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Association of Race, Ethnicity, Education, and Neighborhood Context with Dementia Prevalence and Cognitive Impairment Severity among Older Adults receiving Medicaid-funded Home and Community-based Services

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Abstract

Objectives: While racial, ethnic, and socioeconomic group disparities in cognitive impairment and dementia prevalence are well-documented among community-dwelling older adults, little is known about these disparity trends among older adults receiving Medicaid-funded home- and community-based services (HCBS) in lieu of nursing home admission. We determined how dementia prevalence and cognitive impairment severity compare by race, ethnicity, educational attainment, and neighborhood context in a Medicaid HCBS population.

Design/Setting: A cross-sectional study in Connecticut.

Participants: Adults age ≥65 in the HCBS program, January-March 2019 (N=3,520).

Measurements: The data source was Connecticut's HCBS program Universal Assessment tool. We employed two outcomes: Cognitive Performance Scale (CPS2), a 9-point measure ranging from cognitively intact-very severe impairment; and presence or not of either diagnosed dementia or CPS2 score ≥4 (major impairment). Neighborhood context was measured using the Social Vulnerability Index (SVI).

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Author contributions

Authors Fortinsky, Robison, and Steffens made substantial contributions to the conception and design of the work. All authors made substantial contributions to the acquisition, analysis, or interpretation of data for the work, as well as to drafting the work or revising it critically for important intellectual content. All authors gave final approval of the version to be published, and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Disclosure/conflict of interest

The authors report no conflicts with any product mentioned or concept discussed in this article.

Previous presentation

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Results: Cohort characteristics: 75.7% female; mean(sd) age=79.1(8.2); Non-Hispanic White=47.8%; Hispanic=33.6%; Non-Hispanic Black=15.9%. Covariate-adjusted multivariate analyses revealed no dementia/major impairment prevalence differences among White, Black, and Hispanic individuals, but impairment severity was greater among Hispanic participants (b=0.22; p=0.02). People with >HS education had less severe impairment (b=−.12; p<.001) and lower likelihood of dementia/major impairment (AOR=0.61; p<.001). Dementia/major impairment likelihood and impairment severity were greater in less socially vulnerable neighborhoods.

Conclusions: Racial and ethnic group differences in cognitive impairment are less pronounced in Medicaid-funded HCBS cohorts than in other community-dwelling older adult cohorts. SVI results suggest that, among other possible explanations, older adults with dementia may move to lower social vulnerability neighborhoods where supportive family members reside.

Objective

Alzheimer's disease and related dementia (ADRD) is an important risk factor for nursing home admission,[1] but little is known about ADRD among older adults in Medicaid home- and community-based service (HCBS) programs. The Medicaid HCBS population is growing rapidly throughout the United States due to the confluence of cost-effectiveness policies and Medicaid member preferences. Nationally over the past 25 years, the proportion of Medicaid long-term services and supports users receiving care in nursing homes has steadily declined, while the proportion receiving HCBS has steadily increased.[2] Older adults receiving Medicaid-funded HCBS also represent a growing segment of the dually eligible population, or those eligible for both Medicaid and Medicare. The dually eligible population, more than one-third of whom live in the community with ADRD, is widely known to generate disproportionate healthcare expenditures, and the use of HCBS is intended to help reduce the growth of these costs to the Medicaid and Medicare programs.[3,4] In addition to geriatricians, clinicians who provide geriatric mental health and neuropsychology services to older adults are uniquely qualified to provide services to the dually-eligible population with ADRD as part of broader efforts to reduce adverse outcomes in the dually-eligible population.[3,4]

Numerous studies of community-dwelling older adults in the United States have found that non-Hispanic Black and Hispanic older adults are disproportionately more likely than non-Hispanic White Americans to have ADRD, and these disparities have persisted over time.[5] Among possible explanations for these disparities are the overriding importance of lower levels of education as an independent risk factor for the risk of dementia,[6] and the influence of immigrant status as a moderator of the association between race/ethnicity and dementia prevalence.[7] However, patterns of racial and ethnic group ADRD prevalence and severity of cognitive impairment symptoms are poorly understood in Medicaid HCBS populations. Moreover, even if racial and ethnic group differences were found, it is not known whether differences would persist after controlling for level of formal educational attainment and other covariates, nor whether educational attainment is an independent risk factor for ADRD, in this target population.

