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Author: Xiaoling Xiang, Amanda Leggett, Joseph A. Himle, Helen C. Kales

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Major depression and subthreshold depression among older adults receiving home care

Xiaoling Xiang,*[1] Amanda Leggett,[2] Joseph A. Himle[3], Helen C. Kales[4]

*Corresponding author.

1. PhD, MSW, Assistant Professor, School of Social Work, University of Michigan; 1080 S University Ave, Ann Arbor, MI, 48109; Tel: 734-763-6581; Fax: (734) 763-3372. E-mail: xiangxi@umich.edu

2. PhD, Research Assistant Professor, Program for Positive Aging, Department of Psychiatry, University of Michigan; Rachel Upjohn Building, 4250 Plymouth Rd, Ann Arbor, MI 48109; E-mail: leggetta@med.umich.edu

3. PhD, Associate Dean for Faculty Affairs and Howard V. Brabson Collegiate Professor of Social Work, School of Social Work, and Professor of Psychiatry, Medical School; 1080 S University Ave, Ann Arbor, MI, 48109; Tel: 734-615-0611; E-mail: himlej@med.umich.edu

4. MD, Professor of Psychiatry, Director, Program for Positive Aging, Department of Psychiatry, University of Michigan, 4250 Plymouth Rd, Arbor, MI 48109; Tel: 734-232-0388; E-mail: kales@umich.edu

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Conflict of interest statement

We wish to confirm that there are no known conflicts of interest associated with this publication.

Highlights

- This is the first nationally representative study of prevalence and correlates of major and subthreshold depression and treatment utilization in older home care recipients.
- One in two older home care recipients suffered from probable depression.
- A quarter of older home care recipients with major depression and half of those with subthreshold depression were not receiving treatment.
- Male gender and pain problems were associated with a higher risk of subthreshold and major depression.

Abstract

Objective: This study aims to estimate the prevalence and correlates of major and subthreshold depression and the extent of treatment utilization in older adults receiving home care.

Methods: The study sample included 811 community-dwelling adults ages 60 and over who received paid home care during the 2008-2014 waves of the Health and Retirement Study. Depression was assessed using short forms of the Composite International Diagnostic Interview and the Center for Epidemiologic Studies Depression Scale. Logistic regression was used to examine correlates of depression type and treatment utilization.

Results: One in two older home care recipients suffered from probable depression; 13.4% of the sample suffered from major depression and an additional 38.7% met study criteria for subthreshold depression. The majority (72.7%) of participants with major depression and almost half (44.5%) of participants with subthreshold depression reported taking medication for anxiety or depression. One-third (33.2%) of older home care recipients with major depression and 14.2% of those with subthreshold depression reported receiving formal psychiatric or psychological treatment. Males as compared with females and persons with pain problems as compared with no pain complaints had a higher risk of subthreshold and major depression. The receipt of medication or psychiatric treatment declined with age. African Americans were less likely to

receive medication for anxiety or depression compared with non-Hispanic Whites.

Conclusion: Depression affects a substantial proportion of older adults receiving home care and may be inappropriately treated. Future research is needed to develop optimal strategies for integrating depression assessment and treatment into home care.

Key words: depression; home care; depression treatment; homebound; Health and Retirement Study

Introduction

Home- and community-based care services or HCBS is an umbrella term encompassing a wide range of services, such as transportation, Meals on Wheels, and senior centers, designed to help older adults remain safely in their homes. HCBS have received increased attention as a venue for improving late-life depression in response to the persistent shortage of geriatric mental health providers, the clinical complexity of late-life depression, and the challenges of scaling up evidence-based depression care in the primary care setting.[1,2] A good understanding of the burden of depression and gaps in treatment in HCBS is a critical first step toward developing effective strategies to integrating depression care into these settings.

Studies on depression in HCBS settings have focused on Medicare home health.[3–7] Estimates of major depression have ranged from 8.5%[4] to 13.5%[3] in regional, non-probability samples whereas in a nationally representative sample of Medicare home health recipients, 6.4% had a diagnosis of major depression.[6] Another set of studies assessed subsyndromal depression in recipients of non-specified HCBS, and found that 24% to 42% of HCBS recipients had significant depressive symptoms.[8–15] Some of the variation in estimates might be due to the fact that HCBS cover a wide range of services delivered by different types of providers.

