Decomposing Racial and Ethnic Disparities in Risk and Protective Factors of Dementia in the U.S.

Nasim B. Ferdows, PhD[a,b*], María P. Aranda, PhD[c]

a. Department of Department of Public Health and Health Sciences, Bouvé College of Health Sciences, Northeastern University, 801 NE 13th Street 360 Huntington Ave, Boston, MA 02115
b. School of Public Policy and Urban Affairs, College of Social Sciences and Humanities, Northeastern University, Boston, MA
c. USC Edward R. Roybal Institute on Aging, USC Suzanne Dworak-Peck School of Social Work, University of Southern California, 669 W 34th Street, Los Angeles, CA 90089

Corresponding author: Nasim B. Ferdows
Department of Department of Public Health and Health Sciences, Bouvé College of Health Sciences, Northeastern University
801 NE 13th Street 360 Huntington Ave, Boston, MA 02115
Email: n.ferdows@northeastern.edu

Keywords: Cognitive Functioning, Lifespan, Racial/Ethnic Disparities, Blinder-Oaxaca Decomposition

Funding Disclosures

María P. Aranda, PhD was supported by the National Institute on Aging (NIA) under Award Numbers U54AG063546, P30AG066530, and Nasim B. Ferdows was supported by the NIA under Award Number P30AG043073.

Role of the Funder/Sponsor: The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

ABSTRACT

Objectives: This study investigates racial/ethnic disparities in dementia risk and protective factors using data from the Health and Retirement Study (HRS) and the Harmonized Cognitive Assessment Protocol (HCAP).

Methods: A retrospective analysis of 3,495 individuals aged 65+ from the 2016 HCAP linked to the HRS was conducted. Cognitive status was assessed using the Mini-Mental State Examination (MMSE) scores. Risk factors included midlife cardiovascular conditions, hearing loss, current smoking, depression, and physical inactivity. Protective factors were education and wealth. The Oaxaca-Blinder decomposition method was used to quantify the contribution of these factors in explaining racial/ethnic disparities in cognitive functioning.

Results: Black participants had 2.883 times higher odds of developing dementia compared to Whites, while Hispanic participants had 1.230 times higher odds (not statistically significant). Mid- and late-life risk and protective factors explained 32% of the cognitive gap between Black and White participants, and 70% between Hispanic and White participants, leaving 68% and 30% unexplained, respectively.

Conclusions: Addressing disparities in education, wealth, cardiovascular risks, depression, and hearing loss can reduce cognitive dysfunction in older adults.

Clinical Implications: Clinicians should target modifiable risk factors like depression and physical inactivity, particularly in minority populations. Addressing socioeconomic disparities is also crucial for improving cognitive health.

Keywords: Cognition, dementia, racial/ethnic, disparities, risk factors, protective factors

Data availability statement

The data that support the findings of this study are available from the University of Michigan at https://hrs.isr.umich.edu. Collection of these data were supported by the National Institute on Aging (NIA U01AG009740) and the Social Security Administration.

INTRODUCTION

Along with physical decline, a decline in cognitive functioning is associated with aging and is predictive of mortality. Declining cognitive functioning frequently results in functional impairment and disability.(McGuire et al., 2006) Recent population-based studies suggest that improved population cardiovascular health and rising levels of education in the past 25 years were associated with a reduction of dementia risk in the US.(Bancks et al., 2019) Although cognitive functioning among older adults in the US has improved over time(Bancks et al., 2019) and dementia incidence and prevalence has declined in the last couple of decades,(Derby et al., 2017; Satizabal et al., 2016; Wolters et al., 2020) the number of Americans aged 65 and older with Alzheimer's dementia is projected to increase from 6.2 million in 2021 to 12.7 million by 2050(Association, 2021) The cost of care for Alzheimer's and other dementias is projected to increase from $355 billion to $1.1 trillion over this same period.(Association, 2021)

Lifestyle factors play a crucial role in an individual's risk of developing dementia.(Livingston et al., 2017) While non-modifiable risk factors such as older age and lower levels of early education contribute to the risk,(Bancks et al., 2019; Zhu et al., 2018) modifiable lifestyle factors, including cardiovascular disease-related factors (e.g., physical inactivity, diabetes, obesity, smoking, hypertension, and high cholesterol), as well as hearing loss and depression, have been identified as significant contributors to dementia risk.(Bachman et al., 2003; Livingston et al., 2020; Livingston et al., 2017; Sol et al., 2020) Furthermore, there are notable variations in the prevalence and management of chronic diseases and behaviors associated with poor cardiovascular health among different racial and ethnic groups. Racial/ethnic disparities in dementia prevalence have been well-documented, with studies consistently demonstrating a higher risk of dementia among Black and Hispanic individuals

compared to Whites.(Chen & Zissimopoulos, 2018; Manly et al., 2022; Mehta & Yeo, 2017; Rovner et al., 2018), and a narrowing disparities in neurodegenerative diseases incidence.(Lusk et al., 2023)

Lower educational attainment has been identified as a potential driver of these disparities, particularly among racial and ethnic minorities. Educational disparities(Amariglio et al., 2020; McDougall Jr et al., 2007; Shadlen et al., 2006) have been associated with an increased risk of dementia, with findings suggesting that the higher prevalence of dementia among racial and ethnic minorities may be partially attributed to lower education levels, particularly among Blacks and Hispanics.(Rodriguez et al., 2018) According to another study, it was found that years of education had a significant impact on reducing the odds of cognitive impairment and dementia across different race/ethnicity groups.(Garcia et al., 2018) Other factors such as age, income level, and neurocognitive function have also been implicated in racial and ethnic differences in dementia risk.

