DEPRESSION AMONG WOMEN IN THE AUSTRALIAN LONGITUDINAL STUDY ON WOMEN'S HEALTH

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INTRODUCTION AND SUMMARY OF MAIN FINDINGS

The Australian Longitudinal Study on Women's Health (ALSWH) is a population-based study of changes in the health of a national sample of Australian women. The study provides an opportunity to explore not only the prevalence of depression, but also the medications that women do and do not take in order to treat this condition. By using data collected from the ALSWH and linking it with Medicare and Pharmaceutical Benefits Scheme data for the years 2002-2005, this project also allows for detailed prospective analyses of the health services and medications used by older women with depression, and the outcomes of these treatments. These analyses provide national data on treatment for depression among older women in the population. The main findings are reported briefly below.

Depression is common among older women in Australia

In each of the four surveys, around 7% of women reported they had been told by a doctor that they had depression (in the past three years).

Analysis of symptoms of depression suggests that the problem of depression may be higher than diagnosed, reported and/or treated. For instance, at Survey 4 15% 10% of the women reported that they "felt hopeless", 15% reported they had "lost interest in things", and 20-40% of women were classified as depressed on standard screening instruments.

A large proportion of women with depression do not receive appropriate medications for this condition

25% of women with depression did not use any medications for depression during the three years of the study.

In any year:

Around 30% of the women with depression were treated with Selective Serotonin Reuptake inhibitors which is the drug of choice for older people.

Around 20% of women with depression were treated with Tricyclic antidepressants which are recommended to be used with caution among older people.

Around 20% of women with depression were treated with anxiolytic medications which are considered to be potentially inappropriate for older people.

Around 25% of women with depression were treated with hypnotic medications which are considered to be potentially inappropriate for older people.

Some (but not all) women who are treated with depression have improved mental health related quality of life

60% of women with depression were taking medications at the start of the observation (Survey 3 2002) or prior to Survey 4. Of these women:

> 65% ceased these medications by the end of the period of observation. On average these women had an improvement in scores on the Mental Health subscale over the three years. These are the women who appear to benefit from depression medications.
>
> 35% were taking medications at the start and at the end of the 3 years. The average Mental Health subscale scores for these women did not change. These women do not appear to benefit from the medications.

14% of women with depression were not taking medications at the start but were by the end. Average Mental health Scores for these women became worse over the three years. There was also a significant increase in the depression scores for these women over the three years of observation. This is consistent with commencing medication as symptoms worsen.

Average Mental Health scores for women who did not take depression medications at all over the three year period did not change.

Conclusions

This research highlights the problem of depression for older women. Many women with depression are untreated, and more may be undiagnosed. It also appears that a large proportion of women are inappropriately treated with anxiolytic medications and/or hypnotics. A proportion of women who are treated appear to benefit.

THE STUDY METHODS

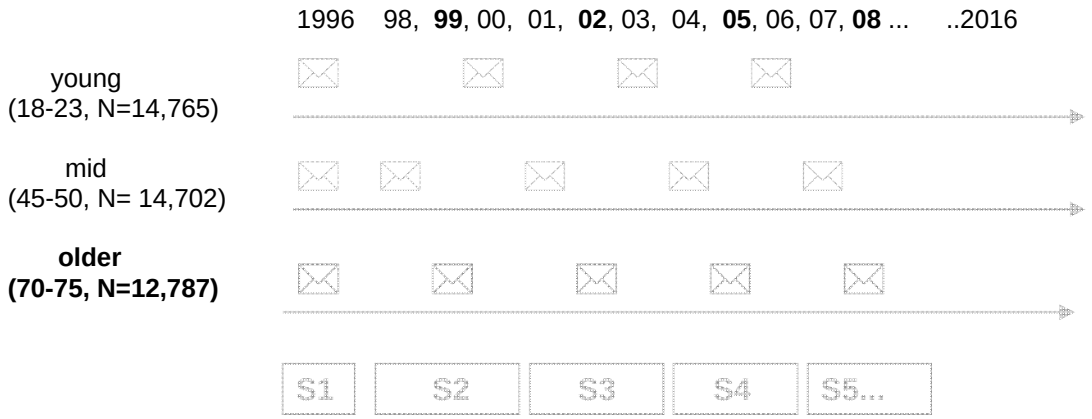
The women

Participants in the Australian Longitudinal Study on Women's Health were randomly selected from the Medicare database which is maintained by the Medicare Australia and contains name and address details of all Australian citizens and permanent residents. This database is widely regarded as the most up-to-date and complete list of Australians in existence. The sample deliberately includes a disproportionate number of women living in rural and remote parts of Australia, so that the experiences of these women can be meaningfully examined. Further details of the survey have been published elsewhere[1] and overviews of the survey, its rationale and methods, can be located on the Study's web site: http://www.alswh.org.au

Women in the older cohort were aged 70-75 years at the time of the first postal survey in 1996 and have since been invited to complete three follow-up surveys - Survey 2 in 1999, Survey 3 in 2002, and Survey 4 in 2005 (when the women were aged 79-84 years). Each Survey included a large number of questions about the women's health and lifestyle, and women have an option to write qualitative comments at the end of the survey. Withdrawals and reasons for withdrawal are recorded by study staff, and deaths are checked through the National Death Index.