This study expands previous research by focusing on home care, a specific type of HCBS provider. Relatively more research on depression has been performed in the home health care setting[3–7] as compared to home care. Home care and home health care are distinct. Home care as defined in this study refers to non-skilled personal care and companionship services, such as assistance with activities of daily living (ADLs), light housekeeping, medication management, escort to appointments, and general companionship. Home care is a booming industry due to the rising aging population in the United States, consumer preferences for aging in place, and public policy favoring community-based alternatives to institutional long-term care.[16] Home care is provided full-time, part-time, intermittently, or even around the clock based on care recipients' long-term care needs, whereas home health care provides intermittent skilled nursing care and rehabilitation services after an acute illness. Home care is paid for by a variety of sources including out-of-pocket payment, Medicaid, veterans' benefits, and long-term care insurance, whereas home health care is primarily paid by Medicare. Home care is often provided without a physician's order or supervision, whereas home health benefits require physician's orders. Relevant to the present investigation, the burden and clinical manifestations of depression, as well as treatment, may differ between the home care and home health care settings.

Older adults who receive home care tend to be homebound and experience multiple chronic illnesses, functional impairment, and social isolation.[17] In addition, recipients of paid home care often experience a loss of physical and social independence. Not being able to fully care for one's self and reduced ability to move about in the community conflicts with people's desire for freedom, control and self-sufficiency.[18] For these reasons, we expected a high burden of depression in older home care recipients.

Older home care recipients may face significant access barriers to depression treatment due to mobility challenges and limited social support. Previous research also indicates that this group is likely receiving sub-optimal antidepressant care due to high medical and cognitive comorbidities and pain complaints.[19] Despite the high risk of mental health problems among home care recipients and the associated service challenges described here, no nationally representative studies on home care recipients reported on this group's mental health and treatment status. This study aims to estimate the prevalence of major and subthreshold depression and associated mental health service utilization in this nationally representative sample of older adults receiving home care. Additionally, we will also explore correlates of depression and treatment utilization in this group.

Methods

Data and participants

The Health and Retirement Study (HRS) is nationally representative study of people aged 51 years and older in the United States, sponsored by the National Institute on Aging (grant number NIA U01AG009740) and conducted by the University of Michigan. The HRS conducts bi-annual interviews with eligible individuals selected using a multistage area probability sampling design, including oversampling of people who identified as African American, Hispanic, and Floridian (http://hrsonline.isr.umich.edu). When a participant was not available to be interviewed, HRS methodology involved the use of proxy respondents instead. This study extracted data from the ninth, tenth, eleventh, and twelfth waves of the HRS conducted in 2008, 2010, 2012, and 2014, respectively. We used data from 2008 survey and onward because the HRS did not assess major depression continuously before 2008. This study adopted a cross-sectional design to pool multiple waves of survey data to increase statistical power.

Respondents were eligible for this study if they (1) received paid home care during at least one survey wave between 2008 and 2014 and (2) were aged 60 years and older and lived in the community when they received paid home care. Home care questions were only asked if the respondent reported at least one activity of daily living (ADL) or instrumental activity of daily living (IADL) limitation. Therefore, the study sample represents a subset of community-dwelling older adults with functional impairment and need for long-term care at home. We excluded participants who used proxy respondents because the assessment of depression was not available for this group.

The number of participants reporting at least one ADL or IADL limitation was 4,108 in 2008, 5,193 in 2010, 4,832 in 2012, and 4,681 in 2014. Among these individuals, 384, 496, 472, and 443 reported receiving paid help from a non-relative, respectively. After excluding individuals aged under 60 years old, those in nursing homes, or those who used proxies, the number of eligible individuals reduced to 264 in 2008, 288 in 2010, 288 in 2012, and 288 in 2014. The majority of excluded individuals used proxies. For participants who met the inclusion criteria during multiple waves, we used responses from the first time they met the inclusion criteria. After excluding duplicates, the final sample consisted of 811 unique community-dwelling older adults who received paid home care between 2008 and 2014. Using pairwise deletion, the valid sample sizes in the analyses may be smaller than 811 depending on missingness.

