Medical morbidity and severity of depression in a large primary care sample of older Australians: the DEPS-GP project

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ABSTRACT

Objectives: To estimate the prevalence of depression among older Australians with common medical morbidities, and to determine the association between poor physical health and depression in this age group.

Design: Cross-sectional, postal questionnaire survey.

Setting and participants: 20 183 community-dwelling adults aged 60 years and over, under the care of 383 general practitioners participating in the Depression and Early Prevention of Suicide in General Practice (DEPS-GP) project (conducted between 2005 and 2008; the data in this article were collected during the baseline phase of the study in 2005).

Main outcome measures: Depressive symptoms (measured by the nine-item depression scale of the Patient Health Questionnaire), health status (measured by the 12-item Short Form Health Survey and a medical morbidity inventory), social support (measured by the subjective support subscale from the Duke Social Support Index), and demographic and lifestyle information.

Results: 18 190 participants (90.1%) reported having at least one chronic physical health condition, while 1493 (7.1%) experienced clinically significant depression (3.1% major depressive syndrome; 4.0% other depressive syndrome). Most chronic physical illnesses were associated with increased odds of depression, and participants with numerous medical morbidities and a high level of functional impairment were three to four times more likely to have a depressive illness.

Conclusions: Depression is more the exception than the rule in later life, and among those who are medically unwell, the level of associated impairment may determine their risk of depression more than their acquired physical illness. Many of the factors associated with depression in medically ill patients are amenable to treatment, and GPs are in a unique position to address this important public health issue.

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In Australia and other Western countries, older adults are the fastest-growing segment of the population. While this dramatic demographic change is a desirable and welcome phenomenon, the social, financial and health consequences of an ageing society cannot be ignored. Most people over the age of 65 years have at least one long-term medical illness, and about 25% have five or more chronic diseases.[1] Depression is one of the most disabling mental disorders of later life,[2] and current evidence suggests that those who experience a chronic medical condition are twice as likely as their healthy counterparts to develop major depression.[3] Among older adults, depressive symptoms can complicate the clinical course of medical conditions,[4] lead to a decline in self-rated health,[5] and increase mortality.[6]

Considering that about 80% of older adults will visit their general practitioner at least once a year in Australia,[7] GPs are strategically placed to detect and treat cases of depression in people of this age group. GPs remain the first, and in many cases the only, health professionals involved in the management of a whole range of conditions, from common anxiety and depressive disorders to severe and enduring mental illnesses.[8] However, it is not always easy to detect depression in older people who present to primary care settings with multiple coexisting chronic diseases and somatic concerns.[9] While comorbid medical illness has been associated with a high prevalence of depression,[3] major depression may not represent a natural consequence of poor physical health.[10] However, as chronic disease and depressive disorder both influence the delivery and outcomes of health care in later life, it is vital that we enhance our understanding of the relationship between the two.

In this study, we aimed to ascertain whether common medical conditions of older age are associated with poorer mental health outcomes within a large general practice sample of Australians aged 60 years and older. More specifically, we wished to: (i) clarify the prevalence and severity of depression among older Australians with common medical morbidities; and (ii) determine the association between poor physical health and depression in this age group. We hypothesised that the level of functional impairment among those who are medically unwell would be more closely related to their depression status than the acquired physical illness.

METHODS

Our study was a cross-sectional survey of community-dwelling older primary care patients aged 60 years or over who attended GPs participating in the Depression and Early Prevention of Suicide in General Practice (DEPS-GP) project. The DEPS-GP study was conducted between 2005 and 2008. The data in this article were collected during the baseline phase of the study in 2005. The DEPS-GP project is a clustered randomised trial designed to test an educational intervention aimed at enhancing awareness and management of depression and suicidality in older general practice patients. Details of recruiting GPs and their patients have been reported elsewhere.[11] Australian GPs listed on the Australasian Medical Publishing Company Proprietary Limited database were mailed an invitation to participate.

Participating GPs used practice registers of currently enrolled patients in their surgeries to post a project questionnaire to those aged 60 years and over. Each patient on the list was sent a self-completion questionnaire, a personalised cover letter from their GP, project information, a consent form and a reply-paid envelope addressed to the project office. We asked all potential participants to return the questionnaires (blank in the case of those who did not wish to participate) so that we could estimate the true denominator of the target population. Recruitment of patients was limited to the initial mail-out.

