Social network and health-related quality of life in older adults: A population-based study in Spain

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Abstract

This study examined the association between social network and health-related quality of life (HRQL) in older adults and compared this against the association between HRQL and a disabling disease such as osteoarthritis. A cross-sectional survey was done on 3600 subjects representative of the Spanish non-institutionalised population aged 60 years and over. Data were collected through home-based personal interview and physical examination. HRQL was measured with the SF-36 health questionnaire. Data analysis was performed with multiple linear regression models with adjustment for the main confounders. Of the total sample, 38.6% of subjects were unmarried, 17.6% were living alone, 4.7% saw their family seldom or never, and 2.9% saw their friends seldom or never. Unmarried status and living alone were associated with lower scores in the social and mental quality-of-life components, though statistical significance was not in general attained ($p > 0.05$). Seeing family members seldom or never was associated ($p < 0.05$) with worse scores in the following scales of SF-36 questionnaire: role-physical, body pain, general health and mental health. HRQL was lower among those who saw friends seldom or never, and the reduction in HRQL proved similar to that associated with osteoarthritis, on the physical functioning (coefficients −8.4 vs. −8.1) and general health scales (−7.8 vs. −6.6); the reduction in HRQL was even greater than that associated with osteoarthritis for other scales, such as vitality (−9.6 vs. −6.7; $p > 0.05$) and social functioning (−14.5 vs. −3.7; $p < 0.05$). We conclude that only a small proportion of Spain's elderly population lack frequent social relationships, yet low frequency of relationships with friends is associated with a decline in quality of life similar to or greater than that associated with osteoarthritis.

Key words: Social network, Health-related quality of life, Older adults, Spain

Introduction

A social network might be defined as the web of social relationships that surround an individual and the characteristics of those ties [1]. There is evidence that the social network not only enables persons to become part of the social structure to which they belong, but also affects their health. Having fewer social relationships increases mortality from cardiovascular diseases, accidents and suicides, and total mortality [2–4]. The link between social network and morbidity has also been studied. While there is no consistent evidence that

social integration affects disease incidence, it seems that it does indeed improve prognosis – in terms of functional capacity – in the case of cardiac ischaemia and cerebrovascular disease [2]. Some physiological mechanisms are known that may explain these associations: specifically, a lesser degree of social integration has been linked to worse immunologic, neuroendocrine and cardiovascular functioning [4, 5].

Studies have addressed the effect of the social network on individuals' mental health. Having social ties reduces risk of depression among the elderly and boosts their self-confidence [6, 7].

Nevertheless, other studies have observed that social connections are associated with greater exposure to disputes, stress and lower self-esteem [8]. Insofar as the presence of disabilities is concerned, Seeman et al. reported a clear relationship between social network and risk of limitations in activities of daily living (ADL), but rather intriguingly observed that receiving instrumental support was associated with a significantly increased risk of disability among men [9]. In contrast, other studies have found that marital status and size of social network play a protective role in physical disability [10, 11].

There is also evidence that poor social networks are associated with: worse subjective health [12]; a worse state of the mental components of health-related quality of life (HRQL) in women [13]; and a worse state of HRQL physical components, again in women [14]. However, little research has been conducted into the influence of social networks on HRQL – namely, the influence exerted simultaneously on its physical, mental and general health components – and, in addition, such research has covered only middle-aged subjects [15]. Moreover, it is not known whether family and friendship ties particularly affect the elderly, who present with a greater degree of disability, and thus need more assistance, than the general population [16].

Accordingly, this study set out to examine the association between social network and HRQL among older adults, and identify the social-network components making a greater contribution to such association. To facilitate clinical and social interpretation of results, this association was then compared to the association between HRQL and osteoarthritis.

There are several reasons for using osteoarthritis as a comparison group. Osteoarthritis is a disabling disease very frequent among the older adults. It affects all scales of quality of life, and not merely the physical ones [17, 18]. In addition, side-effects of treatment of osteoarthritis do not affect quality of life as much as treatment for other disabling diseases, such as cancer or ischaemic heart disease. Thus, it enables separating the effects of the disease from those of its treatment. Moreover, osteoarthritis does not alter consciousness and sensorial skills as much as other important diseases, such as cerebrovascular diseases, Alzheimer

diseases, or psychiatric disorders. Hence, it permits interviewing most subjects with osteoarthritis, contrary to what happens with many patients affected by the other diseases.

