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ORIGINAL INVESTIGATION

Sex differences in depression among older adults: are older women more vulnerable than men in social risk factors? The case of open care centers for older people in Greece

Vilelmine Carayanni · Christina Stylianopoulou · George Koulierakis · Fotoula Babatsikou · Charilaos Koutis

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Abstract This study examined depression, which, research has indicated, is the most common mental health problem affecting older people, especially women. Our objective was to estimate the prevalence of depression among older people in an urban Greek population and to investigate the covariates of depression symptoms prevalence by gender. The sample consisted of 360 individuals, 218 women and 142 men, aged 60 years or older, members of four open care centers for older people in Greece. A questionnaire for socio-demographic and medical data was used. Depression was probed by use of the geriatric depression scale short form. One-hundred and nine persons (30.3%), 32 men (22.53%) and 77 women (35.12%) were found to have depressive symptoms. The results indicated that women have more depression symptoms than men. Being currently unmarried and suffering from multimorbidity were associated with depression symptoms in both gender groups. Meetings with friends were found to be protective factors for both sexes; care of grandchildren and participating in outings and excursions seemed to be protective factors for women only. Unfavorable economic situations, and being childless, were associated with prevalence of depression symptoms among women only. This study confirmed the relationship between depression symptoms and gender and the importance of social and medical factors in the prevalence of depression symptoms, in both gender groups. It also indicated the greater vulnerability of women to some social factors.

Keywords Depression symptoms · Older people · Urban community population · Men · Women

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V. Carayanni (✉) · Ch. Koutis
Department of Public Health, Technological Educational Institute of Athens, Athens, Greece
e-mail: bilma@otenet.gr

Ch. Stylianopoulou
National School of Public Health, Athens, Greece

G. Koulierakis
National School of Public Health, Sector of Sociology, Athens, Greece

F. Babatsikou
Department of Nursing A', Technological Educational Institute of Athens, Athens, Greece

Introduction

Many studies have indicated that the prevalence of depression symptoms increases with age (Kennedy 1996). Depression is the most common psychiatric disorder among older people, and can manifest itself as major depression or as minor depression characterized by a collection of depressive symptoms (Satcher 2000).

There has been substantial evidence indicating that gender directly affects the prevalence of depression symptoms and research has attested the fact that gender differences in depression decrease in old age (Cole and Dendukuri 2003; McCall et al. 2002). Available data suggest that biological factors affect the emergence of depression, but are unlikely to account for gender differences in morbidity (Gutiérrez-Lobos et al. 1999). Also, psychological factors have already been reported in the literature as risk factors of prevalence of depression symptoms (Singh and Misra 2009). Artefactual reasons have also been investigated but do not fully account for sex differences in depression (Piccinelli and Wilkinson 2000).

Researchers across the world have consistently reported that older women are more likely than men to be exposed to social and economic factors associated with depression: lower education, lower income, less skilled occupations, greater likelihood of widowhood, and higher social isolation and greater morbidity and functional limitations (Barefoot et al. 2001; Sonnenberg et al. 2000; Van Grootheest et al. 1999). Nevertheless, there is no consensus on whether risk factors associated with depression in older people are the same for both genders accounting for the above mentioned differences or if women are more vulnerable than men in some risk factors.

Higher vulnerability to a risk factor in women compared with men would mean that this factor is a depression risk which is greater for women than for men (Zunzunegui et al. 2007). Some studies have found higher vulnerability to health and social risk factors for depression in men while other studies have not found any gender differences in vulnerabilities to health or social risk factors (Frasure-Smith et al. 1999; Zunzunegui et al. 1998).

In this study, using a sample of older individuals living independently, our objective was to answer the following research questions:

1. What is the prevalence of depression symptoms in this old age group?
2. Is gender an important factor in the prevalence of depression symptoms?
3. Are women more vulnerable than men in some social risk factors?

This study was the first of its kind in Greece to investigate if women are more vulnerable than men in some risk factors. Our aim was to contribute to improvement of information about the prevalence of depression symptoms in older people in Greece and about the risk and protective factors in depression symptoms prevalence by gender.

Methodology

Study design and sample

Open care centers for older people (OCCFOP; KAPI in Greek), have been, and still are, sociomedical services for older people on a local level. Their objective is to provide complete care by prevention of biological, psychological and social problems among older people. Members of the OCCFOP are registered men and women over 60 years of age residing near the OCCFOP facility.

