Depression symptoms in late life assessed using the EURO–D scale

Effect of age, gender and marital status in 14 European centres

M. J. PRINCE, A. T. F. BEEKMAN, D. J. H. DEEG, R. FUHRER, S.-L. KIVELA, B. A. LAWLOR, A. LOBO, H. MAGNUSSON, I. MELLER, H. VAN OYEN, F. REISCHIES, M. ROELANDS, I. SKOOG, C. TURRINA and J. R. M. COPELAND

Background Data from surveys involving 21 724 subjects aged ⩾65 years were analysed using a harmonised depression symptom scale, the EURO–D.

Aims To describe and compare the effects of age, gender and mental status on depressive symptoms across Europe.

Method We tested for the effects of centre, age, gender and marital status on EURO–D score. Between-centre variance was partitioned according to centre characteristics: region, religion and survey instrument used.

Results EURO–D scores tended to increase with age, women scored higher than men, and widowed and separated subjects scored higher than others. The EURO–D scale could be reduced into two factors: affective suffering, responsible for the gender difference, and motivation, accounting for the positive association with age.

Conclusions Large between-centre differences in depression symptoms were not explained by demography or by the depression measure used in the survey. Consistent, small effects of age, gender and marital status were observed across Europe. Depression may be overdiagnosed in older persons because of an increase in lack of motivation that may be affectively neutral, and is possibly related to cognitive decline.

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The aims of this analysis are as follows:

(a) to describe and compare the main and interactive effects of age, gender and marital status using the EURO–D scale, a continuous measure of depressive symptoms, in 14 European centres;

(b) in so far as effects are homogeneous between centres, to pool data in order to increase the precision of the estimates of effect size;

(c) to assess the effects of age, gender and marital status on the two dominant factors underlying EURO–D – affective suffering and motivation; and

(d) to estimate between-centre differences in EURO–D scale score, adjusted for age, gender and marital status.

METHOD

The studies and centres contributing to this analysis have all been described in detail in the accompanying papers (Prince *et al*, 1999, this issue; Copeland *et al*, 1999*a*,*b*, this issue). In all, 14 centres from 11 countries participated, providing data on a total of 21 724 subjects aged 65 years or over.

Dependent measure

The development and initial validation of the EURO–D scale are also described elsewhere (Prince *et al*, 1999, this issue). The scale has 12 items – depression, pessimism, wishing death, guilt, sleep, interest, irritability, appetite, fatigue, concentration, enjoyment and tearfulness – originally from the Geriatric Mental State scale (GMS; Copeland *et al*, 1976; Gurland *et al*, 1976). Analogous items from the Centre for Epidemiological Studies Depression scale (CES–D) (Radloff, 1977), the Zung Self-Rating Depression Scale (ZSDS) (Zung, 1965) and the Comprehensive Psychopathological Rating Scale (CPRS) (Asberg *et al*, 1978) were mapped onto items from the GMS using expert opinion and, in the case of CES–D, direct observation of correspondence with GMS. For these analyses the scale was transformed in each centre by first dividing by the standard deviation, then adding the mean, and finally subtracting the mean divided by the standard deviation. The effect of this transformation is to standardise the standard deviation to one for each centre, while leaving the centre means unchanged. The assumption is that the variance of the underlying trait measured by EURO–D is really the same in each centre, even if differences are observed, in the manner in which it has been measured. We justify this assumption on the grounds that the standard deviations of 10 out of the 11 GMS, CPRS and ZSDS centres varied only between 1.83 and 2.19, while the standard deviations for the three CES–D EURO–D centres were much lower, ranging between 0.94 and 1.13 (Prince *et al*, 1999, this issue). These differences in variance were probably artefactual, arising from the way in which non-integer scores of between 0 and 1 were allotted for CES–D EURO–D items, while integer scores of either 0 or 1 were used for GMS and CPRS EURO–D items. The CES–D EURO–D therefore gives a good estimate of the central tendency of the GMS EURO–D, but not of its dispersion (Prince *et al*, 1999, this issue).

