Depressive and anxiety disorders are commonly occurring conditions, with lifetime-to-date prevalence estimates of up to 17% reported for major depressive disorder and 4–7% for generalised anxiety disorder, based upon large-scale surveys of adult mental disorders in the general population (Horwath et al., 2002). These conditions impose an enormous economic and social burden on the provision of public health services, evidenced for example by over 24 million prescriptions being written for antidepressants in England during 2001 (Department of Health, 2002). Work has focused on quantifying the effects of depressive and anxiety disorders on physical and psychosocial functioning (Wells et al., 1989; Ormel et al., 1994), both cross-sectionally and prospectively. Although evidence for the profound impact of depressive conditions on public health is compelling, there is still sparse evidence concerning the specific impact of anxiety states. Knowledge concerning the impact of depressive and anxiety states on the perception by individuals of their own health status in the context of chronic medical illness has been gained almost exclusively from the study of patient populations. We now report findings from a population-based study.

Conclusions Depressive and anxiety disorders have a profound impact on functional health that is independent of chronic medical illness. Chronic anxiety is associated with physical health limitations in excess of those associated with chronic depression or any of the physical health conditions considered, except for stroke.

Declaration of interest None. Funding detailed in Acknowledgements.
PCS and MCS scores were created by aggregating across the eight SF–36 subscales, transformed to z scores and multiplied by their respective factor score coefficients, and standardised as T scores with a mean of 50 and a standard deviation of 10. Factor score coefficients used to derive the component scores were based upon a US (Ware et al., 1994) as opposed to a UK population on the basis of uniformity for cross-national comparisons (Jenkinson, 1999).

**Statistical analysis**

We identified those with any of four chronic medical conditions: cancer (not including skin cancers, and confirmed by data from the East Anglia cancer registry), diabetes, myocardial infarction or stroke. Prevalent major depressive disorder and generalised anxiety disorder were defined as any episodes that were ongoing or were reported to have offset within the 12 months prior to HLEQ completion. Mean SF–36 sub-scale and summary component scores (PCS and MCS) are presented by gender (adjusted for age) and for men and women combined (adjusted for age, gender and age–gender interaction). These were derived from linear regression models, with age included as a categorical variable in 5-year bands. Effect size is calculated as the reduction in mean component scores, expressed in terms of US population standard deviations (the US population standard deviation is 10; Ware et al., 1994).

**RESULTS**

The mean age of the EPIC–HLEQ participants was 61 years (s.d. = 9.3, range = 41–80 years). Table 1 shows the prevalence of each of the four chronic medical conditions and of both mood disorders assessed in the EPIC–HLEQ cohort (n = 20,921). Overall, 9.3% of participants (n = 1,953) reported at least one of the four chronic medical conditions, with cancer being the most commonly reported condition (3.6%) and 139 participants (0.7%) reporting more than one medical condition. Men had higher prevalence rates of diabetes, myocardial infarction and stroke and lower cancer rates than women. Overall, 6.3% of participants (n = 1,328) reported either (12-month) prevalent major depressive disorder or generalised anxiety disorder (with the former reported over twice as frequently as the latter) and 1.1% (n = 231) reported both major depressive disorder and generalised anxiety disorder. Prevalence of both major depressive disorder and generalised anxiety disorder was about 1.5 times as great in women as in men.

Of the HLEQ sample, PCS and MCS scores were available for 19,535 participants (93.4%). Non-responders had higher rates of (any) chronic medical conditions than responders (12.4% v. 9.1%) but no differences were observed in the prevalence of either mood disorder (6.0% v. 6.4%). Mean (s.d.) scores were 47.4 (10.2) for the PCS and 52.2 (9.4) for the MCS. In line with the results of other studies, PCS scores declined rapidly with increasing age, whereas MCS scores increased with age. Mean PCS scores were 51.3, 49.4, 46.7 and 42.8 for those aged 41–49, 50–59, 60–69 and 70–80 years, respectively. This corresponds to a 3.2-point decrease (95% CI 3.0–3.3) in the mean PCS score for every 10-year increase in age (from linear regression, with age included as a continuous variable). This decrease in PCS score was the same for men as for women. Overall, men reported higher scores than women on both the PCS (47.7 v. 47.1) and the MCS (52.9 v. 51.6).