The study was carried out in the four OCCFOP of the Agii Anargyri municipality in Attica. Agii Anargyri is a municipality in the western region of the capital, an area of 3,000 m^2 and with population of 32,950 people.

The protocol of the study was approved by the Ethics and Deontology Committee of the National School of Public Health. Also, approval for conducting this study was obtained by the Executive Board of the four OCCFOP and by the Agii Anargyri municipality.

Data were collected in the morning and afternoon hours of all days of the week during the period from 11/15/2008 to 01/31/2009.

Our study required a sample size of 359 to fulfill our objectives at the 95% confidence level. This sample size was calculated assuming a 31% prevalence of depression, in accordance with a previous study in OCCFOP, 5% error bound on the estimate, and 10% non-response (Spyropoulos et al. 2004). Probabilistic sampling stratified by gender was carried out in the four OCCFOPs of Agii Anargyri municipality in Attica. A random sample of 360 persons, stratified by gender, aged 60 years or older, was finally selected. This sample constituted the 30% from the 1,200 active members of the four OCCFOPs. In accordance with the fact that approximately 60% of the members, (according to member records), were women and 40% were men, 218 women and 142 men participated in the study.

Measures

A questionnaire for demographic and health status data and psycho-social factors was used to collect data. The questionnaire was divided into two parts.

The first part comprised socio-demographic and medical information covering a diverse set of variables namely:

1. *Socio demographic factors*: age, sex (men = 0, women = 1), ethnicity (Greek = 1, other = 0), marital status (currently married = 0, other (never married/unmarried/divorced/in separation/widowed) = 1), education (<6 years = 1, 6–12 years = 2, >12 years = 3), living conditions (living alone = 1, with spouse/relatives = 0), children (yes = 1, no = 0), caring for a relative (yes = 1, no = 0), daily care of third persons (not at all/a little = 0, much/very much = 1), economic status (good = 1, moderate = 2, poor = 3), profession before retirement publicly employed = 1, privately employed = 2, worker = 3, freelance professional = 4, technician = 5, farmer = 6, housewife = 7, other = 8), care of grandchildren in free time (yes = 0, no = 1).
2. *Health status and health services use*: diabetes (yes = 1, no = 0), heart diseases (yes = 1, no = 0), depression history (yes = 1, no = 0), cancer (yes = 1, no = 0), hypertension (yes = 1, no = 0), memory problems (yes = 1, no = 0), arthritis (yes = 1, no = 0), mobility problems (yes = 1, no = 0), number of chronic diseases

(<3 = 0, 3+ = 1), use of OCCFOPs health services level (never/rarely = 1, 1 time/trimester = 2, 1 time/month = 3, 1–2 times/week = 4).

3. *Social support/sociability*: Meetings with friends in free time (yes = 0, no = 1), television watching in free time (yes = 1, no = 0), outings and excursions in free time (yes = 0, no = 1), weekly church attendance (yes = 0, no = 1), satisfaction by OCCFOP programs (not at all/a little = 1, much/very much = 0).

In the second part, the 15-item geriatric depression scale (GDS) was incorporated into our questionnaire and was read out during the interviews. We chose the GDS because the presentation of depression in older people is different, with less emphasis on somatic indicators and more on affective symptoms (Wancata et al. 2006). Several studies have reported good correlations between the long (30-item) and short (15-item) forms of the GDS (Wancata et al. 2006). The cut-off used for detecting depression was a score of 6/7 on the GDS. Using this cut-off, a high sensitivity and specificity of the 15-item GDS has been reported (Fountoulakis et al. 1999).

Pre-testing was carried out on 10 older subjects to screen for potential problems in the questionnaire. No significant changes were made in the questionnaire. The interviewers discussed the questionnaire thoroughly before data collection, to reduce interviewer bias and variability.

Data analysis

Descriptive statistics were performed. Also, the χ^2 statistical test was used to test the representativeness of our sample in relation to general and urban older population, and the homogeneity between men and women in different sociodemographic and health characteristics.

Univariate and multivariate logistic models were used to examine factors associated with depressive symptoms. Also, interactions between gender and all potential covariates for depression tested the existence of different gender vulnerability of each risk factor for depression.