Women are also invited to consent to linkage of their survey responses with records from the Medicare database of Medicare Australia and the Pharmaceutical Benefits Scheme (PBS). The Medicare data include information such as number of GP visits and service costs, but no clinical or diagnostic information. The PBS data contain details of all prescriptions filled under this scheme.

Figure 1
Surveys for young, mid and older cohorts



The Surveys and Measures

Each survey included basic demographic data and items measuring physical, social and mental health and health care use.

Measurement of depression

At Survey 2 to Survey 4 women were asked:

"in the LAST 3 YEARS have you been diagnosed with or treated for depression?"

This simple question is easily answered by the women as "yes" or "no". For the purposes of this analysis women were classified as having been diagnosed with depression EVER if they answered "yes" to this question at either Survey 2 or Survey 3 or Survey 4. Otherwise they were diagnosed as NEVER depressed. However because depression is under diagnosed, particularly among older people, the answer to this question is likely to seriously under estimate the existence of this problem in the community. What's more, people who have been diagnosed and treated for this disorder may not identify as having this diagnosis.

Assessing depression is not straight forward, particularly when people have physical disease and other psychosocial disorders.[2 3] Various screening scales have been developed to improve recognition of depressive symptoms.[4 5] Screening scales can provide estimates of the prevalence of depression using consistent measurement criteria across different surveys.

The main technical measure of depression used in this study is the **Goldberg Depression and Anxiety Inventory (or scale) (GADS)** which was included in Survey 3 and Survey 4. The GADS is an 18 item self-report symptom inventory with "yes" and "no" response options.[6] The scale has two dimensions measuring anxiety and depression, but there is a high degree of correlation between these two dimensions. Scores for each dimension are created from a simple sum of the responses. The scale appears to be highly acceptable to the women in the study, with rates of missing data ranging from 2% to 4% for each item. Previous analysis of Survey 3 data for the Older women indicates that the Depression subscale and the Anxiety subscale are highly correlated (0.65) and both reasonable indices of depression in the older cohort. The area under the curve (AOC) for Depression subscale for detecting self-reported doctor diagnosed depression was 0.77 (0.74, 0.79); AOC for Anxiety subscale for detecting self-reported doctor diagnosed depression was 0.75 (0.73, 0.77). The corresponding AOC's for identifying women taking medications for depression (self-report on Survey 3) were 0.74 (0.71, 0.77) and 0.72 (0.70, 0.75). The subscales also have a very high correlation (-0.68) with the Mental Health Index of the SF-36 (see below). The AOC for identifying women classified as depressed on the Mental Health Index (<53) were 0.85 (0.83, 0.87) for the Depression subscale and 0.86 (0.85, 0.88) for the anxiety subscale. Details of these previous analyses of the GADS and other depression measures are available in the ALSWH Data Dictionary Supplement at www.alswh.org.au. For this analysis, Depression scores were calculated for those who answered all nine questions. This represented approximately 90% of surviving participants who filled out survey 3 and 4. Women scoring more than 2 on the depression subscale were classed as depressed; women scoring two or more on the Anxiety subscale were classed as anxious (although in reality the clinical distinction between these two groups of women may not be clear).

A different scale was used in Survey 2, the **Centres for Epidemiological Studies Depression scale (CESD-10)**. The 10 item CESD is one of the most commonly used self-report depression screening scales, and was specifically designed as a screening instrument for symptoms of depressed mood in older adults.[7] Responses are on a 4 point scale, coded 0 to 3. However,

despite these attributes, a large proportion of women in our study were unable to answer all the questions on this scale and so it was not used in subsequent surveys (less than half the older women (44%) completed sufficient items to have a score calculated; 10% of women had all items missing, 16% answered only one item, and a further 9% answered only two items). Other researchers have also reported that the older people sometimes have problems with these sorts of scales. A full exploration of the reasons for and correlates of missing data on CESD-10 in the Older cohort has been published.[8]

In reporting on the CESD-10 responses provided by the women at Survey 2, we have calculated a simple total score (with reversed codes for positive mood items). This score is recommended on the basis of high internal consistency of the scale reported by other researchers which suggest that the items are all symptoms related to depression. Study participants were considered to have completed the CESD-10 if they completed 9 or more of the 10 items, and the score for the missing item is imputed from the mean for the completed items. Participants reporting less than 9 items are considered to be "missing" a score for the CESD-10. CESD-10 scores are not normally distributed and do not respond to transformation. It is therefore generally advised that the scores should be dichotomised. There are no clear guidelines for categorisation, although a cut-off score of 10 has been recommended.[9] In this analysis we accepted a score of 8 or more as being consistent with the condition of "depression".

