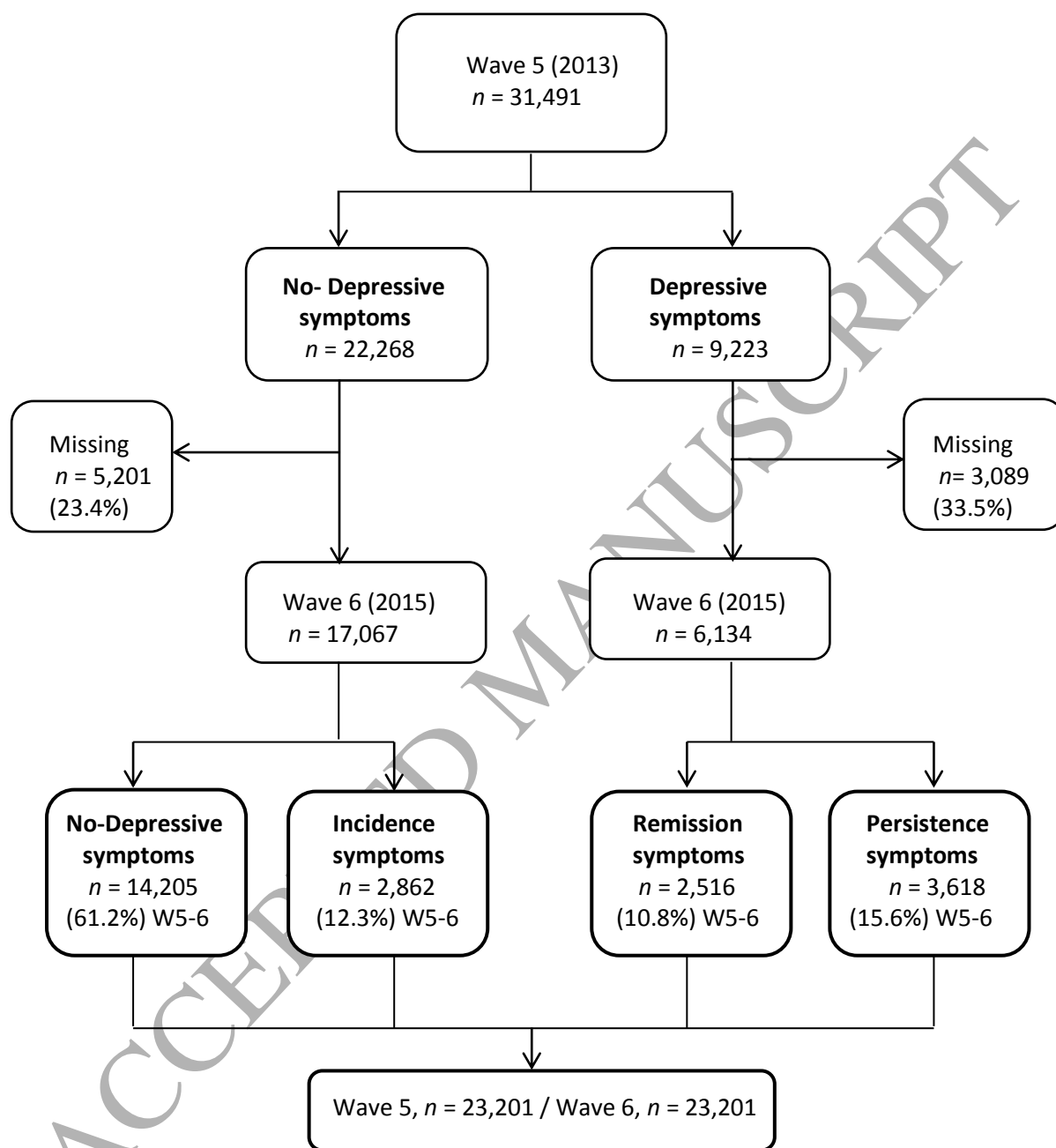
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Figure 1. Flow chart describing the sample for the two-year follow-up study. Unweighted data. Clinically relevant depressive symptoms (EURO-D ≥ 4)

Course of depressive symptoms and associated factors in people aged65+ in Europe: A two-year follow-up

Authors: Josep L. Conde-Sala, Josep Garre-Olmo, Laia Calvó-Perxas, Oriol Turró- Garriga, Joan Vilalta-Franch

Author statement

JL. Conde-Sala designed the study and wrote the manuscript jointly with O. Turró- Garriga. J. Garre-Olmo designed and supervised the statistical analysis. L. Calvó-Perxas, O. Turró Garriga and J. Vilalta-Franch made significant contributions and a critical review of the manuscript. All authors contributed and approved the final manuscript