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Racial and ethnic differences in the prevalence of depressive symptoms among US nursing home residents

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Abstract

This study aimed to examine racial and ethnic differences in significant depressive symptoms among long-term nursing home residents. We analyzed the 2014 national Minimum Data Set linked to a nursing home file, and estimated multivariable logistic regressions to determine the associations of race and ethnicities with significant depressive symptoms (score ≥ 10 on the 9-item Patient Health Questionnaire [PHQ-9] scale), and whether associations were explained by resident and nursing home covariates. Stratified analyses further determined independent associations in subgroups of residents. We found that the prevalence rate of PHQ-9 scores ≥ 10 was 8.8% among non-Hispanic white residents ($n=653,031$), and 7.4%, 6.9%, and 6.6% among black ($n=97,629$), Hispanic ($n=39,752$), and Asian ($n=16,636$) residents, respectively. The reduced likelihoods of significant depressive symptoms for minority residents compared to non-Hispanic whites persisted after sequential adjustments for resident and nursing home covariates, as well as in stratified analyses. The persistently lower rate of significant depressive symptoms among racial and ethnic minority residents suggests that training of nursing home caregivers for culturally sensitive depression screening is needed for improved symptom recognition among minority residents.

Keywords

nursing home; depressive symptoms; race and ethnicity; Patient Health Questionnaire

Introduction

Depression in older adults is associated with functional decline, medical morbidity, mortality, and increased acute care resource use, in addition to psychological suffering and

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reduced quality of life (Crespy, Van Haitsma, Kleban, & Hann, 2016; Crystal, Sambamoorthi, Walkup, & Akincigil, 2003; Gallo, Cooper-Patrick, & Lesikar, 1998; Meeks, Van Haitsma, Schoenbachler, & Looney, 2015; Skarupski et al., 2005). The prevalence of physician-confirmed diagnosis of depression among U.S. nursing home residents varies between 17% and 60% (Bagchi, Verdier, & Simon, 2009; Gaboda, Lucas, Siegel, Kalay, & Crystal, 2011; Siegel et al., 2012; Ulbricht, Rothschild, Hunnicutt, & Lapane, 2017) when estimated with alternative data or for different resident groups such as newly-admitted versus existing residents. The estimated rates of diagnosed depression among nursing home residents are higher than the estimated rates for elderly persons living in the community, which generally range between 5% and 10% (Akincigil et al., 2012; Crystal et al., 2003). The elevated burden of depression among nursing home residents is further complicated by their severe physical and cognitive impairments, their complex clinical and nursing care needs, and the inability of many nursing homes to provide adequate psychiatric services (Li, 2010; Muramatsu & Goebert, 2011; Reichman et al., 1998).

The prevalence of clinical depression and elevated depressive symptoms is likely to vary over racial and ethnic groups, as suggested by the body of studies on community-living elders. Most of these studies reported lower depressive symptom levels and reduced rates of diagnosed depression among racial and ethnic minority elders compared to non-Hispanic whites (Akincigil et al., 2012; Callahan & Wolinsky, 1994; Crystal et al., 2003; Gallo et al., 1998; Pickett, Bazalais, Greenberg, & Bruce, 2014; Shao, Richie, & Bailey, 2016), although several other studies reported no group differences or even higher depressive symptoms for older minority patients (Blazer, Landerman, Hays, Simonsick, & Saunders, 1998; Compton, Conway, Stinson, & Grant, 2006; Skarupski et al., 2005) when their estimates were derived from samples from alternative geographic areas or different periods of time. These reported variations in depressive symptoms may be explained by racial and ethnic differences in socioeconomic status and culture-related differences in symptom reporting and help-seeking behaviors.

Despite these extensive reports on older populations of the larger community, little is known about racial and ethnic differences in depressive symptoms among nursing home residents. Racial and ethnic minorities constitute about 20% of the nursing home population, and tend to live in facilities with poorer resources, lower nurse staffing levels, and more care deficiencies than white nursing home residents (Fennell, Feng, Clark, & Mor, 2010; Li, Harrington, Mukamel, et al., 2015; Li, Harrington, Temkin-Greener, et al., 2015; Mor, Zinn, Angelelli, Teno, & Miller, 2004). Analyses of a handful of previous studies (Brown, Lapane, & Luisi, 2002; Gaboda et al., 2011; Jones, Marcantonio, & Rabinowitz, 2003; Levin et al., 2007; Siegel et al., 2012) suggested that racial and ethnic minority residents were less likely to have a physician-confirmed diagnosis of depression than non-Hispanic white residents. However, these studies were derived from data of more than 10 years old, and did not focus on symptoms of depression measured by a validated instrument.

In this study, we examined the prevalence and racial and ethnic variations in clinically-significant depressive symptoms, defined as a score of 10 or higher on the Patient Health Questionnaire (PHQ-9) (Kroenke, Spitzer, & Williams, 2001), among elderly long-term care nursing home residents. We further determined whether racial and ethnic variations persisted

in subgroups of residents defined by key resident socio-demographic, diagnostic, or functional characteristics, or type of nursing homes.