In this study, our original contribution is twofold. First, we extend prior work with by using a nationally representative and longitudinal dataset to quantify mid- and late-life risk and protective factors that are associated with dementia in later life. Second, we employ Oaxaca-Blinder decomposition to decompose racial/ethnic disparities in lifespan characteristics associated with cognitive performance. This approach provides a novel framework for quantifying the proportion of disparities explained by measurable factors versus those that remain unexplained, addressing structural and unmeasured influences on cognitive disparities. By investigating these factors, this study seeks to enhance our understanding of the complex relationships between risk factors, racial/ethnic disparities, and cognitive decline in older adults,

with the goal of informing interventions and policies to promote brain health and reduce cognitive disparities in the population.

METHODS

Data

This study utilized data from the 2016 Harmonized Cognitive Assessment Protocol (HCAP)(Weir et al.), a cohort within the Health and Retirement Study (HRS). The HRS is a nationally representative, biennial, longitudinal survey focusing on individuals aged 51 years or older in the US. It collects information on various aspects such as health, cognition, disability, work, and economic status of Americans. HRS provides a core resource for researchers who require US population-level data on risk factors, care, cost, and other outcomes associated with dementia. The protocol, methods, and consent procedures for the original study were approved by the University of Michigan Institutional Review Board (IRB).

The entry cohort of the HCAP data consisted of a random selection of 5500 individuals from the wave 13 of HRS panel in 2016, with 3496 completing HCAP interviews. HCAP provides in-depth data on participants based on their prior participation in HRS waves. Details of HCAP have been previously published.(David et al., 2014; Richard N Jones et al., 2024; R. N. Jones et al., 2024; Langa et al., 2020) We also linked the data to the RAND-HRS dataset, which offers a clean and user-friendly version of the HRS data, including derived measures for total annual income, wealth, and other key variables.

Study population

Linking HCAP to HRS, we traced 3496 HCAP participants back to 2000 (9 waves) to capture their midlife characteristics. We restricted our sample to non-Hispanic White, non-Hispanic Black, and Hispanic adults aged 65 and older. We excluded 76 respondents who

identified as other, as well as 149 individuals with missing Mini-Mental State Examination (MMSE) score information. Our analytic sample included 3271 individuals (72.85% non-Hispanic Whites, 16.05% non-Hispanic Blacks, and 11.10% Hispanics).

Dementia measures and outcomes

In this study, cognitive functioning was assessed using the Mini-Mental State Examination (MMSE) score, a widely recognized and the most famous global measure of cognitive function and dementia.(Nichols et al., 2024) The MMSE, introduced in the HRS study within the HCAP subsample, consists of 22 questions assessing various cognitive domains: 10 questions on orientation, 8 on language, and one each on registration, memory, spelling backward, and construction. Scores ranges from 0 to 30, with higher scores indicating better cognitive functioning. Based on the HCAP test selection criteria, we applied established cut points from prior studies to classify cognitive status: scores above 25 indicate *healthy cognition*, scores of 18-24 indicate *mild cognitive impairment (MCI)*, and scores below 17 indicate *dementia*.(David et al., 2014)

While the HRS primarily uses the modified Telephone Interview for Cognitive Status (TICS) to assess cognition (Crimmins et al., 2011; Langa et al., 2017), this measure is particularly sensitive when applied to racial/ethnic minority populations, potentially leading to an over-identification of cognitive impairment and dementia in these groups.(Gianattasio et al., 2019). In contrast, the MMSE, is administered through in-person interviews in HCAP, facilitates cross-national comparisons and provides a more detailed assessment of cognitive functioning. To ensure validity, we compared MMSE-based classifications with TICS-based classifications (see Supplemental Table 1), finding consistent results across measures. This further supports the use of the MMSE as a robust cognitive assessment tool within the HRS population.

Midlife characteristics were derived from the HRS and included history of various cardiovascular risk factors, such as hypertension, stroke, heart disease, obesity, alcohol misuse, and uninsurance, from 2000 to 2014. Alcohol misuse was defined according to the National Institute on Alcohol Abuse and Alcoholism definitions using criteria for "heavy alcohol use" based on gender and frequency of consumption.(Health & Services, 2022) History of alcohol misuse was identified for individuals who met the criteria for heavy drinking in any year from 2000 to 2014. Hearing loss was assessed through participant self-assessment and the use of a hearing aid, resulting in two measures: history of wearing a hearing aid and self-reported fair or poor hearing with or without a hearing aid from 2000 to 2014.