Neighborhood context is a rapidly growing area of interest in the field of geriatrics due to widespread recognition of the role of social determinants of health in the context of health disparities for all segments of the population, including older adults.[8] Recent studies have found that poorer social determinants of health measures at the individual level[9] as well as at the neighborhood level[10] are associated with numerous adverse outcomes, including greater functional limitations, poorer self-rated health, lower likelihood of having a usual source of medical care, and lower active life expectancy. Investigations of brain health-related measures in community-dwelling older adults, found that residence in neighborhoods of greater disadvantage was associated with greater Alzheimer's disease neuropathology,[11] and greater cognitive decline and accelerated cortical degeneration.[12] We know very little about associations between neighborhood-level disadvantage and measures of dementia prevalence and cognitive impairment severity in populations of older adults receiving Medicaid-funded HCBS.

In this study, we aimed to address these questions, with the goal of informing clinicians most likely to manage patients with ADRD about trends in this understudied population of older adults living at home but receiving HCBS in order to avoid or delay nursing home admission. We determined how ADRD prevalence and severity of cognitive impairment were associated with older adults' racial and ethnic group identification and educational attainment, controlling for several covariates, in Connecticut's Medicaid HCBS program. We also studied how the degree of social vulnerability of the neighborhoods in which study participants reside is associated with ADRD. We hypothesized that: (1) Both Hispanic and non-Hispanic Black participants will have higher prevalence rates of ADRD and greater severity of cognitive impairment symptoms than non-Hispanic White individuals, after controlling for educational attainment, medical comorbidities, severity of depressive symptoms, and level of social vulnerability of their neighborhoods; (2) older adults with greater levels of educational attainment will have lower prevalence of ADRD and less severe cognitive impairment symptoms than those with lower levels of educational attainment, after controlling for race, ethnicity, and other covariates; (3) residence in neighborhoods of greater social vulnerability will be associated with higher prevalence of ADRD and greater severity of cognitive impairment symptoms, compared to residence in neighborhoods of less social vulnerability, controlling for race, ethnicity, educational attainment, and other covariates.

Methods

This study, supported by the National Institute on Aging, used a retrospective cohort design, and all analyses were cross-sectional. The study cohort included all clients aged 65 or older enrolled in Connecticut's Medicaid Home and Community Based Services (HCBS) Waiver program, known as the Connecticut Home Care Program for Elders (CHCPE), who had at least one initial, 6-month or annual clinical assessment completed between January 1, 2019 and March 31, 2019. In cases for whom more than one assessment had been completed, the most recent assessment within the three-month time frame was used for analytic purposes. The cohort included 3,520 unduplicated older adults. Trained care managers responsible for determining eligibility of older adults for the CHCPE conducted the assessments.

The source of clinical assessment data was the Connecticut Universal Assessment (UA) tool. Connecticut's UA is based on the interRAI-Home Care tool, with additional items included to assess clients for purposes specific to Connecticut's HCBS programs. The interRAI-HC is a well-tested and validated assessment tool designed to be used with a variety of home- and community-based populations and has been used in more than 20 states and several other countries.[13] The interRAI-Home Care tool includes a common core set of 70 items and specialized items specific to the home care setting. Examples of core items include cognitive skills for decision making, activities of daily living (e.g., personal hygiene, toilet use, eating), mood (e.g., negative statements, persistent anger, crying/tearfulness), behavior problems (e.g., verbal abuse, resisting care), falls, and health symptoms (e.g., pain frequency and intensity, fatigue).[14]

This study was approved by the Institutional Review Board at the University of Connecticut Health Center.