Conceptual Framework

The rate of clinically-significant depressive symptoms as reported by older persons of different racial and ethnic groups may be affected by multiple factors including their psychosocial function, physical health, cognition, socio-demographic characteristics, as well as culture-related differences in symptom reporting (Akincigil et al., 2012; Pickett et al., 2014; Shao et al., 2016). In particular, racial and ethnic differences exist in cultural beliefs and knowledge about depression, as well as in perceived stigma associated with mental health diagnosis. It has been suggested that black persons are more likely to see depression as a “personal weakness”, and to handle depression and other mental health problems on their own (Anglin, Alberti, Link, & Phelan, 2008; Bailey, Blackmon, & Stevens, 2009). Hispanics may also tend to believe that depression and mental health issues should be discussed inside their families and tend to ignore (or be unaware of) professional services for depression available to them (Cabassa, Lester, & Zayas, 2007). In addition, Asians are found more likely to express depression and psychological distress somatically as part of cultural norms, leading to obvious detection and diagnostic difficulties (Parker, Cheah, & Roy, 2001). Stigma attached to emotional illness, which is perceived more strongly among racial and ethnic minorities, may also reduce minority elders’ willingness to present clearly their depressive symptoms (Bailey et al., 2009). Thus, we hypothesized in this study that racial and ethnic minority nursing home residents tended to report less depressive symptoms than non-Hispanic white residents, after accounting for their differences in demographic, socio-economic, functional, and diagnostic characteristics.

It is also likely that provider-side factors, such as the knowledge, attitude, and training received by nursing staff for residents’ behavioral and mental health issues, play an important role in explaining differences in reported depressive symptoms among nursing home residents. Studies showed that caregivers’ attitudes toward patients and diagnostic and treatment practices might be influenced by patient race or ethnicity (IOM, 2003), and in the case of depression, healthcare providers tended to perceive minority patients’ symptoms as less significant than white patients’ (Pickett et al., 2014; Shao et al., 2016). Our analyses thus further accounted for common nursing home characteristics that may be associated with staff care practices and performance such as ownership, census of Medicaid-financed residents or racial/ethnic minority residents, and nurse staffing levels (see Table 1 for a full list of nursing home variables). Previous studies have shown that for-profit ownership of the nursing home, for example, tends to predict lower quality of depression care (Gaboda et al., 2011; Siegel et al., 2012) and predominance of a facility by Medicaid or minority residents is associated with lower nurse staffing level, more deficiencies in care, and lower financial resources for staff training or performance improvement (Fennell et al., 2010; Li, Harrington, Mukamel, et al., 2015; Li, Harrington, Temkin-Greener, et al., 2015; Mor et al., 2004).

Methods

Data Sources and Sample

The primary source of data was the 2014 Minimum Data Set (MDS) 3.0 resident assessment file which contains detailed information about all residents in Medicare and/or Medicaid certified facilities in the United States. Assessment items include residents' demographics, clinical diagnoses, functional and mental status, and treatments received. As mandated by the Centers for Medicare and Medicaid Services (CMS), full MDS assessments are conducted at admission, annually, and when there is a substantial change in health condition. Extensive validation studies have confirmed that compared to MDS 2.0, which has also been validated previously (J. Morris, Moore, & Jones, 2003), MDS 3.0 shows increased clinical utility, improved reliability and accuracy, and increased resident voice in assessments (Chodosh et al., 2008; Saliba & Buchanan, 2008, 2012; Saliba, Buchanan, et al., 2012; Saliba, DiFilippo, et al., 2012). In a national study, CMS contracted investigators reported overall very good to excellent reliability (e.g. kappa>0.7) of common MDS 3.0 items (Saliba & Buchanan, 2008, 2012). In particular, another feasibility and validation study showed that the PHQ-9 could be completed by the majority of residents, and that the PHQ-9 interview had very good agreement (weighted kappa=0.69) with the modified Schedule for Affective Disorders and Schizophrenia for residents without severe cognitive impairment. For residents with severe cognitive impairment who could not be interviewed, the PHQ-9 score based on staff observation (PHQ-9 observational version, PHQ-9 OV) had very high correlation (corr. coefficient=0.84) with the Cornell Scale for Depression in Dementia (Saliba, DiFilippo, et al., 2012).

We used the annual assessments to identify all long-term care residents who were 65 years or older. For residents with two or more full assessments (annual and/or significant change assessments) in the year, we kept their most recent assessments for analyses. We excluded residents who resided in the small number of hospital-based nursing homes given that these nursing homes usually are organized and staffed in a fundamentally different way from other facilities and that they emphasize more post-acute rather than long-term custodial care. We further excluded those who were in coma, or who had an active diagnosis of schizophrenia or bipolar disorder. Finally, for the purpose of analyzing racial and ethnic variations, we retained the records for non-Hispanic white, black, Hispanic, and Asian American/Pacific Islander residents, and excluded from the sample residents with missing racial/ethnic information (n=14,960, 1.8% of the sample) and the small number of American Indian/Alaska Native residents (n=2925, 0.35% of the sample).

We linked the patient-level file to the 2014 Certification and Survey Provider Enhanced Reporting (CASPER) file to obtain nursing home covariates. The CASPER is a facility-level file maintained by the CMS containing variables of key facility characteristics. Information in the CASPER file, previously named Online Survey Certification and Reporting (OSCAR) file, has been widely used in analyses of nursing home practices and operations.

Variables

The dependent variable was the PHQ-9 score for residents capable of being interviewed for their depressive symptoms during the past 2 weeks, or the PHQ-9 OV score based on staff observation for those who could not make themselves understood or could not complete the interview due to cognitive impairment (Saliba, DiFilippo, et al., 2012). The PHQ-9 score ranges from 0 to 27, and was used to categorize residents as having minimal (scores 0–4), mild (5–9), moderate (10–14), moderately severe (15–19), or severe (20–27) depression. The PHQ-9 OV includes the same 9 signs and symptoms of depression in the PHQ-9, but with an additional irritability item that was previously shown to be predictive of mood disorder in persons with cognitive impairment (Saliba, DiFilippo, et al., 2012). The PHQ-9-OV score ranges from 0 to 30, and its categorization of residents was the same except for the group of severe depression (scores 20–30).

