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Gender differences in the relation between depression and social support in later life

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ABSTRACT

Background: Prevalence of depression is twice as high in women as in men, also in older adults. Lack of social support is a risk factor for late-life depression. The relation between depression and social support may be different for men and women.

Methods: Data from the Longitudinal Aging Study Amsterdam were used to investigate gender differences in the relation between social support and depression in a population-based sample aged 55–85 years, with n = 2,823 at baseline and using the 13-year follow-up data on onset of depression.

Results: Respondents without a partner in the household, with a small network, and with low emotional support were more often depressed, with men showing higher rates of depression than women. A high need for affiliation was associated with depression in women but not in men. Lack of a partner in the household and having a small network predicted onset of depression in men but not in women. In respondents with high affiliation need and low social support, depression rates were higher, with men being more often depressed than women.

Conclusions: Low social support and a high need for affiliation were related to depression in later life, with men being more vulnerable for depression than women. Considering the serious consequences of depression, especially in older people, it is important to identify the persons with low social support and a high need for affiliation, and to help them to increase their social support or to adjust their needs.

Key words: aging, depression, epidemiology, sex differences, social support

Introduction

Lifetime prevalence of depression in adult women is almost twice of that in men (21% and 13%, respectively) (Weissman and Klerman, 1977; Jorm, 1987; Kessler *et al.*, 1993; Wolk and Weismann, 1995; Bebbington *et al.*, 1996; Kessler, 2006). Furthermore, women have higher relapse or non-remission rates (Kuehner, 2003). Possible explanations of this gender disparity (the so-called ''gender gap'') in depression are sex differences in social factors, such as social role and status, life events and social support, in addition to sex differences in biological factors (genetic vulnerability, hormonal influences) and psychological factors (coping style, neuroticism, mastery) (Kessler *et al.*, 1984; Wolk and Weismann, 1995; Dorn and Chrousos, 1997; Nolen-Hoeksema, 2000; Kendler *et al.*, 2001; Kuehner, 2003; Kooiman *et al.*, 2007; Leach *et al.*, 2008).

Some authors have concluded that the gender gap is associated with the reproductive period of life, and that in older age the gender gap diminishes or disappears (Krause, 1986; Jorm, 1987; Bebbington *et al.*, 1998; Noble, 2005), but other studies failed to confirm this hypothesis (Beekman *et al.*, 1999; Prince *et al.*, 1999; Sonnenberg *et al.*, 2000; Cairney and Wade, 2002). Among the explanations for the persisting gender gap in older age is the differential exposure of older men and women to social risk factors for late-life depression (Sonnenberg *et al.*, 2000). Older women have lower education and income than older men, and they are more likely than men to lose their partner, which is an important

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risk factor for depression (Harlow *et al.*, 1991; Mendes de Leon *et al.*, 1994). However, not only a differential exposure to risk factors is likely to play a role, but the impact of risk factors also shows gender differences. Older women appear to be less vulnerable for depression than older men when they lose their partner, and when they receive little emotional support (Umberson *et al.*, 1988; Van Grootheest *et al.*, 1999; Sonnenberg *et al.*, 2000). Therefore, not only the amount, but also the significance of interpersonal relationships and social support may influence gender differences in depression, their effects being in different directions.

In studies on social ties among adults of all ages, women and men were found to have different needs for social affiliation, and different expectations of social relationships. Women of all ages have a larger personal network and receive more social support, which is a protective factor against depression, but which also provides a greater opportunity for negative interpersonal experiences (e.g. death of someone close), which in turn may lead to depression (Kessler and McLeod, 1984; Kendler *et al.*, 2001; Leach *et al.*, 2008). In a study by Dalgard *et al.* (2006), women experienced more negative life events particularly related to their personal network, but also had more support, both in general and in the context of the event. Also, women with little support were more vulnerable to depression than men in case of a life event (Dalgard *et al.*, 2006). Husbands and wives were found to provide equal support to each other, but women felt more responsible than men toward their spouse as well as toward other persons, which may lead to feelings of being burdened and overloaded (Neff and Korney, 2005). Interpersonal problems with one's family are associated with a higher prevalence of depression in women than in men, probably due to a greater involvement and feelings of responsibility in family matters in women (Leach *et al.*, 2008).

Similar evidence has been reported on older persons. Older women were found to be more sensitive to life events occurring to other persons than older men (Kessler and McLeod, 1984; Maciejewski *et al.*, 2001). In older people, social support protected against the psychological distress, but in older women with low resources, social connections increased the levels of distress, particularly if there was a role strain due to obligations to provide support to others (Kawachi and Berkman, 2001). In another study on coping with functional diseases in older married couples aged 60–84, social support led to improved well-being in men but not in women (Robb *et al.*, 2008). In a study of people aged 40–70 years old, Takizawa found that men benefited from social support as buffer against depression, but women did not (Takizawa *et al.*, 2006). In a study of 600 African-American older community residents (aged 55–85 years), women tended to become more depressed with increasing number of events combined with low levels of social attachment, guidance and reliability, particularly when they were living alone (Husaini *et al.*, 1991).