Table 2 shows age–gender-adjusted mean SF–36 component summary scores according to the presence or absence of chronic medical conditions and prevalent mood disorders. Significant reductions in both PCS and MCS scores were associated with chronic medical conditions and with prevalent mood disorders. Participants reporting any chronic medical condition had mean PCS scores reduced by 4.7 points and mean MCS scores reduced by 1.9 points. Of the individual medical conditions, stroke was associated with the greatest impact on PCS, with diabetes, myocardial infarction and stroke all having a similar effect on the MCS. Cancer was associated with the smallest reductions in both the PCS and the MCS. The presence of more than one medical condition was associated with a further reduction in both the PCS and MCS scores. Effect sizes tended to be slightly greater for men than for women on the PCS (but not the MCS), although the pattern of results remained the same.

Participants reporting either mood disorder had mean PCS scores reduced by 4.3 points and mean MCS scores reduced by 1.4 points. Meeting putative diagnostic criteria for generalised anxiety disorder was associated with slightly greater reductions in mean PCS and MCS scores than with major depressive disorder. Again, the report of prevalent psychiatric symptoms sufficient to meet putative diagnostic criteria for both major depressive disorder and

### Table 1 Prevalence (%) of chronic medical conditions and mood disorders in the Norfolk cohort of the European Prospective Investigation into Cancer (EPIC–Norfolk, n = 20,921) who completed the Health and Life Experiences Questionnaire

<table>
<thead>
<tr>
<th>Chronic medical conditions</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>3.1 (280)</td>
<td>1.6 (189)</td>
<td>2.2 (469)</td>
</tr>
<tr>
<td>Cancer</td>
<td>2.1 (194)</td>
<td>4.8 (563)</td>
<td>3.6 (757)</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>5.0 (459)</td>
<td>1.3 (158)</td>
<td>2.9 (617)</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.6 (145)</td>
<td>1.0 (115)</td>
<td>1.2 (260)</td>
</tr>
<tr>
<td>Any</td>
<td>10.7 (976)</td>
<td>8.3 (977)</td>
<td>9.3 (1953)</td>
</tr>
<tr>
<td>Multiple</td>
<td>1.0 (93)</td>
<td>0.4 (46)</td>
<td>0.7 (139)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prevalent mood disorders</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major depressive disorder</td>
<td>3.8 (343)</td>
<td>6.4 (754)</td>
<td>5.2 (1097)</td>
</tr>
<tr>
<td>Generalised anxiety disorder</td>
<td>1.7 (158)</td>
<td>2.6 (304)</td>
<td>2.2 (462)</td>
</tr>
<tr>
<td>Either</td>
<td>4.5 (414)</td>
<td>7.7 (914)</td>
<td>6.3 (1328)</td>
</tr>
<tr>
<td>Both</td>
<td>1.0 (87)</td>
<td>1.2 (144)</td>
<td>1.1 (231)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chronic medical conditions and/or prevalent mood disorders</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neither</td>
<td>85.2 (7753)</td>
<td>84.7 (10 014)</td>
<td>84.9 (17 767)</td>
</tr>
<tr>
<td>Medical only</td>
<td>10.3 (934)</td>
<td>7.5 (892)</td>
<td>8.7 (1826)</td>
</tr>
<tr>
<td>Mood only</td>
<td>4.1 (372)</td>
<td>7.0 (829)</td>
<td>5.7 (1201)</td>
</tr>
<tr>
<td>Both</td>
<td>0.5 (42)</td>
<td>0.7 (85)</td>
<td>0.6 (127)</td>
</tr>
</tbody>
</table>
Table 2. Age–gender-adjusted mean Medical Outcomes Study Short Form 36 (SF–36) component summary scores and effect sizes according to the presence/absence of chronic medical conditions and prevalent mood disorders

