



## ORIGINALES

### Factors associated with depression in older adults over the age of 75 living in an urban area

Factores asociados a la depresión en personas mayores de 75 años de edad en un área urbana

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#### ABSTRACT:

**Introduction:** Depression in older adults is a major health problem, and it is considered the most common psychiatric disorder among this population in developing countries. It is associated with suffering and increased prevalence and poor evolution of health problems. The aim of the present study was to determine the prevalence of depression and related factors in people over the age of 75 years in the city of Castellón de la Plana, Spain.

**Methodology:** This was an observational, cross-sectional, and analytical study in which a questionnaire was administered to a sample of 400 community-dwelling older adults over the age of 75 and who were selected using purposive sampling in 2015.

**Results:** the overall prevalence of depression symptoms was 30.5%, a percentage higher among women (40.1%). Older adults living alone presented more symptoms of depression, 26.6% compared with 16.1% ( $p = 0.011$ ). Good self-perceived health was related to fewer depression symptoms. Non-frail individuals presented lower rates of depression symptoms (12.1%) than frail (30.8%), and pre-frail individuals (57%)  $p < 0.05$ . Negative aspects in social relationships showed a lower mean score (0.003) in individuals without depression symptoms ( $p = 0.006$ ).

**Conclusions:** There is a link between the presence of depression symptoms and gender, self-perceived health, living condition, and frailty.

**Key words:** Depression; Older adults; Frail older adults; Risk factors.

#### RESUMEN:

**Introducción:** La presencia de síntomas depresivos en los mayores es un problema importante de salud, se puede considerar como la alteración de la salud mental, más frecuente en ancianos en los países desarrollados. Se asocia al sufrimiento y a un incremento de la prevalencia y mala evolución de los problemas de salud.

**Objetivo:** Determinar la prevalencia de la depresión y factores asociados en personas mayores de 75 años de la ciudad de Castellón de la Plana.

**Material y métodos:** Estudio observacional, transversal y analítico, realizado mediante cuestionario sobre una muestra de 400 individuos mayores de 75 años residentes en la comunidad, que fueron seleccionados mediante muestreo intencionado durante el año 2015.

**Resultados:** Prevalencia de síntomas depresivos 30,5%, las mujeres los presentan en mayor proporción (40,1%). Los mayores que viven solos presentan en mayor medida síntomas de depresión 26,6% frente al 16,1% ( $p= 0,011$ ). La buena autopercepción de la salud se relaciona con menor proporción de síntomas depresivos y en relación a la fragilidad, los individuos no frágiles presentan síntomas depresivos en menor proporción (12,1%) que los frágiles (30,8%) y los prefrágiles (57%)  $p<0,05$ . Los aspectos negativos en las relaciones sociales obtienen una puntuación media menor (0,003) en los individuos sin síntomas depresivos ( $p=0.006$ )

**Conclusiones:** Existe asociación entre la presencia de síntomas depresivos y el sexo, autopercepción de salud, convivencia y fragilidad

**Palabras clave:** Depresión, Anciano, anciano frágil, factores de riesgo.

## INTRODUCTION

Aging is influenced not only by biopsychosocial changes, but also by other multidimensional contexts, such as financial status, lifestyle, personal achievement, illnesses, accumulated suffering, and genetic factors.<sup>(1)</sup>

The concept of depression includes the presence of affective, cognitive, volitional, and somatic symptoms that mainly affect the emotional domain.<sup>(2,3)</sup> Depression manifests in the older adult population in various ways: as a recurring illness from before old age, recent onset as a mental disorder secondary to a general medical condition, or as a secondary symptom associated by the use of medications. Similar to what occurs in other age groups, depression probably stems from a complex multidirectional interaction of biological, psychological (including personality), and social factors.<sup>(4)</sup> A diagnosis of depression is based on observed data and the symptoms reported by patients, based on the International Statistical Classification of Diseases and Related Health Problems (ICD) and the American Psychiatric Association (DSM) criteria. Even though several population-based studies identify depression symptoms using screening scales, the Center for Epidemiological Studies Depression Scale (CES-D)<sup>(5,6)</sup> is the most used instrument.