All surveys included the full SF-36. The **Medical Outcomes Study SF-36 Health Survey (SF-36)**[10 11] is a generic profile measure which examines self-reported health-related quality of life. The SF-36 is a widely used and well validated health profile that has been extensively reviewed for use with older populations. In a recent structured review of generic self-assessed instruments for older people, Haywood et al[12] identified the SF-36 as one of three instruments with extensive evidence of internal consistency, test-retest reliability, construct validity, concurrent validity and responsiveness. The SF-36 is recommended where a detailed and broad ranging assessment of health is required, particularly in community dwelling older people with limited morbidity". The SF-36 produces eight sub-scales and two summary scores. The measure of interest in this analysis was the mental health sub-scale of the SF-36 which is highly correlated with other measures of depression. In previous analyses the Mental Health subscale was shown to have an AOC of 0.82 (0.80, 0.84) for detecting self-reported doctor diagnosis of depression (See Data Dictionary Supplement www.alswh.org.au).

Scores for each SF-36 sub-scale are calculated for respondents completing 50% or more of the items within a scale. Among these respondents, the value for any missing item is imputed as the mean value for non-missing items. Raw scores are calculated as the sum of (re-coded) scale items and transformed to a 0 to 100 scale. If scores for all 8 scales are available, two summary measures known as component scores are derived: the Physical Health Component Score and the Mental Health Component Score. These scores are age and sex standardised using norms for the Australian population. All scales and the component scores are positively scored so that higher scores represent better health-related quality-of-life. Full details of all these measures, their coding and scoring are available at www.alswh.org.au.

Measurement of Medications

Medications were obtained at Survey 2 and Survey 3 by asking the women whether in the past four weeks they had used any medications that were prescribed or recommended by a doctor for depression.

Records of prescriptions submitted for payment of a subsidy under the Pharmaceutical Benefits Scheme and Repatriation Pharmaceutical Benefits Scheme (PBS/RPBS) (2002-2005) were also were available for a subset of the women. These data provide information about prescription drugs that are difficult to collect in surveys due to recall problems, and include medication item number and

description, dates, costs and concessional (including safety net) information. The PBS Code for each medication is allocated on the basis of the purpose of the medication (e.g. the patient's diagnosis or prognosis) rather than its chemical composition. The PBS medication data have also been recoded to conform to the Anatomical Therapeutic Chemical (ATC) Code used by WHO, which is the standard classification system for drug consumption studies. In the ATC classification system, drugs are divided into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties.

Analyses

Data analysis was performed using SAS 9.1 and JMP statistical packages. Frequency tables were used to describe symptoms related to depression. The effect of depression on survival and loss to follow-up was assessed using Cox Proportional Hazards techniques. Longitudinal modelling techniques using PROC Mixed and Generalised Linear Models were employed to assess change in health related quality of life (based on SF-36) and scores on the GADS according to use of anti-depressant medication. These models included interaction between depression and medication use, and Bonferroni adjustment for multiple comparisons.

DETAILED RESULTS

Survey response and retention rates

In 1996, 12432 women aged 70-75 years completed Survey 1. It is estimated that this number represents 37%-40% of the Older women in the original sample. This response rate is considered to be high for longitudinal studies.

A comparison of the demographic characteristics of respondents and aggregate data for nonrespondents (obtained from Medicare Australia) suggest that there are small differences in use of health services among respondents and nonrespondents, with nonrespondents less likely, for example, to have visited a medical specialist in the last 2 years (65% versus 72%). Some of this difference may be explained by the fact that some women who were selected may no longer be living at the address registered by Medicare or may have died, as the Medicare database is not routinely linked to residential aged care records or the National Death Index in Australia. Comparison with the 1996 census data confirms that the participants are reasonably representative of the general population of women of the same age in Australia. There is some response bias in terms of overrepresentation of women with tertiary education and married women. However, comparisons are difficult for marital status and educational qualifications due to the high level of missing data in the Census.

Follow-up and retention rates have been very high. Of the women in Survey 1, 90% responded to Survey 2 in 1999 and 85% of eligible respondents at Survey 2 responded to Survey 3 in 2002. Non-respondent women tended to report poorer self-rated health at Survey 1 than respondents. A total of 7088 women completed Survey 4 (58% of original cohort). Between Surveys 1 and 4, 1838 women died[1], a further 2101 women withdrew and 1405 were missing at follow up from the study due to other reasons. (See Figure 1).