Late-life (current) characteristics included smoking status, household wealth, depression, and physical inactivity—all measured in the last wave of data. Smoking status was categorized as “never,” “former,” or “current smoker.” Household wealth was categorized as “less than 53 000,” “53 001-178 000,” “178 001-470 000,” and “more than 470 001.”(Chen & Zissimopoulos, 2018)

Depressive symptomology in the HCAP cohort was evaluated using the Center for Epidemiological Studies Depression Scale (CESD). The CESD score is calculated by summing the responses to five negative indicators (reflecting symptoms such as feeling depressed, having difficulty with tasks, restless sleep, loneliness, and sadness) and subtracting the responses to two positive indicators (representing feelings of happiness and enjoyment of life). Scores on the CESD range from 0 to 10, with higher scores indicating a higher presence of depressive symptoms. To categorize individuals as depressed, we considered a score above 3 as the threshold.(Stephanie & Herzog, 2004)

Physical inactivity was derived by combining measures of current physical activity (light, moderate, or vigorous) and exercise (every day, more than once per week, 1-3 times per month, or never). Combining the severity and frequency measures, we categorized an individual as inactive if the person reported having less than once a week of all 3 types of physical activities during a month.(Hong et al., 2023; Wei et al.)

Demographic variables included age groups, gender, race/ethnicity, and mutually exclusive indicators for non-Hispanic Whites, non-Hispanic Blacks, and Hispanics—referred to Whites, Blacks and Hispanics henceforth. We also included current insurance status: only Medicare, Medicare and Medicaid, Medicare and Private, and other or no insurance.

Statistical analysis

In descriptive analysis, we used HRS sampling weights and reported weighted percentages (Table 1). Sampling weights were applied to account for the complex survey design and to ensure that estimates are nationally representative. We further investigated gender-specific racial/ethnic differences associated with cognitive functioning scores, employing HRS sampling weights and reporting confidence intervals to identify statistically significant differences (Figure 1).

To examine the association between risk and protective factors of dementia across the lifespan, we conducted multivariable logistic regression analyses. The binary outcome was whether the individual has normal cognition and the reference group included those with dementia or mild cognitive impairment (MCI). These analyses accounted for the complex design of the HRS, incorporating appropriate sampling weights to ensure accurate inferences and generalizability to the non-institutionalized American population aged 65 and older. Four regression specifications were employed, progressively adding explanatory variables to the

equation. The baseline regression included race/ethnicity indicators and sociodemographic variables (Model 1). The second specification included midlife characteristics (Model 2), and the third specification added late-life characteristics (Model 3). Additionally, we conducted a specification test that considered current insurance status while excluding the history of being uninsured, due to potential collinearity (Model 4) (Table 2).

To assess the extent to which observable characteristics explain variation in cognitive functioning scores, we performed Oaxaca-Blinder decomposition by racial/ethnic groups.(Blinder, 1973; Jann, 2008; Oaxaca, 1973; Sinning et al., 2008) This method utilized stratified linear regression, stratified by racial/ethnic category, to disaggregate differences in cognitive functioning scores. The decomposition separated observed characteristics (endowment) from unexplained differences (coefficients). By applying one racial/ethnic group's characteristics to coefficients estimated using a different racial/ethnic group's subsample, we quantified the extent to which differences in characteristics contribute to the cognitive functioning score disparity. The unexplained portion is used as a measure of disparity, but it is important to recognize that it also captures all the potential effects of differences in unobserved variables (Supplement A). Oaxaca-Blinder decomposition is a widely used approach in studying disparities, including racial/ethnic and rural/urban disparities (Supplement A).(Angrisani et al., 2021; Spencer et al., 2018)

RESULTS

Sample description

Table 1 presents the characteristics of the HCAP cohort stratified by race/ethnicity. White participants had a slightly higher mean age, a lower proportion of females, and higher education levels. Black participants exhibited higher midlife prevalence rates of hypertension, stroke, and

obesity, whereas Whites had a higher prevalence of heart disease. Hispanic participants demonstrated higher rates of poor hearing, lack of hearing aid use, and uninsured status. Current risk factors revealed higher smoking rates and physical inactivity among Black individuals, and a higher prevalence of depression among Hispanic individuals.

Figure 1 Panels A, B, and C illustrate the contributions of age, education, and wealth to cognitive functioning disparities across racial/ethnic groups by gender. Panel A shows that cognitive functioning declines with age across all groups, with White participants consistently scoring higher than Black and Hispanic participants. Panel B highlights the positive association between education and cognitive scores, with greater educational attainment mitigating disparities but not fully closing the gap. Panel C demonstrates that higher wealth is associated with better cognitive functioning, yet significant racial/ethnic differences persist even among those in higher wealth categories. Together, these panels underscore that while age, education, and wealth are important contributors to cognitive functioning, racial/ethnic disparities remain evident across all levels of these factors.

Risk and protective factors for dementia

Column 1 of Table 2 shows that after accounting for sociodemographic characteristics, Black and Hispanic participants had higher odds of dementia compared to White participants (3.6, $p<0.01$ and 1.547, $p<0.05$, respectively). Having a high school education or more was associated with lower odds of dementia compared to individuals with no high school education (odds ratios of 0.3 and 0.1, respectively). When considering midlife characteristics, a history of stroke and alcohol misuse were associated with higher odds of developing dementia. Surprisingly, individuals wearing a hearing aid who had experienced hearing loss in midlife also

had increased odds of dementia. Considering late-life characteristics, both depression and physical inactivity were associated with increased odds of dementia. Notably, physical inactivity had the most prominent effects among all lifespan factors examined.

