Low prevalence of depression and anxiety is linked to statutory retirement ages rather than personal work exit: a national survey

ELENA VILLAMIL[1], FELICIA A. HUPPERT[2] AND DAVID MELZER[1,3*]

[1] *Epidemiology for Policy Group, Department of Public Health and Primary Care, University of Cambridge, Cambridge, UK*; [2] *Department of Psychiatry, University of Cambridge, Cambridge, UK*; [3] *Peninsula Medical School, Exeter, UK*

ABSTRACT

Background. Common mental disorder prevalence decreases substantially around the conventional retirement age for men in the UK, but trends for older women are more continuous. Prevalence changes in depression and anxiety around retirement are less clear, as is the role of risk factors. The aim of this study was to establish whether work status, age or other known risk factors account for the reduced prevalence of depressive episode and anxiety disorder around retirement ages for men and for women.

Method. The British Psychiatric Morbidity Survey (BPMS) 2000 was analysed, including 1875 men and 2253 women aged 45–75 years. Diagnoses were from the Revised Clinical Interview Schedule (CIS-R). Logistic models were adjusted for sociodemographic factors, social network, work status, life events, physical illness and disability.

Results. There are marked reductions in the prevalence of depressive episode after 60 years for women [60% lower prevalence, 95% confidence interval (CI) 40–80] and 65 years for men (90% lower prevalence, 95% CI 70–100), compared to the youngest age groups. For anxiety disorder, the reduction in prevalence was 80% (95% CI 60–90) for men and 40% (95% CI 20–60) for women. In fully adjusted multivariate models, the strong association between diagnoses and age groups remained, for both genders. Work status was a significant factor for men but not for women.

Conclusion. There is a discontinuity in the prevalence of depressive episode for both men and women, coinciding with statutory retirement ages. No studied risk factor reduced the associations between age group and disorders. This population scale recovery may provide a model for understanding non-genetic factors.

INTRODUCTION

Several epidemiological studies have reported somewhat lower prevalence rates of 'neurotic' mental disorders in older people compared to middle-aged adults (Bland *et al.* 1988; Regier *et al.* 1993; Murphy *et al.* 2000). At the same time, although unplanned retirement has been linked to raised rates of neurotic disorders (Gallo *et al.* 2000), a number of studies of middle-aged workers have reported significant improvements in mental health after retirement from work (Salokangas & Joukamaa, 1991; Gall *et al.* 1997; Drentea, 2002; Mein *et al.* 2003). What remains unclear is whether and how these phenomena are linked, or whether other risk factors for mental disorders account for the observed prevalence rate trends.

In many countries the 'statutory' retirement age, linked to entitlement to a state pension

and other benefits, has been 65 years for men and 60 years for women, although many individuals leave work early and some remain in work after these ages. In a previous analysis of the British Psychiatric Morbidity Survey (BPMS) 2000, Melzer *et al.* (2004*a*) reported that, for men, there was a sharp prevalence rate reduction in the common mental disorders, and this appeared to coincide with the statutory retirement age and not the timing of individual exit from work. For women, overall common mental disorder prevalence peaked at age 50 years and declined smoothly thereafter, with no large changes evident around age 60 or 65 years. In a replication using Australian national data (Butterworth *et al.* 2006), similar results were obtained.

The 'common mental disorder' label in the BPMS, however, covered a wide range of asymptomatology, including a substantial proportion of cases labelled as 'mixed anxiety and depression' that did not fit more specific diagnostic criteria (Melzer *et al.* 2004*a*). Depression and anxiety are responsible for a large proportion of the burden of morbidity in middle and early old age (De Boer *et al.* 1997; Ustun, 1999; Michaud *et al.* 2001) and examination of prevalence changes in these specific conditions around retirement, especially for women, has been limited. Apart from work status, a range of other risk factors has been associated with common mental disorders, including demographic factors, social situation, physical health and disability, economic factors, and adverse life events (Brugha *et al.* 1987; Goldberg & Huxley, 1992; Beaudet, 1996; Bijl *et al.* 1998; Bebbington *et al.* 2003; Fryers *et al.* 2003; Lorant *et al.* 2003; Melzer *et al.* 2004*b*). The effect of these potential explanatory factors on the prevalence reductions has not been explored.

Understanding the reasons for the reduction in rates of depression and anxiety around retirement age is likely to provide better insights into causation and inform approaches to prevention and treatment. This study therefore aimed to establish whether the known risk factors for depressive episode and anxiety disorder statistically account for part or all of the lowering of disorder rates around the statutory retirement age.

METHOD

The BPMS 2000 (Singleton *et al.* 2001), carried out by the Office for National Statistics (ONS), provides data on common mental disorders, psychotic and personality disorders in a representative sample of adults aged 16–74 years living in private households in the UK. A stratified design using the 'small user' postcode address file (PAF) was used to identify eligible households (12 792 households). Only one adult was selected for interview from each household. Interviews were conducted in home visits, by trained lay fieldworkers, using computerized techniques. The overall response rate for the study was 69·5%, with 95% of responders completing the full interview.

Occupationally based social class is an important factor in this analysis, and thus members of the armed forces were excluded as unclassifiable ($n=2$). Final data in this analysis were from the 1875 men and 2253 women aged 45–74 years.

Diagnosis of depressive episode and anxiety disorder

The psychiatric instrument used was the Revised Clinical Interview Schedule (CIS-R; Lewis *et al.* 1992). The CIS-R enquires about 14 neurotic symptoms in the week before the interview: somatic symptoms, fatigue, concentration and forgetfulness, sleep problems, irritability, worry about physical health, depression, depressive ideas, worry, anxiety, phobias, panic, compulsions and obsession. By applying algorithms based on the ICD-10 system of classification (WHO, 1993), six neurotic disorders were diagnosed from CIS-R scores. These were depressive episode, generalized anxiety disorder, phobia, panic disorder, obsessive–compulsive disorder and manic episodes.