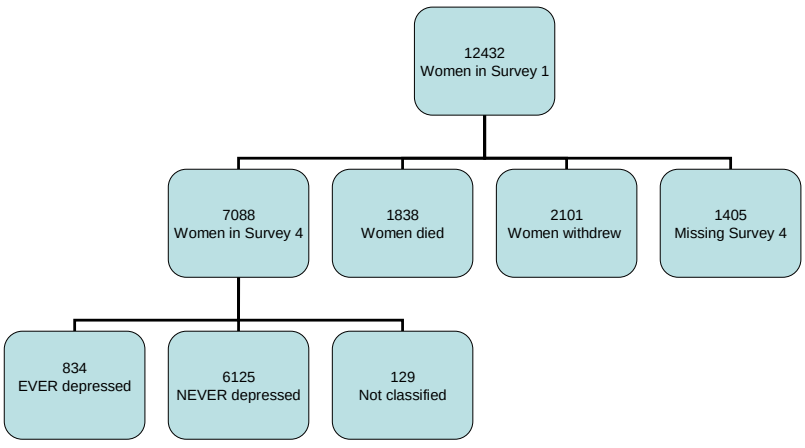


Figure 1
Women in the study

[1] Death recorded prior to 30th June 2005

Reporting of Depression

Self –reported doctor diagnosis and medication use

In each of the four surveys, around 7% of women reported they had been told by a doctor that they had depression (in the past three years), and around 3% of these women said they had taken medications for depression in the past 4 weeks (Survey 2 and Survey 3). In total 834 (12%) of women could be classified as having depression ever (reported on any Survey) and 6125 could be classified as having depression never (not reported on any Survey). A total of 129 women (2%) could not be classified as "ever" or "never" depressed.

Goldberg Anxiety and Depression Scale

Analysis of symptoms of depression suggests that the problem of depression may be higher than diagnosed, reported and/or treated. For example, the women's responses to the questions in the GADS for Survey 4 are shown in Table 1. These results indicate that these symptoms of depression and anxiety are common among women in this age group. The most common symptom was feeling "slowed down" which was reported by 70% of women and which is not unique to depression.

Table 1:
18 Symptoms of Depression and Anxiety contributing to the Goldberg Anxiety and Depression Scale at Survey 4 (Women aged 79-84)

How you have been feeling in the PAST MONTH:	% Yes
Have you felt keyed up or on edge?	29%
Have you been worrying a lot?	27%
Have you been irritable?	20%
Have you had difficulty relaxing?	27%
Have you been sleeping poorly?	42%
Have you had headaches or neckaches?	37%
Have you had any of the following:	
trembling, tingling, dizzy spells, sweating, diarrhoea or needing to pass urine more often than usual?	38%
Have you been worried about your health?	28%
Have you had difficulty falling asleep?	40%
Have you been lacking energy?	59%
Have you lost interest in things?	15%
Have you lost confidence in yourself?	18%
Have you felt hopeless?	10%
Have you had difficulty concentrating?	24%
Have you lost weight (due to poor appetite)?	10%
Have you been waking early?	59%
Have you felt slowed down?	70%
Have you tended to feel worse in the mornings?	29%

Figures in Table 1 are for women who survived and participated in Survey 4 and who could be categorised into categories of EVER depressed and NEVER depressed for subsequent analyses n= 6959

On their own, any individual symptom does not mean that the woman is depressed. Adding all the responses together, 55% of women could be classified a "depressed" on the GADS at Survey 4 (80% of women reporting depression "Ever"; 51% of those reporting depression "Never"); 16% of women could be classified as anxious on the anxiety score at Survey 4 (40% of women reporting depression "Ever"; 12% of those reporting depression "Never"). See Table 2.

Table 2:
Scale-based classifications for women reporting depression EVER and NEVER.

Identified as depressed based on scale scores	**Total classified as depressed or anxious on subscale score (%)***	**Proportion of those reporting depression EVER classified as depressed on the subscale score**	**Proportion of those NEVER reporting depression classified as depressed on the subscale score**
Survey 3 GADS Depression	2937 (47%)	77%	43%
Survey 3 GADS Anxiety	2534 (42%)	59%	40%
Survey 4 GADS Depression	3360 (55%)	80%	51%
Survey 4 GADS Anxiety	912 (16%)	40%	12%

Total number of women in each analysis varies due to missing data

Centres for Epidemiological Studies Depression Scale

For comparison, responses to the CESD-10 for Survey 2 are provided in Table 3 for those women who provided answers to these questions. This measure produces lower prevalence of depression but note the large proportion of missing data on most items. The measure also identifies only 55% of the women who say they have had depression (See Table 4).

Table 3:
10 Symptoms of Depression contributing to the CESD-10 at Survey 2.

Symptom	**Percent of reporting feeling this way "most or all of the time"** (percent missing)
I was bothered by things that don't usually bother me	0.63 (45.0)
I had trouble keeping my mind on what I was doing	0.72 (46.0)
I felt depressed	0.93 (44.7)
I felt everything I did was an effort	2.8 (42.7)
I felt fearful	0.66 (49.3)
My sleep was restless	6.4 (39.9)
I felt lonely	2.0 (44.4)
I could not get going	2.2 (47.2)
I was happy	**50.3 (34.8)**
I felt hopeful about the future	**30.9 (44.6)**

Figures in Table 3 are for women who survived and participated in Survey 4 and who could be categorised into categories of EVER depressed and NEVER depressed for subsequent analyses. N=6959

Table 4:
Scale-based classifications for women reporting depression EVER and NEVER.