Measures

Outcomes

Alzheimer's Disease and related dementia prevalence measure: We constructed a measure of dementia for each individual based on either evidence of ADRD diagnosis, or a Cognitive Performance Scale 2 (CPS2) score of ≥4 on a scale from 0–8. As described further below, a CPS2 score of 4 (moderate impairment) corresponds to a mean Mini Mental Status Exam score of 17. The rationale for including a CPS2 score to augment a diagnosis of ADRD in this study is that ADRD is known to be under-diagnosed, especially in non-White racial and ethnic groups.[6] We wished to be as inclusive as possible in our operational definition of ADRD prevalence in this racially and ethnically diverse study cohort, even in the absence of a formal diagnosis.

The UA provided the data for documentation of ADRD diagnosis. Following the convention established for the interRAI-HC,[15] the UA includes two relevant diagnoses: "Alzheimer's disease" and "Dementia other than Alzheimer's disease". If either of these diagnoses is present, codes designate: (1) primary diagnosis for current episode of care; (2) diagnosis present, receiving active treatment; or (3) diagnosis present, monitored but no active treatment. In this study, if any of these codes are used for either "Alzheimer's disease" or for "dementia other than Alzheimer's disease", we assigned the diagnosis of ADRD.

In order to address the risk of under-diagnosis of dementia in non-White individuals, we used the CPS2 score, which is based solely on observable behavioral criteria, as an alternative means of measuring dementia. The CPS2 is derived from items in the interRAI-HC,[15] all of which are included verbatim in the Connecticut UA. CPS2 scoring is determined based on factors important for everyday living, including independence in decision-making, expressive communication, short-term memory, cognitively based instrumental activities of daily living (managing medications and managing finances), and walking ability.[13] Everyone in the Connecticut Medicaid HCBS program, regardless of racial or ethnic group heritage, is uniformly evaluated by trained assessors on these criteria that make up the CPS2. Moreover, assessors are matched with clients and informants based on common cultural background and language spoken at home, so that CPS2 information is captured with as few language and cultural barriers as possible. The resulting 9-point scale ranges from fully intact cognition (score of 0) to very severe cognitive impairment (score of 8). Developers of the CPS2 demonstrated in published validation work that mean Mini-Mental State Exam scores declined in linear fashion across all 9 categories of the CPS2; study participants who scored in Category 4 on the CPS2 were found in this validation study to have a mean MMSE score=17.[13] Therefore, for purposes of determining ADRD prevalence in the present study, an individual without a diagnosis was categorized as having ADRD if their CPS2 score was ≥4 on the 0–8 range.

Severity of cognitive impairment measure: This measure is based solely on the CPS2 score, whether or not a diagnosis is present, yielding a continuous measure of cognitive impairment severity.

Predictor variables

Race and Ethnicity: The UA provided data for self-reported ethnicity and race data. Individuals reported to assessors whether or not they considered themselves Hispanic or Latinx, and also whether their race was American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, and/or White. We grouped cohort members as non-Hispanic White, non-Hispanic Black, non-Hispanic Other, and Hispanic.

Educational Attainment: Educational attainment was self-reported in the UA with five possible categories: grammar school or less, middle school or some high school, high school diploma, post high school or some college, bachelor's degree or higher. For analysis, this variable was recoded to a three-category variable of less than high school education, high school diploma only, or more than high school education.

Age and Sex: Age was grouped into categories 65–74; 75–84; and ≥85. Sex was classified as female or male.