Variables considered in the analysis

Table 1 summarizes the explanatory factors available in the study data that were examined in univariate and multivariate analyses of the prevalence of the diagnoses. Difficulty climbing stairs (one of the items in the SF-12 questionnaire; Ware *et al.* 1996), although a crude measure of disability, was considered as a measure of (physical) functional limitation, and

Table 1. *Variables considered in the analysis and their definition*

Variable	Definition or groupings
Age (years)	Men: 5-year age groups 45–64/65–74
	Women: 5-year age groups 45–59/60–74
Marital status	Married or with partner/single/divorced or widowed
Ethnicity	White/non-white
Education	Degree/A-level/GCSE/no qualification
Social class (based on occupation)	Registrar General's groupings: I–II/III.1/III.2/IV–V
Working status	Working full-time/working part-time/not working
Life events (number of adverse life events in past 6 months)	0–1/2 or more
Debt (behind with payment in the past year)	No debts/one or more debts
Geographical area	Urban/semi-rural/rural
Housing tenure	Owned (no mortgage)/owned (mortgage)/renting
Number of house moves in past 2 years	0/1/2 or more
Close friends	0–3/4–5/6–10/11 or more
Perceived social support	No lack/moderate lack/severe lack
Children at home	0/1/2 or more
Other adults at home	0/1/2 or more
Long-standing illness	0/1/2 or more
Physical disability (climbing stairs)	No difficulty/moderate difficulty/severe difficulty

found in previous studies to be an early marker and a good indicator of the impact of chronic conditions on the individual's performance in their social and physical environment (Guralnik & Ferrucci, 2003).

Traumatic life events grouped events covering three main areas: (1) personal illness/divorce and serious problem/death/illness of close friend/relative, (2) occupational/financial loss, and (3) events of a violent nature (bullying, sexual abuse, being homeless), occurring in the 6 months prior to the interview. The effect of social support was assessed by means of seven questions enquiring how the respondent perceived the relationship with close people/relatives (respondents are made to feel happy, they feel loved, they can rely on those people, they are being taken care of, they are accepted as they are, they are given support and encouragement, they are made to feel an important part of those people's lives). The total range derived from this variable (1–21) was categorized into severe lack (1–17), moderate lack (18–20) and no lack (21) of social support, as reported previously (Meltzer *et al.* 2002). Age was considered in 5-year categories initially but, where necessary, it was grouped into three categories for men (45–54, 55–64 and 65–74 years) and two categories for women (45–59 and 60–74 years).

As there is a significant difference in prevalence of most neurotic disorders between men and women (Fennig *et al.* 1994; Kessler & Frank, 1997; Bebbington *et al.* 2003; Lorant *et al.* 2003), gender-specific analyses were carried out.

As noted, the BPMS undertook stratified sampling of one person per household, which resulted in people in residences with more than one adult being less likely to be included. Official weights from the survey agency were used, correcting for this effect, plus the effect of non-response, to produce estimates consistent with the age–sex distribution of the national population. All analysis was carried out in STATA 8 (StataCorp, 1999).

Univariate logistic regression analysis was carried out to assess the effect of each variable on each disorder. The variables that showed significant associations were considered in the final logistic regression models. The fitness of the models was assessed by comparing the log likelihood ratio in the fully adjusted model with and without age and work status in the equation, to establish whether these factors remained significant after all other factors had been included.

RESULTS

The mean age of the weighted sample (Table 2) was 58 years in men and 59 years in women. The percentage of respondents with various risk

Table 2. *Percentages of men and women by sociodemographic, work status and illness characteristics* (*weighted estimates*) *according to age group*

Variable		Observations (n)	% at age (years)					
			45–49	50–54	55–59	60–64	65–69	70–74
Men	Number	1875	349	382	312	319	283	230
Marital status	Married	1222	73·6	79·0	77·0	78·4	81·8	73·1
	Single	203	10·9	5·9	5·9	6·00	4·5	5·3
	Divorced	325	15·5	14·2	14·9	10·3	6·6	5·8
	Widowed	125	0	0·9	2·2	5·3	7·1	15·8
Ethnicity	White	1802	93·2	95·6	95·9	94·5	97·4	97·4
	Non-white	73	6·8	4·4	4·1	5·5	2·6	2·6
Social class	I/II	751	48·3	45·3	35·8	35·0	36·7	39·7
	III	765	36·7	40·0	40·7	44·5	44·5	45·1
	IV/V	359	15·0	14·7	23·5	20·5	15·8	18·2
Education	Degree	396	28·5	27·4	16·5	17·9	16·4	15·7
	A-level	214	17·4	13·0	12·8	10·7	7·3	7·3
	GCSE	501	31·4	30·1	31·2	23·5	24·1	21·6
	No qualification	764	22·7	29·5	39·5	48·0	52·2	55·4
Work status*	Working	1016	84·7	84·1	69·5	50·2	13·6	9·7
	Not working	859	15·3	15·9	30·5	49·8	86·4	90·3
Perceived social support	No lack	1655	85·8	89·8	91·3	90·6	92·3	90·2
	Moderate lack	203	13·5	10·1	7·6	9·0	7·1	8·9
	Severe lack	17	0·7	0·1	1·1	0·4	0·6	0·9
Receiving treatment	No	1742	90·6	94·5	92·9	93·1	96·6	93·0
	Yes	133	9·4	5·5	7·1	6·9	3·4	7·08
Long-standing illness*	0	773	52·8	51·5	41·2	37·5	29·3	29·7
	1	613	30·2	31·1	34·3	32·1	37·0	33·9
	2+	489	17·0	17·4	24·5	30·4	33·7	36·4
Difficulty climbing stairs*	No	1454	87·4	87·8	79·2	70·2	70·3	66·2
	Moderate	178	3·5	6·7	7·4	12·1	13·2	15·9
	Severe	243	9·1	5·5	13·4	17·7	16·5	17·9
Women	Number	2253	356	427	379	390	361	340
Marital status	Married	1308	74·3	74·9	75·4	69·8	69·3	48·7
	Single	145	6·6	3·6	3·5	3·1	4·9	6·6
	Divorced	393	16·0	16·9	15·5	13·3	6·1	7·6
	Widowed	407	3·1	4·5	5·6	13·8	19·7	37·1
Ethnicity	White	2202	95·3	97·6	97·5	97·1	99·6	99·2
	Non-white	51	4·7	2·4	2·5	2·9	0·4	0·8
Social class	I/II	642	38·1	32·4	27·4	23·9	23·6	23·2
	III	1002	40·7	43·4	45·8	45·3	47·0	44·9
	IV/V	609	21·2	24·2	26·8	30·8	29·4	31·9
Education	Degree	349	25·1	19·5	13·3	11·4	9·6	10·1
	A-level	139	12·1	6·5	3·4	6·4	3·4	5·5
	GCSE	667	33·3	35·6	33·5	30·2	26·6	21·2
	No qualification	1098	29·5	38·4	49·8	52·0	60·4	63·2
Work status*	Working	946	79·8	71·9	58·8	29·1	10·8	2·7
	Not working	1307	20·2	28·1	41·2	70·9	89·2	97·3
Perceived social support	No lack	2139	94·0	95·7	96·5	94·9	96·1	95·7
	Moderate lack	107	5·6	3·7	3·3	4·9	3·7	4·3
	Severe lack	7	0·4	0·6	0·2	0·2	0·2	0
Receiving treatment	No	1978	90·5	89·0	92·2	90·1	88·7	83·9
	Yes	275	9·5	11·0	7·8	9·9	11·3	16·1
Long-standing illness*	0	888	55·1	43·8	43·7	38·1	33·3	24·9
	1	676	30·2	33·1	27·4	33·4	27·5	29·4
	2+	689	14·7	23·1	28·9	28·5	39·2	45·7
Difficulty climbing stairs*	No	1544	82·9	77·7	73·7	67·3	58·8	52·6
	Moderate	318	7·4	11·1	13·4	16·6	18·2	18·0
	Severe	391	9·7	11·2	12·9	16·1	23·0	29·4