In summary, women have generally been found to have a larger network, which is associated with more social support, but they also experience more negative impact of their social relationships than men. The gender differences in need for social affiliation may be a reflection of differences in the need for sharing feelings, problems and life events, and in appreciation and expectations of the existing relationships and support. It is important to note that depression may also enhance the felt need for affiliation through specific symptoms such as feeling lonely or feeling helpless. Because depression, gender, need for social affiliation, and actual social support are intertwined, prospective designs are needed to study the influence of the presence or absence of social support and need for affiliation on the onset of depression in men and women.

In older people many changes in social support take place due to changes in health, functional capacity and living arrangements, and to illness or death of important others. Therefore, studies focusing on older age are useful to obtain a better understanding of the protective and disruptive effects of social relationships on distress and depression in later life, and lead to a more individually tailored approach in the management of these mental health problems in older men and women.

In the present study, we aimed to investigate the relation between social support (amount of social support and need for social affiliation) and late-life depression in men and women, both in a cross-sectional and prospective design, in a community-based sample of older Dutch citizens.

Materials and methods

Sampling and procedures

Data were derived from the Longitudinal Aging Study Amsterdam (LASA), an ongoing interdisciplinary study on predictors and consequences of changes in autonomy and well-being in the aging population (Deeg and Westendorp-de Serière, 1994; Deeg *et al.*, 2002). Details on sampling procedures and responses have been described in previous publications (Beekman *et al.*, 1995; 2002;

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Deeg *et al.*, 2002; Vink *et al.*, 2009). Briefly, the LASA cohort is based on a representative sample of 3,107 older adults between the ages of 55 and 85 at baseline, stratified for age and sex. It was drawn from the population registers of 11 municipalities in three regions of the Netherlands.

Data collection started in 1992–1993 (T1), followed by data collection cycles every three years: in 1995–1996 (T2), 1998–1999 (T3), 2001–2002 (T4), and 2005–2006 (T5). Trained and supervised interviewers using the same procedures and instruments interviewed respondents at home. All interviews were tape-recorded. The numbers of participants in the five cycles were 3,107, 2,545, 2,076, 1,691, and 1,257, respectively. Non-response in the first LASA cycle was associated with age, but not with sex. Attrition between T1 and T5 was mainly due to mortality: percentages of people who died before approach were 13% between T1 and T2, 14% between T2 and T3, 14% between T3 and T4, and 14% between T4 and T5. Other reasons for attrition were refusal, frailty, and failure to contact (about 5% per cycle). At all four follow-up cycles, attrition was associated with older age and male sex, and with physical disease and cognitive impairment at the preceding cycle. Attrition at T2 was associated with the low level of education and to the presence of depression at T1, but this pattern was not observed at later cycles.

For the present cross-sectional investigation of the association between social support and depression, and gender differences in these associations, the data of the first LASA cycle were used. Due to incomplete data on social support or on the need for social attachment, 2,823 out of the 3,107 respondents were available for the analyses. Furthermore, we conducted a longitudinal investigation of the association of social support with onset of depression in the follow-up period, for which the follow-up data were used of respondents who were not depressed at T1 according to the Centre for Epidemiologic Studies Depression Scale (CES-D $\leq$ 12), and had at least one follow-up measurement. A total of 1,928 respondents fulfilled these criteria. At the four follow-up measurements, the numbers of available respondents were 1,858, 1,580, 1,253, and 910, respectively.

Measures

Depression

Depressive symptoms were measured with the CES-D, a 20-item self-report scale developed for use in the community (Radloff, 1977; Radloff and Teri, 1986). The CES-D has good psychometric properties in older community samples (Beekman *et al.*, 1997) with minimal overlap with physical illness (Berkman *et al.*, 1986). Scores range from 0 to 60 and respondents scoring 16 or higher were considered to have a clinically relevant level of depressive symptoms. At baseline, prevalence of depression was established based on the CES-D. In the prospective study, onset of depression was defined as the development of depression, defined as crossing the cut-off score of the CES-D with an increase of at least four points at one or more measurements within the 13 years of follow-up.

Social and personal support

Three aspects of social and personal support were measured.

First, the *presence of a partner in the household* was assessed. A partner is generally considered the most important relationship in the social network. When the partner is available, he or she is generally an important resource of support (Turner and Marino, 1994; Ross *et al.*, 1995). Respondents received a score of 1 if a spouse or someone they considered their partner was available in the household, otherwise 0.

Next, the *personal network size* was measured, defined as the total number of network members with whom the respondent had important and regular contact (Van Tilburg, 1998). Network size ranged from 0 to 75 network members, with a mean of 14 and a median of 12 network members. A network with fewer than 11 network members was considered to be small.

