Published in final edited form as:

Am J Geriatr Psychiatry. 2017 December ; 25(12): 1351–1360. doi:10.1016/j.jagp.2017.05.021.

Depressive Symptoms in Recipients of Home- and Community-Based Services in the United States: Are Older Adults Receiving the Care They Need?

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Abstract

Objective—To understand unmet depression needs of older adults, the current study investigates depressive symptoms, psychiatric treatment, and home- and community-based service (HCBS) use in a nationally representative sample of older adults in the U.S.

Methods—Participants included 5,582 adults aged 60 and over from the 2010–2012 waves of the nationally representative Health and Retirement Study (HRS). Weighted bivariate analyses were used to examine the frequency of depressive symptoms (CES-D) and psychiatric treatment among HCBS recipients compared to non-HCBS recipients. Weighted logistic regression models were used to evaluate the effect of depressive symptoms on HCBS use.

Results—HCBS recipients had a higher frequency of depressive symptoms compared to non-recipients (27.5% vs 10.4%). In particular, transportation service recipients had the highest frequency of depressive symptoms (37.5%). HCBS recipients with depressive symptoms were no more likely than non-recipients to receive psychiatric services. Depressive symptoms were associated with HCBS use, above and beyond sociodemographic and health risk factors.

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No Disclosures to Report

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Conclusions—Depressive symptoms are more frequent among HCBS recipients compared to non-recipients, however, depressed HCBS recipients are no more likely to receive psychiatric services, suggesting unmet depression needs. HCBS may be a key setting for depression detection and delivery of mental health interventions.

Keywords

Depressive symptoms; home- and community-based services; home delivered meals; homebound older adults

Home- and community-based services (HCBS), such as transportation, Meals on Wheels, and chore services, provide non-medical assistance to community-dwelling older adults. These services are designed to help older adults remain safely in their homes and avoid institutionalization. However, many of the factors that characterize HCBS recipients, such as low socioeconomic status, disability, and homebound status are also known depression risk factors (1, 2), we might expect that their prevalence of depression is also very high. However, nationally representative studies of HCBS recipients have not evaluated the mental health of those using HCBS. The purpose of the present study is to examine the frequency of depressive symptoms and psychiatric service use among HCBS recipients and non-recipients and to determine if depressive symptoms are associated with service use, above and beyond health risk factors, in a nationally representative sample of older adults.

HCBS are supported by a variety of payers, including public and private entities, in addition to household out-of-pocket payments. The major public sources of HCBS come from Medicaid and the Administration on Aging, both administered through the state. Every state has Medicaid funded HCBS waivers targeted at populations who are “at risk of institutional care,” including older adults, persons with physical disabilities, and persons with intellectual disabilities. Waivers allow states to customize supports and services to best address local need and account for environment. Although there is some state-level variation, eligibility for Medicaid-funded HCBS is generally determined by age, disability status, health or functional status (e.g., IADL or ADL impairment), and income (3). The other major source of public funding for HCBS comes from the Older American Act (OAA) Title III and is administered through the Administration for Community Living (ACL) to the states. While OAA funding targets the over-60 population, specific eligibility criteria for OAA-funded HCBS services are determined by the state and services are delivered through local Area Agencies on Aging. Given the various funding streams and flexibility states have, HCBS may vary in terms of who is eligible for services, the setting services are delivered in, and the level of support provided by the services. For example, in some states, home-delivered meals programs require that participants must be homebound whereas this requirement does not apply in other states.

Most prior studies of HCBS recipients have been conducted at the state or community level. These studies generally have found that HCBS recipients have a range of needs (4) and often have a complex combination of social, medical, and mental health conditions (5). Compared to the general population of older adults, HCBS recipients tend to be older, female, Black, poor, living alone, and not married (6). HCBS use has also been associated with a higher

need for assistance with activities of daily living (ADL) and instrumental activities of daily living (IADL) (7). Despite a growing body of literature, national estimates of depressive symptoms among HCBS recipients are lacking and unmet need for depression treatment in this population is unknown.