Independent measures

This analysis was limited to those measures which were complete and incontrovertibly comparable between centres, namely:

(a) age, in years, at time of interview – also grouped into five categories: 65–69 years, 70–74 years, 75–79 years, 80–84 years and 85 years or older;

(b) gender – male or female; and

(c) marital status – never married, currently married, widowed, and divorced or separated.

Analysis

The unique effects of age, gender and marital status were first assessed in separate analyses for each centre. Effect sizes were measured as follows. For age, a one-way ANOVA provided *F*-tests for heterogeneity of mean EURO–D score across five age groups, and a further *F*-test for departure from linearity (one-way ANOVA). Linear effects were further assessed by the coefficient for the linear regression between age and EURO–D score (change in EURO–D per 10-year increment in age) and the

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percentage variance ($R^2 \times 100$) explained by the regression. For gender, independent-sample *t*-tests were used to estimate mean differences in EURO–D score between women and men, with 95% confidence intervals. For marital status, we used *F*-tests for heterogeneity of mean EURO–D score between never married, married, widowed, and separated or divorced subjects, with the variance explained by marital status.

For each main effect, tests were carried out for interaction by centre, and also for age by gender, and gender by marital status, using *F*-statistics obtained from a MANOVA. Where effects were homogeneous between centres, pooled analyses were performed.

The effect of age and gender on the two principal factors underlying EURO–D – affective suffering and motivation (Prince *et al*, 1999, this issue) – were assessed using linear regression (age) and independent sample *t*-tests (gender).

The joint effects of age, gender, marital status and centre, together with any significant interactions, were assessed in a MANOVA model. Centre means for EURO–D adjusted for age, gender and marital status were reported. Finally, centre variance (after adjusting for age and gender) was partitioned into components explained and unexplained by the following three ways of sub-classifying centres: (a) five regions – Benelux, UK and Eire, Germany, Latin countries, and Nordic countries; (b) three dominant religions – Protestant, Catholic and mixed; (c) five instruments used – CES–D, GMS, SHORT-CARE (Gurland *et al*, 1984), CPRS and ZSDS.

RESULTS

Age effects

All centres except two (Dublin and Munich) observed a trend for an increase in EURO–D score with increasing age (Table 1). The trend was more or less linear in most centres, although in London there was a U-shaped association, with higher EURO–D scores in the 65–69 and 85 and over age groups than at intermediate ages. The association was in every case modest, accounting in most centres for less than 1% of the variance in EURO–D score. The trend in both Dublin and Munich was in the reverse direction. However, in Munich the variance in age was constrained, as only subjects aged 85 and over were included. Both the centre-by-age (F=4.08, $P<0.001$) and the centre-by-age-group (F=1.90, P=0.001) interaction terms suggested heterogeneity of age effects between centres. These tests for interaction were no longer significant when data from Dublin were excluded from the analysis. The pooled analysis was therefore carried out omitting Dublin data. A modest positive association between age and EURO–D score was observed, with a 0.11 increase in EURO–D score per 10-year increase in age, accounting on its own for about 0.6 per cent of the variance in EURO–D.

Gender

Women scored significantly higher than men on the EURO–D in 10 out of 14 centres, and in Munich, Gothenburg (Sweden) and Ahtari (Finland) there was a non-significant trend in the same direction (Fig. 1). In Dublin only, there was a non-significant trend towards higher scores in men than in women. Six of the 10 significant effect sizes were between 0.2 and 0.4, while the three largest, the Dutch LASA (Longitudinal Ageing Study Amsterdam) study, the French PAQUID (Personnes Agées QUID) study, and the Italian Verona study, lay between 0.4 and 0.6. The centre-by-gender interaction term was significant (F=9.49, $P<0.001$), suggesting heterogeneity of gender effect between centres. Heterogeneity was reduced, but remained significant, after omitting data from Dublin, the obvious outlier. The gender effect was significantly modified by age (F=2.7, P=0.03), but this