In addition to these structural aspects of social support, functional support exchanges within social relationships were also measured. For this study, we used the mean amount of *emotional support* received from the maximally nine network members (excluding the partner) with whom contact was most frequent. Respondents were asked how often in the previous year they had talked to these nine network members about personal experiences and feelings. Response categories were never (0), seldom (1), sometimes (2), and often (3). Mean scores of the emotional support received from the nine network members were computed and divided in three groups ranging from 0 (relationships are seldom or never supportive) to 2 (relationships are often supportive) (Penninx *et al.*, 1999). For this study, respondents in the groups with scores of 0 or 1 were considered to have low received emotional support.

Need for social affiliation

The need for social affiliation was measured with a four-item self-report scale, the need for affiliation scale. This scale was developed and tested in an adult Dutch community sample (Van Tilburg,

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1988) and contains questions about the need to talk to others about one's feelings, the need for help and support in case of trouble, the need to go to others when something bothers the respondent, and the need to lean on someone when experiencing difficulties. Scores range from 4 (low need for affiliation) to 12 (strong need for affiliation), and respondents scoring 9 or higher were considered to have a high need for affiliation. Reliability of this scale was sufficient, with a Cronbach's α of 0.73.

Age, gender, level of education, cognitive impairment, and physical limitations were considered to be potential confounders because of their relation to depression, gender, and social support, and were therefore included in the study. Respondents were divided into three age groups: 55–64, 65–74, and 75–85 years old. Education was ranked according to three levels: elementary education, intermediate or secondary (vocational) education, and high (vocational) education including university and college education. Cognitive impairment was measured with the Mini-Mental State Examination (MMSE) using a cut-off score of 23 (Folstein *et al.*, 1975). Physical limitations were measured with a self-report scale on difficulty with several activities of daily functioning, previously validated in the Netherlands and summarized in two categories: no difficulty and difficulty with one or more activities (Van Sonsbeek *et al.*, 1988; Kriegsman *et al.*, 1997).

Statistical analyses

Baseline sample characteristics were assessed, including prevalence of depression, in the full sample, and in men and women separately, using chi-square statistics and logistic regression analyses to indicate the magnitude of the gender differences.

Bivariate associations of depression with each of the three social support measures and affiliation need were investigated, adjusted for age and gender, calculating odds ratios in the full sample and in both genders. In order to control for possible confounding, multivariate analyses were performed for each of the support measures and affiliation need, including age, gender, level of education, cognitive impairment, and functional limitations as independent variables. Testing for interaction effects of gender on these associations was performed, using logistic regression analyses.

To investigate the prospective associations of each of the social support measures and need for affiliation with onset of depression, Cox regression analyses were performed in the sample of respondents who were not depressed at the first LASA cycle, with time to onset of depression during follow-up as the dependent variable, and adjusted for age and gender. In order to control for the confounding variables as mentioned above, multivariate analyses were performed. Testing for interaction effects of gender on these associations was performed, using logistic regression analyses.

In all analyses, the criterion for statistical significance was $p < 0.05$.

Results

An overview of baseline sample characteristics with gender differences is shown in Table 1. Due to the stratified sampling, age and gender were equally distributed in the sample. Most respondents had low or intermediate levels of education, with significantly more women in the low-level group. Cognitive impairment was equally divided between men and women. Note that 40% had one or more physical limitations, with preponderance in women. Half of the respondents had a partner in the household. Network size ranged from 0 to 75, with a mean of 14 network members. The majority received emotional support on a regular basis, half of which often. As expected, statistically significant gender differences were found for two social support variables, with men having more often a partner in the household and women receiving more emotional support. Need for affiliation was significantly higher in women than in men. Note that 13% of the respondents had depressive symptoms according to the CES-D, with a statistically significant gender difference of 16.6% in women and 9.7% in men (OR = 1.87, CI = 1.49–2.34, $p < 0.001$, adjusted for age).

Table 2 shows the results of bivariate analyses of depression with the three social support measures and affiliation need, adjusted for age and gender. Not having a partner in the household and having a small network size were both associated with depression in the full sample, and in men and women separately. Low emotional support received was associated with depression in men, but not in women or in the full sample. A high need for social affiliation was associated with depression in the full sample and in women, but not in men. Gender differences in these associations were statistically significant (OR laying outside the CI of the other gender) for having no partner in the household and low emotional support, with men in these conditions being more vulnerable for depression than women.

In Table 3, results are shown of the multivariate analyses of depression with the three social support measures and affiliation need, controlling for the confounding variables age, gender, level of education, cognitive impairment, and functional limitations. Not having a partner in the household

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Table 1. Characteristics of the LASA baseline sample (N = 2,823) with gender differences ($p < 0.05$)