* $p \leqslant 0.001$ denotes significant difference by age group.

factors differed across the age groups. The number of long-standing illnesses and difficulty climbing stairs increased with age, as did the percentage of widows and widowers. The percentage of men working and those having two or more financial debts (not shown) decreased with age. The percentage of women in work also decreased with age, as did the
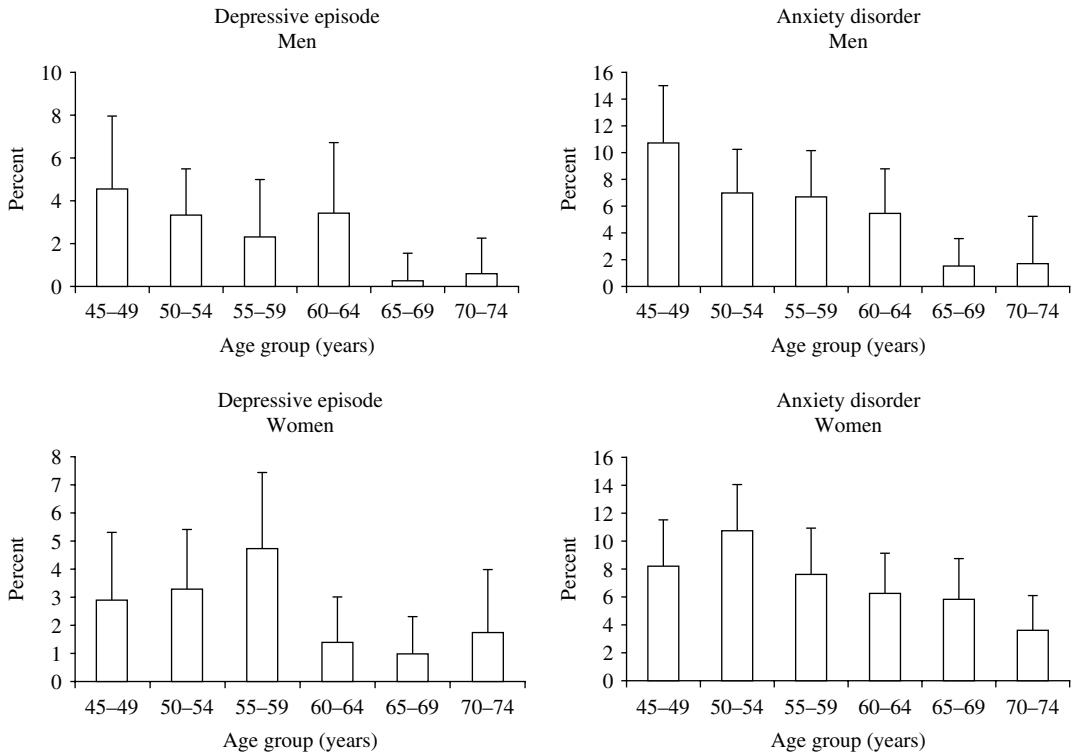
FIG. 1. Prevalence (%) of depressive episode and anxiety disorder by gender and age group.

percentage with financial debts. The number of individuals receiving treatment for mental health problems (antidepressant medication and/or psychotherapy, psychoanalysis, behavioural therapy, cognitive therapy, counselling, etc.) did not vary significantly across the age groups considered.

Both depressive episode and anxiety disorder show lower prevalence rates with increasing age, although the trends appear smooth only for anxiety disorder in women (Fig. 1); for the other disorders a discontinuity of rates is apparent.

The prevalence rates of depressive episode show no clear trend before the statutory retirement ages, but a substantial reduction occurs at the 65-year threshold in men [90% reduction, 95% confidence interval (CI) 70–100, $p \leqslant 0.005$] and at the 60-year threshold in women (60% reduction, 95% CI 40–80, $p \leqslant 0.005$), compared to the youngest age groups (45–54 years for men and 45–59 years for women). A similar pattern is apparent for anxiety disorder in men (80% reduction, 95% CI 60–90,

$p \leqslant 0.005$), but in women the reduction is less marked, but still statistically significant (40% reduction, 95% CI 20–60, $p \leqslant 0.05$).