In multivariable analyses described below, we alternatively categorized residents as whether they were scored 10 or higher on PHQ-9 or PHQ-9 OV because individuals scored in this range are usually considered being at risk for clinically significant depression and will trigger an MDS-related care area assessment and the development of a targeted care plan for the resident (CMS, 2016).

The independent variables of our analyses were 3 separate binary variables for race/ethnicity (black, Hispanic, and Asian/Pacific Islander). We also defined a set of resident and nursing home covariates that were potentially correlated with individual depressive symptoms (Bagchi et al., 2009; Brown et al., 2002; Crespy et al., 2016; Crystal et al., 2003; Gaboda et al., 2011; Gallo et al., 1998; Jones et al., 2003; Levin et al., 2007; Meeks et al., 2015; Skarupski et al., 2005; Ulbricht et al., 2017). Resident covariates included age, male gender (yes/no), marital status (married or not married [i.e. never married, widowed, separated, or divorced]); whether the resident needed an interpreter to communicate with caregivers; the presence or absence of a set of medical conditions including cancer, heart/circulation disease, gastrointestinal disease, genitourinary disease, infections, metabolic disease, musculoskeletal disease, neurologic disease, malnutrition, pulmonary disease, and vision disorders; difficulties in activities of daily living; a cognitive function scale; presence or absence of hallucinations, delusions, and behavioral symptoms; and whether the resident completed the staff observation version of PHQ-9.

Among resident covariates, activities of daily living (ADL) included bed mobility, transferring, dressing, eating, toilet use, personal hygiene, and bathing. Each of the ADL components was coded from 0 (independence) to 4 (total dependence), resulting in a total range of the aggregate ADL score as 0 to 28. Resident cognitive function was defined based on the Brief Interview for Mental Status (BIMS) score (Chodosh et al., 2008) and, for residents not able to complete the BIMS assessments, the cognitive performance scale (CPS) (J. N. Morris et al., 1994; Thomas, Dosa, Wysocki, & Mor, 2015) according to staff assessments. The cognitive function scale in MDS 3.0 can be coded as 0 for being cognitively intact, 1 for mild impairment in cognition, 2 for moderate impairment, and 3 for severe impairment.

Nursing home covariates included total number of beds; whether the nursing home was affiliated with a chain; whether the nursing home was for profit; annual average occupancy rate; an average case mix index of the facility calculated based on the Resource Utilization Group scores of residents (Fries et al., 1994); percentage of residents financed by Medicare, and percentage of residents financed by Medicaid; percentage of racial/ethnic minority residents; nurse hours per resident day for registered nurse, licensed practical nurse, and certified nursing assistant; urban vs rural location of the facility; and a set of dummy variables to identify the states where nursing homes operated.

Statistical Analysis

We performed bivariate analyses to examine racial and ethnic variations in resident and nursing home characteristics, using analyses of variance for continuous variables and χ^2 tests for categorical variables.

We estimated sequentially a set of multivariable logistic regression models to determine the independent associations of race and ethnicity with the likelihood of having clinically significant depressive symptoms (PHQ-9 score ≥ 10). We first estimated a base model for unadjusted racial and ethnic effects by including only race and ethnicity in the model (model 0), and then sequentially added to the base model resident socio-demographic covariates (age, male gender, marital status, interpreter needed; model 1); diagnoses of physical conditions of the resident (model 2); physical, cognitive, and behavioral impairments of the resident (model 3); and nursing home covariate and state dummies (model 4). These sequential estimates aimed to determine the extent to which overall variations in depressive symptoms were explained by these covariates. All models in the sequential analyses used facility-level random intercepts (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006) to adjust for the potential clustering of resident outcomes in the same nursing home and to account for potential unobserved facility characteristics in the mixed model framework. In addition, the random-intercept models decomposed variation in the outcome and allowed us to determine the extent to which the presence of clinically-significant depressive symptoms was explained by resident versus nursing home characteristics.

In these logistic models we tried alternative specifications of continuous covariates (e.g. age) including the use of quadratic terms and categorizations based on alternative cutoff points, in order to capture possible non-linear associations. Alternative specifications of continuous covariates did not affect the estimated racial and ethnic effects. Thus, for ease of presentation and for planned stratified analyses below, we categorized continuous covariates based on common cutoffs (see table 2) and estimated the associations of re-defined categorical variables with presence of significant depressive symptoms.

We further explored the possibility that variations in depressive symptoms differed among subgroups of residents. We estimated additional random-effects logistic regression models of the outcome that were stratified by key resident socio-demographic, diagnostic, and functional characteristics, and by key nursing home characteristics (see table 4 for variables used for stratification). Stratified models adjusted for all resident and nursing home covariates except for the variable used for stratification. Statistical analyses were performed in Stata 15.0 (StataCorp, College Station, TX).

Results

Our sample included 653,031 non-Hispanic white long-term residents, 97,629 black residents, 39,752 Hispanic residents, and 16,636 Asian residents in 2014 (Table 1). Compared to white residents, racial and ethnic minority residents were slightly younger and more likely to be male. More Hispanic (38.9%) and Asian (50.7%) residents needed an interpreter to communicate with nursing home staff than non-Hispanic white (1.0%) and black (1.2%) residents. Most of the residents, regardless of race and ethnicity, were diagnosed with heart disease, diabetes or other metabolic disease, and neurological disease. Physical and cognitive functions did not seem to vary considerably over resident groups, but minority residents were more likely to have their mood assessment completed by staff observation rather than direct interview. Finally, racial and ethnic minority residents were more likely than non-Hispanic white residents to live in larger, for-profit and urban facilities with higher percentages of Medicaid residents.