Racial/ethnic disparities in dementia

Table 3 presents the results of the Oaxaca-Blinder decomposition, analyzing the mean predictions, observed gap, and the decomposition of cognitive functioning scores by race/ethnicity. White participants had a mean cognitive functioning score that was 2.1 points higher than Black participants. Around 32% of this difference was explained by demographics and late-life characteristics. These characteristics are grouped under the endowments term, which shows that if Black participants had the same demographic, midlife, and late-life characteristics as White participants, their cognitive functioning score would increase by 0.6 points. This reflects the portion of the cognitive gap attributable to measured characteristics.. The remaining 68% of the gap is unexplained, indicating differences that cannot be attributed to measured characteristics. The coefficients term indicated that if Black participants had the same returns (or effects of characteristics) as those observed in White participants, their cognitive functioning scores would increase by 1.4 points. The interaction term, which captures the combined effect of differences in characteristics and returns, was not found to be significant, indicating that simultaneous differences in these two dimensions did not contribute meaningfully to the gap.

When comparing White and Hispanic participants, the mean cognitive functioning score for White participants was 1.8 points higher than for Hispanic participants. Demographics and late-life characteristics accounted for approximately 70% of this difference, while about 30% remained unexplained. The increase of 1.3 points suggested that differences in demographics, midlife, and late-life characteristics explained around 70% of the cognitive functioning

difference. The coefficients term indicated that if Hispanic participants had the same demographic, midlife, and late-life characteristics as those observed in White participants, their cognitive functioning scores would increase by 0.6 points.

Sensitivity analysis

To validate the use of the MMSE score as a continuous measure in the Oaxaca-Blinder decomposition, we conducted multivariate ordinary least squares regression using sampling weights. The results were consistent with the previous findings using the discrete outcome measure, demonstrating the robustness and comparability of the results (Supplemental Table 2).

We initially performed a sensitivity analysis to explore the potential impact of traumatic brain injuries (TBI) as a risk factor for dementia. However, due to the limited sample size, with only 224 individuals completing the TBI questionnaire out of the matched HCAP respondents, and insufficient statistical power, this analysis was not included in the final manuscript.

Furthermore, we compared Hispanic and Black participants and performed an Oaxaca-Blinder decomposition analysis. When comparing cognitive functioning between Black and Hispanic participants (Supplemental Table 3), no statistically significant differences in mean cognitive scores were observed (mean difference: -0.32, p=0.37). The Oaxaca-Blinder decomposition showed that demographic characteristics accounted for 67% of the observed difference. However, a significant portion (-1.1 points) was attributed to unexplained differences in coefficients, indicating potential disparities in how characteristics impact cognitive outcomes across these groups.

DISCUSSION

Our study extends the existing literature on racial/ethnic disparities in cognitive functioning by applying Oaxaca-Blinder decomposition to quantify the contributions of

measurable factors and unexplained influences. This approach provides a novel framework for addressing disparities and identifying opportunities for targeted interventions. Thus, this study is the first to investigate racial/ethnic disparities in dementia risk and protective factors throughout mid- and late-life, utilizing a large, nationally representative survey of Americans aged 65 and older. The study reveals four key findings: (1) Higher levels of education and wealth were associated with reduced odds of dementia. (2) Midlife factors such as stroke and hearing loss, as well as late-life factors including depression and physical inactivity, were linked to an increased likelihood of dementia. (3) After accounting for sociodemographic, midlife, and late-life characteristics, Black participants exhibited the highest odds of developing dementia, followed by Hispanic and White participants. (4) The Oaxaca-Blinder decomposition analysis revealed that approximately 68% of the disparity in cognitive functioning scores between Black and White participants remained unexplained, even after considering demographics and late-life factors. Additionally, when comparing White and Hispanic participants, nearly 30% of the disparity in their cognitive functioning scores remained unexplained after accounting for demographics and late-life characteristics.

Risk and protective factors for dementia

Our analysis identified several risk and protective factors for dementia. Midlife cardiovascular risk factors, such as a history of stroke and hearing loss, along with late-life factors like depression and physical inactivity, were found to increase the odds of dementia. Conversely, higher educational attainment and wealth were associated with a lower risk of dementia. These findings align with previous research highlighting the impact of cardiovascular health and lifestyle factors on dementia risk.(Livingston et al., 2020; Whitmer et al., 2005;

Whitmer et al., 2008) However, contrary to some prior studies, we did not observe a significant association between midlife obesity and dementia risk.

Regarding late-life characteristics, our results support previous findings that link depressive symptoms to a faster decline in memory(Livingston et al., 2020; Livingston et al., 2017; Sol et al., 2020) and report a decreased risk of dementia with increased physical activity.(Marioni et al., 2015) Furthermore, physical inactivity was associated with higher odds of dementia.(Livingston et al., 2020; Livingston et al., 2017) Although smoking has been linked to dementia in previous studies,(Bachman et al., 2003; Livingston et al., 2020; Livingston et al., 2017) we did not find a significant association, although current smokers did exhibit higher odds of dementia compared to former or never smokers.