Depressive symptom severity: The UA provided the data for the documentation of a diagnosis of depression. Assessors coded a diagnosis of either major depression or a brief/minor depression. Following the convention established by interRAI-HC, depression was defined as "A mood disorder often characterized by a depressed mood (for example, the person feels sad or empty, appears tearful); decreased ability to think or concentrate; loss of interest or pleasure in usual activities; insomnia or hypersomnia; loss of energy; change in appetite; or feelings of hopelessness, worthlessness, or guilt. May also include thoughts of death or suicide".[15] The Connecticut UA manual defines a diagnosis of major depression "a mental disorder characterized by a pervasive and persistent low mood that is accompanied by low self-esteem and by a loss of interest or pleasure in normally enjoyable activities" and brief/minor depression as "episodes of at least two weeks of depressive symptoms but with fewer than the five items required for Major Depressive Disorder".[15] If either of these diagnoses is present, codes designate: (1) primary diagnosis for current episode of care; (2) diagnosis present, receiving active treatment; or (3) diagnosis present, monitored but no active treatment.[15] For analysis, a diagnosis of depression was recoded to three categories: no depression, minor or brief depression or major depression.

Charlson Comorbidity Index: We used the UA as the data source to extract the medical diagnoses needed to construct a Charlson Comorbidity Index (CCI).[16] The CCI score was based on presence or absence of sixteen medical diagnoses. For purposes of this study, the diagnosis of depression was not included in the CCI because depression is a unique independent variable in our analytic models.

Social Vulnerability Index: The Centers for Disease Control and Prevention's Social Vulnerability Index (SVI) was used as a neighborhood context measure to rank the social vulnerability of the census tract in which each individual lived compared to the social vulnerability of all other census tracts in Connecticut. The SVI provides a percentile ranking of each tract on 15 factors and groups them into four thematic domains: socioeconomic status, household composition and disability, minority status and language, and housing and transportation.[17] Each tract receives a percentile ranking for each domain and an overall ranking. Rankings range from 0.00 to 1.00, with 0.00 signifying least socially vulnerable census tracts and 1.00 signifying most socially vulnerable census tracts. For purposes of this study, we used the US Census Bureau's Geocoding Service to convert each individual's address and zip code to their 2020 Census Bureau FIPS code. Each individual's FIPS code was matched with the Connecticut-specific SVI database.[18]

Statistical Methods: Descriptive statistics were calculated for all variables and compared by study group. Categorical variables were compared using chi-square analyses and continuous variables were compared with t-tests or Mann-Whitney tests, as appropriate. The CDC SVI is an area-level measure which assigns all individuals in a census tract the same value. Subjects from the same census tract are considered a cluster of correlated data. The generalized estimating equations (GEE) approach with compound symmetry correlation structure was used to account for potential intraclass correlation. The large number of census tracts within which study cohort residents lived, or clusters, (n=638 census tracts; range of 1–71 cohort members lived within each census tract) satisfies the general requirements for GEE analysis (i.e., >200 clusters).[19] Generalized multivariate logistic regression was used for the binary outcome ADRD/CPS2 score (Y/N), and generalized linear regression for outcome CPS2 score, which was measured as a continuous variable. Both multivariate models included the following covariates: participant age group, gender, education, race/ethnicity, depression level, Charlson comorbidity index (excluding the depression portion), and SVI category. The GENMOD procedure in SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA) produced the statistical models. A two-sided alpha level of significance of 0.05 was used. To provide a measure of effect size associated with linear regression coefficients in the model where the CPS2 score is the dependent variable, we calculated a standardized effect size measure, Cohen's d, by dividing each regression coefficient by the standard deviation of the CPS2 score. We also reported an interpretation of these effect sizes as small, medium, or large, according to Cohen's longstanding recommendations.[20]

Results

Table 1 summarizes study cohort characteristics (N=3,520). Most cohort members were female; two-thirds were age 75 years or older. Nearly one-half the cohort were non-Hispanic White, one-third were Hispanic, and 16% were non-Hispanic Black. Of those in the non-Hispanic Other category, 79 (86%) were Asian. Almost one-half of the cohort had less than high school education, and one-third completed high school only. Cohort members had an average of three comorbidities other than ADRD or depression, 23% had brief or minor depression, and 17% had major depression. The mean value of 0.71 for the Social Vulnerability Index suggests that the distribution of census tracts in Connecticut in which cohort members reside is clustered toward the more socially vulnerable end of the range of values.