Assessing unmet need for depression treatment is important because depressive symptoms are undertreated in older adults (8) and outcomes for older adults with undetected depression are poor (9). For example, depressive symptoms are associated with increased disability (10), even among older adults with mild depressive symptoms (11). Depression is also associated with greater use of medical services (12), higher health care service costs among older adults (13), and higher risk of mortality (14–16).

Most of the evidence that we do have about depressive symptoms in HCBS recipients comes from local or regional sources. Perhaps consistent with the variation in HCBS eligibility criteria as well as measurement, the frequency of depressive symptoms in these studies also varies, ranging from 12–31% of HCBS recipients reporting at least moderate depressive symptoms (17), with up to 27% meeting criteria for a major depressive episode (18). At least one study suggests that, despite fairly high levels of depression and other difficulties, older adults using HCBS are unlikely to have obtained behavioral health services (19).

As states offer a different array of services and adjust eligibility criteria to best meet local need, conclusions drawn from one state may not represent national trends. In addition to a lack of nationally representative estimates, previous research on HCBS and depressive symptoms has focused on populations of service users (i.e., HCBS recipients), making it difficult to determine how the frequency of depressive symptoms among HCBS recipients compared to non-recipients. In addition to a lack of national estimates of depression in HCBS recipients, previous research has not compared depressive symptoms by type of HCBS use (e.g., home delivered meal recipients compared to transportation recipients). Similarly, to our knowledge, no research has assessed utilization of psychiatric services among HCBS recipients in a national study. This would be important information to inform our understanding of potential unmet need.

The current study extends previous work by examining depressive symptoms among HCBS recipients in the Health and Retirement Study (HRS), a nationally representative longitudinal study of adults over age 50 living in the United States (U.S.). The present study has the following aims: 1) to examine the frequency of significant depressive symptoms and psychiatric service use among HCBS recipients and non-recipients, 2) to examine the frequency of significant depressive symptoms among those using different types of HCBS and 3) to examine if baseline depressive symptoms are associated with HCBS use.

Methods

Sample

The HRS is a longitudinal survey of a nationally representative sample of U.S. adults over age 50 and collects information on a wide range of topics related to aging. Details of the study design and content are provided in elsewhere (20). The core study interview is

conducted every two years. Supplementary studies are fielded in the off-years from the core interview. Data for the present study were drawn from both the core interview as well as from one of the supplementary studies, the Health Care Mail Survey (HCMS) (21). Except for information on HCBS, all variables used in this study were drawn from the RAND HRS, a user-friendly version of the core data (22).

The HCMS was a paper-and-pencil questionnaire mailed in 2011 to a subsample of HRS core respondents. Among other topics, the HCMS included an assessment of use of senior services, including HCBS. The overall response rate for the HCMS was 75%, yielding a sample size of 7,649. Given our focus on community dwelling older adults, our analyses excluded participants age 59 or younger and those living in a nursing home, which resulted in a sample of 4,964 from the HCMS. The second source of data came from the HRS core interview. At the end of the core interview, HRS conducts about ten 3-minute “modules” on a variety of topics. Each module is administered to a random 1/10th of the full core sample. The 2012 wave of core data collection included a module that assessed use of senior services (n=1,375). After restricting this sample to those older than age 59 and not living in a nursing home, the sample size was 618. To maximize power, we combined these samples resulting in a combined sample size of 5,582. For participants who completed both surveys, we used responses to the 2012 module. The sample size for some analyses is lower given missing data.

Measures

HCBS Use—Utilization of HCBS was assessed in both the 2012 HRS module and the 2011 HCMS using similar questions. The HCMS and HRS solicit information about the use of senior services from those who affirmed using a variety of home- and community-based services. Participants of both were asked if they had used: 1) home delivered meals; 2) other food or nutrition services; 3) transportation services; 4) chore services; 5) supportive services for caregivers. Participants were considered recipients of HCBS if they endorsed HCBS use in either the HCMS or the HRS module, or both.