Identified as depressed based on scale scores	**Total identified (%)**	**Proportion of those reporting depression EVER classified as depressed on the subscale score**	**Proportion of those NEVER reporting depression classified as depressed on the subscale score**
Survey 2 CESD-10	722 (22%)	55%	18%

Total depression scores

Total depression scores varied for women classified as having depression "ever", and those classified as having depression "never" are provided in Table 5. Women reporting depression ever had consistently higher group mean scores on depression scales at Survey 2 (CESD-10), Survey 3 and Survey 4 (GADS) (See Table 5).

Table 5
Depression scores for women reporting depression "ever" on any survey and women reporting depression "never"

Scale Survey Year	Depression	N	Mean Score	Median Score	Std Dev	Range
CESD- 10 Survey 2 1999	Ever	338	9.20	8.00	5.90	0-26
	Never	2943	4.62	4.00	3.92	0-24
GADS Survey 3 2001	Ever	738	8.54	8.47	4.16	0-18
	Never	5726	4.72	4.00	3.62	0-18
GADS Survey 4 2005	Ever	758	9.19	9.00	4.30	0-18
	Never	5669	5.26	5.00	3.76	0-18

Health-related Quality of Life and Mental Health

Women's responses to the questions on the Mental Health subscale of the SF-36 Mental Health Sub-scale for Survey 4 are shown in Table 6. Only the lowest two (most depressed) responses are listed in the Table to provide an indication of the proportions of women reporting persistent symptoms of depression.

Table 6:
Symptoms of Depression contributing to the SF-36 Mental Health sub-scale (Survey 4)

In the past 4 weeks:	% reporting the lowest (most depressed) responses
Did you feel full of life? (none of the time/ a little of the time)	23%
Have you been a nervous person? (all of the time/ most of the time)	3.4%
Have you felt so down in the dumps that nothing could cheer you up? (all of the time/ most of the time)	1.5%
Have you felt calm and peaceful? (none of the time/ a little of the time)	12%
Have you had a lot of energy? (none of the time/ a little of the time)	33%
Have you felt down? (all of the time/ most of the time)	2.4%
Did you feel worn out? (all of the time/ most of the time)	6.7%
Have you been a happy person? (none of the time/ a little of the time)	4.7%
Did you feel tired? (all of the time/ most of the time)	14%

Figures in Table 6 are for women who survived and participated in Survey 4 and who could be categorised into categories of EVER depressed and NEVER depressed for subsequent analyses. N= 6959

Use of Medications for Depression

A total of 4661 women who responded to Survey 4 and who could be classified as depressed "ever" or "never" provided consent for PBS data. Of these, 527 (11%) were had reported being diagnosed as depressed "ever" at either Survey2, Survey 3 or Survey 4 and 4134 (89%) had not reported being diagnosed depressed ("never") at Survey2, Survey 3 and Survey4.

The use of Medications for depression identified in the PBS data for these women is shown in Table 7. The Table also shows the proportions of women using anxiolytics (for "nerves") and hypnotics (sleeping pills). In any year, around 30% of the women who reported they ever had depression were identified as using Selective Serotonin Reuptake Inhibitors SSRIs and these appear to be the most popular class of depression medications for use for women's in this age group. The Tricyclic anti-depressant drugs are also in common usage (used by about 20% of women with depression in any year), although these drugs are no longer considered the most appropriate therapy for older people. Anxiolytics and hypnotic medications are also in common usage, and appear to be associated with the diagnosis of depression as they are more commonly identified for women who report ever being told they have depression.

Table 7:
Number and Proportion of women using medications for depression and related therapeutic category

	Self-reported Doctor Diagnosis of Depression							
Year	**2002**		**2003**		**2004**		**2005**	
Medication	**Ever**	**Never**	**Ever**	**Never**	**Ever**	**Never**	**Ever**	**Never**
SSRI	166 (31)	116 (2.7)	174 (33)	142 (3.3)	179 (34)	145 (3.4)	183 (35)	175 (4.1)
Tricyclics	103 (20)	281 (6.5)	96 (18)	327 (7.6)	101 (19)	321 (7.4)	87 (17)	307 (7.1)
MAOI	10 (1.9)	9 (0.2)	8 (1.5)	9 (0.2)	11 (2.1)	8 (0.2)	11 (2.1)	8 (0.2)
Other depression drugs	48 (9.1)	28 (0.6)	56 (11)	49 (1.1)	64 (12)	49 (1.1)	69 (13)	60 (1.4)
Anxiolytics	114 (22)	364 (8.4)	106 (20)	366 (8.5)	112 (21)	357 (8.3)	108 (20)	373 (8.6)
Hypnotics	134 (25)	647 (15)	122 (23)	627 (15)	141 (27)	656 (15)	130 (25)	685 (16)

Ever= any report of depression at any survey
Never=no report of depression at any survey

The main types of depression medication used are listed in Table 8.