Compared to non-Hispanic white residents, minority residents were less likely to have mild and moderate to severe depressive symptoms reported (Table 1). For example, 8.8% of non-Hispanic white residents had PHQ-9 score 10, while the corresponding rate was 7.4% for black residents, 6.9% for Hispanic residents, and 6.6 for Asian residents (Table 2). Multivariable analyses largely confirmed these unadjusted racial and ethnic differences. Results in Table 2 show that after adjusting for resident socio-demographic, diagnostic, and functional characteristics, as well as nursing home covariates, the odds ratio of having PHQ-9 score 10 was 0.75 for black residents, 0.86 for Hispanic residents, and 0.72 for Asian residents ($p < 0.001$ in all cases), compared to non-Hispanic white residents. The random-intercept regression (Model 3) also revealed that 55% of the variation in the presence of clinically-significant depressive symptoms was explained by resident characteristics, while 45% was explained by nursing home characteristics. Nevertheless, results in Table 3 suggested that racial and ethnic differences in depressive symptoms did not seem to differ substantially when resident and nursing home characteristics were sequentially adjusted for.

Table 4 presents results of multivariable analyses stratified by key resident and nursing home characteristics. The reduced likelihood of having moderate to severe depression among racial and ethnic minority residents were found in almost all subgroups, with statistically significant odds ratios ranging from 0.63 to 0.80 for black residents, from 0.77 to 0.89 for Hispanic residents, and from 0.62 to 0.80 for Asian residents, compared to non-Hispanic whites.

Discussion

This national study of long-term care nursing home residents found lower prevalence rates of PHQ-9 scores of 10 or higher for racial and ethnic minority residents than for non-Hispanic white residents. Compared to white residents, black, Hispanic, and Asian residents were roughly between 15% and 30% less likely to have PHQ-9 scores 10. Variations in patient socio-demographic, functional, and diagnostic characteristics, or type of nursing homes did not seem to explain these racial and ethnic differences in significant depression.

Racial and ethnic differences also persisted in subgroups of residents defined according to key resident or nursing home characteristics.

The relatively lower rates of clinically significant depressive symptoms among racial and ethnic minority nursing home residents found in this study (Table 2) are consistent with the findings of many (Akincigil et al., 2012; Callahan & Wolinsky, 1994; Crystal et al., 2003; Gallo et al., 1998; Pickett et al., 2014; Shao et al., 2016), but not all (Blazer et al., 1998; Compton et al., 2006; Skarupski et al., 2005), of the previous studies on community-living elders. These studies used different constructs of depression, such as the Patient Health Questionnaire-2 (PHQ-2) for depression screening, the Center for Epidemiologic Studies–Depression scale for symptoms, and the Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition for identifying major depressive disorder. For example, a recent study on 3711 older patients receiving home healthcare (Pickett et al., 2014) found that black and Hispanic patients tended to have lower rates of positive depressive screens than white patients, which suggests the need for culturally tailored depression screening for racial and ethnic minority elders.

The PHQ-9 used in this study has been widely tested for use among diverse community-living ethnic and racial populations, showing very good internal validity and consistency (Huang, Chung, Kroenke, Delucchi, & Spitzer, 2006; Merz, Malcarne, Roesch, Riley, & Sadler, 2011; Zhang et al., 2013). For example, Huang and colleagues (Huang et al., 2006) validated the PHQ-9 on 4 large samples of non-Hispanic white, black, Chinese American, and Latino primary care patients, and reported excellent internal consistency for all groups (Cronbach's alphas ranging 0.70 to 0.89). Moreover, the validity of the PHQ-9 items has been recently confirmed for the nursing home population when administered by trained nurses (Saliba, DiFilippo, et al., 2012). Our findings of lower depressive symptoms among minority nursing home residents than non-Hispanic white residents based on this validated instrument suggest that the cultural and spiritual factors acting on community-living minority adults' way of understanding, coping with, and reporting depressive symptoms continue to play a role after nursing home placement. In addition, these cultural-related effects on symptom reporting (see "Conceptual Framework" before) do not seem to change for nursing home residents with different ages, functional status, or physical diagnoses, as suggested by the results in the stratified analyses.

As also described in "Conceptual Framework" before, the potential underreporting of depressive symptoms among minority nursing home residents may further be attributable to provider-side factors, i.e. nursing home staff are likely less sensitive to symptoms of their minority residents than non-Hispanic whites. This may be particularly true for residents who were too vulnerable to be interviewed during the PHQ-9 assessment and whose reported scores were only based on staff observations (about 28% of all residents, who tended to be younger, female, minority residents with severe impairments in physical and cognitive functions). Our stratified analyses on this subsample (Table 4) found reduced likelihoods of symptom reporting for all minority groups compared to white residents. For this vulnerable group of residents, nurses' experience, knowledge, and beliefs are critical for interpreting resident mood and behaviors and for making decisions of symptom reporting.