Regression analysis

To explore the effect of the range of potential explanatory factors for depressive episode and anxiety disorder, univariate and multivariate regression models were considered, for men and women separately. Based on the previous descriptive results, age was grouped as 45–54, 55–64 and 65–74 years for men and 45–59 and 60–74 years for women.

In all the final models, age group remained a significant factor for both men and women (Tables 3 and 4). In general, associations with increasing age group were strengthened, despite the inclusion of all the other factors, including work status. Personal work status remained a significant factor in both disorders for men but not for women. Several other potential explanatory factors remained significant but did not account for the age-linked effects.

Table 3. *Odds ratios (ORs) and 95% confidence intervals (CIs) of factors associated with depressive episode and anxiety disorder in men (univariate and multivariate associations)*

| | | Depressive episode | | | | Anxiety disorder | | | |
| | | Univariate | | Multivariate | | Univariate | | Multivariate | |
	$n = 1875$	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age (years)	45–54	1		1		1		1	
	55–64	0·7	0·4–1·4	0·5	0·2–1·0	0·7	0·4–1·0	0·4***	0·3–0·8
	65–74	0·1***	0·0–0·3	0·1***	0·0–0·2	0·2***	0·1–0·4	0·1***	0·0–0·3
Marital status	Married	1		1		1		1	
	Single	1·1	0·4–2·8	0·6	0·2–2·2	1·0	0·5–1·9	0·4*	0·2–1·0
	Divorced	2·8***	1·1–5·4	1·7	0·8–3·5	2·6***	1·6–4·0	1·0	0·6–1·9
	Widowed	0·3	0·0–2·1	0·2	0·1–3·0	0·5	0·2–1·5	0·4	0·1–1·7
Ethnicity	White	1		1		1		1	
	Non-white	2·2	0·8–6·3	2·6	0·8–8·4	0·8	0·3–2·2	0·7	0·2–1·9
Education	Degree	1		1		1		1	
	A-level	1·0	0·3–3·2	0·5	0·1–2·4	2·2	0·9–5·4	1·8	0·7–4·6
	GCSE	1·3	0·5–3·3	0·6	0·2–1·7	1·9	0·9–4·1	1·4	0·6–3·2
	No qualification	1·2	0·5–2·8	0·3	0·1–1·2	3·1***	1·6–6·2	2·1	0·9–4·8
Social class	I/II	1		1		1		1	
	III	2·4*	1·1–5·2	2·1	0·8–5·6	1·5	0·9–2·5	0·8	0·4–1·5
	IV/V	2·4*	1·0–5·8	1·4	0·4–5·0	3·1***	1·8–5·3	1·6	0·7–3·7
Working	Yes	1		1		1		1	
	No	4·0***	1·9–8·5	3·2**	1·3–7·6	2·7***	1·7–4·3	2·6***	1·4–4·7
Traumatic events past 6 months	<2	1		1		1		1	
	2+	4·4**	1·5–13·1	2·5	0·8–7·7	4·8***	2·6–9·0	2·9***	1·5–5·7
Debts	0	1		1		1		1	
	1	1·3	0·3–6·2	0·4	0·1–1·6	3·7***	1·8–7·9	2·5*	1·1–5·7
	2+	5·8***	2·5–13·3	1·3	0·5–3·4	9·7***	5·3–17·8	4·1***	1·9–9·1
Urbanicity	Urban	1		1		1		1	
	Semi-rural	0·5	0·2–1·2	1·0	0·4–2·5	0·5**	0·3–0·8	0·8	0·4–1·3
	Rural	0·5	0·1–1·6	1·8	0·5–6·5	0·5	0·2–1·1	1·2	0·5–2·5
Housing tenure	Owned	1		1		1		1	
	Mortgage	3·3*	1·3–8·8	2·4	0·8–7·2	2·6***	1·5–4·6	2·2*	1·0–4·6
	Renting	9·0***	3·6–22·7	3·3*	1·2–6·7	6·4***	3·6–11·3	1·7	0·8–3·5
Moves in past 2 years	0	1		1		1		1	
	1	1·6	0·6–4·3	1·5	0·5–4·0	1·2	0·6–2·3	1·0	0·5–2·2
	2+	2·5	0·5–13·0	0·6	0·1–3·1	4·2***	1·6–10·9	2·4	0·8–6·9
Close friends	0–5	1		1		1		1	
	6+	0·4**	0·2–0·8	0·4*	0·2–1·0	0·7	0·5–1·1	1·0	0·6–1·6
Lack social support	No lack	1		1		1		1	
	Moderate	0·7	0·3–1·7	0·5	0·2–1·3	1·2	0·7–2·3	1·2	0·5–2·8
	Severe	11·2***	2·6–47·8	7·3***	1·7–32·4	7·8***	2·4–25·8	6·6***	1·9–22·7
Children at home	0	1		1		1		1	
	1+	1·1	0·4–2·7	0·8	0·3–2·2	1·5	0·8–2·7	1·3	0·6–2·6
Long-standing illness	0	1		1		1		1	
	1	3·6*	1·2–11·4	2·3	0·8–7·1	2·5**	1·3–4·8	1·9	0·9–4·0
	2+	11·3***	3·9–32·3	7·1***	1·9–25·9	6·7***	3·6–12·4	4·4***	2·2–8·9
Any treatment	No	1		1		1		1	
	Yes	15·8***	8·2–30·7	5·0***	1·7–14·4	12·5***	7·8–20·1	4·2***	2·1–8·3
Difficulty climbing stairs	No	1		1		1		1	
	Moderate	0·9	0·2–3·2	0·4	0·1–1·7	1·4	0·7–2·8	0·8	0·3–1·8
	Severe	8·9***	4·6–17·2	2·7*	1·2–6·0	6·5***	4·1–10·3	2·1*	1·1–3·9

* $p \leqslant 0.05$, ** $p \leqslant 0.01$, *** $p \leqslant 0.005$.