Table 1 The effect of age according to centre

	One-way ANOVA										
	Group means in age groups					*F*-test – heterogeneity		*F*-test – non-linearity		Linear regression	
Centre	65–69	70–74	75–79	80–84	85+	*F*	*P*	*F*	*P*	Coefficient	R^2
London	2.52	2.35	2.45	2.72	2.73	3.3	0.01	2.34	0.07	0.14 (0.03 to 0.25)	0.82
Liverpool	1.69	1.67	1.77	1.83	1.91	11.5	<0.001	1.07	0.36	0.11 (0.08 to 0.14)	0.90
Dublin	1.42	1.42	1.26	1.24	1.13	2.3	0.06	0.33	0.80	−0.13 (−0.24 to −0.04)	0.76
Amsterdam	1.87	1.94	2.02	2.10	—	10.3	<0.001	0.06	0.94	0.14 (0.09 to 0.20)	0.65
LASA, Netherlands	1.95	2.00	2.09	2.18	2.30	4.9	<0.001	0.15	0.92	0.18 (0.11 to 0.26)	1.09
Antwerp, Belgium	1.69	1.89	1.90	1.97	2.26	7.5	<0.001	1.54	0.20	0.21 (0.13 to 0.29)	2.00
Berlin	—	2.20	2.44	2.31	2.65	5.5	0.001	1.73	0.17	0.20 (0.10 to 0.30)	2.67
Munich	—	—	—	—	3.58		—	—		−0.39 (−0.81 to 0.01)	0.89
Verona, Italy	1.81	1.55	1.96	1.90	2.22	1.7	0.16	1.33	0.27	0.12 (−0.06 to 0.30)	0.31
Zaragoza, Spain	1.55	1.55	1.68	1.71	1.64	1.3	0.26	0.61	0.61	0.09 (0.00 to 0.19)	0.22
PAQUID, France	2.10	2.19	2.31	2.31	2.37	8.6	<0.001	3.03	0.39	0.13 (0.09 to 0.18)	0.78
Gothenburg, Sweden	—	—	—	—	2.11		—	—		—	—
Ahtari, Finland	3.02	3.09	3.35	3.27	3.45	19.3	<0.001	1.38	0.25	0.21 (0.12 to 0.31)	1.70
Iceland	—	—	—	2.06	2.03		—	—		0.23 (−0.47 to 0.95)	0.08
Pooled data[1]	1.98	1.99	2.11	2.11	2.21	35.3	<0.001	3.01	0.02	0.11 (0.09 to 0.13)	0.64

LASA, Longitudinal Ageing Study Amsterdam. PAQUID, Personnes Agées QUID.
1. Data were pooled from all centres except Dublin.

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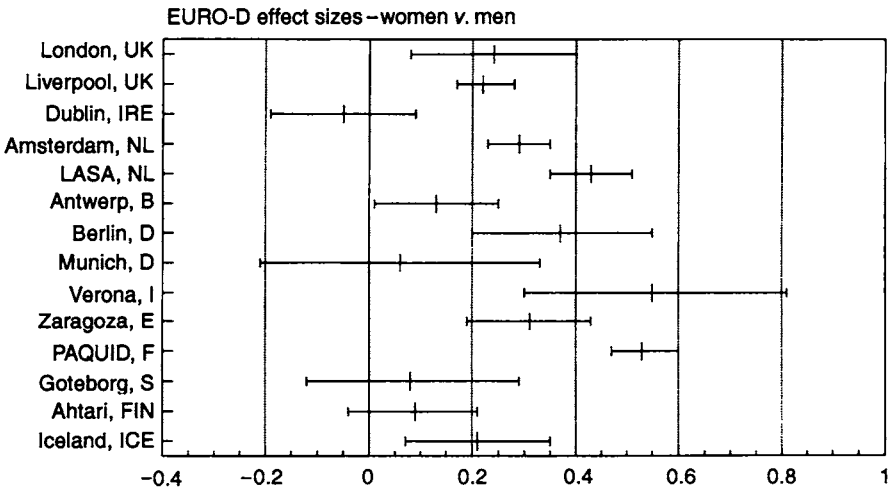