Although the existing literature on nursing home residents did not focus on racial & ethnic variations in depressive symptoms, several studies found that racial/ethnic minority residents were less likely to have a physician-confirmed diagnosis of depression and when they were diagnosed so, were less likely to receive antidepressant and/or psychotherapy than non-Hispanic white residents (Brown et al., 2002; Gaboda et al., 2011; Jones et al., 2003; Levin et al., 2007; Siegel et al., 2012). For example, the study by Gaboda et al. (Gaboda et al., 2011) reported that although depression diagnosis and treatment increased substantially among long-term nursing home residents between 1999 and 2007, racial/ethnic minority residents were 10% to 50% less likely to have a diagnosis of depression; among diagnosed residents, minority residents were also less likely to receive an antidepressant within 7 days before the current MDS assessment. Siegel and colleagues (Siegel et al., 2012) further found that although about 80% of nursing home residents diagnosed with depression received an antidepressant, less than 3% of them received psychotherapy treatment; consistent with other studies, Siegel and colleagues found that black race (versus non-Hispanic white) was associated with a 20–30% reduced likelihood of receiving antidepressant and/or psychotherapy among residents with diagnosed depression.

Our study fills a gap in the literature by determining racial and ethnic variations in self-reported depressive symptoms as measured by PHQ-9, rather than physician diagnosis and treatment of depression, among US nursing home residents. Our findings of lower reported depressive symptoms among racial/ethnic minority residents were consistent with the findings of previous studies that minority residents were less likely to be diagnosed with depression (although they were also less treated after being diagnosed). The findings in this study have important policy implications for the quality of nursing home care, especially care provided to depressed residents and racial and ethnic minority residents. Nursing homes in the United States have long been functioning in a way that focuses on the management of chronic medical conditions and disabilities, largely ignoring the psychosocial needs of residents. As a result, many nursing homes lack the necessary resources, expertise, and financial incentives to serve residents with behavioral health issues appropriately (Li, 2010; Muramatsu & Goebert, 2011; Reichman et al., 1998). This issue is particularly salient for nursing homes predominated by racial and ethnic minorities, which are oftentimes low-resource and poor-staffed facilities (Fennell et al., 2010; Li, Harrington, Mukamel, et al., 2015; Li, Harrington, Temkin-Greener, et al., 2015; Mor et al., 2004). It is therefore critical that efforts be made to improve both the overall quality of behavioral health care in nursing homes, and the culture sensitivity of such care given the increased diversity of ethnicities and cultural backgrounds of their residents. When it comes to care for depressed residents, additional training of nursing home staff may be needed to help them understand the cultural differences in coping strategies and in ways of communicating mood symptoms, so that early detection of mood disorders and culturally and linguistically appropriate care for depression are achieved for all residents.

Limitations

There are several limitations of this study. First, the data are cross-sectional and do not provide a temporal for the observed associations between race/ethnicity and symptom reporting. Future longitudinal studies are needed for improved causal inferences and for the

test of possible cohort effects as, for example, non-Hispanic white and minority baby boomers age into nursing homes. Second, our national analyses exclude American Indian/Alaska Native residents due to their small sample sizes. Finally, although our analyses adjusted for detailed resident and nursing home covariates using multivariable regression and stratification to determine independent associations, it is possible that reported associations are partially mediated by unmeasured individual and nursing home variables (e.g. staff turnovers, and staff knowledge and training in behavioral health issues).

Conclusion

In conclusion, our study found that among U.S. long-term nursing home residents, racial and ethnic minorities had lower prevalence rate of significant depressive symptoms (PHQ-9 scores ≥ 10) than non-Hispanic whites. Racial and ethnic differences in symptom reporting rate were not explained by common resident or nursing home characteristics. Training of nursing home caregivers for culturally sensitive depression screening may be needed for improved symptom recognition among minority residents.

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Table 1

Resident and nursing home characteristics by race and ethnicity: 2014*

| | Non-Hispanic White (n=653,031) | Black (n=97,629) | Hispanic (n=39,752) | Asian/Pacific Islander (n=16,636) | Total (n=807,048) |
|--|-----------------------------------|---------------------|------------------------|--------------------------------------|----------------------|
| | | | | | |
| Depressive symptoms | | | | | |
| None (PHQ-9 score 0–4) | 74.7 | 80.7 | 81.1 | 83.1 | 75.9 |
| Mild (PHQ-9 score 5–9) | 16.6 | 11.9 | 12.0 | 10.3 | 15.7 |
| Moderate (PHQ-9 score 10–14) | 6.3 | 5.7 | 5.4 | 5.2 | 6.1 |
| Moderately severe (PHQ-9 score 15–19) | 2.0 | 1.5 | 1.4 | 1.2 | 1.9 |
| Severe (PHQ-9 score ≥ 20) | 0.5 | 0.2 | 0.2 | 0.2 | 0.4 |
| Age, y | 85.0±8.4 | 81.5±9.1 | 82.5±8.5 | 84.5±8.4 | 84.5±8.6 |
| Male gender | 26.8 | 35.5 | 37.5 | 31.9 | 28.4 |
| Married | 20.3 | 14.8 | 21.5 | 29.1 | 19.9 |
| Interpreter needed | 1.0 | 1.2 | 38.9 | 50.7 | 3.9 |
| Diagnosis of medical condition | | | | | |
| Cancer | 6.4 | 6.8 | 5.0 | 5.3 | 6.3 |
| Heart/circulation | 89.2 | 94.0 | 90.3 | 90.0 | 89.8 |
| Gastrointestinal | 35.7 | 32.6 | 36.8 | 32.5 | 35.3 |
| Genitourinary | 20.0 | 23.9 | 21.3 | 22.7 | 20.6 |
| Infections | 12.4 | 10.2 | 10.5 | 10.9 | 12.0 |
| Metabolic | 65.0 | 68.3 | 72.1 | 69.8 | 65.8 |
| Musculoskeletal | 46.6 | 34.1 | 36.0 | 41.0 | 44.5 |
| Neurological | 76.3 | 80.8 | 81.1 | 77.6 | 77.1 |
| Malnutrition | 3.5 | 4.4 | 4.3 | 3.4 | 3.7 |
| Pulmonary | 23.0 | 19.1 | 19.6 | 18.1 | 22.2 |
| Vision | 17.1 | 21.1 | 19.0 | 19.7 | 17.8 |
| Difficulties in activities of daily living (0–28) ^a | 18.8±5.9 | 20.2±6.1 | 19.8±6.1 | 19.9±6.1 | 19.1±5.9 |
| Cognitive function scale (0–3) ^b | 1.5±1.0 | 1.6±1.0 | 1.7±1.0 | 1.7±1.0 | 1.5±1.0 |