In the model for men, after adjusting for all the other significant factors, associations for depressive episode showed a discontinuity at the 65–74-year age group (Table 3). While the younger age groups were not statistically different, the older age group had much reduced odds ratios (ORs) for depressive episode. When age was classified into 10-year groups, the OR for depressive episode in the older group (OR_{65-74}) was 0·1 (95% CI 0·0–0·2) compared to the youngest group. In anxiety disorder, the reduction in the OR was smoother than in

Table 4. *Odds ratios (ORs) and 95% confidence intervals (CIs) of factors associated with depressive episode and anxiety disorder in women (univariate and multivariate associations)*

| | | Depressive episode | | | | Anxiety disorder | | | |
| | | Univariate | | Multivariate | | Univariate | | Multivariate | |
	$n = 2253$	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age (years)	45–59	1		1		1		1	
	60–74	0·3***	0·1–0·7	0·4***	0·2–0·7	0·6*	0·3–0·9	0·6***	0·4–0·8
Marital status	Married	1		1		1		1	
	Single	1·3	0·3–6·1	2·3	0·8–6·5	0·6	0·2–1·4	0·8	0·4–1·7
	Divorced	2·9***	1·4–6·1	4·2***	2·3–7·8	2·6***	1·7–3·9	3·1***	2·1–4·5
	Widowed	5·0***	1·9–13·3	2·9***	1·4–6·0	2·0**	1·2–3·3	1·6*	1·0–2·4
Ethnicity	White	1		1		1		1	
	Non-white	3·2	0·7–13·7	4·4**	1·5–13·1	1·4	0·4–4·4	1·5	0·6–4·1
Education	Degree	1		1		1		1	
	A-level	0·5	0·1–1·9	0·6	0·2–2·1	0·5	0·3–1·2	0·5	0·2–1·1
	GCSE	0·4	0·1–1·1	0·5	0·2–1·2	0·5*	0·3–1·0	0·5*	0·3–0·9
	No qualification	0·7	0·3–1·7	1·1	0·5–2·5	1·0	0·6–1·9	1·0	0·7–1·6
Social class	I/II	1		1		1		1	
	III	1·0	0·5–2·2	0·8	0·4–1·7	0·7	0·5–1·1	0·7	0·5–1·1
	IV/V	1·3	0·6–3·0	1·8	0·9–3·6	0·9	0·5–1·5	1·3	0·9–1·9
Working	Yes	1		1		1		1	
	No	1·7	0·8–3·4	1·4	0·8–2·5	1·2	0·7–1·9	1·1	0·8–1·5
Traumatic events past 6 months	<2	1		1		1		1	
	2+	1·6	0·8–2·9	2·2**	1·2–4·0	2·0***	1·4–2·9	2·4***	1·7–3·5
Debts	0	1		1		1		1	
	1	0·9	0·3–2·6	3·1*	1·2–8·0	1·4	0·6–3·1	3·2***	1·5–6·5
	2+	1·4	0·5–4·2	3·9**	1·4–11·2	1·0	0·4–2·3	2·7*	1·2–6·0
Urbanicity	Urban	1		1		1		1	
	Semi-rural	0·3**	0·2–0·8	0·3***	0·1–0·6	0·9	0·6–1·4	0·8	0·5–1·2
	Rural	0·8	0·2–2·8	0·5	0·2–1·6	1·2	0·7–2·1	0·9	0·5–1·6
Housing tenure	Owned	1		1		1		1	
	Mortgage	4·1***	1·8–9·4	4·4***	2·1–9·2	1·7*	1·0–2·7	2·1***	1·4–3·1
	Renting	1·9	0·7–4·9	5·3***	2·6–11·1	1·4	0·9–2·1	2·5***	1·6–3·7
Moves in the past 2 years	0	1		1		1		1	
	1	1·6	0·8–3·8	1·7	0·8–3·7	1·1	0·6–2·0	1·2	0·7–2·1
	2+	4·7*	1·1–20·3	4·9	1·3–18·5	1·2	0·4–3·4	2·0	0·7–5·6
Close friends	0–5	1		1		1		1	
	6+	0·6	0·3–1·1	0·4***	0·2–0·7	0·9	0·6–1·2	0·7*	0·5–1·0
Lack social support	No lack	1		1		1		1	
	Moderate	2·4	1·0–6·1	3·5	1·6–7·6	1·7	0·7–2·8	1·9*	1·0–3·4
	Severe	4·0	0·4–35·6	4·1	0·5–35·3	16·0***	2·8–90·0	14·5***	2·9–72·4
Children at home	0	1		1		1		1	
	1+	0·6	0·2–1·8	0·8	0·3–2·3	1·0	0·6–1·9	1·3	0·7–2·2
Long-standing illness	0	1		1		1		1	
	1	0·9	0·4–2·2	1·1	0·5–2·5	1·9**	1·2–3·1	2·0***	1·3–3·2
	2+	2·1	0·9–4·9	3·4***	1·7–6·7	2·4***	1·4–4·0	2·9***	1·9–4·4
Any treatment	No	1		1		1		1	
	Yes	3·8***	2·1–7·0	5·9***	3·4–10·0	3·6***	2·4–5·5	4·8***	3·4–6·9
Difficulty climbing stairs	No	1		1		1		1	
	Moderate	1·9	0·8–4·4	2·5*	1·2–5·2	1·5	0·9–2·4	1·8**	1·2–2·9
	Severe	2·1	0·9–4·7	3·9***	2·2–7·1	1·6*	1·0–2·6	2·5***	1·7–3·6

* $p \leqslant 0\cdot05$, ** $p \leqslant 0\cdot01$, *** $p \leqslant 0\cdot005$.

depressive episode, although the reduction was also marked, with a discontinuity at age 65–74 years (OR_{65-74} 0·1, 95% CI 0·0–0·3).

In the model for women (Table 4), once all previously described factors were considered in the model, there was a marked drop in rates of depressive episode after age 60 years. When age was classified into 15-year groups, the OR of depressive episode after age 60 years (OR_{60-74}) was 0·3 (95% CI 0·1–0·7) compared to the younger group, and for anxiety disorder OR_{60-74} was 0·6 (95% CI 0·3–0·9).