We believe that our study is unique in two aspects; (a) as far as we know, it is the only study which examines the association between social network and quality of life on a national sample of older adults of both sexes. As described above, previous studies were performed in women or middle-age people from specific occupational groups; (b) it is the first study on the topic carried out in a Mediterranean country, where social networks are characteristically different to those of saxon countries. In particular, family ties are deeply-rooted in the Mediterranean countries, and traditionally they have led to an expectation (on the part of the elderly) and to a moral duty, mainly of the spouse and daughters, to keep elders living at home and to maintain frequent contact (almost daily) with them.

Methods

Study design and subjects

This was a cross-sectional survey covering a sample of 4000 subjects representative of the non-institutionalised Spanish population aged 60 years and over. The study was formally approved by the Clinical Research Ethics Committee of the "La Paz" University Teaching Hospital in Madrid, Spain.

Study subjects were selected through probabilistic multistage cluster sampling. Firstly, clusters were stratified by region of residence and size of town. Thereafter, census sections were selected at random in each cluster, followed by individual households where information was then obtained from subjects. Data were collected on a total of 470 census sections in Spain, with subjects being selected in sex and age groups. Subjects were replaced for interview only after 10 failed visits by the interviewer or original subject's incapacity, death, institutionalisation or refusal to participate. The overall study response rate was 71%.

A breakdown of the study sample by age and sex showed that 55.8% were women, 43.7% were aged 60–69 years, 36.5% were aged 70–79 years,

and 19.8% were aged $\geqslant 80$ years. Sample demographic characteristics reliably resembled census data of the target population of elderly Spaniards (56.9% women, and 44.9, 37.2, and 17.9% of subjects in the 60–69, 70–79, and $\geqslant 80$ years age subgroups, respectively).

Study variables

Information was collected through home-based personal interview using a structured questionnaire, followed by a physical examination to measure blood pressure and anthropometric variables. In all cases, informed consent was obtained from subjects or cohabiting next-of-kin. Interviewers underwent standardised training to administer the questionnaire and take anthropometric measurements.

Social network was assessed by asking interviewees the following four questions: Are you single, married, widowed or divorced?; With whom are you currently living?; Do you see family members other than those who are living with you?; Do you see friends or neighbours? Based on this information, subjects were then classified according to whether they: were married vs. any other situation; lived alone or not; saw family members daily or weekly, every month or every few months, or seldom or never; and, saw friends and neighbours daily or weekly, every month or every few months, or seldom or never.

HRQL was measured using the Spanish version of the SF-36 questionnaire [19, 20]. This questionnaire is made up of 36 items, which assess the following eight HRQL components or scales: physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health. Physical functioning, role-physical and body pain reflect the physical component of health; social functioning, role-emotional and mental health cover the psychosocial aspects; and vitality and general health give an overall idea of subjective health, and are thus associated with both the physical and mental aspects. The SF-36 allows for imputation methods to replace missing items in cases where individuals answer more than half the items of a scale. In this study, only 1.5% of respondents have imputed sale scores. Subjects' answers to any given item receive a numerical score which, after being coded, is ranked on a scale of 0–100, with the result that the higher the score the better the state of health [21]. The Spanish version of the SF-36 has previously been used to measure HRQL in the elderly [22, 23], and has shown good reproducibility and validity [20].

Weight and height were measured, using calibrated precision scales and portable wall-mounted stadiometers respectively, in accordance with standardised procedures [24]. Body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in meters (kg/m^2), and subjects were classified as normal weight (18.5–24.9 k/m^2), overweight (25.0–29.9 kg/m^2) and obese ($\geqslant 30$ kg/m^2).