All variables found, by use of univariate analysis, to be associated with depressive symptoms at the $p < 0.20$ level were included in the initial multivariate models to determine which factors were independent predictors of depression in the study subjects. The variables associated with depressive symptoms at the $p < 0.05$ level were maintained in the final multivariate models. For each multivariate exploratory model, their discriminative power was verified using receiver operating characteristic (ROC) curves. A value of the area under the curve of 0.50 would mean that the model (or the covariate) would be useless for discrimination and values near 1 would mean that higher probabilities would be assigned to cases with the outcome of interest compared to cases without the outcome (Agresti 2007).

All analyses were stratified by gender, comparing men and women. The results were recorded as frequencies, unadjusted and adjusted, odds ratios with 95% confidence intervals (CI), and p values.

Results

Sample characteristics and representativeness

The representativeness of our sample in relation to the general older Greek population was tested for basic characteristics, for example gender, marital status, and schooling level using Hellenic Statistical Authority data. No significant differences were observed between members of the OCCFOPs and general urban older population in gender ($\chi^2 = 3.56$, df = 1, $p = 0.06$), in marital status ($\chi^2 = 0.73$, df = 1, $p = 0.39$), or in schooling level. ($\chi^2 = 0.44$, df = 1, $p = 0.51$) distributions.

Table 1 presents basic socio-demographic and health characteristics of the sample. As can be seen, there are significant differences between men and women in the distribution of socio-structural risk factors. In particular, women were shown to have lower education ($p < 0.001$) than men and were more likely to be widowed ($p < 0.001$). Being a housewife was the main occupation for women in this age group, with the highest percentage of men being public employees and freelance professionals ($p < 0.001$). More women than men lived alone ($p < 0.001$). Also, a significantly higher proportion of women judged their economic situation unfavorable ($p = 0.02$). The proportion of women with multimorbidity (3+ chronic diseases) was found to be significantly higher ($p < 0.001$).There were no significant gender differences in other social risk factors for depression, for example meetings with friends in free time and outings and excursions also in free time ($p > 0.05$).

Depression symptoms prevalence

The prevalence of depression symptoms was 30.3%: 32 men (22.53%) and 77 women (35.12%) had depressive symptoms. Results indicated that women had more depression symptoms than men. The association between gender and depressive symptoms was observed in both unadjusted and adjusted analyses: women reported an unadjusted odds ratio (OR) of 1.88 (95% CI: 1.16–2.03), an age-adjusted OR by age of 2.05 (95% CI: 1.48–2.84), and an OR adjusted for all potential covariates of 4.61(95% CI: 1.76–10.07).

Also, significant interactions (Table 2) were observed between gender and no meetings with friends, poor economic status, no outings and excursions, no children, and no care of grandchildren and depression symptoms prevalence controlling for all other potential covariates. This

Table 1 Sociodemographic and health profile of subjects

Variables	Total *N* (%)	Men *N* (%)	Women*N* (%)	*p* value*
Age				
60–69	96 (26.7)	16 (11.3)	80 (36.7)	
70–79	183 (50.8)	74 (52.1)	109 (50.0)	<0.001
80+	81 (22.5)	52 (36.6)	29 (13.3)	
Education				
<6 years	106 (29.4)	26 (18.3)	80 (36.7)	
6–12 years	237 (65.8)	103 (72.5)	134 (61.5)	<0.001
>12 years	17 (4.7)	13 (9.2)	4 (1.8)	
Ethnicity				
Greek	257 (99.2)	141 (99.3)	216 (99.1)	0.69
Other	3 (0.08)	1 (0.9)	2 (0.7)	
Marital status				
Currently married	234 (65)	115 (19.0)	119 (54.6)	<0.001
Other	126 (35)	27 (81.0)	99 (45.4)	
Children				
No	25 (6.9)	6 (4.2)	19 (8.7)	0.10
Yes	335 (93.1)	136 (95.8)	199 (91.9)	
Living conditions				
Alone	87 (24.17)	17 (12)	70 (32.1)	<0.001
With spouse/relatives	273 (75.83)	125 (88)	148 (67.9)	
Profession before retirement				
Publicly employed	68 (18.89)	37 (26.6)	31 (14.22)	
Privately employed	45 (12.50)	28 (19.7)	17 (7.8)	
Worker	70 (19.44)	17 (12.0)	53 (24.3)	
Freelance professional	54 (15.0)	34 (23.9)	20 (9.1)	
Technician	24 (6.67)	20 (14.1)	4 (1.8)	<0.001
Farmer	13 (3.61)	4 (2.8)	9 (4.1)	
Housewife	82 (22.78)	0 (0)	82 (37.6)	
Other	4 (1.11)	2 (1.4)	2 (0.1)	
Economic status				
Good	74 (20.56)	37 (26.1)	37 (17)	
Moderate	224 (62.22)	89 (62.7)	135 (61.9)	0.02
Poor	62 (17.22)	16 (11.3)	46 (21.1)	
Diabetes				
Yes	92 (25.56)	45 (31.69)	52 (23.85)	0.10
No	268 (74.44)	97 (68.31)	166 (76.15)	
Heart diseases				
Yes	105 (29.17)	50 (35.21)	55 (25.53)	0.04
No	255 (70.83)	92 (64.79)	163 (74.77)	
Depression history				
Yes	49 (13.61)	11 (7.75)	38 (17.43)	<0.001
No	311 (86.39)	131 (92.25)	180 (82.57)	
Cancer				
Yes	*12 (3.33)*	*5 (3.52)*	7 (3.21)	0.87
No	*348 (96.67)*	*137 (96.48)*	211 (96.79)	
Hypertension				
Yes	175 (48.61)	90 (63.38)	85 (38.99)	<0.001
No	185 (51.39)	52 (36.62)	133 (61.01)	