Depressive Symptoms—A modified 8-item version of the Center for Epidemiologic Studies Depression Scale (CES-D) was used to measure depressive symptoms in 2010 (23). Participants reported the extent to which in the previous week they felt: 1) depressed; 2) everything was an effort; 3) sleep was restless; 4) that he or she could not get going; 5) lonely; 6) that he or she enjoyed life; 7) sad; and 8) happy. To deal with differences in response categories over waves, the RAND version of the data is coded dichotomously as yes or no. Positive items were reverse-coded, and the items were summed for a count of recent depressive symptoms ranging from 0 to 8. The CES-D had adequate internal consistency (Cronbach’s alpha = 0.79). Following others, we used a cut-off score of 4 or greater to indicate significant depressive symptoms, which is a level of depressive symptomatology consistent with clinical depression (24). The CES-D is part of the core interview.

Demographic and socioeconomic characteristics—Measured in 2010, demographic covariates included age (continuous), gender, race, years of education, and

income (in regression models income was divided by 10,000 for ease of interpretation). Four dichotomous variables were created for each of four racial categories: White, Black, Hispanic, and other.

Health—We conceptualized health status as multidimensional, including self-reported health conditions, self-rated health, self-reported physical functioning, experience of pain, and cognitive functioning, all measured in 2010.

HRS assesses the presence of high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, and arthritis. We used a summary score that ranged from 0 to 7 for the number of chronic health conditions participants reported. Overall self-reported health was assessed on a 5-point scale as poor, fair, good, very good, or excellent. Following common practice, a dichotomous indicator of fair or poor health compared to good, very good, or excellent health was used.

Functional status was assessed with self-reported difficulties in activities of daily living (ADLs) (bathing, eating, dressing, walking across a room, and getting out of bed) and difficulties in instrumental activities of daily living (IADLs) (using the phone, taking medications, managing money, shopping for food, and preparing meals). Continuous variables indicating a count of difficulties were created for each of these measures. Cognition score represents the sum of the scores from the serial 7s test (counting back from 100 by 7s) and a word recall task (normalized with mean 0 and variance 1). A higher score indicates better cognitive functioning.

Behavioral Health—A continuous variable was used to indicate the number of alcoholic drinks consumed per day in 2010. A dichotomous indicator for use of psychiatric medications was created from the HRS question “Do you regularly take prescription medications to help relieve anxiety or depression?” Psychiatric/psychological treatment was a dichotomous indicator in response to the question “Do you now get psychiatric or psychological treatment for your problems?”

Data Analyses

In the HRS, analytic weights are derived to adjust for the complex sample design and non-response. We combined the 2011 and 2012 respondent-level analytic weights and used the combined weight in analyses. Analyses were conducted using SAS version 9.4 (SAS Institute Inc. (2015) SAS Version 9.4. Cary, NC: SAS Institute Inc.). All analyses (including bivariate, chi-square, and regressions) were weighted, and variance estimation, using the Taylor series linear approximation method, accounted for the complex sample design.

Descriptive characteristics were generated for all study variables. Bivariate analyses were performed to compare HCBS recipients to non-recipients on depressive symptoms. Second-order Rao Scott chi-square analyses, which corrected for the complex sample design, were used to determine whether a higher proportion of HCBS recipients with significant depressive symptoms were also utilizing psychiatric services compared to non-HCBS recipients with significant depressive symptoms (Aim 1). The frequency of significant

depressive symptoms was further determined across recipients of different HCBS (Aim 2). To compare across all HCBS simultaneously, we conducted a logistic regression with dichotomous variables for each service predicting elevated depressive symptoms. For reference, we further report the frequency of significant depressive symptoms among individuals using zero, one, or two or more HCBS. Next, a series of logistic regression models evaluated the adjusted effect of depressive symptoms in 2010 on HCBS use in 2011–2012. We took a two-step approach to address whether depressive symptoms were associated with HCBS use above and beyond demographic characteristics, socioeconomic status, and health and health behaviors. *Model 1* evaluated the effect of depressive symptoms, and *Model 2* added the effects of demographic characteristics, socioeconomic status, and health and health behaviors (Aim 3). We report odds ratios and 95% confidence intervals with design corrected likelihood ratio statistics and Wald's chi-square tests.