Table 8:
Main types of depression medication used
(Number of prescriptions for each drug in each calendar year).

Medication	2002	2003	2004	2005	2006
Tricyclics	Amitriptyline (1197)	Amitriptyline (1230)	Amitriptyline (1267)	Amitriptyline (1230)	
	Dosulepin (880)	Dosulepin (953)	Dosulepin (903)	Dosulepin (777)	
	Doxepin (793)	Doxepin (774)	Doxepin (669)	Doxepin (561)	
SSRIs	Sertraline (1325)	Sertraline (1608)	Sertraline (1561)	Sertraline (1559)	
	Paroxetine (673)	Citalopram (815)	Citalopram (770)	Citalopram (812)	
	Citalopram (611)	Paroxetine (344)	Paroxetine (621)	Paroxetine (574)	
MAOI	Moclobemide (167)	Moclobemide (187)	Moclobemide (157)	Moclobemide (130)	
Other	Venlafaxine (395)	Venlafaxine (488)	Venlafaxine (628)	Venlafaxine (578)	
	Mirtazapine (98)	Mirtazapine (271)	Mirtazapine (415)	Mirtazapine (477)	

The total number of types of depression/anxiolytic and hypnotic medications used by women reporting depression ever (and never) for each year is shown in Table 9. Among women reporting depression ever, 25% were not identified as using any drugs in these codes during any of the four years of observation. In 2005, 39% of the women reporting depression ”ever” were on no medications, 56% were on one medication, and 5% were on more than one category of medication for depression during the year. Looking across the four years, 20% of women had been prescribed more than one type of depression medication.

Table 9
Number of drug categories per individual by calendar year N (%)

	2002		2003		2004		2005		Total	
Drug categories	**Ever**	**Never**	**Ever**	**Never**	**Ever**	**Never**	**Ever**	**Never**	**Ever**	**Never**
0 (Imputed)*	235 (45)	3716 (90)	226 (43)	3633 (88)	218 (41)	3636 (88)	207 (39)	3617 (87)	130 (25)	3296 (80)
1	261 (50)	402 (9.7)	272 (52)	476 (12)	268 (51)	475 (11)	294 (56)	488 (12)	286 (54)	725 (18)
2	27 (5.1)	16 (0.39)	25 (4.7)	24 (0.58)	37 (7.0)	21 (0.51)	22 (4.2)	25 (0.60)	85 (16)	101 (2.4)
3	4 (0.76)	.	4 (0.76)	1 (0.024)	3 (0.57)	2 (0.048)	4 (0.76)	4 (0.10)	22 (4.2)	11 (0.27)
4	.	.	.	.	1 (0.19)	.	.	.	4 (0.76)	1 (0.024)

Comparison of women using depression medications with those not using medications indicates an apparent inequity for women with depression living in rural areas. Women with depression who were not taking medications were more likely to come from rural areas. It also appears that women who do not take medications are more likely to have education beyond primary school, drink 3 or more gasses of alcohol per week; and less likely to be married, have seen a specialist in the past twelve months, be caring for someone else who lives with them.

This table also shows that women with depression appear to have more comorbid diseases, are more likely to be current smokers and more likely to have difficulty managing on their income.

Table 10
Characteristics of women using depression medications

	Depression Ever		Depression Never	
Characteristic at Survey 4 (unless indicated)	**On depression medications ever (SSRI, Tricyclic, MAOI, other depression drugs)**	**Never on depression meds**	**On depression meds ever**	**Never on depression meds**
Area (Rural)	211 (56)	83 (65)	421 (55)	1815 (56)
Education (S1) (primary only)	269 (73)	88 (62)	536 (71)	2134 (66)
Marital Status (Married)	123 (32)	32 (24)	302 (38)	1275 (38)
Comorbidity (2 or more conditions)	323 (83)	113 (83)	610 (78)	2247 (68)
Current Smoker (S2)	19 (5.2)	8 (6.4)	27 (3.7)	104 (3.3)
BMI – overweight or obese	168 (50)	58 (50)	354 (53)	1443 (48)
Alcohol (S2)				
None/rare/less than once/wk	229 (65)	75 (63)	468 (64)	2044 (64)
1 – 2 times/wk	33 (9.3)	6 (5.0)	64 (8.7)	259 (8.2)
3 or more times/wk	93 (26)	39 (33)	200 (27)	868 (27)
Trouble manageing on income: Impossible, difficult most of the time.	36 (9.3)	12 (9.0)	37 (4.8)	127 (3.8)
5+ GP visits/12 month	308 (81)	97 (72)	556 (72)	1917 (58)
Specialist visit/ 12 month	226 (75)	76 (68)	467 (73)	1673 (62)
Caring someone who lives with me	41 (11)	9 (7.2)	101 (13)	343 (11)
Caring someone who lives elsewhere	54 (15)	21 (17)	109 (14)	606 (19)

Association between use of depression medication and health outcomes.