In addition, interview-based information was obtained on all remaining study variables, including presence of any chronic disease diagnosed by the physician and reported by the individual. In particular, questions specifically targeted the presence of the following diseases: chronic obstructive pulmonary disease, ischaemic cardiopathy, cerebrovascular disease, osteoarthritis, diabetes mellitus, cancer at any site, depression with need for treatment, and cataracts without treatment. Previous studies confirm a high degree of agreement between self-reported disease and clinical records among the elderly [25, 26].

The socio-demographic variables considered were: sex; age; educational level (no formal education, primary, secondary and university); and size of town of residence (<5000, 5000–500,000, and over 500,000 inhabitants).

Lastly, information was also gathered on subjects' lifestyle, namely: tobacco use (never smoker, ex-smoker and smoker), alcohol consumption (abstainers, 1st, 2nd and 3rd tertiles of consumption) and physical activity during leisure time (inactive, moderate, and regular or intense).

Data analysis

Of the 4000 subjects surveyed, the following were excluded: those who had failed to furnish information for any of the variables; those who had registered extreme values for alcohol consumption (>300 g/day); or those who had a BMI $\leqslant 18.5$ kg/m^2. The final analyses were thus performed on 3600 (90.3%) subjects. Compared to the subjects who provided complete and valid information on

the study variables, those who failed to do so were older (79.7 vs. 71.8 years), included a higher proportion of subjects with no formal education (71.3 vs. 54.0%), had a lower proportion of smokers (2.8 vs. 10.1%) and reported suffering from more chronic diseases (82.4 vs. 70.2%).

A first group of multiple linear regression models was constructed, in which the dependent variable was the score for each of the SF-36 questionnaire scales, and the principal independent variable was suffering from osteoarthritis. These models were adjusted for the following demographic and lifestyle variables: sex, age, educational level, habitat, suffering other chronic diseases, tobacco use, alcohol consumption, BMI and physical activity during leisure time. Osteoarthritis and the variables of adjustment were introduced into the models categorically, using dummy terms.

A second group of linear models was constructed, with the score for each of the SF-36 questionnaire scales as the dependent variable. The principal independent variables were those which furnished information on the social network, namely, marital status, living alone, and frequency with which family and friends were seen; in addition, "suffering from osteoarthritis" was also included as an independent variable. These variables were introduced into the models using dummy terms. The models were then adjusted for all the socio-demographic and lifestyle variables used in the first group of models, though this time they were introduced continuously, after checking that they had a linear relationship with the SF-36 scales (except for "tobacco use", which was included as a categorical variable).

Interaction terms were included in the models to test whether the association between social network variables and quality of life varied with sex, age (<75 vs. ⩾75 years) and educational level (no formal versus some type of education).

All analyses were performed using the SAS 8.2 software package [27].

Results

A breakdown of the study sample showed that: 1590 (44.2%) were men and 2010 (55.8%) women, mean age 70.8 and 72.1 years, respectively; 53.8% had no formal education; the majority (79.3%) lived in an urban habitat; 65.3% of subjects did not smoke and 55.8% were abstainers, mainly women in both cases. There was a high prevalence of overweight (49.2% in men and 39.8% in women) and of obesity (31.7 and 41.4%, respectively). Moreover, 42.9% of persons were inactive during their leisure time (Table 1).

Over half the sample suffered from osteoarthritis and 70.3% from other chronic diseases. Insofar as social-network variables were concerned, 38.6% of persons were unmarried (19.1% of men and 54.1% of women), 17.6% were living alone (8.6 and 24.6%, respectively), 4.7% saw their family seldom or never, and 2.9% saw their friends seldom or never (Table 1).

Table 2 lists the mean scores obtained for each dimension of the SF-36 health questionnaire. Subjects with osteoarthritis scored lower across all scales. Worse scores for all scales were likewise observed for unmarried vs. married persons, and for persons living alone vs. those that were accompanied. With regard to the frequency with which family and friends were seen, subjects who had weekly contact registered higher scores than those who had contact seldom or never. A downward gradient in scores was observed for almost all dimensions of HRQL with decreasing frequency of contact.