Results

Participants included 5,582 adults aged 60 and over with a mean age of 70.5 (se=0.21). Approximately 8% were using HCBS and approximately 11% had significant depressive symptoms based on self-report assessment. Full sample characteristics and comparisons of HCBS recipients and non-recipients can be found in Table 1. In general, those using HCBS had significantly more economic, physical, and mental health concerns than those not using HCBS.

Significant depressive symptoms at baseline were more common among HCBS users compared to those not using HCBS (27.5% vs. 10.5%, Rao-Scott $\chi^2=49.1$, df=1, $p<0.001$). To address Aim 1, we evaluated the frequency of depressive symptoms and use of psychiatric services among those using and not using HCBS (Table 2). Among those experiencing significant depressive symptoms, psychiatric or psychological treatment utilization was not different between users and non-users of HCBS (27.8% vs. 30.1%, Rao-Scott $\chi^2=0.14$, df=1, $p=0.71$). Among those with significant depressive symptoms, taking a psychiatric medication was not significantly different between HCBS recipients and HCBS non-recipients (49.1% vs. 47.5% Rao-Scott $\chi^2=0.04$, df=1, $p=0.83$).

We next considered the proportion of individuals using different types of HCBS who also had previously reported significant depressive symptoms (Aim 2). Figure 1 displays the proportion of users of each service who reported significant depressive symptoms. The highest proportion of recipients who had significant depressive symptoms was found for transportation services (37.5%). The proportion of significant depressive symptoms among recipients of the other services was 26.1% for those using home delivered meals, 25.2% for those using other food services, 31.9% for those using chore services, and 24.3% for those using caregiver services. Comparing the proportion of significant depressive symptoms among HCBS recipients, those using transportation services had a significantly higher proportion with significant depressive symptoms than other service recipients (OR:2.39, $t=3.17$, df=40, $p<.01$). No other types of HCBS were associated with a significantly higher proportion of significant depressive symptoms. The frequency of significant depressive symptoms among those using no HCBS was 11.7%, among those using one service was 28.0% and among those using two or more was 56.5%.

To address Aim 3, Table 3 presents results of two logistic regression models to examine significant baseline depressive symptoms (*Model 1*) and demographic, socioeconomic, physical health and health behaviors (*Model 2*) as covariates of HCBS use. In *Model 1*, depressive symptoms were significantly associated with use of HCBS (OR:3.24, Wald $\chi^2=XX$, df=, $p<.001$) and remained so in Model 2 after adjusting for other risks. The overall models were statistically significant as indicated: *Model 1* (Wald test=92.16, df=(1,55), $p<.001$) and *Model 2* (Wald test=15.23, df=(14,55), $p<.001$).

Discussion

Utilizing a nationally representative sample of older adults in the U.S. from the Health and Retirement Study, we found that 8% were using Home- and Community-Based Services (HCBS). Among HCBS recipients, over a quarter (27%) had, in the past year, reported clinically meaningful depressive symptoms, a two-fold greater frequency compared to non-recipients. These findings are consistent with local studies such as a report of HCBS recipients in Monroe County, NY, which found 27% of participants met criteria for major depressive episode (1, 25). The current study finds relatively higher levels of depressive symptoms, however, than found in community-area studies of home delivered meal recipients. For example, 12% of home delivered meals recipients in New York's Westchester County (17) and 18% in Central Texas (26) endorsed significant depressive symptoms, whereas we found 26% of home delivered meals recipients in the HRS sample endorsed significant depressive symptoms.

Despite their participation in aging services, HCBS recipients with significant depressive symptoms were no more likely to be receiving psychiatric services or using psychiatric medication than those with significant depressive symptoms who were not using HCBS. Our results showed that of individuals with significant depressive symptoms, approximately 30% of both HCBS recipients and non-recipients received some form of psychological treatment and 50% received some type of psychiatric medication. These percentages are similar to those found in a study of Florida home-based aging service recipients (19).