Table 2 summarizes results of multivariate logistic model analyses in which the dependent variable is whether or not study participants had ADRD based on medical diagnosis or by severity of cognitive impairment consistent with an ADRD diagnosis. Results indicated no statistically significant differences between Hispanic and non-Hispanic White older adults, or between non-Hispanic Black and non-Hispanic White individuals, in the likelihood of having ADRD. Those in the non-Hispanic Other category had 64% greater likelihood of having ADRD than non-Hispanic White participants. Likelihood of ADRD was 82% greater in those with less than high school education, and 51% greater in those with high school only education (Table 2) compared with those with more than high school education. Likelihood of ADRD also was greater among those with minor and major depressive symptom severity, each compared to those with no depressive symptoms, as well as among those with greater comorbidity burden.

Social Vulnerability Index results in Table 2 indicate that likelihood of ADRD generally decreased in Index categories signifying greater social vulnerability. Compared with residents residing in the least socially vulnerable census tracts where the Index was <0.60, residents residing in census tracts where the Index was 0.60–0.69 were 34% less likely to have ADRD. Residents living in the most socially vulnerable census tracts where the Index was 0.90–1.00 were 45% less likely than those in the least socially vulnerable census tracts to have dementia.

Table 3 shows results of multivariate linear model analyses in which the dependent variable is the severity of cognitive impairment, based on the CPS2 score for each study participant. Results indicate that, compared to non-Hispanic White program participants, Hispanic individuals had statistically significantly greater levels of cognitive impairment as did non-Hispanic Other individuals; effect sizes, however, reached the small range threshold only for non-Hispanic Others. No differences in cognitive impairment severity were observed between non-Hispanic Black and non-Hispanic White older adults. Individuals with less than high school education and those with high school education only showed more severe levels of cognitive impairment than those with more than high school education; both effect sizes were in the small range. Those with major depression had statistically significantly more severe cognitive impairment than those with no depression, although the effect size did not reach the small range threshold, and no difference in cognitive impairment severity was found between those with no depression and those with minor depression. Comorbidity burden was positively associated with cognitive impairment severity, but the effect size did not reach the small range threshold..

Social Vulnerability Index results in Table 3 show that, compared with those residing in least socially vulnerable census tracts (Index category <0.60), cognitive impairment severity was statistically significantly less severe in all Index categories except Index category 0.70–0.799. Effect sizes were in the small range for all statistically significant Index categories.

Conclusions

The current study, based on a statewide cohort of all older adults receiving Medicaid HCBS in lieu of nursing home admission during a three-month period in 2019, suggests that racial and ethnic group differences in dementia prevalence and severity of cognitive impairment in this target population are not as pronounced as in most published studies of community-dwelling older adults. We found no statistically significant differences between non-Hispanic White and non-Hispanic Black older adults in dementia prevalence or in cognitive impairment severity. Comparing Hispanic to non-Hispanic White individuals, we found no statistically significant difference in dementia prevalence, and although we found that Hispanic participants had statistically significantly more severe cognitive impairment than did their non-Hispanic White counterparts, the effect size for this difference fell below the small range threshold. The group of non-Hispanic older adults of other ethnic backgrounds, most of whom were of Asian American heritage, were statistically significantly more likely to have dementia and more severe cognitive impairment, with a small effect size, than non-Hispanic White older adults. We speculate that this finding might be due to Asian American caregivers, regardless of nationality, religion, and culture, strongly endorsing familism and filial obligations. Caregiving for older adults is a natural and expected stage among Asian Americans when older relatives cannot live independently.[21] Therefore, in this study cohort, it is possible that Asian American older adults receiving Medicaid-funded HCBS remain at home with dementia and more severe levels of cognitive impairment to a greater extent compared to other racial and ethnic groups due to the strong filial obligations of family caregivers to keep their relatives at home as long as possible. These speculations are made cautiously, however, given the relatively small number of Asians in the study cohort.

We also found that level of formal educational attainment was inversely associated with dementia prevalence and with cognitive impairment severity, as found in other studies of community-dwelling older adults; however, to our knowledge, this association has not been previously examined in a Medicaid home and community-based service program population.