	FULL SAMPLE (n = 2,823)		MEN (n = 1,369)		WOMEN (n = 1,454)		p-VALUE OF GENDER DIFFERENCE
	N	%	N	%	N	%	
Sex							
Male	1,369	48.5					
Female	1,454	51.5					
Age							
55–64	932	33.0	449	32.8	483	33.2	p = 0.40
65–74	899	31.8	423	30.9	476	32.7	
75–85	992	35.2	497	36.3	495	34.1	
Level of education							
Low (elementary)	1,195	42.3	425	31.0	770	53.0	**p < 0.001**
Intermediate	1,300	46.1	726	53.0	574	39.5	
High	328	11.3	218	16.0	110	7.5	
Cognitive functioning							
Not impaired (MMSE ≥ 24	2,438	86.4	1,184	86.5	1,254	86.2	p = 0.97
Impaired (MMSE < 24)	385	13.6	185	13.5	200	13.8	
Physical limitations							
No	1,706	60.4	918	67.1	788	54.2	**p < 0.001**
One or more	1,117	39.6	451	32.9	666	45.8	
Partner available in household							
No partner	897	31.8	234	17.1	663	45.6	**p < 0.001**
Partner in household	1,844	65.3	1,086	79.3	758	52.1	
Partner out household	82	2.9	49	3.6	33	2.3	
Network size (range 0–75)							
Mean (SD)	13.9 (8.3)		13.8		14.0		p = 0.49
Small (<11)	1,156	40.9	580	42.4	576	39.6	p = 0.14
Emotional support received							
Seldom	584	20.7	356	26.0	228	15.7	**p < 0.001**
Sometimes	1,254	44.4	614	44.9	640	44.0	
Often	985	34.9	399	29.1	586	40.3	
Need for affiliation							
Low (score 4–8)	1,464	51.9	774	56.5	690	47.5	**p < 0.001**
High (score 9–12)	1,359	48.1	595	43.5	764	52.5	
Depressive syndrome							
No (CES-D < 16)	2,449	86.8	1,236	90.3	1,213	83.4	**p < 0.001**
Yes (CES-D ≥ 16)	374	13.2	133	9.7	241	16.6	

MMSE = Mini-Mental State Examination; CES-D = Centre for Epidemiologic Studies Depression Scale

Table 2. Bivariate associations of depression with social support and need for affiliation, adjusted for age and gender, in the full sample and in men and women (OR with 95% CI; $p < 0.05$)

	FULL SAMPLE (n = 2,823)			MEN (n = 1,369)			WOMEN (n = 1,454)		
	OR	CI	*p*	OR	CI	*p*	OR	CI	*p*
No partner in household	**2.72**	**2.13–3.47**	**p < 0.001**	**4.01**	**2.76–5.88**	**p < 0.001**	**2.06**	**1.52–2.81**	**p < 0.001**
Small network (<11)	**1.68**	**1.34–2.10**	**p < 0.001**	**1.97**	**1.37–2.84**	**p < 0.001**	**1.51**	**1.14–2.00**	**p < 0.01**
Low emotional support received	1.06	0.84–1.33	p = 0.65	**1.62**	**1.05–2.50**	**p = 0.03**	0.85	0.64–1.12	p = 0.24
High affiliation need (>8)	**1.32**	**1.06–1.64**	**p = 0.02**	1.27	0.89–1.82	p = 0.19	**1.37**	**1.03–1.82**	**p = 0.03**

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Table 3. Multivariate associations of depression with social support and need for affiliation, adjusted for age, gender, level of education, cognitive impairment, and functional limitations, in the full sample and in men and women (OR with 95% CI; $p < 0.05$)

	FULL SAMPLE (n = 2,823)			MEN (n = 1,369)			WOMEN (n = 1,454)		
	OR	CI	*p*	OR	CI	*p*	OR	CI	*p*
No partner in household (*1)	**2.43**	**1.89–3.13**	**p < 0.001**	**3.34**	**2.25–4.96**	**p < 0.001**	**1.97**	**1.43–2.72**	**p < 0.001**
Small network (<11) (*2)	**1.51**	**1.20–1.90**	**p < 0.01**	**1.73**	**1.19–2.52**	**p < 0.01**	**1.38**	**1.03–1.86**	**p < 0.03**
Low emotional support received (*3)	1.01	0.80–1.29	p = 0.92	**1.58**	**1.01–2.47**	**p < 0.05**	0.82	0.61–1.10	p = 0.18
High affiliation need (>8) (*4)	**1.37**	**1.09–1.72**	**p < 0.01**	1.17	0.81–1.70	p = 0.40	**1.50**	**1.12–2.02**	**p < 0.01**

Interactions of gender with:
*1. No partner in the household: **OR = 1.72, CI = 1.06–2.80, p = 0.03**.
*2. Small network size: OR = 1.28, CI = 0.80–2.04, p = 0.31.
*3. Low emotional support received: **OR = 1.93, CI = 1.13–3.29, p = 0.02**.
*4. High affiliation need: OR = 1.01, CI = 0.92–1.11, p = 0.85.