Table 1 continued

Variables	Total *N* (%)	Men *N* (%)	Women*N* (%)	*p* value*
Memory problems				
Yes	68 (18.89)	33 (23.24)	35 (16.07)	0.09
No	292 (81.11)	109 (76.76)	183 (83.94)	
Arthritis				
Yes	84 (23.33)	39 (27.46)	45 (20.64)	0.13
No	276 (76.67)	103 (72.54)	173 (79.36)	
Mobility problems				
Yes	32 (8.39)	17 (11.95)	15 (6.88)	0.10
No	328 (91.1)	125 (88.03)	203 (93.12)	
Number of chronic diseases				
<3	201 (55.83)	98 (69.0)	103 (47.2)	<0.001
3+ (multimorbidity)	159 (44.16)	44 (31.0)	115 (52.8)	
Use of OCCFOP's health services level				
Never/ rarely	125 (37)	52 (33)	73 (35)	
1/trimester	45 (16)	23 (11)	22 (12)	0.10
1/month	105 (24)	34 (33)	71 (29)	
1–2/week	84 (23)	32 (24)	52 (24)	
Care of grandchildren in free time				
No	280 (77.78)	126 (88.7)	154 (70.6)	<0.001
Yes	80 (22.22)	16 (11.3)	64 (29.4)	
Caring for a third person (relatives)				
No	342 (95)	134 (94.4)	206 (94.5)	0.96
Yes	20 (5)	8 (5.6)	12 (5.5)	
Meeting with friends in free time				
No	263 (73.06)	107 (75.4)	156 (71.6)	0.43
Yes	97 (26.94)	35 (24.6)	62 (28.4)	
Outings and excursions with friends in free time				
No	230 (63.89)	96 (67.6)	134 (61.5)	0.24
Yes	130 (36.11)	46 (32.4)	84 (38.5)	
Church attendance				
No	349 (96.9)	142 (100)	207 (95)	<0.001
Yes	11 (3.1)	0 (0)	11 (5)	
Television watching in free time				
No	85 (23.6)	40 (0.28)	45 (0.21)	0.10
Yes	275 (76.4)	102 (0.72)	173 (0.79)	
Satisfaction by OCCFOP programs				
Not at all/a little	49 (13.7)	25 (17.7)	24 (14.1)	0.10
Much/very much	308 (82.3)	116 (78.3)	192 (85.9)	
Daily time caring for third persons				
Not at all/a little	285 (79.2)	124 (87.3)	161 (73.9)	<0.001
Much/very much	75 (20.8)	18 (12.7)	57 (26.1)	
Depression symptoms				
Yes	109 (30.3)	32 (22.5)	77 (35.3)	0.01
No	251 (69.7)	110 (77.5)	141 (64.7)	