Racial/ethnic disparities in cognitive functioning

Prior research consistently demonstrates that Black and Hispanic older adults have a higher prevalence, incidence, and risk of dementia compared to White older adults.(Chen & Zissimopoulos, 2018; Farina et al., 2020; Manly et al., 2022; Rovner et al., 2018; Weuve et al., 2018) Even after accounting for sociodemographic, risk, and protective factors, racial/ethnic disparities in dementia persist. (Chen & Zissimopoulos, 2018; Farina et al., 2020; Sol et al., 2020; Weuve et al., 2018) Most studies report that lower educational attainment (Amariglio et al., 2020; Garcia et al., 2018) and higher risk factors(Levine et al., 2020) among Black and Hispanic populations contribute to lower cognitive function and higher dementia rates compared to Whites. However, 68% of the disparity between Black and White participants and 30% of the disparity between Hispanic and White participants remained unexplained. Unexplained differences in cognitive functioning among Black and Hispanic participants compared to Whites may be attributed to structural racism, perceived discrimination, and healthcare stereotypes.

Other factors such as pollution, environmental/chemical exposures, and biological factors may also contribute to these disparities. Measurement error, particularly in self-reported measures and the cognitive test used to assess dementia, poses limitations in our study. While self-reported health is generally reliable, the accuracy of self-reported disease incidence and functioning may vary. Additionally, the complex relationships between educational attainment, midlife factors, and cognitive functioning could not be fully explored due to the nature of the Oaxaca-Blinder decomposition method used. Furthermore, the dementia measure used in this study is based on a cognitive test and is therefore subject to measurement error. Measurement error may vary across racial/ethnic groups and may be more notable for Blacks and Hispanics if correlated with factors such as educational attainment (Figure 1). However, we controlled for other factors that might be associated with this type of measurement error.

The comparison between Black and Hispanic participants highlights unique patterns in cognitive disparities. While demographic characteristics, such as age and education, partially explain differences, the unexplained portion underscores the potential role of cultural, environmental, or unmeasured factors in shaping cognitive outcomes. These findings suggest that interventions targeting social determinants of health may be particularly effective in addressing disparities within and across minority groups.

This study builds upon earlier preliminary findings presented at the Gerontological Society of America (Ferdows & Aranda, 2022), where initial results were shared as part of a scientific abstract. The current manuscript significantly expands on those findings by employing decomposition analyses to quantify disparities and integrating additional data and methodological rigor to address these disparities.

CONCLUSIONS

Declining cognitive functioning in late life results in functional impairment and disability. Our analysis indicates that differences in sociodemographic, midlife, and late-life risk and protective factors for dementia explained a substantial proportion of the difference in cognitive functioning of older adults of different racial/ethnic groups. These findings provide information for prioritizing the development of public health interventions and resource allocations to optimize the cognitive health of all racial/ethnic groups of future generations. The information can inform the development of targeted interventions, health promotion strategies, and policies aimed at reducing dementia risk and improving cognitive health outcomes, particularly among marginalized populations.

CLINICAL IMPLICATIONS

Targeted Prevention: Clinicians should prioritize interventions for older Black and Hispanic adults to reduce modifiable risk factors like depression, cardiovascular conditions, and physical inactivity, which are associated with higher dementia risk.

Education and Wealth: Increasing educational attainment and addressing socioeconomic disparities may significantly reduce cognitive dysfunction and dementia risks, particularly in minority populations.

Unexplained Disparities: Clinicians should be aware that a significant portion of dementia risk in Black and Hispanic populations remains unexplained, indicating the potential influence of structural and social determinants of health.

ACKNOWLEDGEMENT

Aliya Kitsakos, MPA of Northeastern University and Heather R. Hollen, MS, of the University of Oklahoma Health Sciences Center contributed to the editing of the manuscript.

REFERENCES

Amariglio, R. E., Buckley, R. F., Rabin, J. S., Papp, K. V., Quiroz, Y. T., Mormino, E. C., Sparks, K. P., Johnson, K. A., Rentz, D. M., & Sperling, R. A. (2020). Examining Cognitive Decline Across Black and White Participants in the Harvard Aging Brain Study. *J Alzheimers Dis*, *75*(4), 1437-1446. https://doi.org/10.3233/jad-191291

Angrisani, M., Barrera, S., Blanco, L. R., & Contreras, S. (2021). The racial/ethnic gap in financial literacy in the population and by income. *Contemporary Economic Policy*, *39*(3), 524-536.

Association, A. s. (2021). 2021 Alzheimer's Disease Facts and Figures. *Alzheimers Dementia*, *17*(3).

Bachman, D. L., Green, R. C., Benke, K. S., Cupples, L. A., Farrer, L. A., & Group, f. t. M. S. (2003). Comparison of Alzheimer's disease risk factors in white and African American families. *Neurology*, *60*(8), 1372-1374. https://doi.org/10.1212/01.wnl.0000058751.43033.4d

Bancks, M., Alonso, A., Allen, N., Yaffe, K., & Carnethon, M. (2019). Temporal trends in cognitive function of older US adults associated with population changes in demographic and cardiovascular profiles. *J Epidemiol Community Health*, *73*(7), 612-618.

Blinder, A. S. (1973). Wage discrimination: reduced form and structural estimates. *Journal of Human resources*, 436-455.