Fig. 1 Effect of gender on late-life depression. IRE, Republic of Ireland; NL, The Netherlands; B, Belgium; D, Germany; I, Italy; E, Spain; PAQUID, Personnes Agées QUID; F, France; S, Sweden; FIN, Finland; ICE, Iceland

Table 2 The effect of age and gender on EURO–D scale score

	Mean EURO–D score		
Age group	Men	Women	Mean difference (95% CI)
65–69	1.72 (n=2220)	2.13 (n=2606)	0.41 (0.35–0.46)
70–74	1.80 (n=2151)	2.10 (n=2318)	0.30 (0.24–0.36)
75–79	1.86 (n=1985)	2.25 (n=2471)	0.39 (0.33–0.46)
80–84	1.91 (n=1605)	2.21 (n=2113)	0.30 (0.23–0.37)
85+	2.01 (n=1649)	2.31 (n=2548)	0.31 (0.24–0.38)

Table 3 The effect of marital status

Centre	Never married	Married	Widowed	Divorced/ separated	F	P	$R^2 \times 100$
London	2.62	2.48	2.51	2.61	0.7	0.58	0.0
Liverpool	1.69	1.67	1.92	1.96	26.2	<0.001	1.5
Amsterdam	1.97	1.88	2.11	2.04	14.4	<0.001	1.0
LASA, Netherlands	2.17	1.86	2.37	2.25	39.4	<0.001	5.7
Antwerp, Belgium	1.97	1.77	2.16	2.69	14.55	<0.001	3.5
Berlin	2.76	2.21	2.60	2.41	6.0	0.001	3.0
Munich	3.45	3.72	3.57	3.59	0.6	0.6	0.0
Verona, Italy	1.94	1.59	2.15	2.38	5.3	0.002	6.0
Zaragoza, Spain	1.55	1.52	1.77	1.38	4.4	0.005	1.0
PAQUID, France	2.22	2.11	2.42	2.42	26.1	<0.001	2.1
Gothenburg, Sweden	2.14	2.18	2.07	2.09	0.4	0.77	0.0
Ahtari, Finland	3.04	3.18	3.20	3.20	0.8	0.50	0.1
Iceland	1.86	2.01	2.08	2.44	3.5	0.02	1.0

LASA, Longitudinal Ageing Study Amsterdam; PAQUID, Personnes Agées QUID.

interaction appeared to be non-linear with respect to age (Table 2).

Marital status

There was considerable variability in the distribution of marital status between centres. The proportion of married to widowed subjects was largely determined by the age structure of the population, with widows predominating in older populations. However, the divorce rate was much lower in predominantly Catholic centres (Liverpool 2.9%, Antwerp, Belgium 1.1%, Verona 1.0%, Zaragoza, Spain 0.7% and PAQUID 2.7%) than in Protestant or mixed centres (London 9.0%, Berlin 7.6%, Gothenburg 6.9%, Amsterdam 5.0%). The proportion of never-marrieds varied from 4.8% (PAQUID) to 16.5% (London) and 18.5% (Iceland). There was an association between marital status and EURO–D score in every centre except London, Munich, Ahtari and Gothenberg. Mean EURO–D scores tended to be lower among the married and the never married than among the widowed, divorced or separated (Table 3). However, the effect of marital status differed between centres (F=3.08, P<0.001). There was also a significant interaction between marital status and gender (F=10.6, P<0.001). The gender difference was in most centres least prominent among the never married, and most prominent among the married. The differences in the mean EURO–D score between women and men were: 0.07 in the never married (95% CI −0.03–0.17), 0.37 in the currently married (0.33–0.41), 0.27 in the widowed (0.21–0.32), and 0.31 in the divorced (0.15–0.48).