Table 3 shows the regression coefficients of the SF-36 questionnaire scales for osteoarthritis and socio-demographic and lifestyle factors. Osteoarthritis and the presence of other chronic diseases were associated with worse scores across all scales. Female gender and more advanced age were also associated with a worse HRQL. In general, a rise in the educational level and size of town of residence was accompanied by a rise in HRQL. Tobacco use failed to register a clear association with any of the SF-36 questionnaire scales, but moderate alcohol consumption was associated with better scores than either abstinence or high consumption. A rise in BMI was accompanied by a corresponding decline in quality of life, with this association being of the greatest magnitude on scales that addressed physical components. Lastly, the more physical activity during leisure time the better the HRQL.

The association between social network and HRQL is set out in Table 4. Unmarried status was

Table 1. Characteristics of the study sample, by sex

	Total (n = 3600)	Men (n = 1590)	Women (n = 2010)
Age (mean ± SD)	71.5 (7.8)	70.8 (8.0)	72.1 (7.6)
Educational level (%)			
No formal education	53.8	47.2	59.1
Primary	33.6	34.8	32.7
Secondary	8.9	12.6	5.8
University	3.7	55.3	2.4
Habitat (number of inhabitants) (%)			
<5000	20.7	21.9	19.7
≥5000 to ≤500,000	59.6	59.8	59.5
>500,000	19.7	18.3	20.8
Tobacco use (%)			
Never-smoker	65.3	28.6	94.2
Ex-smoker	24.3	50.3	3.6
Smoker	10.4	20.9	2.1
Alcohol consumption (%)			
Abstainers	55.8	30.7	75.9
1st tertile (<17.5 g/day)	14.8	18.2	12.1
2nd tertile (≥17.6 to <30 g/day)	15.2	22.3	9.5
3rd tertile (≥30 g/day)	14.2	28.8	2.5
Body Mass Index (%)			
Normal weight (18.5–24.9 kg/m^2)	18.9	19.2	18.8
Overweight (25.0–29.9 kg/m^2)	43.9	49.2	39.8
Obesity (≥30.0 kg/m^2)	37.2	31.7	41.4
Physical activity during leisure time (%)			
Inactive	42.9	34.4	49.6
Moderate	54.0	61.4	48.1
Regular/intense	3.1	4.2	2.3
Osteoarthritis (%)	55.5	42.1	66.1
Other chronic diseases (%)	70.3	67.2	72.7
Unmarried (%)	38.6	19.1	54.1
Living alone (%)	17.6	8.6	24.6
Family seen (%)			
Every week	79.0	78.0	79.9
Every month	16.3	17.0	15.8
Seldom or never	4.7	5.0	4.3
Friends seen (%)			
Every week	95.1	95.9	94.5
Every month	2.0	1.9	2.1
Seldom or never	2.9	2.2	3.4

accompanied by lower scores for the social and mental components of quality of life, though statistical significance was only attained on the mental health scale. Living alone was associated with worse quality of life on six of the eight scales, without attaining statistical significance on any.

Seeing family members seldom or never was associated with a lower quality of life on the role-physical (−7.42 points; $p < 0.05$), body pain (−5.10 points; $p < 0.05$), general health (−3.48 points; $p < 0.05$), and mental health scales (−3.51 points; $p < 0.05$) (Table 4).

HRQL was lower among those who saw friends seldom or never, and the reduction in HRQL proved similar to that associated with suffering osteoarthritis, on the physical functioning (coefficients −8.4 vs. −8.1) and general health scales (−7.8 vs. −6.6); the reduction in HRQL was even

Table 2. Mean (SD) SF-36 health questionnaire scores, by osteoarthritis and social network variables