Table 4. Cox regression analyses with hazard ratios with 95% confidence intervals of onset of depression with social support and need for affiliation, adjusted for age and gender, in the full sample and in men and women ($p < 0.05$)

	FULL SAMPLE (n = 1,928)			MEN (n = 945)			WOMEN (n = 983)		
	HR	CI	*p*	HR	CI	*p*	HR	CI	*p*
No partner in household	**1.23**	**1.00–1.51–1.44**	**p < 0.05**	**1.87**	**1.31–2.66**	**P < 0.01**	1.08	0.84–1.37	p = 0.56
Small network (<11)	**1.33**	**1.10–1.60**	**p < 0.01**	**1.82**	**1.33–2.48**	**p < 0.01**	1.13	0.89–1.43	p = 0.33
Low emotional support received	0.89	0.73–1.07	p = 0.21	0.89	0.64–1.25	p = 0.51	0.90	0.72–1.13	p = 0.38
High affiliation need (>8)	1.15	0.96–1.39	p = 0.13	0.98	0.72–1.34	p = 0.91	1.23	0.98–1.55	p = 0.08

and having a small network size remained statistically significant in the association with depression in the full sample and in men and women separately. Low emotional support received was associated with depression in men but not in the full sample or in women. A high need for affiliation was associated with depression in the full sample and in women, but not in men. Statistically significant gender differences in these associations were found for having no partner in the household and low received emotional support. Test statistics of the interactions for gender are shown in the footnotes of Table 3.

In Table 4, the results for onset of depression in the follow-up sample are shown, adjusted for age and gender. In the Cox regression analyses in the sample without depression at baseline (CES-D ≤ 12), a higher onset of depression in the follow-up period of 13 years was found in respondents without a partner in the household and in those with a small network at baseline, but not in respondents with low emotional support, or with a high affiliation need. Separate analyses for men and women showed a statistically significant association with onset of depression for living without a partner in the household and for having a small network in men, but not in women.

In Table 5, results of the multivariate analyses for onset of depression in the follow-up sample are shown, with controlling for the confounding variables. In the Cox regression analyses in the sample without depression at baseline (CES-D ≤ 12), a higher onset of depression in the follow-up period of 13 years was found in respondents with a small network at baseline, but not in respondents without a partner in the household, with low emotional support, or with a high affiliation need. Separate analyses for men and women showed an association with onset of depression for living without a partner in the household and for having a small network in men, but not in women.

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Table 5. Cox regression analyses with hazard ratios with 95% confidence intervals of onset of depression with social support and need for affiliation, adjusted for age, gender, level of education, cognitive impairment, and functional limitations, in the full sample and in men and women ($p < 0.05$)

	FULL SAMPLE (n = 1,928)			MEN (n = 945)			WOMEN (n = 983)		
	HR	CI	*p*	HR	CI	*p*	HR	CI	*p*
No partner in household (*1)	1.17	0.95–1.45	p = 0.14	**1.70**	**1.19–2.43**	**p < 0.01**	1.06	0.82–1.35	p = 0.67
Small network (<11) (*2)	**1.29**	**1.07–1.55**	**p < 0.01**	**1.71**	**1.25–2.34**	**p < 0.01**	1.10	0.87–1.40	p = 0.44
Low emotional support received (*3)	0.85	0.70–1.03	p = 0.10	0.87	0.62–1.21	p = 0.40	0.86	0.68–1.09	p = 0.21
High affiliation need (>8) (*4)	1.13	0.94–1.36	p = 0.19	0.97	0.71–1.32	p = 0.83	1.20	0.95–1.52	p = 0.13

Interactions of gender with:
*1. No partner in the household: **HR = 1.99, CI = 1.32–3.00, p < 0.01**.
*2. Small network size: **HR = 1.69, CI = 1.15–2.50, p < 0.01**.
*3. Low emotional support received: HR = 0.89, CI = 0.44–1.81, p = 0.74.
*4. High affiliation need: HR = 1.27, CI = 0.87–1.88, p = 0.22.

A statistically significant interaction effect of gender on onset of depression was found for not having a partner in the household and for small network size, with men being more likely to become depressed than women with these characteristics. Test statistics of the interactions for gender are shown in the footnotes of Table 5.

Discussion

In the present study on gender differences in the relation between social support and depression in a population sample of 2,823 Dutch citizens aged 55–85 years, we observed associations of depression in later life with several social support measures and need for social affiliation, and gender differences in these associations.

Women were found to be more often depressed than men. Respondents without a partner in the household and with a small network showed higher depression rates than those living with a partner and with a large network. These findings correspond with the literature on depression in the elderly (Blazer, 1989; Harlow *et al.*, 1991; Copeland *et al.*, 1992; NIH Consensus Development Conference, 1992; Blazer, 1994; Mendes de Leon *et al.*, 1994; Beekman *et al.*, 1995; Cole *et al.*, 1999; Cole and Dendukuri, 2003). Depression was also associated with having a high need for social affiliation. These associations persisted after adjustment for age, gender, education, cognitive impairment, and functional limitations.

Although women were found to be more often depressed than men, the associations between depression and some of the social support measures were stronger for men than for women. Men without a partner in the household or with low emotional support received were more vulnerable for depression than women. Vulnerability for depression associated with a small network size was equal for men and women. On the other hand, a high need for affiliation was associated with depression only in women and not in men.

In the prospective analyses, male respondents living without a partner in the household and having a small network were more likely to experience onset of depression than women.