Age and gender effects on factor scores

Principal components analysis was used to generate two factors – affective suffering (depression, tearfulness, wishing death and sleep) and motivation (enjoyment, interest and concentration). The associations between these underlying factors and age in all centres except Dublin, and separately in Dublin alone, are shown in Table 4. The affective suffering factor score was positively but weakly associated with age (scores tending to increase with increasing age, indicating increased symptom load), while in Dublin there was a strong negative association. Conversely, in Dublin motivation factor scores tended to remain constant with increasing age, whereas elsewhere they increased (indicating increased symptom load) and, it seems, accounted for the upward trend with age observed for the EURO–D. The gender difference in EURO–D, however, seemed to be determined by the affective suffering factor (gender difference 0.33, 95% CI 0.31–0.36), with no significant gender difference in the motivation factor (0.00, −0.02–0.03).

Final model

The final model (Table 5) included the main effects of centre (accounting independently

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Table 4 Associations between EURO–D factors and age

	All centres except Dublin		Dublin	
	Coefficient (95% CI)	$R^2 \times 100$	Coefficient (95% CI)	$R^2 \times 100$
Affective suffering	0.02 (0.00 to 0.04)	0.01	−0.18 (−0.28 to −0.08)	1.15
Motivation	0.16 (0.14 to 0.18)	1.47	0.02 (−0.04 to 0.08)	0.01

for 4.1% of the variance), gender (0.2%), and age group (0.6%), with centre-by-gender (0.3%) and gender-by-marital status (0.4%) interaction terms. Taken together, the final model accounted for 15.8% of the variance in EURO–D. Estimated centre means, adjusted for all these main effects and interaction terms, hardly differed from the observed centre means (Table 6). In a rough-and-ready attempt to model between-centre variance, after adjusting for age and gender, a plausible division of Europe into five geo-demographic regional blocks accounted for 45% of the between-centre variance, compared with 63% accounted for by the instrument from which EURO–D had been derived (Table 7). Centre religious denomination accounted for only 15% of the between-centre variance. These three variables together explained 69% of the variance associated with centre.

DISCUSSION

Effect of age

The US Epidemiologic Catchment Area (ECA) survey (Weissman *et al*, 1988) suggested that the prevalence of major depression decreases with increasing age, with a prevalence rate of only 1% among those over 65 years old. This low prevalence rate for major depression among the older population has since been confirmed in Canadian (Bland *et al*, 1988) and Australian surveys (Henderson *et al*, 1993). These findings have been controversial, as they could be taken to imply that the management of depression may require fewer resources per capita for the old than for the young (Snowdon, 1990). Moreover, they conflict with the impression that the frequency of depressive symptoms and broader depressive syndromes either increases (Kanowski, 1994; Tannock & Katona, 1995; Ernst & Angst, 1995) or remains stable (Henderson *et al*, 1993; Forsell *et al*, 1994) with increasing age; this discrepancy has yet to be satisfactorily explained. The lay-administered Diagnostic Interview Schedule (DIS; Robins *et al*, 1981), from which ECA DSM–III (American Psychiatric Association, 1980) diagnoses were derived, excludes symptoms attributable to bereavement, physical illness or cognitive impairment. The complexity of the symptom descriptions in the DIS and the judgmental process required for responding to probes may have exceeded the cognitive capacity of many older adults, leading to systematic response bias. This may have been a particular problem where subjects were required to attribute symptoms to physical or non-physical causes (Knauper & Wittchen, 1994). However, a re-analysis of ECA data, re-attributing physical symptoms to psychiatric symptoms, did not lead to a disproportionate rise in major depression among older age groups (Heithoff, 1995). The observation that the lifetime prevalence of major depression also seems to be lower for elderly subjects (1.4% for those over 65 years of age in the ECA survey) than for younger subjects (7.5% for those aged 30–44, from the same survey) has led some to suggest a cohort effect, with successive birth cohorts having an increasing propensity for major depression. More plausibly, this finding may have arisen from a selective tendency for older subjects not to recall earlier undiagnosed episodes (Giuffra & Risch, 1994), and from the selective mortality of those most vulnerable to repeated severe episodes of depression (Ernst & Angst, 1995; van Ojen *et al*, 1995). A broad review of this area (Simon & VonKorff, 1992) reported similar findings for most psychiatric diagnoses, including schizophrenia, and concluded that cohort trends cannot be safely extrapolated from cross-sectional data.