	Physical functioning	Role-physical	Body pain	General health	Vitality	Social functioning	Role-emotional	Mental health
Osteoarthritis								
No	74.9 (26.6)	82.4 (35.9)	80.1 (26.0)	61.7 (21.0)	67.0 (23.6)	84.8 (24.7)	89.7 (28.1)	72.9 (21.5)
Yes	61.6 (28.2)	67.9 (42.1)	61.1 (28.9)	52.2 (20.4)	56.4 (23.8)	77.1 (27.5)	82.5 (34.0)	65.4 (22.1)
Civil status								
Married	71.4 (27.2)	76.8 (39.6)	71.5 (29.6)	57.6 (22.0)	63.8 (24.1)	83.6 (25.2)	88.2 (30.1)	71.8 (21.7)
Other	61.3 (28.7)	70.5 (40.7)	66.5 (28.5)	54.6 (19.8)	56.8 (24.1)	75.5 (27.9)	81.9 (33.7)	64.0 (21.9)
Living alone								
No	68.7 (28.6)	75.2 (40.3)	70.3 (29.4)	56.8 (21.6)	61.9 (24.4)	81.4 (26.7)	86.2 (31.3)	69.7 (22.1)
Yes	62.1 (26.5)	70.5 (39.7)	66.1 (28.1)	54.6 (19.2)	57.5 (23.3)	76.0 (25.9)	81.6 (33.4)	64.4 (21.8)
Family seen								
Every week	67.7 (28.3)	74.6 (40.2)	69.9 (29.4)	56.9 (20.9)	61.7 (24.1)	81.1 (26.3)	85.9 (31.7)	69.2 (21.7)
Every month	68.3 (27.3)	76.2 (38.7)	70.1 (27.8)	55.8 (22.0)	59.3 (24.4)	78.9 (27.2)	86.7 (30.6)	68.0 (22.5)
Seldom or never	60.8 (30.8)	64.1 (44.4)	63.1 (30.3)	50.9 (22.2)	56.6 (27.0)	75.5 (29.9)	79.7 (36.4)	64.4 (27.0)
Friends seen								
Every week	68.0 (28.1)	74.9 (40.0)	69.8 (29.3)	56.8 (21.2)	61.6 (24.2)	81.2 (26.2)	86.0 (31.6)	69.0 (22.1)
Every month	65.6 (26.6)	69.6 (40.7)	72.2 (23.8)	55.3 (18.6)	57.5 (21.8)	72.7 (28.9)	87.2 (28.5)	65.2 (22.3)
Seldom or never	51.2 (30.5)	61.1 (43.2)	60.7 (29.3)	44.7 (20.3)	47.1 (24.6)	61.4 (30.6)	76.1 (38.3)	61.8 (21.6)

SD: Standard deviation.

greater than that associated with osteoarthritis for other scales, such as vitality (−9.6 vs. −6.7; Wald's test: $p > 0.05$) and social functioning (−14.5 vs. −3.7; Wald's test: $p < 0.05$) (Table 4).

The results were similar for men and women alike and, even though the association between seeing friends seldom or never and HRQL was more marked among subjects aged 75 years and over and among those that had some educational level, the interaction terms failed to attain statistical significance.

Discussion

Spain's elderly population registers a high percentage of married persons who do not live alone and who see their families frequently. This confirms findings reported by previous local studies [28] and shows that in Spain a family lifestyle characterised by frequent social relationships still prevails. In addition, HRQL is lower among subjects with a poorer social network, approximated by a lower frequency of contact with family and friends, regardless of socio-demographic and lifestyle variables and chronic diseases, including osteoarthritis. Moreover, low frequency of relationships with friends is associated with a decline in quality of life similar to or greater than that associated with a disease as disabling as osteoarthritis.

Some studies suggest that there are gender-based differences in the relationship between social network and physical and mental health [9]. Compared to men, it seems that women tend to maintain more emotional relationships, require more social support and, in addition, are more frequently caregivers [8]. As a consequence, men who report social isolation, do so more intensely than women, and the impact on their quality of life is greater than it is on that of women [29]. Nevertheless, no gender-based differences were observed in our study. Where age was concerned, our results were similar both for persons under 75 years of age and for those who were older. Other researchers have reported that the social network is stably maintained over the course of a lifetime [30] and that, though the amount of instrumental support needed does indeed increase with age, the elderly tend to obtain this from close contacts.