All participants gave written informed consent. The study was approved by the Human Research Ethics Committee of the University of Western Australia (No. RA/4/1/1107) and the Royal Australian College of General Practitioners (No. 20040128).

Measures

All variables were assessed by means of written self-report responses collected on the postal questionnaire; the questionnaires covered a range of sociodemographic, clinical and lifestyle variables, including:

- ***Demographic factors:*** age, sex, marital status, living arrangement and religious participation were ascertained using standard questions.
- ***Social support:*** the subjective support subscale from the Duke Social Support Index was used to measure perceived social support.[12] The scale has been validated in healthy and sick older people, with Cronbach's α values of 0.75 and 0.71, respectively.[12] To enable us to explore the specific influences of social support for other research we are currently conducting, we adapted the subscale's seventh item on the postal questionnaire by splitting it into two items that covered family and friends separately. To achieve the standard scoring criteria within this report, we calculated the mean score of the combined two split items to represent the scale's original seventh item. Cronbach's α for the recalculated 7-item subscale was 0.89. A scale score of 7–35 (lesser to greater social support) was obtained and divided into quartiles for analysis.
- ***Physical activity:*** physical activity was ascertained with the question, "As a rule, do you do at least half an hour of moderate or vigorous exercise (such as walking or sport) on five or more days of the week?" Possible answers were "yes" and "no". This question has been shown to efficiently discriminate between physically active and sedentary older adults.[13]
- ***Alcohol and smoking:*** hazardous or harmful drinking was defined as reporting the consumption of four or more drinks in response to the question, "How many alcoholic drinks do you consume on a typical day when you are drinking?" Smoking behaviour was ascertained by the question, "Are you currently smoking?"
- ***Financial stress:*** participants were asked, "Please indicate how much financial burdens have been a part of your life over the past 3 months (eg, difficulty paying bills, or buying groceries or medications)." Possible scores were zero (not at all/only slightly part of my life) or 1 (distinctly/very much part of my life).
- ***Poor physical health:*** a medical morbidity inventory was used to ascertain the presence of common medical conditions of older age. Participants were asked, "Have you ever been told *by a doctor* that you have or have had any of the following medical conditions?" A list of conditions was then presented, including: arthritis, diabetes, hypertension, stroke, heart attack or angina, heart failure, peripheral vascular disease, asthma or chronic bronchitis, emphysema, osteoporosis, cancer (except for skin cancer), thyroid disorder, head injury and dementia. We then created a summary measure of burden of physical illness by adding all measured morbidities and grouping participants into three groups according to the total number (0–2, 3–4, 5 or more).
- ***Functional health status:*** the 12-item Short Form Health Survey (SF-12) provides a valid and widely used measure of health status. The scale yields two summary measures: the physical component summary (PCS) and the mental component summary (MCS).[14] Scores range from zero to 100 (Australian population mean, 50; SD, 10).[15] For the purposes of this study we used the PCS scores as a measure of physical morbidity and grouped participants according to their PCS scores of less than 30, 30–49, or $\geqslant 50$.
- ***Depression:*** the 9-item depression scale of the Patient Health Questionnaire (PHQ-9)[16] was used to identify clinically significant depression. The PHQ-9 gives each of the nine *Diagnostic and statistical manual of mental disorders*, fourth edition (DSM-IV)[17] depression criteria a score ranging from zero (not at all) to 3 (nearly every day) over the previous 2 weeks. We used a previously published algorithm of no depression, other depressive syndrome, and major depressive syndrome[16] for this study.

Statistical analysis

The statistical package SPSS, version 14.0 for Windows (SPSS Inc, Chicago, Ill, USA) was used to analyse the data. Participants were grouped on the basis of their PHQ-9 status (no depression, other depressive syndrome, or major depressive syndrome) with the association between depression status and various demographic, lifestyle, and clinical variables examined using univariate methods and reported as odds ratios with 95% confidence intervals. We used multivariate logistic regression to control for the possible effects of other variables on the association between physical morbidity and depression status. We performed multicollinearity diagnostic statistics, with a variance inflation factor cut-off value of 2.5, on the independent variables entered into the multivariate analyses, with each of the variables scoring below this value. Finally, we used generalised estimating equations to determine the differences between MCS and PCS scores according to age, as well as the interaction between age and these scores.