We can confirm that in 11 out of 13 European centres a modest tendency exists for depressive symptoms to increase with

Table 5 Final model (general factorial ANOVA) showing the effect of centre, gender, marital status and age group on EURO–D score

Source of variation	Sum of squares	Degrees of freedom	Mean squares	*F*-value	*P*-value	Effect size (partial ξ^2)
Within+residual	19 796.80	20 553	0.96			
Main effects						
Centre	843.00	12	70.25	72.93	<0.001	4.1
Gender	39.52	1	39.52	41.03	<0.001	0.2
Marital status	9.47	3	3.16	3.28	0.02	0.0
Age group	114.58	4	28.65	29.74	<0.001	0.6
Interaction terms						
Centre × gender	54.18	12	4.52	4.69	<0.001	0.3
Centre × marital status	86.25	36	2.40	2.49	<0.001	0.2
Marital status × gender	34.87	3	11.62	12.07	<0.001	0.4
Age group × gender	8.34	4	2.08	2.16	0.07	0.0
(Model)	3813.87	75	50.85	52.79	<0.001	
(Total)	23 610.68	20 628	1.14			

Total variance explained ($R^2 \times 100$)=15.8%

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Table 6 The effect of centre, adjusted for potential confounders

	Unadjusted	Adjusted for age and gender	Adjusted for age, gender and marital status
London	2.54	2.52	2.54
Liverpool	1.79	1.77	1.80
Dublin	1.34	1.42	—
Amsterdam	1.98	1.95	1.97
LASA, Netherlands	2.06	2.08	2.10
Antwerp, Belgium	1.93	1.94	1.96
Berlin	2.48	2.45	2.45
Munich	3.58	3.51	3.50
Verona, Italy	1.84	1.85	1.84
Zaragoza, Spain	1.61	1.63	1.64
PAQUID, France	2.23	2.23	2.26
Gothenburg, Sweden	2.11	2.05	2.05
Ahtari, Finland	3.17	3.18	3.18
Iceland	2.03	1.97	1.98

LASA, Longitudinal Ageing Study Amsterdam; PAQUID, Personnes Agées QUID.

Table 7 The effect of geographical region, predominant religion and survey instrument on EURO–D scores, adjusted for each of these factors, and for age and gender

	Adjusted EURO–D mean
Region	
Benelux countries	2.02
UK and Eire	1.94
Germany	2.86
Nordic countries	2.44
Latin	2.00
Religion	
Protestant	2.46
Catholic	2.05
Mixed	1.96
Instrument	
CES–D[1]	2.17
SHORT-CARE	2.53
GMS[2]	1.88
CPRS[3]	2.11
ZSDSS[4]	3.17

1. Centre for Epidemiological Studies Depression scale.
2. Geriatric Mental State scale.
3. Comprehensive Psychopathological Rating Scale.
4. Zung Self-Rating Depression Scale.