Chen, C., & Zissimopoulos, J. M. (2018). Racial and ethnic differences in trends in dementia prevalence and risk factors in the United States. *Alzheimers Dement (N Y)*, *4*, 510-520. https://doi.org/10.1016/j.trci.2018.08.009

Crimmins, E. M., Kim, J. K., Langa, K. M., & Weir, D. R. (2011). Assessment of cognition using surveys and neuropsychological assessment: the Health and Retirement Study and the Aging, Demographics, and Memory Study. *J Gerontol B Psychol Sci Soc Sci*, *66 Suppl 1*, i162-171. https://doi.org/10.1093/geronb/gbr048

David, R. W., Ryan, M., Lindsay, H. R., & Kenneth, M. L. (2014). *Cognitive Test Selection for the Harmonized Cognitive Assessment Protocol (HCAP)*.

Derby, C. A., Katz, M. J., Lipton, R. B., & Hall, C. B. (2017). Trends in Dementia Incidence in a Birth Cohort Analysis of the Einstein Aging Study. *JAMA Neurol*, *74*(11), 1345. https://doi.org/10.1001/jamaneurol.2017.1964

Farina, M. P., Hayward, M. D., Kim, J. K., & Crimmins, E. M. (2020). Racial and Educational Disparities in Dementia and Dementia-Free Life Expectancy. *J Gerontol B Psychol Sci Soc Sci*, *75*(7), e105-e112. https://doi.org/10.1093/geronb/gbz046

Ferdows, N. B., & Aranda, M. (2022). RACIAL/ETHNIC DISPARITIES IN RISK AND PROTECTIVE FACTORS OF DEMENTIA: A LIFESPAN APPROACH. Innovation in Aging,

Garcia, M. A., Saenz, J., Downer, B., & Wong, R. (2018). The role of education in the association between race/ethnicity/nativity, cognitive impairment, and dementia among older adults in the United States. *Demogr Res*, *38*, 155-168. https://doi.org/10.4054/DemRes.2018.38.6

Gianattasio, K. Z., Wu, Q., Glymour, M. M., & Power, M. C. (2019). Comparison of Methods for Algorithmic Classification of Dementia Status in the Health and Retirement Study. *Epidemiology*, *30*(2), 291-302. https://doi.org/10.1097/ede.0000000000000945

Health, U. D. o., & Services, H. (2022). National Institute on Alcohol Abuse and Alcoholism. Drinking Levels Defined. In.

Hong, C., Liu, Z., Liu, Y., Jin, Y., & Luo, Y. (2023). The Role of Smoking, Obesity, and Physical Inactivity in Cognitive Performance and Decline: A Multicohort Study. *The Journals of Gerontology: Series A*, *79*(2). https://doi.org/10.1093/gerona/glad232

Jann, B. (2008). The Blinder–Oaxaca decomposition for linear regression models. *The Stata Journal*, *8*(4), 453-479.

Jones, R. N., Manly, J. J., Langa, K. M., Ryan, L. H., Levine, D. A., McCammon, R., & Weir, D. (2024). Factor structure of the Harmonized Cognitive Assessment Protocol neuropsychological battery in the Health and Retirement Study. *Journal of the International Neuropsychological Society*, *30*(1), 47-55.

Jones, R. N., Manly, J. J., Langa, K. M., Ryan, L. H., Levine, D. A., McCammon, R., & Weir, D. (2024). Factor structure of the Harmonized Cognitive Assessment Protocol neuropsychological battery in the Health and Retirement Study. *J Int Neuropsychol Soc*, *30*(1), 47-55. https://doi.org/10.1017/S135561772300019X

Langa, K. M., Larson, E. B., Crimmins, E. M., Faul, J. D., Levine, D. A., Kabeto, M. U., & Weir, D. R. (2017). A Comparison of the Prevalence of Dementia in the United States in 2000 and 2012. *JAMA Intern Med*, *177*(1), 51-58. https://doi.org/10.1001/jamainternmed.2016.6807

Langa, K. M., Ryan, L. H., McCammon, R. J., Jones, R. N., Manly, J. J., Levine, D. A., Sonnega, A., Farron, M., & Weir, D. R. (2020). The health and retirement study harmonized cognitive assessment protocol project: study design and methods. *Neuroepidemiology*, *54*(1), 64-74.

Levine, D. A., Gross, A. L., Briceño, E. M., Tilton, N., Kabeto, M. U., Hingtgen, S. M., Giordani, B. J., Sussman, J. B., Hayward, R. A., Burke, J. F., Elkind, M. S. V., Manly, J. J., Moran, A. E., Kulick, E. R., Gottesman, R. F., Walker, K. A., Yano, Y., Gaskin, D. J., Sidney, S., . . . Galecki, A. T. (2020). Association Between Blood Pressure and Later-Life Cognition Among Black and White Individuals. *JAMA Neurol*, *77*(7), 810-819. https://doi.org/10.1001/jamaneurol.2020.0568

Livingston, G., Huntley, J., Sommerlad, A., Ames, D., Ballard, C., Banerjee, S., Brayne, C., Burns, A., Cohen-Mansfield, J., & Cooper, C. (2020). Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. *The Lancet*, *396*(10248), 413-446.