* The χ^2 test and Fisher's exact test were used to calculate the *p* value

Table 2 Significant interaction effects[a] of population characteristics associated with depressive symptoms (GDS-15 score >6) by gender in the OCCFOP population, Agii Anargyri, Greece

Interaction effect	*p*	OR (95% CI)
Gender × no meetings with friends	<0.001	4.40 (1.91–10.1)
Gender × no care of grandchildren	<0.001	4.91 (2.08–11.61)
Gender × no outings and excursions	0.03	2.23 (1.05–4.07)
Gender × poor economic status	0.04	2.46 (1.03–5.91)
Gender × no children	0.03	4.01 (1.16–13.87)

[a] Adjusted by age, children's existence, economic situation, marital status, multimorbidity existence, meetings with friends, caring for invalid persons, care of grandchildren, outings and excursions, education level and by other interactions

finding indicated the need for further investigation of the existence of greater vulnerability of women in some socio-structural factors.

Univariate logistic models

Table 3 indicates the significant results ($p < 0.05$), at least for one gender, from univariate analysis of socio-demographic and health characteristics and indicators of social support associated with depressive symptoms, by gender. Significant associations ($p < 0.001$) in both gender groups were observed for marital status (not currently married) and multimorbidity. Also, multimorbidity occurred more frequently in depressive persons than in others ($p < 0.001$), especially diabetes and heart disease in both men and women (80–85% in the total of men and women, respectively, with multimorbidity). Depression history was more frequent in depressive women (50% of the total of women with multimorbidity) than in men ($p < 0.001$).

Being older (70+), and childless, with poor economic status, were associated with depressive symptoms in women, but not in men. Also, meetings in free time were protective factors for depression symptoms for both genders whereas care of grandchildren in free time as and outings and excursions were protective factors for women only. Additionally, involvement of older people as informal care givers of invalid third persons (relatives) was found to be highly significant in women ($p < 0.001$).

Nevertheless, we have not been able to conclude that there were gender differences in these explanatory variables because the estimate for women was inside the confidence interval for men.

Other characteristics investigated (use of health services level, daily time caring for third persons in free time, television use, weekly church attendance, satisfaction with OCCFOP programs), were not significantly associated with the presence of depressive symptoms in either gender (results not shown).

Table 3 Significant results for at least one gender from univariate analysis of risk factors associated with depressive symptoms (GDS-15 score >6) by gender in the OCCFOP population, Agii Anargyri, Greece

Variables	*p*		OR (95%)	
	Men	Women	Men	Women
Age				
70–79	0.16	0.02	1.9 (0.83–4.36)	2.16 (1.13–4.14)
80+	0.13	<0.001	3.11 (0.6–15.3)	4.88 (1.97–12.08)
Number of chronic diseases				
3+ (multimorbidity)	<0.001	<0.001	4.15 (1.82–9.48)	3.08 (1.7–5.56)
Marital status				
Not currently married	<0.001	<0.001	5.80 (2.34–14.38)	3.47 (1.94–6.22)
Living conditions				
Living alone	<0.001	<0.001	4.98 (1.74–14.32)	2.76 (1.53–4.99)
Children				
No children	0.35	0.01	2.14 (0.35–12.9)	3.53 (1.33–8.4)
Care of grandchildren in free time				
No	0.70	<0.001	1.03 (0.27–3.99)	3.61 (1.75–7.45)
Caring for a relative				
Yes	0.31	<0.001	2.2 (0.72–6.01)	6.09 (2.42–13.24)
Meeting with friends in free time				
No	0.032	<0.001	3.97 (1.13–13.95)	2.62 (1.32–5.23)
Economic status				
Moderate	0.17	0.04	2.21 (0.71–6.9)	2.87 (1.72–6.13)
Poor	0.15	0.03	2.57 (0.7–9.47)	4.04 (1.56–10.46)
Outings and excursions with friends				
No	0.56	<0.001	1.19 (0.49–2.91)	2.61 (1.41–4.83)

Table 4 Multivariate logistic regression results for the OCCFOP population, Agii Anargyri, Greece