These findings suggest that in older adult populations receiving Medicaid-funded HCBS services in lieu of nursing home residence, racial and ethnic disparities in dementia prevalence and cognitive impairment severity might be relatively attenuated due to the uniform eligibility criteria for nursing home admission regardless of racial or ethnic background. Additionally, Medicaid HCBS populations often have characteristics that reflect or are associated with lower socioeconomic status such as lower levels of education, greater likelihood of depression, and greater levels of social vulnerability, all of which might exert a leveling influence on effects of race and ethnicity on dementia prevalence and level of cognitive impairment. A recent study comparing Black and White older adults with predominantly low income found that racial differences in incident dementia were modified and attenuated by income level.[22] Implications of these findings are that dementia is equally prevalent across most racial and ethnic groups receiving Medicaid HCBS, services directed to older adults with dementia must be culturally tailored to account for racial and ethnic heterogeneity, and services must be equally tailored to the educational and literacy level of those receiving services.

Our findings of increased likelihood of ADRD among those with higher minor and major depressive symptom severity is consistent with prior studies.[23,24] Both minor (subsyndromal) and major depression increase risk for dementia among cognitively normal individuals.[25,26,27,28] Comorbid depression and cognitive impairment also increase dementia risk.[29,30] In the present study, our data are cross-sectional, so we cannot determine whether depression in this cohort increases ADRD risk among previously non-demented individuals. Clinical implications of these findings are that depression and dementia could be addressed and treated simultaneously, regardless of the racial and ethnic background of older adults receiving Medicaid HCBS.

When considering how clinical care could be improved for older adults with dementia and depression in this study's target population, it is important to note that Medicaid-funded HCBS do not include physician services of any type, nor neuropsychology services. However, care managers who help coordinate and arrange Medicaid-funded HCBS for their clients are also responsible for communicating with primary care providers about their clients' clinical needs. Care managers are in an ideal position to notify primary care providers about client needs related to cognition, although the extent to which they do so is unclear. Therefore, implications of our study findings are that, if more routinely notified by care managers, primary care providers could make referrals to geriatric psychiatrists and/or neuropsychologists more frequently to address and treat cognitive impairment along with depression. There is much room for improvement in making these referral links more explicit for the Medicaid HCBS population.

Finally, we unexpectedly found that dementia prevalence and severity of cognitive impairment were both inversely related to the degree of social vulnerability of neighborhoods in which cohort members resided. In other words, we found that ADRD prevalence was highest, and cognitive impairment most severe, in the *least socially vulnerable* census tracts. This inverse association is the opposite of findings from other recent studies that have used measures of neighborhood context to determine associations between neighborhood-level disadvantage and Alzheimer's disease neuropathology[11] and with cognitive decline and cortical changes in the brain.[12] Both prior studies found worse brain pathology and cognitive decline in individuals living in more highly disadvantaged neighborhoods.

Several potential explanations might account for this unexpected finding. First, it is possible that when older adults receiving Medicaid-funded HCBS develop ADRD or experience more severe cognitive impairment, they relocate to reside with other family members who live in less socially vulnerable neighborhoods. Second, there may be a selection effect by which older adults with dementia and their families in more socially vulnerable neighborhoods might not be as likely to access Medicaid-funded HCBS as their counterparts in less socially vulnerable areas due to lack of knowledge about program availability, or because families in more socially vulnerable areas prefer to provide care without formal services. Such a selection effect might result in more frequent long-term nursing home admissions among older adults with dementia living in more socially vulnerable areas without ever receiving Medicaid-funded HCBS. Finally, there may be a survivor effect, by which older adults with dementia in more socially vulnerable areas die before receiving HCBS, compared to their counterparts living in less socially vulnerable neighborhoods. All of these possible explanations are worthy of future research attention.