Despite the presence of work status in all the regression models, this factor did not alter the strong association of the disorders with age group. After adjusting for all factors including

age group, work status did not show any significant association with either disorder for women, but remained significant for men.

DISCUSSION

This study has shown that, in both men and women, the prevalence of depressive episode is markedly lower after the statutory retirement age. This pattern is also present for anxiety disorder in men, although for women the prevalence declines more smoothly. In multivariate models adjusting for potentially explanatory factors including work status, the associations with age group were not reduced: in fact they were generally stronger, indicating that the age-linked effect is not the result of any of these other factors. Work status, which would reflect early or late retirement, was not a significant factor for either disorder in women and remained statistically significant in men. Clearly the personal timing of leaving work does not account for the age-linked effects, which coincide with the statutory retirement ages.

In considering these results, the limitations of the study need to be taken into account. The source data are cross-sectional and thus it is not possible to follow individuals as they go through the retirement transition. The response rate of 69% in the survey may suggest a problem with non-response bias, but there is no evidence that the response rate was lower in the older age groups in our dataset. Similar prevalence rate findings for these diagnostic groupings have been reported from an Australian national survey (Henderson *et al.* 1998).

The data on known risk factors for common mental disorders included in this analysis are relatively detailed, but nevertheless some dimensions were not studied. For example, nothing is known in this sample about personality traits, coping strategies or self-esteem (Stansfeld, 2002). Adverse conditions at work (Karasek, 1979; Kawakami *et al.* 1990; Amick *et al.* 1998; Niedhammer *et al.* 1998; Cropley *et al.* 1999; Kim & Moen, 2002; Paterniti *et al.* 2002) and whether work exit was unplanned have both been linked to raised rates of neurotic disorders (Gallo *et al.* 2000). However, while inclusion of such factors would be worthwhile, the results show that the timing of personal exit

from work appears less important than passing the statutory retirement age.

While acknowledging the limitations, the strengths of the analyses also need to be considered. The BPMS comprises a large nationally representative sample. The psychiatric assessment, the CIS-R (Lewis *et al.* 1992), is a validated psychiatric instrument for use by lay interviewers, and was designed to minimize observer variations. While some instruments measure psychological distress or depressive symptoms, the CIS-R is designed to yield diagnoses based on the ICD-10 (WHO, 1993), although they may not be as accurate as those obtained from clinical assessment by a qualified psychiatrist. In addition, there is no information at present on the sensitivity of the CIS-R in the various age groups. However, it seems unlikely that a decrease in sensitivity with increasing age could occur with the sharp discontinuity at age 60 in women and 65 in men, as would be necessary to explain our findings.

A number of previous epidemiological studies have reported lower prevalence of depression and anxiety in older groups (Regier *et al.* 1993; Henderson *et al.* 1998; Stephens *et al.* 1999), but little attention has previously been paid to the 'statutory' retirement age thresholds. In a previous analysis of the BPMS 2000, Melzer *et al.* (2004*a*) reported that the sharp prevalence rate reduction in 'common mental disorders' around the conventional retirement age occurred for men only, with a more gradual reduction for women. It is clear from the data presented, however, that there is in fact a marked reduction in prevalence rates for depressive episode in women around age 60 years. This fact was obscured by the more gradual reduction in anxiety prevalence, and by the somewhat ill-defined category of 'mixed anxiety and depression' included under the common mental disorder in the BPMS.

Changes in prevalence of mental disorders across the retirement transitions may, in theory, occur in cross-sectional data due to three possible factors that could not be examined in this analysis: cohort effects, differential mortality, and medical treatment.

Analysing data from the National Institutes of Mental Health Epidemiologic Catchment Area Study (NIMH ECA), Klerman &

Weissman (1989) reported that the prevalence for major depression was higher in younger cohorts. In the BPMS in 1993 (which did not sample people aged 65–74 years), men then aged 58–64 years had a prevalence rate for any common mental disorder of 13·3 % (95 % CI 10·4–16·3) (Melzer *et al.* 2004*a*), but 7 years later in the 2000 survey the (independent) sample drawn from those born at the same time but then aged 65–71 years had a prevalence rate of 5·4 % (95 % CI 3·3–7·5). Additionally, Singleton *et al.* (2001), comparing both British surveys, reported no statistically significant difference in the prevalences of generalized anxiety disorder and of depressive episode for men in the age range studied, refuting the possibility of cohort effect in that particular birth cohort. Conversely, they reported that women aged 55–64 years had higher prevalence of depressive episode in 2000 (3·0 %, 95 % CI 1·8–4·2) than in 1993 (1·1 %, 95 % CI 0·5–1·7). For women, it is not clear whether the cohort effect could explain the result of the present analysis of the BPMS 2000. Further research is needed to elucidate this effect.

No direct data are available to establish whether the reduced prevalence rates may be due to high mortality in those with mental disorders in middle-age, although the magnitude of the prevalence change and the pattern of an earlier reduction in women makes this an implausible explanation. In terms of treatment, in men access changes little across the 45–74 years age range, except for a significant reduction in treatment use in the 65–69 years age group (Table 1). In women, access to treatment remains stable from age 50 to 69 years. Thus, increases in access to treatment around the statutory retirement ages were not present.

Several risk factors previously linked to common mental disorders could have accounted for the prevalence reductions coinciding with the statutory retirement ages. The analysis presented has used the well-established approach of first identifying the factors that are associated with disorder presence in univariate models, and then entering the statistically significant factors into multivariate logistic models. The models were optimized without the presence of age group, which was added at the last step. This process should have resulted in a full adjustment for the effects of all the other risk factors, and

would normally be expected to greatly reduce associations with a single factor of interest. In this case, however, the effect of age group was unchanged or showed even stronger associations. Sensitivity analyses with various groupings of age, or entering age as a continuous variable, all produced consistent results. Thus it appears that being female and over 60 years or male and over 65 years is the crucial factor linked to the reduced prevalence of depressive episode, and anxiety disorder in men. As noted, the reductions in prevalence of anxiety disorder with age in women are more continuous.