| | Non-Hispanic White (n=653,031) | Black (n=97,629) | Hispanic (n=39,752) | Asian/Pacific Islander (n=16,636) | Total (n=807,048) |
|--|-----------------------------------|---------------------|------------------------|--------------------------------------|----------------------|
| | | | | | |
| Presence of | | | | | |
| Hallucinations | 2.1 | 1.7 | 1.4 | 1.0 | 2.0 |
| Delusions | 5.9 | 4.7 | 4.1 | 2.6 | 5.6 |
| Behavioral symptoms | 13.9 | 10.5 | 12.7 | 9.6 | 13.4 |
| Staff observation of mood | 27.1 | 30.7 | 34.3 | 40.2 | 28.2 |
| Nursing home characteristic | | | | | |
| Total number of beds | 136.0±82.1 | 165.2±98.9 | 170.5±118.8 | 165.3±103.8 | 141.8±87.7 |
| Chain affiliation | 53.7 | 55.3 | 47.5 | 46.0 | 53.4 |
| For-profit ownership | 66.0 | 79.6 | 81.4 | 79.8 | 68.7 |
| Occupancy rate, % | 85.1±12.3 | 85.6±11.5 | 85.7±12.2 | 88.6±10.1 | 85.3±12.1 |
| Case mix index | 1.3±0.1 | 1.3±0.1 | 1.3±0.1 | 1.4±0.2 | 1.3±0.1 |
| Percentage of patients paid by | | | | | |
| Medicare, % | 13.6±9.8 | 12.9±8.9 | 13.1±9.6 | 12.3±9.4 | 13.4±9.7 |
| Medicaid, % | 60.1±18.8 | 70.6±15.7 | 69.0±16.0 | 68.0±17.8 | 62.0±18.7 |
| Percentage of racial/ethnic minority patients, % | 12.9±16.4 | 50.6±28.3 | 53.6±28.8 | 58.8±30.0 | 20.4±24.8 |
| Nurse hours per patient day for | | | | | |
| Registered nurse | 0.5±0.3 | 0.4±0.3 | 0.4±0.3 | 0.6±0.3 | 0.5±0.3 |
| Licensed practical nurse | 0.8±0.3 | 0.9±0.3 | 0.8±0.3 | 0.7±0.3 | 0.8±0.3 |
| Certified nursing assistant | 2.4±0.6 | 2.3±0.5 | 2.3±0.6 | 2.5±0.6 | 2.4±0.6 |
| Rural location | 27.6 | 13.9 | 8.9 | 4.8 | 24.6 |

* P<0.001 for comparisons of all characteristics across resident groups, based on analyses of variance for continuous variables and chi-square tests for categorical variables.

^aSeven types of activities of daily living were coded 0 (independence) to 4 (total dependence) for a total score of 0–28.

^bCoded 0 for being cognitively intact to 3 for severely impaired cognition.

PHQ-9 = 9-item Patient Health Questionnaire; SD = Standard Deviation.

Table 2Depressive symptoms (PHQ-9 score \geq 10) and associations with resident and nursing home characteristics

| | N | PHQ-9 score 10 unadjusted rate, % | Adjusted associations* | |
|------------------------|---------|---|------------------------|---------|
| | | | Odds ratio | P-value |
| Race and ethnicity | | | | |
| Non-Hispanic white | 653,031 | 8.8 | Ref. | |
| Black | 97,629 | 7.4 | 0.76 | <0.001 |
| Hispanic | 39,752 | 6.9 | 0.87 | <0.001 |
| Asian/Pacific Islander | 16,636 | 6.6 | 0.72 | <0.001 |
| Age group | | | | |
| 65–74 | 121,986 | 8.4 | 1.05 | 0.003 |
| 75–84 | 243,688 | 8.4 | 1.00 | 0.730 |
| 85 | 441,374 | 8.5 | Ref. | |
| Gender | | | | |
| Male | 229,538 | 8.5 | 0.98 | 0.114 |
| Female | 577,510 | 8.4 | Ref. | |
| Married | | | | |
| Yes | 160,677 | 9.3 | 1.03 | 0.006 |
| No | 646,371 | 8.3 | Ref. | |
| Interpreter needed | | | | |
| Yes | 30,937 | 8.0 | 0.95 | 0.226 |
| No | 773,205 | 8.5 | Ref. | |
| Cancer | | | | |
| Yes | 51,196 | 10.9 | 1.41 | <0.001 |
| No | 755,852 | 8.3 | Ref. | |
| Heart/circulation | | | | |
| Yes | 724,835 | 8.4 | 1.08 | <0.001 |
| No | 82,213 | 8.7 | Ref. | |
| Gastrointestinal | | | | |
| Yes | 285,198 | 8.6 | 1.12 | <0.001 |
| No | 521,850 | 8.4 | Ref. | |
| Genitourinary | | | | |
| Yes | 166,268 | 9.0 | 1.09 | <0.001 |
| No | 640,780 | 8.3 | Ref. | |
| Infections | | | | |
| Yes | 96,507 | 12.2 | 1.51 | <0.001 |
| No | 710,541 | 8.0 | Ref. | |
| Metabolic | | | | |
| Yes | 531,387 | 8.4 | 1.01 | 0.247 |