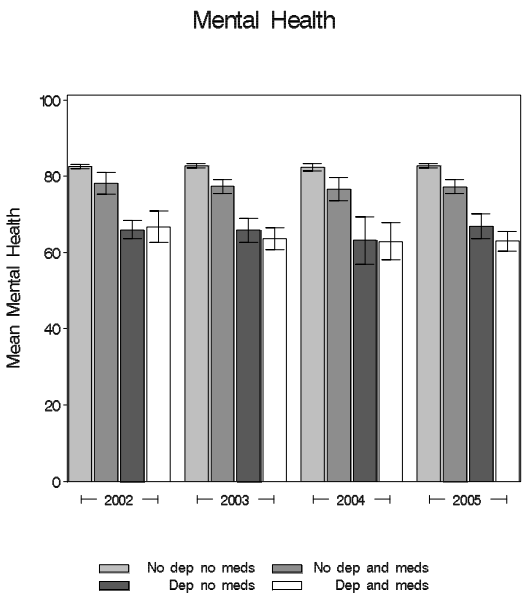
Reporting of depression at Survey 2 was not associated with death or withdrawal from the study by Survey 4. After adjusting for area of residence (as reported at Survey 3), highest level of education (at Survey 1), smoking status (at Survey 2) and total number of comorbidities (as measured at Survey 3), the relative risk of death given a woman said she had been diagnosed with depression at Survey 2 was 1.09 (95% CI 0.85, 1.35). Relative risk of withdrawal from the study given a woman said she had been diagnosed with depression at Survey 2 was 0.93 (95% CI 0.55, 1.39).

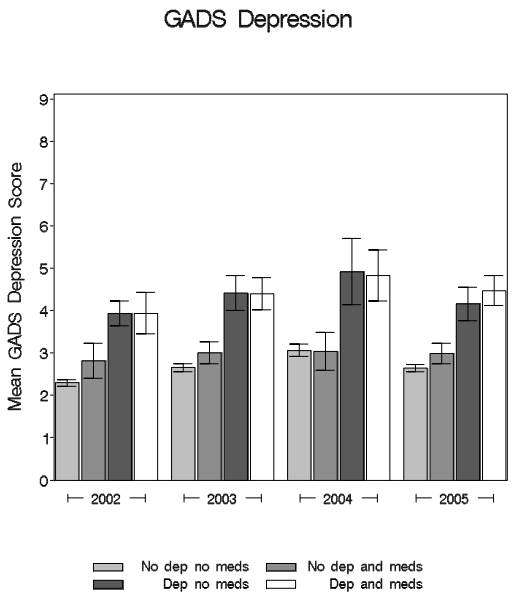
Longitudinal models were used to assess the association between depression and use of depression medications and health-related quality of life. In constructing these models, the use of depression medications for each year was determined from PBS data for that year. The SF-36 subscale scores were determined from Survey responses in 2002 (Survey 3) and 2005 (Survey 4), and were estimated from these scores for the two intervening years. Group mean scores were calculated for each time point and 99% Confidence intervals were calculated for each estimated mean.

Figures 1a-n show the SF-36 scores for women four groups:

1) Those who never report depression and who are not identified as using depression medication during the corresponding Survey year: **No depression (Never), No medications (in that year)**. These women have the highest mean scores for health related quality of life and provide a benchmark for comparing women reporting depression and women using depression medications.
2) Those who never report depression but who have been identified as using depression medication during the Survey year: **No depression (Never), Medications (in that year)**.
3) Those reporting depression ever at any Survey 1-4 and who are identified as using medications during the survey year: **Depression (Ever), Medications (in that year)**.
4) Those reporting depression ever at any Survey 1-4 and who are identified as using medications during the survey year (**Depression (Ever), No Medications (in that year)**.

Women in groups 3 and 4 have significantly lower scores on the SF-36 Mental Health subscale at each time point. The GADS score was highest at each time point for women who ever reported depression, and there was no difference between those on medications and those not on medications at that time.





However, in these analyses medication use is a time varying covariate. Women who had depression and were treated and recovered (and went off their medications) may move from group 3 at one time to group 4 at the next time point and these analyses do not capture improvement in their condition. Likewise women in Group 2 at one time may move to group 3 in the time point if they are prescribed depression medications in that year.

Longitudinal Analysis of fixed cohorts defined according to uptake and duration of use of depression medication

To assess the impact of depression medications for women with depression, the change in SF-36 scores was modelled for women in four groups:

1) Women on medications for depression at Survey 3 (2002) and at Survey 4. (2005)
2) Women not on medications for depression at Survey 3 but who commenced medications between Survey 3 and Survey 4
3) Women not on medications at Survey 4 but on medications at an earlier time.
4) Women Not on medications at any time point

Group	**2002**	**2003**	**2004**	**2005**
1 n= 230	**Y**	Y/N	Y/N	**Y**
2 n= 607	**N**	Y/N	Y/N	**Y**
3 n= 344	**Y**	Y/N	Y/N	**N**
4 n= 3480	**N**	**N**	**N**	**N**

On analysis of the change in scores for the Mental Health subscale of SF-36, the interaction between depression and medication approached significance at the 0.01 level (p= 0.016).
Differences between Group 1 and Group 3 approached significance (p=0.038);
Differences between Group 2 and Group 3 were highly significant (p=0.0004);
Differences between Group 3 and Group 4 approached significance (p=0.041).