RESULTS

In total, 19 046 GPs located in New South Wales, Queensland, Victoria, South Australia, and Western Australia were contacted, 772 consented to participate, and 383 contributed to the recruitment of patients. There were 77 820 patients aged 60 years and over on the practice registers of these 383 GPs — an average of 203 patients per GP. Thus, 77 820 questionnaires were or should have been posted; 22 258 (29%) were returned with written informed consent, 9087 were returned not completed, 2934 were returned to sender because the person named on the envelope was not known at the address, and 820 were not posted by the GP. A small number of older adults who agreed to participate were found to be ineligible because they were aged under 60 years (120) or did not reside in the community (nursing home, 54), while a further 243 had incomplete data on basic demographic characteristics (age and sex) and were excluded from the analysis. This left a sample of 21 841 older people, of whom 20 183 reported complete information on depressive symptoms and physical illness.

The mean age of the 20 183 participants was 71.6 years (SD, 7.6 years), ranging from 60 to 101 years. There were 11 683 women (57.9%). Compared with participants in the 70–79-year age range (56.7% women), discrepancies between the sexes were greatest in the 60–69-year age group (60.3% women; odds ratio [OR], 0.86; 95% CI, 0.81–0.92) and among those aged $\geqslant 80$ years (59.4% females; OR, 1.11; 95% CI, 1.03–1.20). Other depressive syndrome affected 4.0% of the cohort and was more frequently found among men, older participants and less educated participants. Major depressive syndrome affected 3.1% of the sample, and was more frequent among the youngest participants. Apart from tertiary education, the associations between the remaining variables and depression status

1 Demographic, lifestyle, and clinical factors associated with depression status among 20 183 community-dwelling older Australians

	No depression ($n = 18\,744$)	Other depressive syndrome ($n = 806$)		Major depressive syndrome ($n = 633$)	
Factor	No. (%)	No. (%)	OR (95% CI)	No. (%)	OR (95% CI)
Sex (female)	10 889 (58.1)	429 (53.2)	0.82 (0.71–0.95)	365 (57.7)	0.98 (0.84–1.15)
Age					
60–69 years	8493 (45.3)	321 (39.8)	1 (Reference)	333 (52.6)	1 (Reference)
70–79 years	7043 (37.6)	286 (35.5)	1.07 (0.91–1.26)	195 (30.8)	0.71 (0.59–0.85)
⩾ 80 years	3208 (17.1)	199 (24.7)	1.64 (1.37–1.97)	105 (16.6)	0.84 (0.67–1.04)
Born overseas	4800 (25.7)	227 (28.2)	1.14 (0.97–1.33)	174 (27.6)	1.10 (0.92–1.32)
Married	12 789 (68.3)	491 (61.2)	0.73 (0.63–0.85)	344 (54.4)	0.55 (0.47–0.65)
Tertiary education	2899 (15.7)	47 (6.0)	0.34 (0.25–0.46)	61 (9.9)	0.59 (0.445–0.77)
Living alone	4398 (23.5)	207 (25.8)	1.13 (0.96–1.33)	182 (28.8)	1.32 (1.10–1.57)
Social support (DSSI) quartile					
1 (< 27.5)	3961 (21.6)	345 (44.2)	1 (Reference)	439 (72.0)	1 (Reference)
2 (27.5–30)	5145 (28.2)	194 (24.8)	0.43 (0.36–0.52)	82 (13.4)	0.14 (0.11–0.18)
3 (30.5–33)	4911 (26.8)	155 (19.8)	0.36 (0.30–0.44)	61 (10.0)	0.11 (0.09–0.15)
4 (33.5–35)	4287 (23.4)	87 (11.2)	0.23 (0.18–0.30)	28 (4.6)	0.06 (0.04–0.09)
Daily exercise	12 011 (64.6)	394 (49.4)	0.54 (0.47–0.62)	261 (41.7)	0.39 (0.33–0.46)
Financial stress	1613 (8.9)	169 (22.3)	2.95 (2.46–3.52)	207 (11.4)	5.33 (4.47–6.35)
Religious participation	8547 (47.1)	354 (45.4)	0.94 (0.81–1.08)	260 (42.6)	0.83 (0.71–0.98)
Four or more alcoholic drinks per day	1000 (5.3)	66 (8.2)	1.58 (1.22–2.05)	67 (10.6)	2.10 (1.62–2.73)
Current smoker	1101 (5.9)	77 (9.6)	1.70 (1.33–2.16)	110 (17.4)	3.37 (2.72–4.17)