Indicator of receiving paid home care

Receipt of home care was based on self-report with reference to ADL and IADL limitations. ADLs included walking, dressing, bathing, eating, getting in/out of bed, and using the toilet. IADLs included preparing hot meals, shopping for groceries, making telephone calls,

and taking medications. For each ADL or IADL limitation reported, participants were asked if they received help with that limitation, how much help was received, what their relationship with the helper was, and whether the helper was paid. Respondents were classified as recipients of home care if they reported 1) receiving help with any ADL or IADL from a nonrelative, an employee of an organization or institution, a paid helper, or a professional and 2) that people who provided the help were paid for their services.[20] Given the nature of help provided, this indicator of paid help captures non-skilled home care.

Measure of depression

The HRS administered the World Health Organization's Composite International Diagnostic Interview-Short Form (CIDI-SF), a validated method for estimating the prevalence of major depression in large surveys by lay interviewers.[21] The CIDI-SF consists of 33 questions with skip patterns about respondents' experiences of dysphoria and/or anhedonia for more than 2 weeks in a row in the past 12 months. Respondents were asked to identify their worst episode and then were probed about symptoms and their persistence. Having five or more symptoms on the CIDI-SF indicates a probable diagnosis of 12-month major depression[22] according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R).[23]

The HRS also administers an 8-item Center for Epidemiologic Studies Depression Scale (CES-D) to assess current depressive symptoms. This instrument asks respondents to indicate if the following feelings were true much of the time during the past week, including: depressed, everything was an effort, sleep was restless, could not get going, lonely, felt sad, enjoyed life, and happy. Validation studies reported a correlation coefficient of 0.93 and comparable discriminant validity between the 8-item and 20-item CES-D.[22,24] The CES-D score, ranging from 0 to 8, is the sum of six "negative" feelings and absence of two "positive" feelings. A cut-

off score of ≥3 has a sensitivity of 0.71 and a specificity of 0.79 to predict depressive disorder.[22]

Respondents were classified as having 12-month major depression if they experienced 5 or more symptoms on the CIDI-SF. Respondents were classified as having subthreshold depression if they scored ≥ 3 on the CES-D, but reported fewer than 5 symptoms on the CIDI-SF.

Measure of depression treatment

A dichotomous indicator of psychiatric medication use was based on the response to the question "Do you regularly take prescription medications to help relieve anxiety or depression?" A dichotomous indicator of psychological treatment was based on the response to the question "Do you now get psychiatric or psychological treatment for your problems?" Respondents were not asked about the specific condition for which they were receiving psychological treatment.

Individual socio-demographic, clinical and functioning characteristics

Measures of socio-economic characteristics included age, sex (female or male), race/ethnicity (non-Hispanic white, non-Hispanic black, non-Hispanic Asian or other, Hispanic), highest educational attainment (no degree, high school diploma or equivalent, some college, college degree or above), marital status (married, separated/divorced/widowed, never married), a dichotomous indicator of living alone, household net wealth, and a dichotomous indicator of Medicaid enrollment. Measures of disease and comorbidities included a count of self-reported chronic disease diagnoses (hypertension, diabetes, heart disease, stroke, cancer, lung disease, and arthritis), a dichotomous indicator of probable cognitive impairment, and problems with pain (no pain, mild pain, moderate or severe pain). A dichotomous indicator of probable cognitive impairment was also assessed based on several cognition tests, including an immediate word recall (interviewer reading 10 nouns and asking respondents to recall immediately), delayed

word recall (respondents recalling the 10 nouns from immediate word recall test after answering several survey questions), the serial 7s (counting down from 100 by sevens), and backwards counting (counting backwards as quickly as possible from 20). Summing up the scores of these four tests yields a composite score ranging from 0 to 27. A score of ≤ 11 indicates probable diagnosis of cognitive impairment.[25] Physical functioning measures included counts of ADL limitations and IADL limitations.

Data analysis

Data analyses involved descriptive statistics, bivariate analysis comparing sample characteristics by depression status using t-tests and chi-square tests, multinomial logistic regression examining correlates of depression type, and binary logistic regression evaluating correlates of depression treatment. Logistic regression models were built based on the purposeful selection of covariates process described in Bursac et al.[26] Analyses accounted for the sampling, clustering, and stratification design features of the HRS, using Taylor linearization for variance estimation in Stata 14.0 SE Version (College Station, TX: StataCorp LP).