Study limitations included the use of a secondary data source that did not enable us to determine a clinically valid diagnosis of ADRD for each study participant, availability of data from a single state, and a relatively brief three-month time span for data acquisition (January-March 2019). Although a longer study time span would have strengthened the study, we were able to include all assessment data in the entire Medicaid HCBS population throughout the state from that three-month period. We also acknowledge that, because this was a pre-COVID pandemic study, results might be different using data during the pandemic period. Potential impacts of the pandemic on dementia prevalence and cognitive impairment severity in the Medicaid HCBS population is an important topic for future research.

Study strengths included focus on a growing but poorly understood segment of the older population using publicly funded home- and community-based services in lieu of nursing home residence with a high prevalence of dementia, a large sample size comprising the entire population of service users during a defined time period, an ethnically and racially diverse study cohort, and linkage of individual-level data with neighborhood-level data measuring social vulnerability and disadvantage. Findings have important implications for clinicians in geriatrics, geriatric psychiatry, and neuropsychology, and for Medicare and Medicaid policy initiatives intended to optimize independent living in the dually eligible older population.

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Highlights

What is the primary question addressed by this study? (1 sentence maximum)

How do dementia prevalence and cognitive impairment severity vary according to race, ethnicity, educational attainment, and neighborhood context in a population of older adults receiving Medicaid-funded home- and community-based services in lieu of nursing home care?

What is the main finding of this study? (2 sentence maximum)

Compared with non-Hispanic White individuals, Hispanic, but not non-Hispanic Black, individuals, had greater severity of cognitive impairment. Dementia prevalence and cognitive impairment severity were both greater among those with less than high school education, and both were greater among those living in neighborhoods that were less socially vulnerable.

What is the meaning of the finding? (1 sentence maximum)

Racial and ethnic group differences in dementia and cognitive impairment severity are less pronounced among older adults receiving Medicaid home- and community-based services than among other community-dwelling older adults, and older adults receiving these services may be more likely to move to lower social vulnerability neighborhoods where family members reside when they have dementia and more severe cognitive impairment.

Table 1.

Sample Characteristics (N= 3,520 unless otherwise specified)

Predictor variables	**N (%) or mean (SD)**
Age (years)	79.2 (8.2)
Age category (years)	
64–74	1174 (33.4%)
75–84	1377 (39.1%)
85+	969 (27.5%)
Sex	
Female	2664 (75.7%)
Male	856 (24.3%)
Race/Ethnicity (n=3,436)	
Hispanic or Latino	1154 (33.6%)
Non-Hispanic Black	548 (15.9%)
Non-Hispanic White	1642 (47.8%)
Non-Hispanic Other	92 (2.7%)
Education Level (n=3,398)	
Less than high school	1535 (45.2%)
High school	1125 (33.1%)
Beyond High School	738 (21.7%)
Social Vulnerability Index (census tract of residence mean SVI score (SD); n=3,232)	0.71 (0.24)
Social Vulnerability Index (census tract SVI score categories; n (%) of cohort members living within each census tract category; n=3,232	
0.0073 – 0.599	880 (25%)
0.6– 0.699	438 (12.4%)
0.7– 0.799	431 (12.2%)
0.8– 0.899	617 (17.5%)
0.9– 1.0	866 (24.6%)
Depressive symptom severity	
No depression	2104 (59.8%)
Brief or Minor Depression	818 (23.2%)
Major Depression	598 (17.0%)
Charlson Comorbidity Index	3.37 (1.96)
Dependent Variables	
Cognitive Performance Scale	2.67 (1.85)
Dementia (based on diagnosis of AD or other dementia or CPS2≥4)	
Not Present	2250 (63.9%)
Present	1270 (36.1%)

Table 2.