Another finding of this study was that when looking at the entire sample, although psychiatric/psychological treatment was evenly distributed between recipients and non-recipients of HCBS (18.6% vs 18.7%, Rao-Scott $\chi^2=0.00$, df=1, $p=0.97$), psychiatric medication was more commonly used in the recipients than non-recipients (27.1% vs 19%, Rao-Scott $\chi^2=7.34$, df=1, $p=0.007$). But as described, when looking only at those with significant depressive symptoms psychiatric medication was not significantly different between recipients and non-recipients of HCBS. It may be that HCBS use indicates a tendency to use health care services in general, including psychiatric medication. Also, psychiatric medications are often prescribed to older adults by primary care physicians and are increasingly being prescribed to patients who report pain, which is more common among HCBS recipients, even without the presence of mental health condition(27).

Given the increased attention that HCBS recipients receive, one might expect that their symptoms of depression would be more likely to be identified and treated than those of older adults not using HCBS, particularly considering that many of these services occur in the

context of daily contact (e.g., home delivered meals). This study did not find evidence to support this conjecture. Perhaps this is not surprising. Most HCBS are delivered by front-line paid staff and volunteers focused on providing supportive services, not medical or mental health treatment. Further, previous research has shown that older adults are unlikely to pursue referrals to mental health services (28). In light of this, interventions have been developed to increase the likelihood that older adults accessing senior services will also access mental health services (29–32), however these interventions have only been implemented in a few discrete service regions (e.g., New York City). Clearly HCBS recipients with depressive symptoms have unmet treatment needs. The current findings suggest that interventions for depressive symptoms could be beneficial across HCBS types.

The present study also found differences in depressive symptom frequency by type of service used. We found that transportation services had the highest proportion of recipients with significant depressive symptoms. The comparatively high rates of depressive symptoms in this group could be related to driving cessation, which is associated with the onset of depressive symptoms (33, 34). This finding may reflect the sense of independence that is associated with driving and the reliance on driving to engage in meaningful activities (35). Many older adults who rely on transportation services are former drivers. Those who receive transportation services may face both psychological challenges to adjust to a perceived loss of independence and self-reliance as well as functional challenges associated with relying on others for transportation. Recipients of transportation services may represent an especially vulnerable group, deserving particular attention.

In regards to our third aim, HCBS recipients were more likely than non-recipients to be older, Black, with lower education, lower income, higher ADL needs, and more chronic health conditions, which is consistent with prior research (6, 11, 36). Even accounting for these factors, significant depressive symptoms were associated with use of HCBS. This finding is consistent with findings that show that depressive symptoms are associated with increased health service use and costs (37–39). Depressive symptoms may be an indicator of unmeasured physical health severity or other mental health needs of the population. This is supported by literature showing that high depressive symptoms are associated with severe medical conditions, multi-morbidity, poor outcomes, higher health care need, and lower survival (39, 40). In addition, the psychosocial consequences associated with functional limitations such as the loss of independence and isolation could contribute to increased depressive symptoms that in turn lead to greater HCBS use.

The present study has the advantage of a large nationally representative sample of older adult users and non-users of HCBS, however does have some limitations to be noted. HRS uses a modified 8-item version of the CES-D rather than a structured clinical interview for psychiatric disorders. Although a 10-item CES-D has demonstrated high accuracy in detecting major depression in older adults (41), using the modified 8-item version prevents us from commenting directly on major depressive disorders among HCBS recipients or comparing depression prevalence directly with prior research. Additionally, depression was only measured during the core interview in 2010. To maximize power we combined two HCBS measures from the core in 2012 and an off-year survey in 2011. Because the majority of our sample having HCBS information comes from the 2011 survey we do not have