OR = odds ratio. DSSI = Duke Social Support Index. ◆

tended to be cumulative, with the strongest associations found among those with major depressive syndrome (Box 1).

Over 90% of participants (18 190) reported having at least one chronic physical health condition. Box 2 shows the frequency of the physical morbidities we measured among participants with other depressive syndrome and major depressive syndrome. Most of the physical morbidities measured were associated with increased odds of a depressive illness (with the exceptions of cancer and osteoporosis for other depressive syndrome and hypertension for major depressive syndrome), even after controlling for numerous sociodemographic and lifestyle factors in the analyses. Box 2 also shows that the odds of experiencing a depressive illness increased in relation to participants' burden of disease, with depression being three to four times more likely to occur in those experiencing the highest number of medical morbidities and greatest level of functional impairment (assessed by PCS scores).

Across all age groups, participants' physical health status (assessed by PCS scores) was significantly lower than their mental health status (assessed by MCS scores) ($z = 19.36$; $P < 0.001$), and there was a significant interaction between composite scores and age, with PCS scores declining markedly with increasing age when compared with MCS scores ($z = 33.18$; $P < 0.001$; Box 3). However, those with MCS scores of 40 or less were twice as likely to have PCS scores less than 40 (OR, 2.22; 95% CI, 1.99–2.48). Notably, the MCS scores of participants were consistently above the national average for all ages, but the opposite occurred with PCS scores.

DISCUSSION

Among our large sample of community-dwelling older Australians, 7.1% experienced some level of clinically significant depressive symptoms (3.1% major depressive syndrome; 4.0% other depressive syndrome), similar to the rate of major depression (2.4%) found among people aged over 65 years in Australia's 1997 national survey of mental health and well-being.[2] While that survey reported higher rates of major depression among older women, we found the male to female rate ratio to be close to one, and that men were at greater risk of experiencing other depressive syndromes, suggesting an increase in depressive rates among older men, like that previously reported among men in Britain,[18] although still typically lower than that found among younger Australian cohorts of either sex.[19] Apart from age and sex, the risk factors related to other depressive syndromes and major depressive syndromes tended to be similar — being unmarried, having a lower level of education, living alone, having poor social support, being physically inactive, being under financial stress, currently smoking, and drinking harmful quantities of alcohol — with the level of association much stronger among those with a more severe depressive illness. Similarly, almost all of the chronic medical conditions we examined were associated with greater odds of having a depressive illness, even after controlling for the influence of the aforementioned risk factors. However, the level of risk expanded rapidly as the burden of participants' ill health increased, manifested by their number of medical morbidities and their level of functional impairment. Those

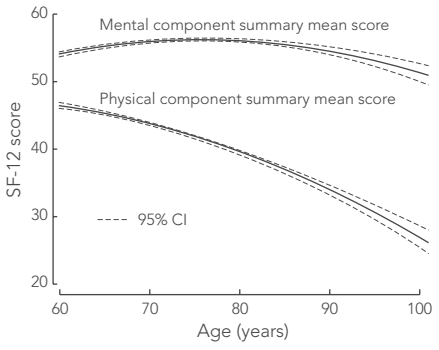
2 Association between physical morbidity and depression status among 20 183 community-dwelling older Australians, adjusted for various demographic, lifestyle, and clinical factors