So, men without a partner in the household appeared to be more vulnerable for prevalence and onset of depression than women. However, due to more frequent partner loss, women experience the lack of a partner in the household more often than men, which explains the female preponderance in depression in this respect.

Considering the role of need for affiliation, older persons with a high need for affiliation were found to be more likely to have depression than those with a low affiliation need. As noted earlier, an explanation of this finding may be that people who are depressed have higher scores on affiliation need, because they feel more in need for support due to their low mood. Thus, a high affiliation need may be part of the depressive syndrome. Our finding that having a higher need for affiliation did not predict the onset of depression provides some support for this explanation. In the literature, need for affiliation is not considered to be a fixed personality trait, but a lasting pattern of conceptions about what is needed and desirable for a person.

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When one's personal circumstances are not in accordance with these needs and wishes, people may attempt to adjust their situation (e.g. by searching for new friends or a new partner), or they may lower their expectations about what they need (e.g. accepting that one has no partner anymore, and that this resource of support is no longer available). Changes in the need for affiliation are supposed to take time, and the capacity to change is likely to show considerable interpersonal variation. It is conceivable that particularly those persons who have a high affiliation need, and are incapable to adjust this need to a lower level when social support has declined, are at risk for depression. Our results showed that low support – a well-known risk factor for depression – and high need for social affiliation both increased the risk for depression, and they may enhance each other. In our study sample, 351 respondents had low social support, and 79 of these respondents had a high need for affiliation. One-third of these were men. In this group with low support combined with a high affiliation need, 29.1% were depressed, with a preponderance in men (34.6%) compared to women (26.4%). These gender differences were not statistically significant, due to the small numbers, but these percentages are much higher than in the full sample, particularly in men, and they may be of clinical importance. So, when aiming to identify older persons at risk for depression for preventive strategies, we should target the subgroup with low support and with a high affiliation need.

Strengths of the present study include its large sample size, with comparatively low attrition at follow-up, and its balanced gender ratio, especially in older age groups.

In addition, several potential limitations also need to be addressed. We investigated the quality of the social network mostly by applying quantitative measures: the availability of a partner and the network size. Although we asked the respondents to identify important network members only, it is possible that the respondent was not satisfied about the content and the quality of these factors. A person may have a small but very supportive network, or alternatively a large but superficial network and/or a not very supportive spouse. To minimize these problems we included a third measure, received emotional support, which reflected the quality of the relationship. Another problem may be that we underestimated the true prevalence of depression in the follow-up sample due to the fluctuating course of depression relative to the three-year interval between every follow up cycle.

In conclusion, older women had a higher prevalence of depression than older men. Older people without a partner in the household, with a small network, and with low emotional support were more likely to experience depression, with men having higher rates of depression than women in these conditions. A high need for social affiliation was associated with depression, but only in women. Lack of a partner in the household and having a small network predicted onset of depression in men but not in women. In a subgroup with low social support and high affiliation need, high rates of depression were found, particularly in men. Considering the serious consequences of depression, it is important to focus on older people with these characteristics, with the aim of helping them to increase their social support, or to accept the deficiency in support and adjust their needs.

Conflict of interest

None.

Description of authors' roles

C. Sonnenberg designed the study, assisted in the data collection, carried out the statistical analyses of the data, and wrote the paper. D. Deeg and A. Beekman supervised the data collection and the statistical design of the study, and assisted with the statistical analyses and writing the paper. T. van Tilburg and D. Vink carried out part of the data collection and the statistical design and assisted with writing the paper. M. Stek assisted with writing the paper.

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References

Bebbington, P. E. *et al.* (1998). The influence of age and sex on the prevalence of depressive conditions: report from the National Survey of Psychiatric Morbidity. *Psychological Medicine*, 28, 9–19.

Beekman, A. T. F., Deeg, D. J. H., Van Tilburg, T. G., Smit, J. H., Hooijer, C. and Van Tilburg, W. (1995). Major and minor depression in later life: a study of prevalence and associated factors. *Journal of Affective Disorders*, 36, 65–75.

Beekman, A. T. F., Deeg, D. J. H., Van Limbeek, J., Braam, A. W., de Vries, M. Z. and Van Tilburg, W. (1997). Criterion validity of the Center for Epidemiologic Studies Depression scale (CES-D): results from a

https://doi.org/10.1017/S1041610212001202 Published online by Cambridge University Press

community-based sample of older subjects in the Netherlands. *Psychological Medicine*, 27, 231–235.

Beekman, A. T., Copeland, J. R. and Prince, M. J. (1999). Review of community prevalence of depression in later life. *British Journal of Psychiatry*, 174, 307–311.

Beekman, A. T. F. *et al.* (2002). The natural history of late-life depression: a 6-year prospective study in the community. *Archives of General Psychiatry*, 59, 605–611.

Berkman, L. F., Berkman, C. S. and Kasl, S. V. (1986). Depressive symptoms in relation to physical health and functioning in the elderly. *American Journal of Epidemiology*, 124, 372–388.