Some evidence has been published regarding the way in which socio-economic level is linked to social network. Hence, individuals belonging to the lowest social class show a lesser degree of social integration, fewer activities undertaken out-

Table 3. Linear regression coefficients of the SF-36 health questionnaire scales for osteoarthritis and socio-demographic and lifestyle variables

	Physical functioning	Role-Physical	Body pain	General health	Vitality	Social functioning	Role-emotional	Mental health
Osteoarthritis[a]	−8.0***	−9.5***	−15.0***	−6.7***	−6.7***	−3.7***	−3.3**	−3.5***
Woman[a]	−4.4***	−5.3**	−7.7***	0.8	−4.3***	−6.2***	−8.6***	−10.3***
Age (years) [a]								
⩾66 to <71	−2.0	0.7	−0.9	−0.3	1.1	−0.1	0.9	0.9
⩾71 to <78	−5.9***	−2.8	−2.0	0.4	−1.2	−1.2	−0.2	0.0
⩾78	−19.3***	−8.7***	−3.0*	−0.5	−5.0***	−6.1***	−0.6	0.8
Educational level[a]								
Primary	4.4***	4.9***	1.2	3.7***	2.7**	2.0*	2.6*	1.7*
Secondary	5.2***	6.1*	4.4**	7.1***	7.0***	4.8**	3.0	4.5***
University	6.8**	10.7**	7.6**	8.0***	5.1*	5.6*	5.0	6.0**
Habitat (number of inhabitants) [a]								
⩾5000 to ⩽500,000	1.0	−0.03	−0.4	2.9***	0.9	1.0	−2.0	1.6
>500,000	5.4***	−0.2	4.6**	4.3***	4.9***	1.6	1.9	5.5***
Other chronic diseases[a]	−8.6***	−12.2***	−7.6***	−7.4***	−6.9***	−6.2***	−9.6***	−7.9***
Tobacco use[a]								
Ex-smoker	0.9	−2.2	−1.4	0.9	1.8	−0.9	−1.2	−0.3
Smoker	0.6	−0.5	0.1	0.9	−0.2	−1.7	−0.3	−0.8
Alcohol consumption (g/day) [a]								
1st tertile (<17.5)	5.7***	3.6	0.0	7.9***	3.4**	2.9*	−0.6	0.6
2nd tertile (⩾17.6 to <30)	3.6**	5.6**	1.6	6.4***	5.1***	4.5***	2.2	3.2**
3rd tertile (⩾30)	0.3	1.8	−1.9	3.7***	2.0	1.2	−1.0	−0.2
Body mass index[a]								
Overweight	0.3	2.3	0.6	1.7	2.0	1.6	2.4	1.7
Obesity	−4.5***	−3.2	−3.2*	−0.1	−0.2	-0.8	0.3	0.8
Physical activity during leisure time[a]								
Moderate	12.6***	5.3***	6.6***	7.9***	8.3***	9.5***	3.6**	3.3***
Regular/intense	20.3***	8.7*	8.1**	16.3***	17.6***	13.4***	5.3	9.7***

Multiple linear regression models adjusted for all variables in the table.
*$p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
[a]Reference categories: no osteoarthritis, male, age <66 years, no formal education, habitat < 5000 inhabitants, disease-free, never-smoker, abstainer, normal weight, inactive during leisure time.

side home and less emotional support [31]. In our study, stratification by educational level – the variable used to assess individuals' social class – led to no substantial modification in the association between quality of life and social network, though persons with some type of education reported a greater decline in their quality of life with the reduction in the frequency of contacts with friends than did persons with no formal education. Rosengren et al. [31] reported that the best socially integrated individuals (those enjoying the highest social class) are the ones likely to be most affected by a poorer social network.

Our study showed no association between tobacco use and any of the HRQL components. In other studies, however, smoker status among older adults was associated with poorer physical functioning [14, 32]. The improvement in quality-of-life scores observed in our study for subjects reporting moderate levels of alcohol consumption vs. abstainers was also seen in earlier studies [14, 32], and our results as to the respective associations between BMI and physical activity on the one hand and HRQL on the other are likewise consistent with previous data [14, 32–34].