| | N | PHQ-9 score 10 unadjusted rate, % | Adjusted associations * | |
|--|---------|---|-------------------------|---------|
| | | | Odds ratio | P-value |
| No | 275,661 | 8.7 | Ref. | |
| Musculoskeletal | | | | |
| Yes | 358,734 | 8.6 | 1.01 | 0.258 |
| No | 448,314 | 8.3 | Ref. | |
| Neurological | | | | |
| Yes | 622,119 | 8.8 | 0.77 | <0.001 |
| No | 184,929 | 7.5 | Ref. | |
| Malnutrition | | | | |
| Yes | 29,630 | 11.1 | 1.46 | <0.001 |
| No | 777,418 | 8.4 | Ref. | |
| Pulmonary | | | | |
| Yes | 179,480 | 9.2 | 1.22 | <0.001 |
| No | 627,568 | 8.2 | Ref. | |
| Vision | | | | |
| Yes | 143,373 | 8.6 | 0.98 | 0.146 |
| No | 663,675 | 8.4 | Ref. | |
| Difficulties in activities of daily living (0–28) ^a | | | | |
| <20 | 366,458 | 5.5 | Ref. | |
| 20–28 | 440,590 | 10.9 | 1.80 | <0.001 |
| Cognitive function scale (0–3) ^b | | | | |
| 0 or 1 | 360,041 | 6.1 | Ref. | |
| 2 or 3 | 447,007 | 10.4 | 0.98 | 0.161 |
| Hallucinations | | | | |
| Yes | 15,803 | 20.5 | 1.53 | <0.001 |
| No | 791,245 | 8.2 | Ref. | |
| Delusions | | | | |
| Yes | 45,241 | 17.7 | 1.46 | <0.001 |
| No | 761,807 | 7.9 | Ref. | |
| Behavioral symptoms | | | | |
| Yes | 107,843 | 15.8 | 1.60 | <0.001 |
| No | 699,205 | 7.3 | Ref. | |
| Staff observation of mood | | | | |
| Yes | 227,168 | 15.4 | 3.07 | <0.001 |
| No | 579,880 | 5.8 | Ref. | |
| Nursing home bed number | | | | |
| <140 | 305,889 | 8.8 | Ref. | |
| 140 | 501,159 | 8.3 | 0.98 | 0.596 |
| Chain affiliation | | | | |

| | N | PHQ-9 score 10 unadjusted rate, % | Adjusted associations* | |
|---|---------|---|------------------------|---------|
| | | | Odds ratio | P-value |
| Yes | 430,899 | 7.8 | 0.92 | 0.006 |
| No | 376,149 | 9.2 | Ref. | |
| For-profit ownership | | | | |
| Yes | 554,324 | 8.6 | Ref. | |
| No | 252,724 | 8.2 | 0.98 | 0.650 |
| Occupancy rate | | | | |
| <85% | 293,541 | 8.6 | Ref. | |
| 85% | 513,507 | 8.4 | 1.08 | 0.020 |
| Case mix index | | | | |
| <1.3 | 382,955 | 8.1 | Ref. | |
| 1.3 | 424,093 | 8.8 | 1.02 | 0.567 |
| Medicare patient census | | | | |
| <15% | 530,568 | 8.9 | Ref. | |
| 15% | 276,480 | 7.6 | 0.93 | 0.046 |
| Medicaid patient census | | | | |
| <60% | 307,340 | 8.1 | Ref. | |
| 60% | 499,708 | 8.7 | 1.17 | <0.001 |
| Minority patient census | | | | |
| <20% | 534,381 | 8.9 | Ref. | |
| 20% | 272,667 | 7.6 | 0.87 | <0.001 |
| Registered nurse hours per patient day | | | | |
| <0.75 | 696,666 | 8.3 | Ref. | |
| 0.75 | 110,382 | 9.6 | 1.05 | 0.296 |
| Licensed practical nurse hours per patient day | | | | |
| <0.80 | 382,820 | 9.6 | Ref. | |
| 0.80 | 424,228 | 7.5 | 0.98 | 0.543 |
| Certified nursing assistant hours per patient day | | | | |
| <2.80 | 667,219 | 8.5 | Ref. | |
| 2.80 | 139,829 | 8.1 | 1.13 | 0.004 |
| Rural location | | | | |
| Yes | 198,177 | 9.0 | 1.08 | 0.030 |
| No | 608,871 | 8.3 | Ref. | |

* Multivariable random-effects logistic model adjusted for the clustering of residents in nursing homes; effects of state dummies are not shown in the table.

Racial and ethnic differences in depressive symptoms (PHQ-9 score 10) among long-term nursing home patients

Table 3

| Effect of race or ethnicity relative to white | African American | | Hispanic | | Asian/Pacific Islander | |
|---|------------------|--------|------------|--------|------------------------|--------|
| | Odds ratio | P | Odds ratio | P | Odds ratio | P |
| Model 0 ^a | 0.78 | <0.001 | 0.87 | <0.001 | 0.73 | <0.001 |
| Model 1 ^b | 0.79 | <0.001 | 0.85 | <0.001 | 0.69 | <0.001 |
| Model 2 ^c | 0.80 | <0.001 | 0.86 | <0.001 | 0.70 | <0.001 |
| Model 3 ^d | 0.73 | <0.001 | 0.83 | <0.001 | 0.67 | <0.001 |
| Model 4 ^e | 0.76 | <0.001 | 0.87 | <0.001 | 0.72 | <0.001 |

^aModel 0: no covariates but adjusted for the clustering of residents in nursing homes using random effects.