Variables	*p*		OR 95% CI	
	Men	Women	Men	Women
Marital status				
Not currently married	<0.001	<0.001	6.63 (2.45–20.47)	3.5 (1.7–7.22)
Number of chronic diseases				
3+	<0.001	<0.001	5.99 (2.27–15.83)	3.31 (1.57–7.01)
Meetings with friends in free time				
No	0.03	0.04	4.26 (1.08–16.73)	4.21 (1.78–9.92)
Children				
No children	0.58	0.04	1.76 (0.18–15.3)	3.71 (1.04–13.26)
Care of grandchildren in free time				
No	0.81	<0.001	1.18 (0.30–4.6)	4.76 (1.96–11.57)
Economic status				
Poor	0.38	0.04	1.23 (0.78–1.97)	2.52 (1.05–6.02)
Outings and excursions in free time				
No	0.88	0.03	1.00 (0.38–2.63)	2.26 (1.08–4.75)

The initial logistic models included, in addition to these, age, education level, caring for third person

Multivariate logistic models

Table 4 shows the final results from multivariate analysis of the factors associated with depressive symptoms by gender. After adjustments for confounders, not being currently married, multimorbidity, and not having meetings with friends in free time remained significantly ($p < 0.05$) associated with depressive symptoms, in both genders.

Among men, only the three factors previously mentioned remained significantly associated with depressive symptoms. The relationship of being informal carers of third persons did not remain significant ($p = 0.06$) for women and neither did living conditions ($p = 0.28$). Among women, being childless, having poor economic situation, not caring for a grandchild, and not participating in outings and excursions remained significant risk factors for prevalence of depression symptoms.

Multivariate analysis confirmed that having a poor economic situation, not caring for a grandchild, and not participating in outings and excursions clearly indicated a gender difference in vulnerability. Nevertheless, being childless was not indicative of a gender difference as the estimate for one gender was inside the confidence interval for the other gender. Statistical interactions among these variables were tested, but none was significant. When statistical significance was set at $p = 0.004$ to account for multiple comparisons (Fleiss 1986), the two first conditions (marital status and multimorbidity) remained significant for both sexes; the variable caring for grandchildren also remained significant for women.

The c statistics (statistics of the area under ROC curve) for each multivariate model (Fig. 1) gave the following results:

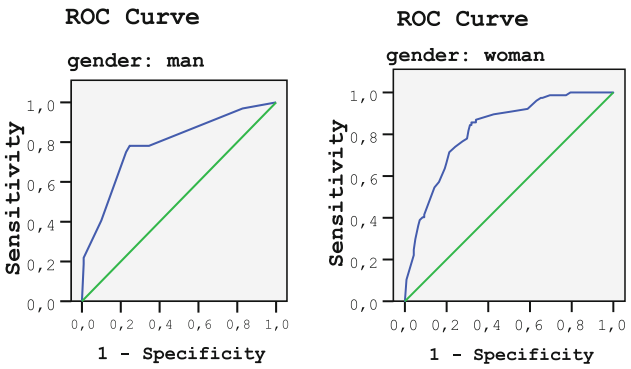

Fig. 1 ROC curves for the multivariate logistic models

1. *Multivariate logistic model for men*: The area under the curve (c) was 0.787 with 95% CI: (0.692–0.881). That is, the model correctly classifies men with and without depression in 78.7% of all possible case pairs where one case has depression and the other does not.
2. *Multivariate logistic model for women*: The area under the curve (c) was 0.839 with 95% CI: (0.786–0.892). That is, the model correctly classifies women with and without depression in 83.9% of all possible case pairs where one case has depression and the other does not.

Discussion

The presence of depression symptoms in this study population was 30.3%, indicating that depression was highly prevalent in the Greek urban older people. Also, a female excess in depressive symptoms remained after taking into account the higher prevalence of some socio-structural and health-related risk factors.

In general, previous studies have shown that depressive symptoms among older people are associated, beyond female gender, with age group, social support, health conditions and use of health services (Cole and Dendukuri 2003; Gallo and Lebowitz 1999; Flint 2005; Birrer and Vemuri 2004; Rabheru 2004). Many of these associations were found in this study. However, important similarities and differences were observed between the gender groups.

Socio-structural factors

Marital status was found to be a strong predictor of depressive disorders in later life in both genders. These results concur with the results of other studies (Minicuci et al. 2002). The prevalence of depression was found to be significantly higher in older people who were single (never married, widowed, divorced or separated). Several studies have classified these as risk factors for depression among older people (Minicuci et al. 2002; Taqui et al. 2007). A study on older people in Greece also concurred with our finding (Argyriadou et al. 2001). The finding that older people who had lost their spouse suffered more from depression could be explained by the fact that late-life support by a partner is of importance to psychological health. Also, it is known that dependence of older people on their spouse increases as they age (Taqui et al. 2007).