	No depression (*n* = 18 744)	Other depressive syndrome (*n* = 806)			Major depressive syndrome (*n* = 633)		
Medical morbidities	No. (%)	No. (%)	OR (95% CI)	Adjusted OR (95% CI)	No. (%)	OR (95% CI)	Adjusted OR (95% CI)
Arthritis	10 462 (55.8)	537 (66.6)	1.58 (1.36–1.84)	1.42 (1.20–1.68)	457 (72.2)	2.06 (1.72–2.45)	1.74 (1.42–2.13)
Hypertension	9288 (49.6)	438 (54.3)	1.21 (1.05–1.40)	1.18 (1.01–1.38)	344 (54.3)	1.21 (1.03–1.42)	1.14 (0.95–1.36)
Diabetes	2873 (15.3)	189 (23.4)	1.69 (1.43–2.00)	1.43 (1.18–1.73)	164 (25.9)	1.93 (1.61–2.32)	1.62 (1.31–2.00)
Stroke	1227 (6.5)	104 (12.9)	2.12 (1.71–2.62)	1.73 (1.36–2.20)	99 (15.6)	2.65 (2.12–3.31)	2.24 (1.73–2.90)
Heart attack or angina	3060 (16.3)	219 (27.2)	1.91 (1.63–2.24)	1.53 (1.27–1.84)	175 (27.6)	1.96 (1.64–2.34)	1.67 (1.35–2.08)
Heart failure	946 (5.0)	83 (10.3)	2.16 (1.71–2.74)	1.73 (1.33–2.27)	61 (9.6)	2.01 (1.53–2.63)	1.70 (1.23–2.34)
Peripheral vascular disease	3383 (18.0)	291 (36.1)	2.57 (2.21–2.98)	1.99 (1.68–2.36)	249 (39.3)	2.94 (2.50–3.47)	1.98 (1.63–2.40)
Asthma or chronic bronchitis	3188 (17.0)	206 (25.6)	1.68 (1.42–1.97)	1.50 (1.25–1.79)	166 (26.2)	1.73 (1.45–2.08)	1.32 (1.07–1.62)
Emphysema	754 (4.0)	64 (7.9)	2.06 (1.58–2.68)	1.38 (1.02–1.88)	55 (8.7)	2.27 (1.71–3.02)	1.52 (1.09–2.12)
Cancer (except for skin cancer)	2389 (12.7)	113 (14.0)	1.12 (0.91–1.37)	0.98 (0.78–1.24)	104 (16.4)	1.35 (1.09–1.67)	1.30 (1.01–1.66)
Osteoporosis	3265 (17.4)	178 (22.1)	1.34 (1.13–1.59)	1.17 (0.95–1.42)	165 (26.1)	1.67 (1.39–2.00)	1.59 (1.28–1.97)
Head injury	1006 (5.4)	65 (8.1)	1.55 (1.19–2.01)	1.39 (1.03–1.87)	75 (11.8)	2.37 (1.85–3.04)	2.14 (1.60–2.86)
Thyroid disorder	2116 (11.3)	115 (14.3)	1.31 (1.07–1.60)	1.43 (1.14–1.80)	98 (15.5)	1.44 (1.16–1.79)	1.50 (1.16–1.94)
Dementia	171 (0.9)	27 (3.3)	3.77 (2.49–5.69)	2.24 (1.35–3.72)	32 (5.1)	5.78 (3.93–8.51)	3.31 (1.97–5.56)
No. of medical morbidities							
0–2	11 162 (59.6)	315 (39.1)	1 (Reference)	1 (Reference)	204 (32.2)	1 (Reference)	1 (Reference)
3–4	5838 (31.1)	294 (36.5)	1.78 (1.52–2.10)	1.38 (1.14–1.66)	255 (40.3)	2.39 (1.98–2.88)	1.74 (1.41–2.16)
5 +	1744 (9.3)	197 (24.4)	4.00 (3.33–4.82)	2.93 (2.36–3.65)	174 (27.5)	5.46 (4.43–6.72)	3.53 (2.74–4.56)
PCS grouping							
50 +	5954 (33.9)	112 (15.5)	1 (Reference)	1 (Reference)	65 (11.5)	1 (Reference)	1 (Reference)
30–49	8868 (50.5)	297 (41.2)	1.78 (1.43–2.22)	1.35 (1.05–1.73)	228 (40.4)	2.36 (1.78–3.11)	1.49 (1.10–2.02)
< 30	2738 (15.6)	312 (43.3)	6.06 (4.86–7.55)	4.14 (3.15–5.43)	271 (48.1)	9.07 (6.89–11.93)	4.17 (3.02–5.75)

OR = odds ratio. Adjusted OR = odds ratio adjusted for age group, sex, living alone, marital status, education, social support quartile, exercise, financial stress, religious participation, harmful drinking, and smoking. PCS = Physical component summary of the 12-item Short Form Health Survey. ◆

whose mental health status was at least one standard deviation below the mean were twice as likely to report high levels of functional impairment related to their physical health.