Assessment of the change in scores for each group indicated that there was:
No change in scores for group 1 (mean difference -2.05, 95%CI -5.4,1.3);
A negative change in scores for group 2 (worsening mental health related quality of life) (mean difference -3.6, 95%CI -6.1,-1.1)
An improvement in scores for women in group 3 (mean difference 4.7, 95%CI 0.46 ,8.9)
No change in scores for group 4 (mean difference -1.76, 95%CI -4.8,1.3);

On analysis of the change in scores for the GADS, the interaction between depression and medication was highly significant (p= 0.0001).
Differences between Group 2 and Group 3 were highly significant (p=0.009);
Differences between Group 2 and Group 4 approached significance (p=0.012).

Assessment of the change in scores for each group indicated that there was:
No change in scores for group 1 (mean difference 0.23, 95%CI -0.25,0.78);
An increase in scores for group 2 (worsening depression) (mean difference 0.87, 95%CI 0.53-1.23)
No change in scores for women in group 3 (mean difference -0.07, 95%CI -0.65, 0.51)
No change in scores for group 4 (mean difference0.15, 95%CI -0.27,0.56);

CONCLUSION

This study indicates that depression is common among older women in Australia. While a majority of the women reporting depression did receive some medical treatment for their depression, a large proportion could be considered to be treated with medications that were potentially inappropriate. Further analyses will allow us to explore the impact of these treatments for women with depression.

Among women with depression who were treated with medications, the medications do appear to be associated with positive outcomes for a majority. These women ceased medications during the period of observation and had better health related quality of life scores.

In contrast, women who did not receive treatment for depression had no improvement in their depression scores. A proportion of these women could have been expected to have improvement in their mental health if their problem had been treated appropriately. These women represent the problem of under treatment of depression among older women.

The data also indicate that depression rates may be higher than reported. The problem of undertreatment is therefore likely to be magnified by the problem of underdiagnosis. Both problems represent a challenge and an opportunity to improve the mental health related quality of life of older women in Australia.

References

1 Lee C, Dobson A, Brown W, Bryson L, Byles J, Warner-Smith P, Young A. International Journal of Epidemiology 2005: 34(5):987-991.Cohort Profile: The Australian Longitudinal Study on Women's Health. Lee C, Dobson A, Brown W, Bryson L, Byles J, Warner-Smith P, Young A. International Journal of Epidemiology 2005: 34(5):987-991.

2 McCallum J, Mackinnon A, Simons L, Simons J. Measurement properties of the Center for Epidemiologic Studies Depression Scale: an Australian community study of aged persons. Journal of Gerontology. Series B, Psychological Sciences and Social Science 1995;50B:5182 5189

3 Vahle VJ, Andresen EM, Hagglund KJ. Depression measures in outcomes research. Archives of Physical Medicine and Rehabilitation 2000; 81: S53-S62

4 Beekman ATF, Deeg DJH, van Limbeek J, Braam AW, de Vries MZ, van Tilburg W. Criterion validity of the Center for Epidemiologic Studies Depression Scale (CES-D): results from a community-based sample of older subjects in the Netherlands. Psychological Medicine 1997;27:231-235

5 Mulrow CD, Williams JW, Gerety MB, Ramirez G, Montiel OM, Kerber C. Case-finding instruments for depression in primary care settings. Annals of Internal Medicine 1995;122:913-921

6 Goldberg D, Bridges K, Duncan Jones P, Grayson D. Detecting anxiety and depression in general medical settings. British Medical Journal 1988;297:897-899

7 Radloff LS. The CES D Scale: A self-report depression scale for research in the general population. Applied Psychological Measurement 1977;1(3):385-401

8 Powers JR, Young AF, Russell A, Pachana NA. Who has missing data? Implications of non-response of older women to a short form of the Center for Epidemiologic Studies Depression Scale. International Journal of Aging and Human Development 2003;57(1):37-54

9 Andresen EM, Carter WB, Malmgren JA, Patrick DL. Screening for depression in well older adults: evaluation of a short form of the CES D. American Journal of Preventive Medicine, 1994;10:77 84.

10 Ware JE. Sherbourne CD. The MOS 36-item Short Form Health Survey (SF-36): I. Conceptual framework and item selection. Medical Care 1992;30:473-483

11 Ware JE. Kosinski M. Keller SK. SF-36® Physical and Mental Health Summary Scales: A User's Manual. Boston, MA: The Health Institute, 1994.

12 Haywood KL, Garrat AM, Fitzpatrick R. Quality of life in older people: a structured review of generic self-assessed health instruments. Quality of Life Research. 2005; 14: 1651-1668.