concurrent assessment of HCBS and depressive symptoms. All analyses use the 2010 measure of CES-D, therefore, limiting our ability to detect true prevalence in the population of service users since depression was assessed before service use. Also, HRS did not assess why HCBS were offered and who is paid for the service (private, ACL funded, Medicaid). Nor did the HCMS assess case management services, therefore, this type of HCBS was not included in our analysis. As more waves of data from the HRS become available, future studies could extend this research by increasing the duration of follow-up to detect future significant depressive symptoms among those using HCBS. Further, variables on psychiatric/psychological treatment and psychiatric medication utilization do not specify which treatments or medications were being used or for how long. It is possible that our sample could be receiving treatment and medication for other psychiatric comorbidities that were not assessed. Although attrition in the HRS is relatively low (roughly 10%), we cannot rule out selective attrition as a potential source of bias (20).

In conclusion, this study of a nationally representative sample shows that older adults who receive HCBS are twice as likely as the rest of the population to suffer from clinically significant depression. And, like older adults generally, depression tends to be untreated. The scope of unmet need for depression treatment in this population is substantial. Based on 2012 data, there are at least 3.2 million HCBS participants (42). Given our finding that 27% have significant depressive symptoms, there are about 880,000 individuals within these services that have significant depressive symptoms. This number is likely to increase as the number of HCBS recipients continues to grow. However, the HCBS infrastructure offers an opportunity to reach this population. Increased screening and treatment of depressive symptoms within these services, or at least in partnership with these services, are indicated to better address the needs of this vulnerable group of older adults.

Acknowledgments

Support for this work provided by: the National Institute of Mental Health (T32 MH073553; Dr. Leggett's and Dr. Pepin's postdoctoral fellowship funding). Dr. Leggett was supported by the Program for Positive Aging. Dr. Assari was supported by the Heinz C. Prechter Bipolar Research Fund, the Richard Tam Foundation, and Nutrition Obesity Research Center, at the University of Michigan.

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Highlights

- Home- and community-based service (HCBS) recipients had a higher frequency of depressive symptoms compared to non-recipients (27.5% vs 10.4%).
- HCBS recipients with depressive symptoms were no more likely than non-recipients to receive psychiatric services.
- Depressive symptoms were associated with HCBS use, above and beyond sociodemographic and health risk factors.
- HCBS recipients have unmet depression needs. HCBS may offer an opportunity to detect depression and deliver mental health interventions to vulnerable older adults.

Figure 1.

Proportion of Service Users with Significant Depressive Symptoms

*note. On the x-axis, the sample sizes represent the unweighted number of participants who used each service. Recipients could use more than one service. The y-axis represents the percentage of those individuals whom had significant depressive symptoms. Based on the logistic regression analysis (Wald $F=2.1$, $df = 5$, 40 , $p=.08$) reported in the results, individuals utilizing transportation services were significantly more likely to have significant depressive symptoms than those not using this service ($OR=2.39$, $df=40$, $p<.01$). No other service type was significantly associated with depressive symptoms. For reference, the diagonal shaded bars represent significant depressive symptoms among those using no, one, or two or more HCBS.

Table 1
Sample Characteristics for the Total Sample, Recipients, and Non-Recipients of HCBS