increasing age. We also make the tentative suggestion that this association may be accounted for entirely by those symptoms contributing to the motivation factor (loss of interest, poor concentration and lack of enjoyment) rather than symptoms contributing to the depressed affect factor (depression, tearfulness, sleep problems and wishing death), which tended to remain constant with increasing age. The Swedish Kungsholmen study (Forsell *et al*, 1994) identified very similar factors in a community survey of subjects over 75 years old. In that study, neither factor correlated with age, but motivation symptoms increased sharply with declining cognitive function. Our findings may therefore be accounted for in whole or in part by older cognitively impaired subjects recording more motivation symptoms. We could not control formally for cognitive function in the pooled analysis. However, most EURODEP subjects with frankly impaired cognitive function will have missed more than one depression scale item, and hence will have been excluded from our analysis. An alternative explanation for our findings is that world-weariness may, with increasing age, become an affectively neutral construct, or even a reasoned adaptation to the restrictions imposed by age. Asking those in extreme old age whether they look forward to the future, or whether they have as much interest or enjoyment in life as they used to, may miss the component of affective suffering central to most definitions of depression.

Gender differences

The gender difference in depression symptoms and syndromes is among the most robust findings in psychiatric epidemiology (Weissman & Klerman, 1977). However, the extent of the excess morbidity among women may attenuate with increasing age, and no gender difference has been detected in rates of major depression among the very old (Forsell *et al*, 1995; Girling *et al*, 1995). Jorm carried out a meta-analysis of published data and showed that the gender difference for both depression (Jorm, 1987*b*) and neuroticism (Jorm, 1987*a*) was best described by a parabolic function, maximal in mid-life and negligible in early and late life. Rates of depression among women rose sharply from childhood to adulthood and then declined slightly in older age. In men, rates remained stable after a slight rise in early life.

We report a significant excess of depression symptoms among women in 10 out of 14 centres studied, with no tendency for the gender difference to attenuate with increasing age across the span of 65–90 years. No other study, including Jorm's meta-analysis, has been able to measure gender differences across the late-life age span and into extreme old age with equivalent precision. We replicate the Kungsholmen study's finding (Forsell *et al*, 1994) that the excess of depression symptoms among women arises entirely from symptoms loading on the depressed affect factor, with no gender difference in motivation symptoms. We cannot exclude cohort effects; there was, for instance, a report of gender differences in the USA increasing for those reaching adolescence pre-1910 and in 1930–1939 – times when educational opportunities were increasing for women – and decreasing in between (Silverstein & Perlick, 1991). The EURODEP studies were mostly carried out over a narrow time period around 1990, completely confounding age and birth cohort. Those aged 65–75 would have reached adolescence in the 1930s, and those who were older between 1910 and 1930. Thus, had the US experience held true for EURODEP, the cohort effect would have accentuated rather than obscured Jorm's attenuation with age (Jorm, 1987*a*,*b*).

We do, however, have strong evidence that the gender difference is modified by a subject's marital status, being lower among the never married than among those who were at some stage married (the currently married, widowed and divorced). The gender-by-marital-status interaction did not vary statistically between centres, thus confirming across

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the EURODEP collaboration an effect reported initially in just one centre (Prince *et al*, 1997). It is consistent with the observation from several studies that married older men cite their wife as their main confidante, whereas women more often cite a friend outside the home (Bowling, 1994). Also, a prospective study in Finland showed that for men the risk of onset of depression over five years is increased for those having poor emotional relations with their wives, while for women the risk is greatest among those not living alone at the beginning of the follow-up period (Kivela *et al*, 1996). The quality of older persons' marriages may, therefore, be an important factor; equally there may be external factors which, to the extent to which they affect wives and husbands and single men and single women differently, might have explained some of the gender-by-marital status interaction. One such factor may be the social integration and activity of single men and women. Another area worthy of investigation is the relative health of male and female marital partners. A national US survey showed that 64% of all spousal carers were wives, suggesting that in older age the burden of care in marriages may generally move away from the husband and devolve onto the wife (Stone *et al*, 1987).