Depression in older adults is a major health issue and is considered the most common psychiatric disorder among this population in developed countries, associated with suffering and increased prevalence and poor evolution of health problems.<sup>(7)</sup> The prevalence of depression in older adults is 13.5% worldwide.<sup>(8)</sup> However, in a European study carried out with community-dwelling older adults, this percentage was 12.3%,<sup>(9)</sup> whereas in Spain, it was 14%.<sup>(10)</sup> The prevalence of major depression (recurrent episodes) in community-dwelling older adults is between 1 and 5%.<sup>(11)</sup>

Some factors specific to depression in older adults have been identified, such as comorbidity, neurological disorders, psychosocial factors, social support, and life stressors.<sup>(12)</sup> Learning more about the factors associated with this pathology can help outline actions that aim to improve the health of older adults.

The objective of this study was to determine the prevalence of depression and factors associated with older adults over the age of 75 years in the city of Castellón de la Plana, Spain.

# METHODOLOGY

## Study design, location, and period

This was an observational, cross-sectional, and analytical study carried out in the city of Castellón de la Plana, Spain, throughout 2015, using individual interviews to administer the Fralle survey.<sup>(13)</sup>

## Population and sampling. Inclusion and exclusion criteria

The population consisted of community-dwelling individuals over the age of 75 years (12,711 individuals). Inclusion criteria were older adults of both genders, who lived in family households, had healthcare cards, and who agreed to participate in the study, and individuals who presented cognitive impairments and had caregivers (in this case, the respondents were not asked questions about subjective data).

Terminally ill individuals, receiving institutional care, who presented cognitive impairments and did not have caregivers, and those who did not want to participate in the study were excluded.

The sample size was determined using a 95% confidence level and 5% accuracy, with significance set at  $p=0.5$ , resulting in a sample of  $n=373$ . Anticipating a nonresponse rate of 10% (survey errors or individuals who did not show up to the interview), the sample size was set as  $n=414$ . Purposive sampling was carried out over the year of 2015, and consisted of primary care team nurses conducting interviews with individuals during their appointments or by phone. Finally, a sample  $n=400$  was obtained with individuals who visited seven out of nine of the department's healthcare centers. This figure, along with the distribution of the sociodemographic characteristics of the centers in which the individuals participated, ensured the representativeness of the sample.

## Study protocol

As previously mentioned, data was collected by administering the Fralle survey<sup>(13)</sup> designed on the basis of validated questionnaires for a study about non-institutionalized older adult population in Lleida, Spain. This sample consists of a series of questions distributed in 9 dimensions, measuring social relationships, self-perceived health, general health, and depression symptoms, among other factors.

## Target study variables

### Dependent variable

Presence of depression symptoms, measured by the Center for Epidemiologic Studies Depression Scale (CES-D)<sup>(5)</sup> scale, which consists of 20 questions and investigates cognitive and behavioral components of depression symptoms in the population. Score ranges from 0 to 60, and higher scores indicate depression symptoms: scores  $\geq 16$  are associated with depression disorder.

## Independent variables

Sociodemographic variables: living condition, monthly income, level of education, and gender. Living condition was measured using two items: “alone”, for people living alone in their home, and “with a partner”. Monthly income consisted of two categories, <900 euros and >900 euros per month, along with an option for nonresponse. Level of education was measured using the items “Cannot read or write”, “Did not finish elementary school”, “Complete elementary school”, “Complete junior high school”, “High school”, and “Higher education”, which was later categorized as “No formal education” (Cannot read or write or Did not finish elementary school) or “Formal education” (Complete elementary school, Junior high school, High school, or Upper education).

Self-perceived health was measured based on a question about general perceived health with five answer options: excellent, very good, good, regular or poor; after the interview, these categories become two: either good (including positive options: excellent, very good, good) or poor (including options for negative answers: regular or poor).

Frailty was defined according to the criteria set forth by Fried et al<sup>(14)</sup>: unintentional weight loss, grip strength, exhaustion, walk time, and low level of physical activity. Individuals are considered “frail” when three or more frailty criteria are met; “intermediate”, one or two criteria; and “not frail” when no criteria are met.

Social relationships were measured using the questionnaire “Aging in Leganés”, designed and adapted to the Spanish population in a study conducted in Leganés, according to the conceptual model created by Berkman and Glass.<sup>(15)</sup> Information about the structure of the participants’ social network structure and psychosocial mechanisms involved in social networks were obtained.<sup>(16)</sup> Drawing from the questions on social relationships, the following variables were formulated:

Social networks:

- Rate of family ties with contact (score range 0-3)
- Rate of community activities (score range 0-4)
- Rate of network diversity: including the two rates above and contact with friends (score range 0-8)

Psychosocial mechanisms of social relationships:

- Rate of received emotional support (mean score obtained from the emotional support scales from four family ties)
- Rate of individual’s role (mean score obtained from the scales of the individual’s role in the life of friends and family ties).
- Rate of negative aspects (score mean obtained from the scales of negative aspects for each one of the children, extended family, friends, and partner ties).