The occupation of older people as informal care givers for invalid third persons (relatives) was found to be highly significant for women in univariate analysis. It is known that care giving is another chronic stressor that places adults—particularly women—at increased risk of depressive disorders (Wijeratne 1997). Nevertheless, this relationship did not remain significant in the multivariate analysis.

Additionally, our study indicated that older women are more vulnerable than older men to some socio-structural risk factors, which have been confirmed by our multivariate analysis. Women with poor economic status, a risk factor already mentioned in other studies (Lynch et al. 1997), had greater prevalence of depression symptoms. Also, care of grandchildren as a main occupation in free time was a significant protective factor in univariate and multivariate analysis for women only. Grand-parenting involves re-assumption of parenting roles in advanced ages even as elders have to contend with their own problems of getting older, among them, their declining health (Hughes et al. 2007). Although the increased burden of grand-parenting has been notable, the services performed by the grandchildren for their grandparents and their strong emotional bond are beneficial to the total well-being of the older persons and this must not be overlooked (Hughes et al. 2007; United Nations 2009).

The fact that Greece has long been a place of traditional gender roles, meaning that men and women have distinct roles, both within the home and without, can explain to some extent these differences between sexes. Also, gender differences found in this study are greater than in other studies in less traditional countries, for example the Netherlands and Sweden (Zunzunegui et al. 2007).

Health status

It is known that people with co-morbidity are more likely to suffer from depression. Many studies have reported that medical co-morbidity affects the feeling of well-being in late life and that chronic medical conditions increase the risk of depression (Cole and Dendukuri 2003; Djernes 2006; Bruce et al. 2002). A study of older people in Greece also concurred with our finding (Papadopoulos et al. 2005). Our multivariate analysis suggested there is no differences in vulnerability to this risk factor for depressive symptoms between men and women.

Social support

The association between social support factors as protective factors and depressive symptoms among older people has been well established (Flint 2005). In this study, social support was assessed as meetings with friends, outings and excursions, and weekly church attendance in free time. Only the first has an independent and significant association with depressive symptoms for both genders, whereas outings and excursions proved to be protective factors for depression symptoms for women only.

It is known from the literature that organization of outings and excursions by voluntary and statutory groups, as either day trips or even holidays, may give interest and stimulation to older people and protect them from depression symptoms (Green 1995). Research has also indicated that older widowed women, especially, express clear preferences for such activities (Wilson 1995).

Study limitations

Some limitations of this study merit discussion. First, this study concerned only an urban community population comprising persons living independently, and sample sizes were too small to apply valid statistical tests in some cases (e.g. giver of care to third persons in the case of men). Further larger studies are needed to confirm and disentangle these associations. Second, depressive symptoms were measured by use of the GDS-15 scale and the rating used, 6/7 was found to be the best diagnostic cut-off for depression, with sensitivity = 92.23 and specificity = 95.24 (Fountoulakis et al. 1999). Nevertheless, some misclassification is likely that

should bias to some extent the study toward null result, that is, underestimating the strengths of the associations found. Thus, the association between depressive symptoms and the exploratory variables may be greater than that observed in this study. Additionally, because this was a cross-sectional study, temporal relationship between depressive symptoms and covariates is unknown. Longitudinal data are necessary to further unravel the complex interplay between the course of depressive symptoms and the above mentioned covariates.

Conclusions

Despite these limitations, this study supports evidence that both the prevalence of depressive symptoms and their covariates are affected by gender in a population of older people living independently.

Widowhood, deteriorating health status, and the absence of regular relationships with friends are risk factors for both sexes. On the other hand, women seem to be more sensitive to the absence of some social support factors, for example outings and excursions, and to some protective psychosocial factors, for example care of grandchildren, with all other risk factors remaining equal. Also, women are more sensitive than men to some social stressor factors, for example poor economic status. These findings are consistent with a large body of reviewed literature.

On the other hand, confirmation of the high incidence of depressive symptoms in this Greek urban aged population confirms the need to create a strong psycho-social support and health-promoting network for older people in the framework of Primary Health Care (Stylianopoulou et al. 2010).

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