The association between social network and HRQL was of a considerable magnitude,

Table 4. Linear regression coefficients of the SF-36 health questionnaire scales for social-network variables and osteoarthritis

	Physical functioning	Role-physical	Bodily pain	General health	Vitality	Social functioning	Role-emotional	Mental health
Unmarried[a]	0.4	2.0	1.9	1.2	−0.7	−2.0	−1.1	−3.4**
Living alone[a]	0.5	−0.7	−1.4	−1.0	0.0	−0.5	−1.4	−0.2
Family seen[a]								
Every month	0.8	1.3	−0.7	−1.6	−2.7**	−2.1	0.5	−1.6
Seldom or never	−2.4	−7.4*	−5.1*	−3.5*	−2.1	−1.6	−4.5	−3.5*
Friends seen[a]								
Every month	0.5	−2.5	2.6	−0.2	−2.6	−6.6**	2.5	−3.1
Seldom or never	−8.4**	−6.3	−4.9	−7.8***	−9.6***	−14.5***	−5.6	−3.6
Osteoarthritis[a]	−8.1***	−9.5***	−15.1***	−6.6***	−6.7***	−3.7***	−3.3**	−3.4***

Multiple linear regression models adjusted for all variables in the table and for sex, age, educational level, habitat, other chronic diseases, tobacco use, alcohol consumption, body mass index, physical activity during leisure time.
*$p < 0.05$; **$p < 0.01$; *** $p < 0.001$.
[a]Reference categories: married status, not living alone, family seen every week, friends seen every week, no osteoarthritis.

inasmuch as it was comparable to that observed for osteoarthritis. The positive effects of a social network may be explained by its dual ability to mitigate stressful circumstances, due to the individual's perception of being supported, and to provide company and assistance where needed [4]. In addition to security, it creates a sense of belonging and integration [13]. In other studies too, relationships with friends have been observed to be more closely associated with individuals' well-being than contact with family [35]. This may be due to the fact that friends, unlike family, tend to be chosen, and that there is intermittent contact with friends, which, though conducive to confidentiality, usually entails no obligations. Nevertheless, the fact that the family is the principal resource when healthcare is needed, can also give rise to demanding and stressful situations and even to feelings of dependence, which undermine self-esteem [8, 9]. This idea finds support in the results yielded by our and other earlier studies [36], in which neither unmarried status nor living alone was associated with worse quality of life.

One of the limitations of our study is its cross-sectional design. Although the hypothesis studied was that poor social network was associated with worse quality of life among older adults, it is also possible that poor physical (e.g., disabilities) or mental functioning (e.g., depression) might render the individual unfit or unable to become part of a social network.

In the second place, not all the components and features of the structure of elderly persons' social network were measured. However, there is evidence that the questions used enable subjects' main social ties to be assessed [37]. The variables used to measure social network furnish information on the existence of social ties and frequency of contact, but not on subject's participation in social activities, volunteer groups to which they might belong and attendance at religious services [38], since these variables presuppose a minimum level of functional capacity, meaning in turn that any information so afforded is fundamentally about disability rather than integration in a social network.

In the third place, we used the SF-36 questionnaire as the only instrument to assess HRQL. We found significant associations for a small number of dimensions of HRQL, and it is not possible to discern whether associations with other dimensions of HRQL do no exist or the associations do exist but are not detected by the SF-36.

In the fourth place, we decided not to adjust for individuals' degree of dependence, since the influence exerted by this variable on the association between social network and HRQL is still not clear. It may be that the social network is small because there is a lack of dependence and the person is not in need of assistance, or alternatively that a high degree of dependence hinders social relationships because persons are rendered unfit or unable to form relationships. Furthermore, the link between degree of dependence and a worsening in older adults' quality of life is also not clear. Indeed, evidence has been found of subjects

adapting to disability status to such an extent that their overall quality of life is not affected [39, 40].

Neither did we adjust for social support, since it is a mediating variable of the relationship between social network and health, one that indicates the resources which are available to someone when needing help and to which access may be had thanks to that person's social network [4]. Furthermore, even though the terminology in this field is often somewhat imprecise, it is important to note that "social network" and "social support" represent different concepts. Thus, while disabled individuals tend to have more frequent contact with their family members, this in no way means that such persons are better integrated socially [9].

In conclusion, despite the fact that we studied a population with a high prevalence of chronic diseases, something that influences such persons' quality of life to a considerable degree, an association between fewer social ties and worse scores was observed for many HRQL dimensions. Therefore, identification of the determinants of poor social relationships should be a priority on the research agenda in this field.

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