Livingston, G., Sommerlad, A., Orgeta, V., Costafreda, S. G., Huntley, J., Ames, D., Ballard, C., Banerjee, S., Burns, A., Cohen-Mansfield, J., Cooper, C., Fox, N., Gitlin, L. N., Howard, R., Kales, H. C., Larson, E. B., Ritchie, K., Rockwood, K., Sampson, E. L., . . . Mukadam, N. (2017). Dementia prevention, intervention, and care. *The Lancet*, *390*(10113), 2673-2734. https://doi.org/10.1016/s0140-6736(17)31363-6

Lusk, J. B., Ford, C., Clark, A. G., Greiner, M. A., Johnson, K., Goetz, M., Kaufman, B. G., Mantri, S., Xian, Y., O'Brien, R., & O'Brien, E. C. (2023). Racial/ethnic disparities in dementia incidence, outcomes, and health-care utilization. *Alzheimers Dement*, *19*(6), 2376-2388. https://doi.org/10.1002/alz.12891

Manly, J. J., Jones, R. N., Langa, K. M., Ryan, L. H., Levine, D. A., McCammon, R., Heeringa, S. G., & Weir, D. (2022). Estimating the Prevalence of Dementia and Mild Cognitive Impairment in the US: The 2016 Health and Retirement Study Harmonized Cognitive Assessment Protocol Project. *JAMA Neurol*, *79*(12), 1242-1249. https://doi.org/10.1001/jamaneurol.2022.3543

Marioni, R. E., Proust-Lima, C., Amieva, H., Brayne, C., Matthews, F. E., Dartigues, J. F., & Jacqmin-Gadda, H. (2015). Social activity, cognitive decline and dementia risk: a 20-year prospective cohort study. *BMC Public Health*, *15*(1), 1089. https://doi.org/10.1186/s12889-015-2426-6

McDougall Jr, G. J., Vaughan, P. W., Acee, T. W., & Becker, H. (2007). Memory performance and mild cognitive impairment in Black and White community elders. *Ethnicity & disease*, *17*(2), 381.

McGuire, L. C., Ford, E. S., & Ajani, U. A. (2006). Cognitive Functioning as a Predictor of Functional Disability in Later Life. *The American Journal of Geriatric Psychiatry*, *14*(1), 36-42. https://doi.org/https://doi.org/10.1097/01.JGP.0000192502.10692.d6

Mehta, K. M., & Yeo, G. W. (2017). Systematic review of dementia prevalence and incidence in United States race/ethnic populations. *Alzheimers Dement*, *13*(1), 72-83. https://doi.org/10.1016/j.jalz.2016.06.2360

Nichols, E., Gross, A. L., Zhang, Y. S., Meijer, E., Hayat, S., Steptoe, A., Langa, K. M., & Lee, J. (2024). Considerations for the use of the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) in cross-country comparisons of cognitive aging and dementia. *Alzheimers Dement*. https://doi.org/10.1002/alz.13895

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International economic review*, 693-709.

Rodriguez, F. S., Aranda, M. P., Lloyd, D. A., & Vega, W. A. (2018). Racial and Ethnic Disparities in Dementia Risk Among Individuals With Low Education. *Am J Geriatr Psychiatry*, *26*(9), 966-976. https://doi.org/10.1016/j.jagp.2018.05.011

Rovner, B. W., Casten, R. J., Hegel, M. T., & Leiby, B. (2018). Preventing Cognitive Decline in Black Individuals With Mild Cognitive Impairment: A Randomized Clinical Trial. *JAMA Neurol*, *75*(12), 1487-1493. https://doi.org/10.1001/jamaneurol.2018.2513

Satizabal, C. L., Beiser, A. S., Chouraki, V., Chêne, G., Dufouil, C., & Seshadri, S. (2016). Incidence of Dementia over Three Decades in the Framingham Heart Study. *New England Journal of Medicine*, *374*(6), 523-532. https://doi.org/10.1056/nejmoa1504327

Shadlen, M. F., Siscovick, D., Fitzpatrick, A. L., Dulberg, C., Kuller, L. H., & Jackson, S. (2006). Education, cognitive test scores, and black-white differences in dementia risk. *J Am Geriatr Soc*, *54*(6), 898-905. https://doi.org/10.1111/j.1532-5415.2006.00747.x

Sinning, M., Hahn, M., & Bauer, T. K. (2008). The Blinder–Oaxaca decomposition for nonlinear regression models. *The Stata Journal*, *8*(4), 480-492.

Sol, K., Zaheed, A. B., Kraal, A. Z., Sharifian, N., Arce Rentería, M., & Zahodne, L. B. (2020). Psychological predictors of memory decline in a racially and ethnically diverse longitudinal sample of older adults in the United States. *Int J Geriatr Psychiatry*, *35*(2), 204-212. https://doi.org/10.1002/gps.5236

Spencer, J. C., Wheeler, S. B., Rotter, J. S., & Holmes, G. M. (2018). Decomposing Mortality Disparities in Urban and Rural U.S. Counties. *Health Serv Res*. https://doi.org/10.1111/1475-6773.12982

Stephanie, J. F., & Herzog, A. R. (2004). *Documentation of Physical Functioning Measures in the Health and Retirement Study and the Asset and Health Dynamics Among the Oldest Old Study*.