Between-centre differences

Age, gender and marital status each accounted for less than 1% of the variance in EURO–D, and unsurprisingly could not account for the observed between-centre differences. After adjusting for these effects, centre differences accounted for just 4–5% of the variance in EURO–D scores. Geographical region and type of instrument explained just under a half and just over a half, respectively, of the variance associated with centre. Dominant religion was less relevant. The variance associated with region and instrument was inflated by the unusually high EURO–D scores derived from the Finnish study, which used the ZSDS questionnaire. It is impossible to be sure whether these high scores reflect a relative excess of depression symptoms in Finland, or an incongruent depression measure. It is at least reassuring that methodological effects do not predominate overall. The between-centre differences may have arisen from relatively subtle local effects which are not well captured by the coarse aggregate level data examined here.

CLINICAL IMPLICATIONS

- While symptoms of depression increase with age, depression may be overdiagnosed in older persons because of an increase in complaints of lack of interest and motivation which may be affectively neutral, and possibly related to cognitive decline.
- Identification of the aggregate community-level factors responsible for the substantial between-centre differences in levels of depression symptoms may offer scope for primary prevention of late-life depression.

LIMITATIONS

- Age, gender and marital status are consistently but weakly associated with depression symptoms in old age. The explanatory power of the model may be enhanced when the role of other risk factors is investigated in the same data set.
- The effect of cognitive impairment on depression symptoms could not be estimated.
- Methodological differences may still have accounted for some or all of the between-centre differences in depression symptoms.

M. J. PRINCE, MD, Epidemiological Unit, London School of Hygiene and Tropical Medicine, London; A. T. F. BEEKMAN, MD, Department of Psychiatry, Vrije Universiteit Amsterdam, The Netherlands; D. J. H. DEEG, PhD, Faculty SCW/LASA, Vrije Universiteit, De Boelelaan 1081C, 1081 Amsterdam, The Netherlands; R. FUHRER, PhD, INSERM U360, Hôpital de la Salpetriere, 75652 Paris, Cedex 13, France; S.-L. KIVELA, MD, Oulu University Hospital, Unit of General Practice PB5000, 90401 Oulu, Finland; B. A. LAWLOR, MRCPsych, Department of Psychiatry of the Elderly, St James's Hospital, Dublin, Republic of Ireland; A. LOBO, Prof. Dr, Department of Psychiatry, Hospital Clinico Universitario, Zaragoza, Spain; H. MAGNUSSON, Prof. Dr, Heilsugaeslustod Grundarfjardar, Iceland; I. MELLER, Priv. Doz. Dr, Department of Psychiatry, University of Munich, Munich, Germany; H. VAN OYEN, MD DrPH, Department of Epidemiology, Scientific Institute of Public Health, J. Wytsmanstraat 4, 1050 Brussels, Belgium; F. REISCHIES, Priv. Doz. Dr med., Freie Universität Berlin, Department of Psychiatry, Universität Klinikum, Eschenallee 3, Berlin, Germany; M. ROELANDS, MD, Department of Behaviour Therapy and Counselling, University of Gent, B-9000 Gent, Belgium; I. SKOOG, MD, Psykiatriska Kliniken, Sahlgrenska sjukhuset, 413 45 Goteborg, Sweden; C. TURRINA, MD, Clinica Psichiatrica, Ospendale Civile, Breschia, Italy; J. R. M. COPELAND, FRCPsych, Department of Psychiatry, Institute of Human Ageing, University of Liverpool, Liverpool

Correspondence: M. J. Prince, Epidemiological Unit, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT

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This is not to say that closer examination of these between-centre differences may not generate hypotheses for future study. Older people in Liverpool and Dublin, for instance, recorded substantially lower prevalences of depression and depression symptom levels than did older people in Gospel Oak, London (Prince *et al*, 1997; Copeland *et al*, 1999*b*). Levels of socio-economic disadvantage were similar in all three inner-city communities. What factors then explained the difference, and to what extent might those factors be addressed in the high-prevalence community?

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