## Ethical considerations

Prior to the study, the authors obtained permission from the Fralle Survey to replicate the study in the city of Castellón. The Clinical Research Ethics Commission of the health department of Castellón approved the study project, and the participants signed informed consent forms. Data confidentiality was upheld at all times, in accordance with current legislation.

## Data analysis

Statistical descriptive analysis was carried out with central tendency measures and percentage rates.

Bivariate analysis of the factors associated with depression, was conducted using Pearson's Chi-square for qualitative analysis and Student's T-test for quantitative analysis; significance level was set at  $p < 0.05$ .

Nonresponse (when any of the survey questions were not answered or the person presented cognitive impairment) was calculated as recommended by Demaio<sup>(17)</sup>, considering that nonresponse rates lower than 10% allow for inference based on available cases. Allocation was not used in the analysis.

To assess the impact of several factors on depression symptoms, logistic regression analysis was carried out. Different models of logistic regression were designed, introducing the control variables one-by-one: the first model was designed based only on gender; the second model included living conditions; and the third model, health condition and social relationships. Data analysis was conducted with the help of the SPSS Statistics program, version 2.0.

## RESULTS

A total of 400 individuals were interviewed, with a mean age of 81.29 ranging from 75 to 96 years of age, of which 46.8% were male and 53.2% were female.

Descriptive analysis by gender (Table 1) showed that 30.5% of the individuals presented depression symptoms, with women presenting higher rates (40.1%) than men (19.7%). Most 78.2% individuals had partners, but among women, this percentage was lower (68.7%) than men (88.9%). Regarding level of education, 51.8% of the individuals did not have a high school education.

In terms of income, 41.5% of the older adults earned less than 900 euros monthly, and among women this rate was higher.

Self-perceived health was considered good by 62.9% of the sample. Women perceived their general health as good less often than men: 55.5% compared with 71.4%.

On comparing frailty by gender, 23.2% of the sample self-reported as frail, wherein women presented higher rates than men: 28% compared with 18%.

**Table 1. Sample characteristics by gender: count (n) and percentage (%)**

		Gender						P
		Total		Male		Female		
		n	%	n	%	n	%	
<b>Age</b>	<85	315	78.8	142	75.1	173	82	0.094
	≥85	85	21.3	47	24.9	38	18	
<b>Living condition</b>	Alone	87	21.8	21	11.1	66	31.3	0.000
	With partner	313	78.2	168	88.9	145	68.7	
<b>Level of education</b>	No education	206	51.8	93	49.2	113	54.1	0.333
	With education	192	48.2	96	50.8	96	45.9	
<b>Monthly income*</b>	<900	135	41.5	46	29.9	89	52	0.000
	≥900	190	58.5	108	70.1	82	48	
	Did not answer	71	17.9	34	18.1	37	17.8	
<b>Self-perceived health condition</b>	Good	236	62.9	125	71.4	111	55.5	0.001
	Poor	139	37.1	50	28.6	89	44.5	
<b>Depression symptoms</b>	No	257	69.5	139	80.3	118	59.9	0.000
	Yes	113	30.5	34	19.7	79	40.1	
<b>Frailty</b>	Non-frail	89	22.2	57	30.2	32	15.2	0.001
	Pre-frail	218	54.5	88	51.9	120	56.9	
	Frail	93	23.2	34	18	59	28	

Note: \* Due to the level of nonresponse for this variable (see Demaio 1980), the inferred values may not represent the population's characteristics.

Bivariate analysis of the association of depression symptoms with the studied variables (Table 2), showed that, in terms of age, there were no statistically significant differences between individuals under the age of 85 years and 85 years old or older. Statistically significant differences ( $p=0.011$ ) were found related to living conditions: older adults living alone showed more depression symptoms than those living with a partner: 26.6% compared with 16.1%.