| Chronic medical conditions       | PCS          |       |       |       |       |       |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|----------------------------------|--------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                  | Men          | Women | All   | Effect size | Men | Women | All | Effect size |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Diabetes                         | 43.0***       | 44.0*** | 43.4*** | 0.5 | 52.4*   | 50.5*** | 51.5*** | 0.3 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Cancer                           | 43.8***       | 45.0*** | 44.7*** | 0.4 | 52.5     | 52.8     | 53.0     | 0.1 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| MI                               | 42.1***       | 42.0*** | 42.0*** | 0.6 | 52.1***  | 51.0     | 51.5***  | 0.3 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Stroke                           | 41.1***       | 42.5*** | 41.7*** | 0.7 | 51.3**   | 50.3*    | 50.8***  | 0.3 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Any                              | 43.0***       | 44.3*** | 43.6*** | 0.5 | 52.3**   | 51.9*    | 52.1***  | 0.2 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Multiple                         | 37.9***       | 39.8*** | 38.5*** | 1.0 | 50.6**   | 50.8     | 50.5**   | 0.4 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

| Prevalent mood disorders         | PCS          |       |       |       |       |       |       |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|----------------------------------|--------------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|       |
|                                  | Men          | Women | All   | Effect size | Men | Women | All | Effect size |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| MDD                              | 43.4***       | 44.8*** | 44.4*** | 0.4 | 38.3***  | 40.6***  | 40.0***  | 1.4 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |�...
Outcomes Study, which is probably the most widely used, reliable and valid generic measure of subjective health status and is recognised to provide useful information not identified in routine clinical evaluations (Brown et al., 1999). The Medical Outcomes Study of over 11,000 out-patients attending primary care facilities in the USA (Wells et al., 1989) reported that the functioning and well-being of patients with depression were comparable with or worse than those uniquely associated with eight major medical conditions, with subsequent work extending findings through the study of groups of patients drawn from other cultures (Ormel et al., 1999). Prolonged follow-up of patients meeting the diagnostic criteria for major depressive disorder has shown the clinical course to be characterised by periods of sustained symptomatic impairment equivalent to that of major depressive disorder in this study. However, the structured self-assessment approach adopted in the HLEQ represents a pragmatic solution to enabling measures of emotional state, representative of core DSM-IV diagnostic criteria, to be included in a large-scale chronic disease epidemiology project. Previous work has demonstrated that prevalence estimates and age–gender distributions of major depressive disorder derived from this approach are comparable to those from interview-based assessments from UK and international studies (Surtees et al., 2000).

Although this study perhaps provides a unique perspective on the extent to which a large middle-aged and older community-dwelling UK population report levels of impairment in their health status, according to the SF–36 (associated with chronic medical conditions and mood disorders) the results are based upon a cross-sectional analysis and therefore provide no insight into the direction of effects. However, findings from longitudinal patient-based studies have shown that pre-existing depression is a risk factor for the onset of objective measures of disability (Penninx et al., 1998), that effective treatment of depression improves health-related quality of life (Wells et al., 2000) and that functional limitations predict the onset and worsening of depression (Prince et al., 1998). These findings have led some (Ormel, 2000) to conclude that the association between depression and disability is likely to be due to bi-directional effects among depression, physical limitations and psychosocial disability, with this being particularly so in older people.

Implications of the findings

Our results suggest that chronic anxiety is associated with physical functional health status limitations in excess of those associated with either chronic depression or any of the physical health conditions considered, except for stroke. These findings complement other evidence concerning levels of impairment associated with generalised anxiety disorder (Kessler et al., 1999). Additionally they provide a UK population perspective on the impact of mood disorders on functional health status relative to chronic disease, most usually examined in the context of patient groups and with a focus on depression (Wells et al., 1989). Major (unipolar) depression has been reported (Murray & Lopez, 1996) to be responsible for more than 1 in every 10 years of life lived with a disability worldwide, with projections that by the year 2020 depression will be the second most important determinant of global disease burden, which is a larger proportionate increase from 1990 than that for the cardiovascular diseases. Chronic disabling medical and emotional conditions consume a substantial part of curative health service resources and, as this study has suggested, combine to impair functional status. With compelling evidence for the effective treatment of mood disorders having an associated benefit in terms of improved physical capacities, further research is needed on the prevention and management of mood states (particularly in general practice), including those comorbid with physical disease. Such research would need to address the realistic primary care concerns over mood disorder detection, treatment effectiveness, patient compliance with treatment and the use of diagnostic criteria for depression developed in secondary care (Kendrick, 2000), together with further evaluation of care models designed to map the duration of intervention to condition chronicity (Rost et al., 2002).