Results

As shown in Table 1, older adults receiving home care were 78 years old on average. They were predominantly female (69.2%), non-Hispanic white (71.8%), divorced, separated, or widowed (70.2%), and living alone (57%). One third of study participants were Medicaid beneficiaries. Participants reported an average of 3 chronic diseases. Half of the study sample possessed a probable diagnosis of cognitive impairment, and half reported problems with moderate or severe pain. The average count of ADL limitations was 2.6 and the average count of IADL limitations was 1.7.

One in two study participants had probable depression; 13.4% of the study participants

met CIDI criteria for 12-month major depression and an additional 38.7% met study criteria for subthreshold depression (not shown in tables). As shown in Table 1, compared with participants without depression, participants with major or subthreshold depression were younger, had lower incomes, reported more problems with pain, and had more ADL limitations. Men, racial/ethnic minorities, and Medicaid beneficiaries were also overrepresented among home care recipients with depression.

As shown in Table 1, among participants with subthreshold depression, over half (55.3%) did not receive any treatment, 30.3% reported taking psychiatric medication alone, only 0.2% reported receiving psychiatric/psychological treatment alone, and 14.2% reported both medication and psychiatric/psychological treatment. Among participants with major depression, a quarter (24.9%) did not receive any treatment, 40.8% reported taking psychiatric medication alone, only 2.4% reported receiving psychiatric/psychological treatment alone, and 31.9% reported both medication and psychiatric/psychological treatment. More than a quarter (27.3%) of older home care recipients without significant depressive symptoms also reported use of medication for anxiety or depression.

As shown in Table 2, the most frequently endorsed depressive symptom on the CES-D was “everything was an effort” (51.5%), followed by “sleep was restless” (45.1%), “could not get going” (44.5%), and “lonely” (40.6%).

Among older home care recipients with major depression who reported taking medication for anxiety or depression, an overwhelming majority (85%) scored ≥ 3 on the CES-D, an indicator of significant depressive symptoms in the past week (not shown in tables).

Table 3 presents results from a multinomial logistic regression examining correlates of depression status. Compared with their female counterpart, men had higher risk of subthreshold

(RRR=1.60, 95% CI=1.04-2.5, t=2.19, p=.032) and major depression (RRR=2.89, 95% CI=1.40-5.94, t=2.95, p=.005). People with a high school degree or greater education had a lower risk of subthreshold (RRR=0.51, 95% CI=.31-.85, t=-2.62, p=.011) and of major depression (RRR=0.34, 95% CI=.14-.86, t=-2.34, p=.023) compared with their counterparts without a high school diploma. Problems with pain, either mild or moderate/severe, were significant predictors of subthreshold and major depression (RRR ranged from 2.40 to 6.95). Risk of subthreshold depression was greater among Hispanics as compared to non-Hispanic white patients (RRR=2.14, 95% CI=1.03-4.44, t=2.09, p=.041), there was no difference in the risk of major depression by race/ethnicity. Risk of major depression declined with age (RRR=0.93, 95% CI=.90-.96, t=-5.12, p<.001) and was lower among Medicaid beneficiaries (RRR=0.36, 95% CI=.17-.78, t=-2.64, p=.011).

Table 4 presents results from binary logistic regression examining correlates of depression treatment status. The odds of medication use for anxiety or depression had a nearly two-fold increase (OR=1.83, 95% CI=1.16-2.9, t=2.63, p=.011) among persons with subthreshold depression and a 5-fold increase (OR=5.33, 95% CI=2.82-10.06, t=5.27, p<.001) among persons with major depression. The odds of psychiatric treatment had a nearly three-fold increase (OR=2.8, 95% CI=1.29-6.08, t=2.66, p=.010) among persons with subthreshold depression and a 5-fold increase (OR=5.11, 95% CI=2.26-11.56, t=4.01, p<.001) among persons with major depression. The odds of receiving either medication (OR=.97, 95% CI=.95-.99, t=-3.21, p=.002) or psychiatric treatment (OR=.94, 95% CI=.90-.97, t=-3.63, p=.001) declined with age. African Americans were less likely to receive medication for anxiety or depression compared with non-Hispanic white patients (OR=0.45, 95% CI=.26-.78, t=-2.91, p=.005). The odds of receiving medication was higher among people with cognitive impairment (OR=1.96,

95% CI=1.40-2.75, t=3.98, p<.001). People with mild pain complaints were more likely to receive psychiatric treatment (OR=2.69, 95% CI=1.09-6.64, t=2.19, p=.033) compared with those without pain problems.