Perhaps the most striking finding from this analysis was that work status did not significantly affect the association seen between mental disorders and age. Working status was also not even a significant factor in the models, except for depressive episode in women. Much of the literature from occupational settings suggests that leaving work to go into retirement is generally associated with improved mental health and well-being (Salokangas & Joukamaa, 1991; Gall *et al.* 1997; Drentea, 2002). This analysis suggests, however, that in the general population the more important factor may be reaching the statutory retirement age, rather than taking personal retirement early or later.

If work status, or the timing of personal retirement, or any of the other established risk factors studied are not the reasons for the marked reductions in disorder prevalence shown, what is the reason? Biological changes with age could possibly contribute, but there are no obvious candidates to explain the clear discontinuities in the trends at age 60 years in women and 65 years in men. There is some evidence that vulnerability to depression in older individuals is reduced with increased levels of mastery in the control of negative emotions (Turner *et al.* 1999). Better adaptation, resistance and acceptance of life events (Henderson *et al.* 1972) associated with better coping strategies and a diminished emotional response to stressful events (Gross *et al.* 1997), have also been noted. Those retiring at the statutory retirement age may be subjected to less demands and expectations (Sarkisian *et al.* 2002) from society and may experience less anxiety about their future achievements, and more acceptance. All these factors could be important as the person crosses from pre- to post-retirement,

although the observed prevalence changes appear to be less linked to individual transitions than to group or statutory norms. Social norms regarding where an individual should be in the labour market have been seen to have an effect on the individual's well-being (Mathers & Schofield, 1998; Clark, 2003). Clark (2003) demonstrated that in unemployed individuals, well-being was higher if the individual's community had high rates of unemployment. In a similar way societal norms may still continue to put pressure on individuals who decide to retire earlier and who are still considered to be of working age, having an effect on their mental health.

The prevalence rate discontinuity around retirement in depressive episode is a rare example of scale recovery from a significant mental disorder in both men and women, and deserved thorough exploration. More detailed analysis would help to clarify the role of non-genetic aetiological factors in depressive episode. The data presented add to the case for a prospective study of a cohort of men and women going through the peri-retirement period, to explore the range of potentially explanatory factors.

CONCLUSIONS

There is a discontinuity in the prevalence of depressive episode with increasing age, with markedly lower prevalence rates in women aged over 60 years and men aged over 65 years. A similar pattern exists for anxiety disorder in men, but in women the age-related trend towards lower prevalence is more continuous. In logistic modelling, none of the studied risk factors for common mental disorder reduced the associations of age group with disorders. Work status remained independently significant in men, although it was not a risk factor in women. These results suggest that social normalization of retired work status may be more important than work exit in improving mental health.

ACKNOWLEDGEMENTS

DECLARATION OF INTEREST

None.

REFERENCES

Amick, B. C. III, Kawachi, I., Coakley, E. H., Lerner, D. J., Levine, S. & Colditz, G. A. (1998). Relationship of job strain and iso-strain to health status in a cohort of women in the United States. *Scandinavian Journal of Work Environment and Health* **24**, 54–61.

Beaudet, M. P. (1996). Depression. *Health Reports* **7**, 11–24.

Bebbington, P., Dunn, G., Jenkins, R., Lewis, G., Brugha, T., Farrell, M. & Meltzer, H. (2003). The influence of age and sex on the prevalence of depressive conditions: report from the National Survey of Psychiatric Morbidity. *International Review of Psychiatry* **15**, 74–83.

Bijl, R. V., Ravelli, A. & van Zessen, G. (1998). Prevalence of psychiatric disorder in the general population: results of the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Social Psychiatry and Psychiatric Epidemiology* **33**, 587–595.

Bland, R. C., Newman, S. C. & Orn, H. (1988). Period prevalence of psychiatric disorders in Edmonton. *Acta Psychiatrica Scandinavica* **338**, 33–42.

Brugha, T., Bebbington, P. E., MacCarthy, B., Potter, J., Sturt, E. & Wykes, T. (1987). Social networks, social support and the type of depressive illness. *Acta Psychiatrica Scandinavica* **76**, 664–673.

Butterworth, P., Gill, C. G., Rodgers, B., Anstey, K. J., Villamil, E. & Melzer, D. (2006). Retirement and the mental health of older Australians: analysis of the National Survey of Mental Health and Well-being. *Social Science and Medicine* **62**, 1179–1191.

Clark, A. E. (2003). Unemployment as a social norm: psychological evidence from panel data. *Journal of Labour Economics* **21**, 323–351.

Cropley, M., Steptoe, A. & Joekes, K. (1999). Job strain and psychiatric morbidity. *Psychological Medicine* **29**, 1411–1416.

De Boer, A. F., Wijker, W. & Haes, H. C. (1997). Predictors of health care utilization in the chronically ill: review of the literature. *Health Policy* **42**, 101–115.

Drentea, P. (2002). Retirement and mental health. *Journal of Aging and Health* **14**, 167–194.

Fennig, S., Schwartz, J. E. & Bromet, E. J. (1994). Are diagnostic criteria, time of episode and occupational impairment important determinants of the female:male ratio for major depression? *Journal of Affective Disorders* **30**, 147–154.

Fryers, T., Melzer, D. & Jenkins, R. (2003). Social inequalities and the common mental disorders: a systematic review of the evidence. *Social Psychiatry and Psychiatric Epidemiology* **38**, 229–237.

Gall, T. L., Evans, D. R. & Howard, J. (1997). The retirement adjustment process: changes in the well-being of male retirees across time. *Journal of Gerontology Series B: Psychological Sciences and Social Sciences* **52**, 110–117.

Gallo, W. T., Bradley, E. H., Siegel, M. & Kasl, S. V. (2000). Health effects of involuntary job loss among older workers: findings from the health and retirement survey. *Journal of Gerontology Series B: Psychological Sciences and Social Sciences* **55**, S131–S140.

Goldberg, D. P. & Huxley, P. (1992). *Common Mental Disorders: A Biosocial Model*. Routledge: London.