3 12-item Short Form Health Survey (SF-12) mental and physical component summary mean scores and 95% confidence intervals for 20 183 community-dwelling older Australians according to age



Given that about 7% of our sample were suffering from depressive illness, yet 90% reported at least one chronic illness, our results appear to support the integrative model of depression proposed by Lewinsohn and colleagues,[20] whereby disease will be a risk factor for depression mainly when disease results in functional impairment. Previous research has also found that the presence of chronic medical conditions may not be as influential in predicting the onset of depression as the functional limitations that may arise from these conditions, and the degree by which people's internal locus of control (mastery) is affected.[21-24] Findings from the EURODEP population-based research into the epidemiology of late-life depression appear to support this view.[25] An examination of cross-national differences in the relationship between physical health and depressive symptoms in older people across Western Europe found that depressive symptoms were more strongly related to functional disability than they were to chronic physical conditions.[25] Functional impairment can thus be said to trigger a cascade of events that lead to reduced positive reinforcement and increased aversive experience,[26] as shown by the lower level of social support and higher incidence of financial stress among our physically ill depressed participants.

Considering that depression adversely affects outcomes from chronic medical conditions[27] and can hasten mortality independently of physical illness among older primary care patients,[28,29] our findings have significant public health implications. For many older adults, self-rated health improves after they are treated for depression, even when their objectively rated physical conditions are unchanged,[30] while those who are medically ill report fewer

depressive symptoms a year after the onset of their illness if replacements can be found for lost activities.[31] Many of the factors associated with depression in medically ill patients are amenable to treatment, and GPs can help older patients maintain or regain physical function and independence. This may entail promoting a healthy lifestyle, such as physical activity, and a multidisciplinary approach to treatment to increase physical and psychosocial function, as well as resilience.

Our study has limitations. First, the cross-sectional nature of our data makes it difficult to determine the direction of causality. As our study is based on baseline data collected as part of a longitudinal intervention study, we hope to report on such findings once follow-up data become available. Second, we were not able to verify self-reported data against GPs' records. This information would have afforded a more careful examination of the association between physical illness and depression. However, we used well-validated instruments (eg, PHQ-9, SF-12) and note that most of the risk factors related to depression in this study are similar to those observed in other studies of chronically ill older adults. Finally, our sampling strategy yielded a larger absolute number of participants than any other single study of this kind that we could find in the scientific literature (almost as large as the combined 14-nation EURODEP studies which had 22 570 participants).[25] However, we acknowledge that our sampling strategy had limitations. Although our sample size was large, our overall response rate was less than optimal at 29%. This figure probably underestimates our true response rate, as an unknown proportion of the 77 820 questionnaires may not have reached the intended recipient because the individual had moved away or died, the recipient did not consider the corresponding GP to be their regular doctor, or individuals were sent two or more questionnaires because some surgeries had overlapping lists of patients. We did receive 9087 unanswered questionnaires by return mail, which we had encouraged to obtain an accurate denominator; such a small proportion suggests that our true participation rate was higher than 29%. Nonetheless, potential selection biases associated with our suboptimal response rate must be considered when interpreting our findings. On the one hand, depressed older adults and/or those with low levels of literacy may have been more likely to refuse requests to participate, leading to underestimates of the prevalence of depression.[32] Alternatively, GPs with particularly high caseloads of patients with depression might have been the most likely to recruit patients, because of their interest in the area, resulting in overestimates.

Our findings support the view that depression is more the exception than the rule in later life, and that among those who are medically unwell, the level of associated impairment may determine their risk of depression more than their acquired physical illness. Given the deleterious effects of depression in this age group, and that many of the factors associated with depression in medically ill patients are amenable to treatment, such as problem-solving therapy for minor depression in older individuals with chronic medical morbidity,[33] GPs appear to be in a unique position to address this important public health issue.

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COMPETING INTERESTS

None identified.

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