Discussion

This study provides national estimates of depression prevalence and associated treatment among older adults receiving home care. One in two older home care recipients suffered from probable depression; 13.4% of the study participants suffered from major depression and 38.7% met study criteria for subthreshold depression. Our estimate of major depression was almost identical to the 13.5% reported in a previous study of a local sample of Medicare home health care patients.[3] Compared to other studies of HCBS recipients,[8–15] our study reported a slightly higher combined prevalence rate of depression (52.1%, including major and subthreshold depression). Home care tends to serve individuals with a high level of functional impairment whereas HCBS includes a wide range of services targeting individuals with varying functioning levels. In addition, home care recipients have restricted outdoor mobility whereas not all HCBS recipients are homebound. This burden of disability and social isolation may explain the higher prevalence of depression found in our sample of home care recipients compared with previous studies of HCBS users.

No-treatment rates reported in the present study are similar to recent studies,[11] but are lower compared with earlier studies. A recent study using 2010-2012 waves of the HRS found that 51% HCBS recipients with subthreshold depression were not using psychiatric medication,[11] and that is comparable to the 56% found in this study. Earlier studies reported much higher rates of no-treatment. A 2002 study by Bruce et al.[3] found that 78% of home health patients with major depression were not receiving antidepressants. Weissman et al.[27] reported that 66% of

home health patients with depression from the National Home Health and Hospice Care survey did not use antidepressants. Several reasons can explain this discrepancy. Our estimate of no-treatment rate is probably an underestimate because the treatment utilization question included medications for anxiety and depression. As such, the actual no-treatment rate for depression medication alone is likely to be closer to those reported in previous studies. On the other hand, antidepressants use has dramatically increased in the US in the last decade.[28] Antidepressants are frequently prescribed for anxiety disorders, insomnia, pain, and other conditions.[29] The overall increasing trends in antidepressant use and off-label prescriptions could explain why a quarter of the study sample without depression also reported taking psychiatric medication.

Depression treatment patterns found in our study point to the potential problems of heavy reliance on medication and under-utilization of psychotherapies. The overall rates of psychiatric medication use were 27% among participants without depression, 45% among participants with subthreshold depression, and 73% with major depression. The overwhelming majority of treated subjects received medication alone: 84% of treated subjects without depression, 68% of treated subject with subthreshold depression; and 54% of treated subjects with major depression reported mediation alone. While medication is effective for treating major depression, its effectiveness for subthreshold depression is unclear. Optimal treatment of subthreshold depression is still subject to debate and needs to carefully consider the benefits of treatment based on characteristics of the individual patients and their disease progression.[30]

Eight in ten older home care recipients with major depression who reported taking medication still experienced significant depressive symptoms. There are several explanations. Because the treatment utilization question was not specific to antidepressants, some participants may have been treated for anxiety and not for depression. Moreover, residual symptoms are not

uncommon even when antidepressants have been helpful to the person. In addition, a multi-component treatment program beyond medication is likely needed for treating late-life depression.[31,32] In particular, cognitive impairment is a prevalent comorbidity in older adults receiving home care, and persons with cognitive impairment are more likely to be prescribed antidepressants. Unfortunately, cognitive impairment predicts poor response to antidepressant drugs and persists after successful treatment of depressive symptoms.[33] Finally, receiving medication does not guarantee adequate dosing or adherence. A study of home health care patients reported that 40% of treated patients received inadequate antidepressants treatment due to under-dosing and/or non-adherence.[3] Inadequate treatment continues to be a problem despite a sharp increase in the identification and treatment of late-life depression due to various patient- and provider-level factors.[5]