Gross, J. J., Carstensen, L. L., Tsai, J., Skorpen, C. G. & Hsu, A. Y. C. (1997). Emotion and aging: experience, expression and control. *Psychological Aging* **12**, 590–599.

Guralnik, J. M. & Ferrucci, L. (2003). Assessing the building blocks of function: utilizing measures of functional limitation. *American Journal of Preventive Medicine* **25**, 112–121.

Henderson, A. S., Jorm, A. F., Korten, A. E., Jacomb, P., Christensen, H. & Rodgers, B. (1998). Symptoms of depression and anxiety during adult life: evidence of a decline in prevalence with age. *Psychological Medicine* **28**, 1321–1328.

Henderson, A. S., Montgomery, I. M. & Williams, C. L. (1972). Psychological immunisation: a proposal for preventive psychiatry. *Lancet* **1**, 1111–1112.

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: implications for job design. *Administrative Science Quarterly* **24**, 298–308.

Kawakami, N., Araki, S. & Kawashima, M. (1990). Effects of job stress on occurrence of major depression in Japanese industry: a case–control study nested in a cohort study. *Journal of Occupational Medicine* **32**, 722–725.

Kessler, R. C. & Frank, R. G. (1997). The impact of psychiatric disorders on work loss days. *Psychological Medicine* **27**, 861–873.

Kim, J. E. & Moen, P. (2002). Retirement transitions, gender, and psychological well-being: a life-course, ecological model. *Journal of Gerontology Series B: Psychological Sciences and Social Sciences* **57**, 212–222.

Klerman, G. L. & Weissman, M. M. (1989). Increasing rates of depression. *Journal of the American Medical Association* **261**, 2229–2235.

Lewis, G., Pelosi, A. J., Araya, R. & Dunn, G. (1992). Measuring psychiatric disorder in the community: a standardized assessment for use by lay interviewers. *Psychological Medicine* **22**, 465–486.

Lorant, V., Deliege, D., Eaton, W., Robert, A., Philippot, P. & Ansseau, M. (2003). Socioeconomic inequalities in depression: a meta-analysis. *American Journal of Epidemiology* **157**, 98–112.

Mathers, C. D. & Schofield, D. J. (1998). The health consequences of unemployment: the evidence. *Medical Journal of Australia* **168**, 178–182.

Mein, G., Martikainen, P., Hemingway, H., Stansfeld, S. & Marmot, M. G. (2003). Is retirement good or bad for mental and physical health functioning? Whitehall II longitudinal study of civil servants. *Journal of Epidemiology and Community Health* **57**, 46–49.

Meltzer, H., Singleton, N., Lee, A., Bebbington, P., Brugha, T. & Jenkins, R. (2002). *The Social and Economic Circumstances of Adults with Mental Disorders*. TSO: London.

Melzer, D., Buxton, J. & Villamil, E. (2004a). Decline in common mental disorder prevalence in men during the sixth decade of life. *Social Psychiatry and Psychiatric Epidemiology* **39**, 33–38.

Melzer, D., Fryers, T. & Jenkins, R. (2004b). *Social Inequalities and the Distribution of the Common Mental Disorders*. Psychology Press Ltd: Hove and New York.

Michaud, C. M., Murray, C. J. & Bloom, B. R. (2001). Burden of disease – implications for future research. *Journal of the American Medical Association* **285**, 535–539.

Murphy, J. M., Laird, N. M., Monson, R. R., Sobol, A. M. & Leighton, A. H. (2000). A 40-year perspective on the prevalence of depression: the Sterling County Study. *Archives of General Psychiatry* **57**, 209–215.

Niedhammer, I., Goldberg, D. P. & Leclerc, A. (1998). Psychosocial factors at work and subsequent depressive symptoms in the Gazel cohort. *Scandinavian Journal of Work Environment and Health* **24**, 197–205.

Paterniti, S., Niedhammer, I., Lang, T. & Consoli, S. M. (2002). Psychosocial factors at work, personality traits and depressive symptoms. Longitudinal results from the GAZEL Study. *British Journal of Psychiatry* **181**, 111–117.

Regier, D. A., Farmer, M. E., Rae, D. S., Myers, J. K., Kramer, M., Robins, L. N., George, L. K., Karno, M. & Locke, B. Z. (1993). One-month prevalence of mental disorders in the United States and socio-demographic characteristics: the Epidemiologic Catchment Area study. *Acta Psychiatrica Scandinavica* **88**, 35–47.

Salokangas, R. K. & Joukamaa, M. (1991). Physical and mental health changes in retirement age. *Psychotherapy and Psychosomatics* **55**, 100–107.

Sarkisian, C. A., Hays, R. D. & Mangione, C. M. (2002). Do older adults expect to age successfully? The association between expectations regarding aging and beliefs regarding healthcare seeking among older adults. *Journal of the American Geriatrics Society* **50**, 1837–1843.

Singleton, N., Bumpstead, R., O'Brien, M., Lee, A. & Meltzer, H. (2001). *Psychiatric Morbidity Among Adults Living in Private Households, 2000: Main Report*. The Stationery Office: London (available online at www.statistics.gov.uk/downloads/theme_health/psychmorb.pdf).

Stansfeld, S. (2002). Work, personality and mental health. *British Journal of Psychiatry* **181**, 96–98.

StataCorp (1999). STATA Statistical Software: Release 7.0. Stata Corporation: College Station, TX, USA.

Stephens, T., Dulberg, C. & Joubert, N. (1999). Mental health of the Canadian population: a comprehensive analysis. *Chronic Diseases of Canada* **20**, 118–126.

Turner, R. J., Lloyd, D. A. & Roszell, P. (1999). Personal resources and the social distribution of depression. *American Journal of Community Psychology* **27**, 643–672.

Ustun, T. B. (1999). The global burden of mental disorders. Commentaries. *American Journal of Public Health* **89**, 1315–1318.

Ware Jr., J., Kosinski, M. & Keller, S. D. (1996). A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Medical Care* **34**, 220–233.

WHO (1993). *The ICD-10 Classification of Mental and Behavioural Disorders*, 10th revised edn. World Health Organization: Geneva.