Blazer, D. G. (1989). Depression in the elderly. *New England Journal of Medicine*, 32, 164–166.

Blazer, D. G. (1994). Epidemiology of late-life depression. In L. J. Schneider, C. F. Reynolds III, B. D. Lebowitz and A. J. Friedhoff (eds.), *Diagnosis and Treatment of Late Life Depression: Results of the NIH Consensus Development Conference* (pp. 9–21). Washington DC: Psychiatric Association Press.

Cairney, J. and Wade, T. J. (2002). The influence of age on gender differences in depression: further population-based evidence on the relationship between menopause and the sex difference in depression. *Social Psychiatry and Psychiatric Epidemiology*, 37, 401–408.

Cole, M. G. and Dendukuri, N. (2003). Risk factors for depression among elderly community subjects: a systematic review and meta-analysis. *American Journal of Psychiatry*, 160, 1147–1156.

Cole, M. G., Bellavance, F. and Mansour, A. (1999). Prognosis of depression in elderly community and primary care populations: a systematic review and meta-analysis. *American Journal of Psychiatry*, 156, 1182–1189.

Copeland, J. R. M. *et al.* (1992). Alzheimer disease, other dementias, depression and pseudodementia: prevalence, incidence and three-year outcome in Liverpool. *British Journal of Psychiatry*, 161, 230–239.

Dalgard, O. S. *et al.* (2006). Negative life events, social support and gender difference in depression: a multinational community survey with data from the ODIN study. *Social Psychiatry and Psychiatric Epidemiology*, 41, 444–451.

Deeg, D. J. H. and Westendorp-de Serière, M. (1994). *Autonomy and Well-being in the Aging Population I: Report from the Longitudinal Aging Study Amsterdam 1992–1993*. Amsterdam: VU University Press.

Deeg, D. J. H., Van Tilburg, T. G., Smit, J. H. and De Leeuw, E. D. (2002). Attrition in the Longitudinal Aging Study Amsterdam: the effect of differential inclusion in side studies. *Journal of Clinical Epidemiology*, 55, 319–328.

Dorn, L. D. and Chrousos, G. P. (1997). The neurobiology of stress: understanding regulation of affect during female biological transitions. *Seminars in Reproductive Endocrinology*, 15, 19–35.

Folstein, M. F., Folstein, S. E. and McHugh, P. R. (1975). ''Mini-mental state'': a practical method for grading the cognitive status of patients for the clinician. *Journal of Psychiatry Research*, 2, 189–198.

Harlow, S. D., Goldberg, E. L. and Comstock, G. W. (1991). A longitudinal study of risk factors for depressive symptomatology in elderly widowed and married women. *American Journal of Epidemiology*, 134, 526–536.

Husaini, B. A. *et al.* (1991). Social density, stressors, and depression: gender differences among the black elderly. *Journal of Gerontology*, 46, 236–242.

Jorm, A. F. (1987). Sex and age differences in depression: a quantitative synthesis of published research. *Australian and New Zealand Journal of Psychiatry*, 21, 46–53.

Kawachi, I. and Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health*, 78, 458–467.

Kendler, K. S., Thornton, L. M. and Prescott, C. A. (2001). Gender differences in the rates of exposure to stressful life events and sensitivity to their depressogenic effects. *American Journal of Psychiatry*, 158, 587–593.

Kessler, R. C. (2006). The epidemiology of depression among women. In C. L. M Keyers and S. H. Goodman (eds.), *Women and Depression* (pp. 22–37). New York: Cambridge University Press.

Kessler, R. C. and McLeod, J. D. (1984). Sex differences in vulnerability to undesirable life events. *American Social Review*, 49, 620–631.

Kessler, R. C., McGonagle, K. A., Swartz, M., Blazer, D. G. and Nelson, C. B. (1993). Sex and depression in the National Co-morbidity Survey 1: lifetime prevalence, chronicity and recurrence. *Journal of Affective Disorders*, 29, 85–96.

Kooiman, L. A., Jansen, B. J. and Peeters, F. P. (2007). Sensitive to change: neuroendocrinologic aspects of depression in women [English translation]. *Tijdschrift voor Psychiatrie*, 49, 241–250.

Krause, N. (1986). Stress and sex differences in depressive symptoms among older adults. *Journal of Gerontology*, 41, 727–731.

Kriegsman, D. M. W., Deeg, D. J. H., Van Eijk, J. T. M., Penninx, B. W. J. H. and Boeke, A. J. (1997). Do disease specific characteristics add to the explanation of mobility limitations in patients with different chronic diseases? A study in the Netherlands. *Journal of Epidemiological Community Health*, 51, 676–685.

Kuehner, C. (2003). Gender differences in unipolar depression: an update of epidemiological findings and possible explanations. *Acta Psychiatrica Scandinavica*, 108, 163–174.

Leach, L. S., Christensen, H., Mackinnon, A. J., Windsor, T. D. and Butterworth, P. (2008). Gender differences in depression and anxiety across the adult lifespan: the role of psychosocial mediators. *Social Psychiatry and Psychiatric Epidemiology*, 43, 983–998.