Consistent with previous studies,[5,34,35] we found that older age and African American race were associated with a small risk of no-treatment. Patient and provider-level factors could both contribute to these differences. A treatment study of homebound older adults recruited from meals-on-wheels and other HCBS providers reported that people of older age and African Americans were less likely to rate their antidepressant medications as very effective.[35] Increased sensitivity to the stigma of depression and its treatment, perception of depression as a normal part of aging, transportation and financial barriers, and concerns of medication side effects are other patient-level barriers to depression treatment.[36] On the provider-level, studies have found that older and African American patients were less likely to receive a depression diagnosis and treatment[36,37], even though studies have found higher risk of depression among African Americans than among their white counterparts.[38]

The finding that males possessed a much higher risk of subthreshold and major

depression than females was inconsistent with the literature on sex differences in depression rates; higher rates of depression are usually reported in women than in men.[39] It is possible that men who receive home care suffer from higher burden of medical comorbidities and functional impairments than women and their confounding effects could not be fully adjusted in a regression model. Another explanation is related to masculine ideology and culturally defined gender-roles and related attitudes toward seeking help. Tasks associated with receiving professional home care, such as admitting a need for help, increased reliance on others, and recognizing and labeling a problem that can lead to institutionalization, contradicts the messages men receive about the importance of self-reliance, physical toughness, and emotional control.[40]

This study has several limitations. Proxy responses were excluded from the sample because HRS did not administer depression assessments to proxies. Proxies most often occur in the case of cognitive impairment or illness; both of which are risk factors of depression. Therefore, by excluding proxy responses, this study may have underestimated the burden of depression in older home care recipients. We defined home care as paid help with ADLs or IADLs from a non-relative. Under consumer directed care, family members frequently receive payments for providing home care for older adults. Our study, therefore, cannot be generalized to older adults receiving home care from a relative. Moreover, information on the types of home care providers (e.g., independent contractor or agency-based) and sources of payment were not available. The CES-D measures the number of depressive symptoms in the past week, which can vary greatly from week to week. Although the version of CES-D used in the HRS has been validated, the CES-D measures in general have a low specificity,[41] resulting in a large number of "false-positives." In addition, the medication measure asked about prescriptions for anxiety or depression and was not specific to antidepressants. Therefore, our estimate of the undertreatment

rate is likely an underestimate.

Home care is a promising home-based setting for improving late-life depression. The public health impact of targeting the home care setting can be substantial given the high burden of depression and comorbidity as well as gaps in depression treatment in older home care recipients. Characteristics of the home care setting, including care provided in a naturalistic setting and frequent home visits over an extended period, provide opportunities for addressing access barriers to mental health treatment and for ongoing treatment and monitoring of depressive symptoms. Several home-based depression treatment programs have been developed and evaluated, with the majority of studies focused on the skilled home health setting.[42–47] Although these treatment programs were not specifically designed for non-skilled home care, they can be potentially adapted for use in this setting. In particular, leveraging technology to administer psychotherapy[42,44] shows promise to make treatments more widely accessible to recipients of home care. Efforts aimed at late-life depression prevention in home care should pay special attention to male home care recipients who may be at higher risk of depression than females. Future studies should further investigate patterns of depression care in home care recipients to understand the persistence of depressive symptoms in treated patients.

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Table 1. Sample characteristics of older adults receiving home care

	Total (N=811)	Not depressed (N=399)	Subthreshold depression (N=308)	Major depression (N=101)	Uncorrected chi-square statistic	Adjusted Wald test	p-value
Age in years	78.2 (.63)	81 (.83)	77.7 (.91)	69.8 (1.1)	--	F(2, 54) =38.4	<.001
Male (%)	30.8	24.9	31.6	48.9	$\chi^2(2)$ =679.9	F(1.79, 98.25) =7.4	.002
Race/ethnicity (%)					$\chi^2(6)$ =976.5	F(4.67, 257.06) =4.2	.001
Non-Hispanic white	71.8	79.2	64.1	66.6			
Non-Hispanic black	13.6	12.7	13.3	18.1			
Non-Hispanic Asian or other	3.9	1.7	6.2	5.2			
Hispanic	10.7	6.4	16.4	10.1			
Education attainment (%)					$\chi^2(6)$ =1169.6	F(5.24, 288.09) =3.4	.005
Less than high school	30.1	22.7	39.3	29.7			
High school	29.8	34.7	27.0	21.0			
Some college	22.7	21.6	19.5	36.6			
College graduate or higher	17.4	21.1	14.2	12.7			
Marital status (%)					$\chi^2(4)$ =139.2	F(3.24, 177.93) =0.6	.650
Married/partnered	20.4	19.4	23.5	14.4			
Divorced/separated/widowed	70.2	70.5	68.1	75.4			
Never married	9.5	10.1	8.5	10.2			