**Table 2. Depression symptoms according to study variables: count (n) and percentage (%)**

		Depression symptoms						P
		Total		Yes		No		
		n	%	n	%	n	%	
<b>Age</b>	<85	315	78.8	169	79	146	78.5	0.907
	≥85	85	21.3	45	21	40	21.5	
<b>Gender</b>	Male	173	46.8	34	30.1	139	54.1	0.000
	Female	197	53.2	79	69.9	118	45.9	
<b>Living condition</b>	Alone	87	21.8	57	26.6	30	16.1	0.011
	With partner	313	78.3	157	73.4	156	83.9	
<b>Level of education</b>	With education	192	48.2	97	45.3	95	51.6	0.210

	No education	206	51.8	117	54.7	89	48.4	
<b>Monthly income*</b>	<900	135	34.1	81	38.4	54	29.2	0.126
	≥900	190	48	97	46	93	50.3	
	Preferred not to answer	71	17.9	33	15.6	38	20.5	
<b>Self-perceived health condition</b>	Good	236	62.9	97	51.1	139	75.1	0.000
	Poor	139	376.1	93	48.9	46	24.9	
<b>Frailty</b>	Non-frail	89	22.3	26	12.1	63	33.3	0.000
	Pre-frail	218	54.25	122	57	96	51.6	
	Frail	93	23.3	66	30.8	27	14.5	

Note: \* Due to the level of no answer for this variable (see Demaio 1980) the inferred values may not be representative of the population characteristics.

No statistically significant differences were found between the presence of depression symptoms and monthly income; the same was true for level of education.

Conversely, regarding self-perceived health, individuals who self-reported good health conditions did not present depression symptoms at higher rates (75.1%) than those who perceived their health as poor (24.9%) ( $p=0.000$ ).

Regarding frailty, non-frail individuals presented less depression symptoms (12.1%) than intermediate (57%) and frail individuals (30.8%) ( $p=0.000$ ).

An analysis of the participants' social relationships (Table 3) shows that there were no significant differences in the rates of family ties, community activities, network diversity, and received emotional support; however, mean scores were lower among individuals who presented more depression symptoms. Considering only the negative aspects of social relationships, the mean score was significantly ( $p=0.006$ ) higher among individuals with depression symptoms.

**Table 3. Depression symptoms according to the social relationships: count (n) y rate (%)**

	Depression symptoms				P
	Yes		No		
	Mean	DE	Mean	DE	
<b>Rate of family ties</b>	2.38	0.7713	2.32	0.7409	0.444
<b>Rate of community activities</b>	1.63	1.1624	1.80	1.2020	0.532
<b>Rate of network diversity</b>	4.61	1.8318	4.82	1.7186	0.787
<b>Rate of received emotional support</b>	1.28	0.6497	1.40	0.6365	0.596
<b>Individual role</b>	1.12	0.7367	1.31	0.6888	0.735
<b>Negative aspects of social relationships</b>	0.01	0.1330	0.003	0.0623	0.006

As for binary logistic regression analysis, which assessed the possibility of presenting depression (Table 4), the variables that presented statistical significance in bivariate analysis were introduced one by one: gender, living condition, frailty, self-perceived health, and negative aspects of social relationships. Gender (female) was statistically significant in the three models, with women presenting almost double the risk of men of being affected by depression (OR: 1.953; CI: 1.159-3.292). Additionally, living condition also presented a significant association with depression: Individuals living with partners showed lower risk of suffering depression symptoms (OR: 0.429; CI: 0.239-0.771). Negative self-perceived health was associated with a higher risk of presenting depression symptoms (OR: 2.582; CI: 1.552-4.295). Frailty was positively associated with depression symptoms, in which frail older adults presented twice the risk of suffering from depression symptoms (OR: 2.118; CI: 1.430-3.136). There was no link between the negative aspects of social relationships and depression symptoms.

**Table 4: Odds Ratio (OR) and 95% confidence interval (95%CI) of the binary logistic regression model that assesses the possibility of presenting depression symptoms**

Variable	Depression		
	OR	95% CI	P
<b>Model 1</b>			
<b>gender</b>	2.737	1.709-4.383	<0.001
<b>Model 2</b>			
<b>Gender</b>	2.451	1.511-3.977	<0.001
<b>Living condition</b>	0.574	0.338-0.975	0.040
<b>Model 3</b>			
<b>Gender</b>	1.953	1.159-3.292	0.012
<b>Living condition</b>	0.429	0.239-0.771	0.005
<b>Self-perceived health</b>	2.582	1.552-4.295	<0.001
<b>Frailty</b>	2.118	1.430- 3.136	<0.001
<b>Negative aspects</b>	2.606	0.208- 32.623	0.458