Multivariate Analysis Results[*]: Predictors of Likelihood of Any Dementia Diagnosis or Moderate-Very Severe Cognitive Impairment (N=3,092)

Predictor Variable	df	Chi-Square	Adjusted Odds Ratio (95% Confidence Interval)	p-value
Sex	1	3.91		
Male (vs. Female)			1.20 (1.00–1.43)	0.05
Age group	2	92.36		<0.001
Age 65–74 (vs. Age 85+)			0.33 (0.27–0.40)	<0.001
Age 75–84 (vs. Age 85+)			0.53 (0.44–0.63)	<0.001
Racial and ethnic group	3	7.13		0.068
Non-Hispanic Black (vs. White)			1.05 (0.83–1.32)	0.68
Hispanic (vs. White)			1.22 (0.97–1.53)	0.08
Non-Hispanic other groups (vs. White)			1.64 (1.00–2.68)	0.05
Educational level	2	24.45		<0.001
< High school (vs. > High school)			1.82 (1.45–2.28)	<0.001
High school only (vs. > High school)			1.51 (1.21–1.89)	< 0.001
Depressive symptom severity	2	13.08		0.001
Minor depression (vs. no depression)			1.27 (1.05–1.53)	0.01
Major depression (vs. no depression)			1.44 (1.16–1.78)	<0.001
Comorbidity burden	1	48.80	1.18 (1.13–1.22)	<0.001
Social Vulnerability Index scorecategory	4	24.81		<0.001
0.60–0.699 (vs. < 0.60)			0.66 (0.50–0.85)	0.002
0.70–0.799 (vs. <0.60)			0.75 (0.55–1.02)	0.06
0.80–0.899 (vs. <0.60)			0.63 (0.48–0.83)	0.001
0.90–1.00 (vs. <0.60)			0.55 (0.43–0.69)	<0.001

[*] We used a Generalized Estimating Equations (GEE) for binary outcomes approach to account for potential intraclass correlation. There were 638 clusters (census tracts) with a range of 1–71 cohort members per census tract.

Table 3.

Multivariate Analysis Results[*]: Predictors of Cognitive Impairment Severity based on Cognitive Performance Scale (CPS2) (N=3,092)

Predictor Variable	df	Regression coefficient (SE)	Chi-Square	P-value	Effect size[**]	Effect size meaning[***]
Sex, Male	1	0.14 (0.07)	3.46	0.06	0.07	ns
Age group	2		95.38	<0.001		
Age 65–74		−1.00 (0.08)		<0.001	0.54	M
Age 75–84		−0.66 (0.09)		<0.001	0.36	S
Age 85+ (reference)		n/a				
Racial and ethnic group	3		11.47	<0.01		
Non-Hispanic Black		0.04 (0.10)		0.72	0.02	ns
Hispanic		0.22 (0.09)		0.02	0.12	ns
Non-Hispanic other groups		0.49 (0.21)		0.02	0.26	S
White (reference)		n/a				
Educational level	2		31.27	<0.01		
< High school		0.55 (0.09)		<0.001	0.3	S
High school only		0.41 (0.08)		< 0.001	0.22	S
> High school (reference)		n/a				
Depressive symptom severity	2		8.22	0.02		
Minor depression		0.10 (0.08)		0.17	0.06	ns
Major depression		0.27 (0.09)		0.003	0.14	ns
No depression (reference)		n/a				
Comorbidity burden	1	0.06 (0.02)	12.55	<0.001	0.03	ns
Social Vulnerability Index category	4		21.25	<0.01		
0.90–1.00		−0.51 (1.12)		<0.001	0.27	S
0.80–0.899		−0.40 (0.12)		0.001	0.22	S
0.70–0.799		−0.18 (0.13)		0.17	0.1	ns
0.60–0.699		−0.42 (0.13)		<0.001	0.23	S
< 0.60 (reference)		n/a				

[*] We used a Generalized Estimating Equations (GEE) approach to account for potential intraclass correlation. There were 638 clusters (census tracts) with a range of 1–71 cohort members per census tract.

[**] Effect size calculated by dividing the regression coefficient by the CPS2 standard deviation of 1.85.

[***] Effect size meaning based on Cohen’s (1988) suggested benchmarks for small (S; 0.20–0.49), medium (M; 0.50–0.79), and large (≥ 0.80) effect sizes. Reference: Cohen J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. New York, NY: Routledge Academic.