Live alone (%)	57.0	60.9	51.1	60.0	$\chi^2(2)$ =213.4	F(1.65, 90.53) =2.2	.126
Household net worth ($)	380,245 (76,018)	561,592 (138,444)	247,911 (57,298)	117,432 (23,510)	--	F(2, 54) =5.0	.010
Medicaid beneficiaries (%)	33.6	27.3	41.1	34.1	$\chi^2(2)$ =433.1	F(1.98, 108.85) =5.1	.008
Number of chronic diseases	3.0 (.07)	3.0 (.09)	3.0 (.10)	3.4 (.18)	--	F(2, 54) =2.55	.087
Cognitive impairment (%)	51.4	51.8	55.4	39.0	$\chi^2(2)$ =254.5	F(1.97, 108.43) =2.4	.095
Problems with pain (%)					$\chi^2(4)$ =2498.1	F(3.75, 206.18) =15.9	<.001
No pain	38.5	53.4	30.0	11.2			
Mild pain	10.2	8.1	13.2	9.1			
Moderate/severe pain	51.3	38.5	56.8	79.8			
ADL limitations	2.6 (.08)	2.3 (.15)	2.8 (.10)	3.2 (.21)	--	F(2, 54) =5.4	.008
IADL limitations	1.7 (.05)	1.6 (.07)	1.7 (.07)	1.8 (.13)	--	F(2, 54) =0.5	.594
Depression treatment status (%)					$\chi^2(6)$ =3172	F(4.65, 255.55) =12.2	<.001
Not receiving any treatment	59.1	72.1	55.3	24.9			
Psychiatric medication alone	28.5	23.3	30.3	40.8			
Psychiatric/psychological treatment alone	0.7	0.6	0.2	2.4			
Both medication and psychiatric treatment	11.8	4.0	14.2	31.9			

Note. Values are means with standard errors in parentheses, unless otherwise noted. Results are weighted to adjust for the complex sample design of HRS. Adjusted Wald test statistics were obtained using default Stata adjustment for the design degrees of freedom. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 2. Frequency of endorsed depressive symptoms on CESD-8

Items on CESD-8	Weighted %	N
Depressed much of the time during the past week	28.1	807
Sad much of the time during the past week	37.7	809
Unhappy[a]	27.7	804
Lonely much of the time during the past week	40.6	808
Everything was an effort much of the time during the past week	51.5	806
Could not get going much of the time during the past week	44.5	804
Did not enjoy life[a]	25.2	808
Sleep was restless much of the time during the past week	45.1	809

Note. a. The original CESD-8 asked if the respondents were happy and enjoyed life. These items are reversely worded in the table for the ease of reporting. The frequency showed represent the number and percentage of people who did not endorse "were happy" or "enjoyed life."

Table 3. Correlates of depression status in multinomial logistic regression

	Subthreshold depression				Major depression			
	RRR (95% CI)	S.E.	t statistic	p	RRR (95% CI)	S.E.	t statistic	p
Age in years	.99 (.96, 1.01)	.01	-.89	.375	.93 (.90, .96)	.01	-5.12	<.001
Sex								
Female	Reference				Reference			
Male	1.60 (1.04, 2.50)	.34	2.19	.032	2.89 (1.40, 5.94)	1.04	2.95	.005
Race/ethnicity								
Non-Hispanic white	Reference				Reference			
Non-Hispanic black	.96 (.58, 1.58)	.24	-.18	.859	1.08 (.50, 2.35)	.42	.20	.841
Non-Hispanic Asian or other	2.56 (.88, 7.47)	1.37	1.76	.083	1.51 (.24, 9.38)	1.38	.46	.650
Hispanic	2.14 (1.03, 4.44)	.78	2.09	.041	1.32 (.47, 3.72)	.68	.53	.597
Education attainment								
Less than high school	Reference				Reference			
High school	.51 (.31, .85)	.13	-2.62	.011	.34 (.14, .86)	.16	-2.34	.023
Some college	.65 (.35, 1.22)	.26	-1.38	.175	.94 (.36, 2.45)	.45	-.12	.904
College graduate or higher	.49 (.24, 1.01)	.18	-1.99	.052	.37 (.10, 1.44)	.25	-1.47	.149
Household net worth								