ACKNOWLEDGEMENTS

We thank the participants and general practitioners who took part in this study and the staff associated with the research programme. EPIC–Norfolk is supported by programme grants from the Cancer Research Campaign and the Medical Research Council, with additional support from the Stroke Association, the British Heart Foundation, the Department of Health, the Food Standards Agency, the Wellcome Trust and the Europe Against Cancer Programme of the Commission of the European Communities.

REFERENCES


form 36 scores compared with a normal population.

Heart, 81, 352–358.

Norfolk: study design and characteristics of the cohort.
British Journal of Cancer, 80 (suppl. 1), 95–103.

Department of Health (2002) Prescriptions Dispensed
London: Department of Health.

Epidemiology of depressive and anxiety disorders. In
Textbook in Psychiatric Epidemiology (2nd edn) (eds M. T.

methods for weighting and scoring the SF–36 summary

Psychosocial disability during the long-term course of
unipolar major depressive disorder. Archives of General
Psychiatry, 57, 375–380.

depression? We must question the basis of the guidelines

Kessler, R. C., DuPont, R. L., Berglund, P., et al
(1999) Impairment in pure and comorbid generalized
anxiety disorder and major depression at 12 months in
two national surveys. American Journal of Psychiatry, 156,
1915–1923.

Burden of Disease: a Comprehensive Assessment of
Mortality and Disability from Diseases, Injuries, and Risk
Factors in 1990 and Projected to 2020. Global Burden of
Disease and Injury Series: Vol. I. Harvard School of Public
Health on behalf of the World Health Organization and
the World Bank; distributor Cambridge, MA: Harvard
University Press.

Ormel, J. (2000) Synchrony of change in depression
and disability – what next? Archives of General
Psychiatry, 57, 381–382.

mental disorders and disability across cultures – results
from the WHO Collaborative Study on Psychological
Problems in General Health Care. JAMA, 272, 1741–1748.

(1998) Depressive symptoms and physical decline in
community-dwelling older persons. JAMA, 279,
1720–1726.

Prince, M. J., Harwood, R. H., Thomas, A., et al
(1998) A prospective population-based cohort study of
the effects of disablement and social milieu on the
onset and maintenance of late-life depression. The Gospel Oak
Project VII Psychological Medicine, 28, 337–350.

Managing depression as a chronic disease: a randomised

Surtees, P. G. & Barkley, C. (1994) Future imperfect:
the long-term outcome of depression. British Journal of
Psychiatry, 164, 327–341.

Psychosocial aetiology of chronic disease: a pragmatic
approach to the assessment of lifetime affective
morbidty in an EPIC component study. Journal of
Epidemiology and Community Health, 54, 114–122.

Childhood adversity, gender and depression over the
life-course. Journal of Affective Disorders, 72, 33–44.

Ware, J. E. & Sherbourne, C. D. (1992) The MOS 36-
Item Short-Form Health Survey (SF–36). I. Conceptual
framework and item selection. Medical Care, 30, 473–483.

The functioning and well-being of depressed patients. Results
from the Medical Outcomes Study. JAMA, 262, 914–924.

Impact of disseminating quality improvement programs
for depression in managed primary care — a randomized controlled trial. JAMA, 283, 212–220.

(1996) Phenomenology and course of generalised
anxiety disorder. British Journal of Psychiatry, 168,
308–313.
Functional health status, chronic medical conditions and disorders of mood
PAUL G. SURTEES, NICHOLAS W. J. WAINWRIGHT, KAY-TEE KHAW and NICHOLAS E. DAY
Access the most recent version at DOI: 10.1192/bjp.183.4.299

References
This article cites 18 articles, 7 of which you can access for free at:
http://bjp.rcpsych.org/content/183/4/299#BIBL

Reprints/permissions
To obtain reprints or permission to reproduce material from this paper, please write to permissions@rcpsych.ac.uk

You can respond to this article at
/letters/submit/bjprcpsych;183/4/299

Downloaded from
http://bjp.rcpsych.org/ on June 17, 2017
Published by The Royal College of Psychiatrists

To subscribe to The British Journal of Psychiatry go to:
http://bjp.rcpsych.org/site/subscriptions/