Maciejewski, P. K., Prigerson, H. G. and Mazure, C. M. (2001). Sex differences in event-related risk for major depression. *Psychological Medicine*, 31, 593–604.

Mendes de Leon, C. F., Kasl, S. V. and Jacobs, S. (1994). A prospective study of widowhood and the changes in symptoms of depression in a community sample of the elderly. *Psychological Medicine*, 24, 613–624.

Neff, L. A. and Karney, B. R. (2005). To know you is to love you: the implications of global adoration and specific accuracy for marital relationships. *Journal of Personality and Social Psychology*, 88, 480–497.

NIH Consensus Development Conference (1992). Diagnosis and treatment of depression of late life. *JAMA*, 268, 1018–1029.

https://doi.org/10.1017/S1041610212001202 Published online by Cambridge University Press

Noble, R. E. (2005) Depression in women. *Metabolism*, 54, 49–52.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, 109, 504–511.

Paykel, E. S. (1994). Life events, social support and depression. *Acta Psychiatrica Scandinavica*, 89, 50–58.

Penninx, B. W., Van Tilburg, T. G., Kriegsman, D. M., Boeke, A. J., Deeg, D. J. and Van Eijk, J. T. (1999). Social network, social support, and loneliness in older persons with different chronic diseases. *Journal of Aging and Health*, 11, 51–68.

Prince, M. J. *et al.* (1999). Depression symptoms in late life assessed using the EURO-D scale. Effect of age, gender and marital status in 14 European centres. *British Journal of Psychiatry*, 174, 339–345.

Radloff, L. S. (1977). The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measures*, 1, 385–401.

Radloff, L. S. and Teri, L. (1986). Use of the CES-D with older adults. *Clinical Gerontology*, 5, 119–136.

Robb, C., Small, B. and Haley, W. E. (2008). Gender differences in coping with functional disability in older married couples: the role of personality and social resources. *Aging and Mental Health*, 12, 423–433.

Ross, C. E., Mirowsky, J. and Cockerham, W. C. (1983). Social class, Mexican culture, and fatalism: their effects on psychological distress. *American Journal of Community Psychology*, 11, 383–399.

Sonnenberg, C. M., Beekman, A. T. F., Deeg, D. J. H. and Van Tilburg, W. (2000). Sex differences in late-life depression. *Acta Psychiatrica Scandinavica*, 101, 286–292.

Takizawa, T., Kondo, T., Sakihara, S., Ariizumi, M., Watanabe, N. and Oyama, H. (2006). Stress buffering effects of social support on depressive symptoms in middle age: reciprocity and community mental health. *Psychiatry and Clinical Neuroscience*, 60, 652–661. (Erratum: (2007), 61, 336–337.)

Turner, R. J. and Marino, F. (1994). Social support and social structure: a descriptive epidemiology. *Journal of Health and Social Behavior*, 35, 193–212.

Umberson, D., Wortman, C. B. and Kessler, R. C. (1992). Widowhood and depression: explaining long-term gender differences in vulnerability. *Journal of Health and Social Behavior*, 33, 10–24.

Van Grootheest, D. S., Beekman, A. T. F., Broese van Groenou, M. I. and Deeg, D. J. H. (1999). Sex differences in depression after widowhood. Do men suffer more? *Social Psychiatry and Psychiatric Epidemiology*, 34, 391–398.

Van Sonsbeek, J. L. A. (1988). Methodological and substantial aspects of the OECD indicator of chronic functional limitations. *Maandbericht Gezondheidszorg Statistieken (CBS)*, 88, 4–17.

Van Tilburg, T. G. (1988). Verkregen en gewenste ondersteuning in het licht van eenzaamheidservaringen [Obtained and desired social support in association with loneliness], pp. 58–60 and pp. 119–121. PhD Dissertation, VU University Amsterdam.

Van Tilburg, T. G. (1995). Delineation of the social network and differences in network size. In C. P. M. Knipscheer, J. de Jong-Gierveld, T. G. van Tilburg and P. A. Dykstra (eds.), *Living Arrangements and Social Networks of Older Adults* (pp. 83–96). Amsterdam: VU University Press.

Van Tilburg, T. G. (1998). Losing and gaining in old age: changes in personal network size and social support in a four-year longitudinal study. *Journal of Gerontology*, 53B, S313–S323.

Vink, D. *et al.* (2009). Onset of anxiety and depression in the aging population: comparison of risk factors in a 9-year prospective study. *American Journal of Geriatric Psychiatry*, 17, 642–652.

Weismann, M. M. and Klerman, G. L. (1977). Sex differences and the epidemiology of depression. *Archives of General Psychiatry*, 34, 98–111.

Wolk, S. and Weissman, M. M. (1995). Women and depression: an update. *Review of Psychiatry*, 14, 227–259.

https://doi.org/10.1017/S1041610212001202 Published online by Cambridge University Press