1st quartile	Reference				Reference			
2nd quartile	1.10 (.68, 1.77)	.26	.38	.703	.80 (.36, 1.81)	.33	-.54	.591
3rd quartile	.89 (.50, 1.60)	.26	-.40	.689	.35 (.11, 1.18)	.21	-1.73	.089
4th quartile	.76 (.35, 1.66)	.30	-.70	.487	.33 (.13, .85)	.15	-2.36	.022
Medicaid beneficiaries								
No	Reference				Reference			
Yes	.95 (.58, 1.57)	.24	-.20	.840	.36 (.17, .78)	.14	-2.64	.011
Problems with pain								
No pain	Reference				Reference			
Mild pain	2.52 (1.32, 4.79)	.81	2.88	.006	4.44 (1.28, 15.39)	2.75	2.40	.020
Moderate/severe pain	2.40 (1.52, 3.78)	.55	3.83	<.001	6.95 (3.40, 14.24)	2.50	5.42	<.001
Count of ADL and IADL limitations	1.08 (.99, 1.17)	.05	1.67	.101	1.19 (1.03, 1.37)	.08	2.47	.017

Note. Valid sample size = 786. RRR=relative risk ratio. ADL=activities of daily living. IADL=instrumental activities of daily living. Count of ADL and IADL were combined to reduce collinearity. Reference category for multinomial logistic regression was people without subthreshold depression or major depression. Results were weighted to adjust for the complex sample design of HRS. Final model presented in this table was constructed based on the purposeful selection of covariates described in Bursac et al.[26]

Table 4. Correlates of depression treatment in binary logistic regression

	Medication for anxiety or depression				Psychiatric/Psychological treatment			
	OR (95% CI)	S.E.	t statistic	p	OR (95% CI)	S.E.	t statistic	p
Depression status								
Not depressed	Reference				Reference			
Subthreshold depression	1.83 (1.16, 2.90)	.42	2.63	.011	2.80 (1.29, 6.08)	1.09	2.66	.010
Major depression	5.33 (2.82, 10.06)	1.69	5.27	<.001	5.11 (2.26, 11.56)	2.08	4.01	<.001
Age in years	.97 (.95, .99)	.01	-3.21	.002	.94 (.90, .97)	.02	-3.63	.001
Race/ethnicity								
Non-Hispanic white	Reference				-	-		-
Non-Hispanic black	.45 (.26, .78)	.12	-2.91	.005	-	-		-
Non-Hispanic Asian or other	.38 (1.17, 1.25)	.23	-1.62	.110	-	-		-
Hispanic	.84 (.50, 1.40)	.21	-.69	.495	-	-		-
Household net worth								
1st quartile	-	-		-	Reference			
2nd quartile	-	-		-	.34 (.14, .81)	.15	-2.49	.016
3rd quartile	-	-		-	.64 (.25, 1.64)	.30	-.94	.350
4th quartile	-	-		-	.96 (.39, 2.38)	.44	-.09	.929

Cognitive impairment	1.96 (1.40, 2.75)	.33	3.98	<.001	-	-		-
Problems with pain								
No pain	Reference				Reference			
Mild pain	1.83 (.95, 3.55)	.61	1.83	.072	2.69 (1.09, 6.64)	1.21	2.19	.033
Moderate/severe pain	1.61 (.94, 2.76)	.43	1.78	.080	1.62 (.65, 4.02)	.73	1.07	.291

Note. Valid N =773 for the model predicting medication use and N=808 for the model predicting psychiatric/psychological treatment. OR=odds ratio. Covariates with empty cells were not included in the corresponding regression model. Final models presented in this table were constructed based on the purposeful selection of covariates described in Bursac et al.[26] Results were weighted to adjust for the complex sample design of HRS. (Valid N=773)