^bModel 1: model 0 plus resident socio-demographic covariates (age, male gender, marital status, interpreter needed).

^cModel 2: model 1 plus diagnoses of medical conditions (table 1).

^dModel 3: model 2 plus physical, cognitive, and behavioral impairments of the resident.

^eModel 4: model 3 plus nursing home covariates and state dummies.

Adjusted racial and ethnic differences in depressive symptoms (PHQ-9 score 10), by key resident and nursing home characteristics*

Table 4

| Effect of race or ethnicity (relative to non-Hispanic White) | Black | | Hispanic | | Asian/Pacific Islander | |
|--|--|---------|------------|---------|------------------------|---------|
| | Odds Ratio | P-value | Odds Ratio | P-value | Odds Ratio | P-value |
| Age group | | | | | | |
| 65–74 | 0.75 | <0.001 | 0.78 | <0.001 | 0.83 | 0.106 |
| 75–84 | 0.73 | <0.001 | 0.89 | 0.025 | 0.79 | 0.003 |
| 85 | 0.80 | <0.001 | 0.84 | <0.001 | 0.63 | <0.001 |
| Gender | | | | | | |
| Male | 0.77 | <0.001 | 0.82 | <0.001 | 0.73 | <0.001 |
| Female | 0.75 | <0.001 | 0.87 | <0.001 | 0.70 | <0.001 |
| Married | | | | | | |
| Yes | 0.72 | <0.001 | 0.80 | <0.001 | 0.72 | <0.001 |
| No | 0.77 | <0.001 | 0.87 | <0.001 | 0.72 | <0.001 |
| Interpreter needed | | | | | | |
| Yes | Model not estimable on the relatively small sample | | | | | |
| No | 0.75 | <0.001 | 0.83 | <0.001 | 0.79 | <0.001 |
| Difficulties in activities of daily living (0–28) ^a | | | | | | |
| <20 | 0.72 | <0.001 | 0.87 | 0.007 | 0.72 | 0.001 |
| 20–28 | 0.78 | <0.001 | 0.85 | <0.001 | 0.73 | <0.001 |
| Cognitive function scale (0–3) ^b | | | | | | |
| 0 or 1 | 0.68 | <0.001 | 0.88 | 0.021 | 0.73 | 0.001 |
| 2 or 3 | 0.79 | <0.001 | 0.85 | <0.001 | 0.71 | <0.001 |
| Staff observation of mood | | | | | | |
| Yes | 0.79 | <0.001 | 0.82 | <0.001 | 0.68 | <0.001 |
| No | 0.73 | <0.001 | 0.89 | 0.009 | 0.77 | 0.001 |
| Nursing home bed number | | | | | | |
| <140 | 0.73 | <0.001 | 0.81 | <0.001 | 0.67 | <0.001 |
| 140 | 0.79 | <0.001 | 0.92 | 0.076 | 0.77 | <0.001 |

| Effect of race or ethnicity (relative to non-Hispanic White) | Black | | Hispanic | | Asian/Pacific Islander | |
|--|------------|---------|------------|---------|------------------------|---------|
| | Odds Ratio | P-value | Odds Ratio | P-value | Odds Ratio | P-value |
| Chain affiliation | | | | | | |
| Yes | 0.73 | <0.001 | 0.83 | <0.001 | 0.68 | <0.001 |
| No | 0.80 | <0.001 | 0.91 | 0.020 | 0.77 | <0.001 |
| For-profit ownership | | | | | | |
| Yes | 0.74 | <0.001 | 0.87 | <0.001 | 0.71 | <0.001 |
| No | 0.80 | <0.001 | 0.86 | 0.044 | 0.76 | 0.007 |
| Occupancy rate | | | | | | |
| <85% | 0.70 | <0.001 | 0.87 | 0.005 | 0.81 | 0.013 |
| 85% | 0.79 | <0.001 | 0.88 | 0.001 | 0.69 | <0.001 |
| Medicaid patient census | | | | | | |
| <60% | 0.79 | <0.001 | 0.89 | 0.043 | 0.69 | <0.001 |
| 60% | 0.74 | <0.001 | 0.86 | <0.001 | 0.74 | <0.001 |
| Minority patient census | | | | | | |
| <20% | 0.79 | <0.001 | 0.92 | 0.153 | 0.72 | <0.001 |
| 20% | 0.73 | <0.001 | 0.85 | <0.001 | 0.73 | <0.001 |
| Registered nurse hours per patient day | | | | | | |
| <0.75 | 0.75 | <0.001 | 0.88 | <0.001 | 0.74 | <0.001 |
| 0.75 | 0.82 | <0.001 | 0.81 | 0.025 | 0.65 | 0.001 |
| Rural location | | | | | | |
| Yes | 0.64 | <0.001 | 0.78 | 0.007 | 0.79 | 0.123 |
| No | 0.78 | <0.001 | 0.89 | <0.001 | 0.73 | <0.001 |

* Multivariable random-effects logistic models on stratified samples adjusted for the clustering of residents in nursing homes, resident covariates, nursing home covariates, and state dummies.