	Total (unweighted n=5,582)		Recipients (unweighted n=451)		Non-recipients (unweighted n=5131)		p
	Weighted Mean	se	Weighted Mean	se	Weighted Mean	se	
Age	70.53	0.21	74.15	0.70	70.44	0.22	<.001
Years of education	12.97	0.10	11.85	0.20	12.92	0.10	<.001
Household income	\$65,908	\$1,798.77	29,988	1,570.39	66,945	1,848.37	<.001
Cognitive recall [†]	9.76	0.06	8.18	0.20	9.69	0.07	<.001
ADLs ^{††}	0.27	0.01	0.78	0.05	0.26	0.02	<.001
IADLs ^{†††}	0.22	0.01	0.64	0.06	0.22	0.01	<.001
Chronic health conditions	2.14	0.02	2.74	0.11	2.11	0.02	<.001
Number of alcoholic drinks per day	0.75	0.02	0.49	0.08	0.73	0.02	0.004
	Weighted %	se	Weighted %	se	Weighted %	se	Rao-Scott χ^2 (df)
Female	55.59	0.66	65.36	3.07	54.74	0.64	.001
Race							
White	86.02	0.87	72.65	2.38	87.18	0.87	<.001
Black	9.47	0.65	21.18	2.15	8.46	0.63	<.001
Other	4.51	0.56	6.17	1.73	4.36	0.56	0.29
Hispanic ethnicity	7.47	0.99	13.63	3.03	6.94	0.92	0.013
Troubled with pain	35.53	0.74	51.65	3.11	35.01	0.77	<.001
Significant depressive symptoms ^{††††}	10.86	0.54	27.50	2.45	10.49	0.54	<.001
Psychiatric/psychological treatment	18.16	1.40	18.56	3.51	18.69	1.50	.97
Psychiatric medication	19.29	0.72	27.11	2.71	19.01	0.78	0.007
Any home and community based services	7.98	0.45					
Meals services	1.77	0.24					
Nutrition services	3.46	0.33					
Transportation	2.64	0.24					
Chore Services	1.25	0.15					
Caregiver support	1.09	0.15					

Notes: Results are weighted to adjust for the complex sample design;

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- ⁷ Serial 7's and word recall task;
- ⁷⁷ Activities of Daily Living;
- ⁷⁷⁷ Instrumental Activities of Daily Living;
- ⁷⁷⁷⁷ 8-item CES-D;

Source: Health and Retirement Study, 2010, 2011, 2012.

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Psychiatric Service Use among HCBS Recipients and Non-Recipients with Significant Depressive Symptoms

Table 2

	Recipients		Non-Recipients		χ ²	p
	%	se	%	se		
Psychiatric/psychological treatment	27.80	5.87	30.14	3.34	0.14	0.71
Psychiatric medication	49.10	6.89	47.54	2.91	0.04	0.83

Rao-Scott Chi-Square test with 1 degree of freedom. Source: Health and Retirement Study, 2010, 2011, 2012.

Notes: Results are weighted to adjust for the complex sample design

Table 3

Logistic Regressions Examining Predictors of HCBS Use

	Model 1		t-value(df)	Model 2		t-value(df)
	Odds Ratio	95% CI		Odds Ratio	95% CI	
Depressive symptoms	3.24***	2.54–4.13	9.69(55)	1.70**	1.22–2.37	3.13(55)
Age	--	--		1.03***	1.01–1.05	3.41(55)
Female ^a	--	--		1.18	0.89–1.57	1.13(55)
Race ^b	--	--				
Black	--	--		2.39***	1.75–3.26	5.48(55)
Other	--	--		1.05	0.52–2.13	0.15(55)
Hispanic ethnicity	--	--		1.81	0.99–3.30	1.93(55)
Years of education	--	--		1.06**	1.02–1.09	2.89(55)
Household income	--	--		0.85***	0.80–0.90	–5.53(55)
Cognitive impairment	--	--		0.98	0.94–1.02	–1.13(55)
Activities of Daily Living (ADLs)	--	--		1.19**	1.07–1.31	3.32(55)
Instrumental ADLs	--	--		1.10	0.96–1.25	1.39(55)
Chronic health conditions	--	--		1.19**	1.04–1.35	2.63(55)
Troubled with pain	--	--		1.26	0.98–1.61	1.82(55)
Number of alcoholic drinks per day	--	--		0.99	0.88–1.11	–0.21(55)
Wald test (df)	92.16(1.55)***			15.23(14.55)***		
Unweighted n	5,442			5,442		

Notes: The degrees of freedom for the t-test is 55 given the number of clusters in the complex sample design. When complex survey design is used, the standard errors are based on the number of clusters and thus the appropriate test of significance is based on the t distribution. Results are weighted to adjust for the complex sample design;

* $p < .05$,

** $p < .01$,

*** $p < .001$;

^a reference group: Male;

Source: Health and Retirement Study, 2010, 2011, 2012.

reference group: White;
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