## DISCUSSION

The prevalence of depression estimated in different studies varies considerably. The figures obtained in the current work (30.5%) are very similar to those presented in the study conducted in Lleida<sup>(18)</sup> applying the same methodology. However, the results are lower than those obtained in the works of Sánchez-García et al<sup>(19)</sup> and Estrada et al.<sup>(20)</sup>, which used the CES-D-R (modified CES-D scoring) as a measuring tool (56.8% and 47.6% respectively). This may be because the modified CES-D scoring method has proved to be more sensitive in identifying depression symptoms among the older adult population.<sup>(19)</sup> Variability in the prevalence of depression may be due to the fact that the researchers did not perform a screening test first, followed by diagnostic confirmation.<sup>(21)</sup>

In the current study, differences between gender were observed with more depression symptoms occurring in women, data that coincide with the findings of other studies,<sup>(18,19,22)</sup> and can be related to social and cultural factors. In contrast, some authors claim that differences in the prevalence of depression between men and women decrease with age, as shown by a study by Urbina et al.<sup>(23)</sup>

Regarding age, no significant differences were found in the Castellón sample, in contrast to the findings of studies with populations of Valle (Mexico), and Moscow.<sup>(7,19,24)</sup> A possible explanation is that there were very few older adults 85 years old or older in the Castellón sample.

Regarding living condition, significant differences were observed among older adults living alone, who presented more symptoms of depression. This agrees with the studies of Zavala-González<sup>(7)</sup>, Domínguez-Sosa<sup>(25)</sup>, Escobar et al.<sup>(18)</sup> and Ferreira & Tavares.<sup>(26)</sup> Contrary to the results of the present study, Acosta & García<sup>(27)</sup> found no significant differences in terms of living conditions, perhaps because they included a broader age group.

The perceived monthly income was not related with depression symptoms, although these results may be taken with caution, since the percentage of losses in the question is high, especially taking into account that, in the consulted literature, a relationship between the economic factor and depression was observed.<sup>(7,18)</sup>

Positive self-perceived health was associated with lower prevalence of depression,<sup>(20)</sup> in agreement with the results of the current study. Considering that positive health perception is linked to a better physical health condition, the present results are in accordance with those obtained by Escobar et al,<sup>(18)</sup> and Kronfly Carlos-Gil et al.<sup>(28)</sup>

Differences were found in the frailty of participants, in that the frail and intermediate individuals were associated with the presence of depression symptoms, a finding that coincides with the works of Díaz de León et al<sup>(29)</sup> and Carlos-Gil et al.<sup>(30)</sup> This relationship may be explained by the increased vulnerability of frail and intermediate older adults when faced with stressful situations.<sup>(31)</sup>

Regarding social relationships among the Castellón population, significant differences were found regarding negative perceptions of their friends and family ties. The results are in accordance with those of Ferlander et al.<sup>(24)</sup> and Marroquin & Nolen-Hoeksema.<sup>(32)</sup> Along the same lines, Zavala et al.<sup>(7)</sup> described a link between poor family ties and higher risk of depression. However, in the current study, this variable did not present predictive value.

The results of the present study confirm that being a woman, having positive self-perceived health, and frailty were strongly associated with the presence of symptoms of depression, similar to other studies.<sup>(33,34)</sup> The negative aspects of social relationships did not present a significant association, even though it is presented by the literature as a predictor variable,<sup>(35,36)</sup> and this can be an effect of the good family support networks presented by the sample of the current study.

Limitations of the present study include data loss from the participants who presented cognitive impairments and did not answer the survey's subjective questions. Furthermore, purposive sampling is subject to the willingness of the healthcare centers

to participate in the study and may have impacted the results. Last, the cross-sectional design of this work prevents the researchers from establishing casual relationships.

## CONCLUSIONS

The results point to a relationship between the presence of depression symptoms and the female gender, negative self-perceived health, frailty, and living alone, in agreement with most of the bivariate analysis results.

The prevalence of depression symptoms was high. Related factors were gender, with higher rates among women; living condition, with higher rates among older adults living alone; and frailty.

The high prevalence of depression symptoms in the study population justifies the need to design interventions aimed at this issue. Efficient actions should focus on aspects associated with the presence of depression symptoms and propose new lines of longitudinal studies.

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