Wei, J., Lohman, M. C., Brown, M. J., Hardin, J. W., Yang, C.-H., Merchant, A. T., & Friedman, D. B. Modifiable and Non-Modifiable Risk Factors for Dementia Among Non-Hispanic White and Black Populations Aged 50-64 in the United States, 2006-2016. *Journal of*

Geriatric Psychiatry and Neurology, *0*(0), 08919887241267315. https://doi.org/10.1177/08919887241267315

Weir, D. R., Langa, K. M., & Ryan, L. H. *Cognition data*. Retrieved June 14 from https://hrs.isr.umich.edu/data-products/cognition-data

Weuve, J., Barnes, L. L., Mendes de Leon, C. F., Rajan, K. B., Beck, T., Aggarwal, N. T., Hebert, L. E., Bennett, D. A., Wilson, R. S., & Evans, D. A. (2018). Cognitive Aging in Black and White Americans: Cognition, Cognitive Decline, and Incidence of Alzheimer Disease Dementia. *Epidemiology*, *29*(1), 151-159. https://doi.org/10.1097/ede.0000000000000747

Whitmer, R. A., Gunderson, E. P., Barrett-Connor, E., Quesenberry, C. P., Jr., & Yaffe, K. (2005). Obesity in middle age and future risk of dementia: a 27 year longitudinal population based study. *Bmj*, *330*(7504), 1360. https://doi.org/10.1136/bmj.38446.466238.E0

Whitmer, R. A., Gustafson, D. R., Barrett-Connor, E., Haan, M. N., Gunderson, E. P., & Yaffe, K. (2008). Central obesity and increased risk of dementia more than three decades later. *Neurology*, *71*(14), 1057-1064. https://doi.org/10.1212/01.wnl.0000306313.89165.ef

Wolters, F. J., Chibnik, L. B., Waziry, R., Anderson, R., Berr, C., Beiser, A., Bis, J. C., Blacker, D., Bos, D., Brayne, C., Dartigues, J.-F., Darweesh, S. K. L., Davis-Plourde, K. L., de Wolf, F., Debette, S., Dufouil, C., Fornage, M., Goudsmit, J., Grasset, L., . . . Hofman, A. (2020). Twenty-seven-year time trends in dementia incidence in Europe and the United States. *The Alzheimer Cohorts Consortium*, *95*(5), e519-e531. https://doi.org/10.1212/wnl.0000000000010022

Zhu, S., Zhao, J., Chen, Z., & Wang, Y. (2018). Influential factors on cognitive performance in middle-aged cohort: Third National Health and Nutrition Examination Survey-based study. *Medicine (Baltimore)*, *97*(37), e12033-e12033. https://doi.org/10.1097/MD.0000000000012033

Table 1. Characteristics of the 2016 HCAP participants by race/ethnicity

Characteristics	Non-Hispanic Whites (n = 2383)		Non-Hispanic Blacks (n = 525)		Hispanics (n = 363)		Total (n = 3271)	
	%[a]	SE	%[a]	SE	%[a]	SE	%[a]	SE
MCI/Dementia [b]	9.6%	0.5	28.2%	2.8	24.3%	2.9	12.4%	0.6
Demographic characteristics								
Age (years)	74.4	0.2	73.5	0.6	73.3	0.5	74.2	0.2
Females	55.3%	1.3	66.0%	2.6	61.2%	4.1	56.7%	1.1
Early life characteristics								
Education								
Less than high school	8.5%	0.7	25.0%	3.2	51.0%	4.0	13.2%	0.9
High school	33.7%	1.2	35.2%	2.4	22.6%	3.1	33.0%	1.0
More than high school	57.9%	1.5	39.8%	2.5	26.4%	3.0	53.8%	1.4
Midlife characteristics								
Cardiovascular risk factors								
Hypertension	61.6%	1.3	82.1%	2.3	65.3%	5.8	63.8%	1.2
Stroke	8.3%	0.7	12.7%	2.5	7.2%	1.7	8.6%	0.7
Heart disease	28.5%	0.9	26.9%	3.1	21.7%	3.8	27.9%	0.9
Obesity	46.0%	1.4	51.9%	3.2	50.1%	3.1	46.8%	1.2
Alcohol	16.4%	0.9	9.4%	1.7	14.2%	2.7	15.6%	0.8
Hearing loss								
Good hearing	63.1%	1.3	59.6%	3.5	40.9%	4.0	61.1%	1.3
Poor hearing, wearing aid	13.6%	0.9	5.4%	1.1	11.3%	1.8	12.7%	0.8
Poor hearing, not wearing aid	23.2%	1.0	35.0%	3.5	47.8%	3.4	26.2%	1.0
History of no insurance	13.1%	0.8	26.3%	3.2	38.8%	4.8	16.3%	1.0
Late-life (Current) characteristics								
Smoking								
Current	7.2%	0.8	11.5%	2.8	11.5%	2.3	8.0%	0.7
Former	48.4%	1.1	50.2%	3.1	41.3%	4.9	48.0%	1.0
Never	44.4%	1.1	38.3%	3.1	47.2%	4.8	44.0%	1.0
Depression	10.6%	0.7	17.8	2.0	22.4%	3.4	12.1%	0.6
Physical inactivity	12.4%	0.8	19.3%	2.3	13.6%	2.3	13.1%	0.7
Wealth								
< 53 000	17.8%	1.2	53.8%	3.2	48.6%	3.1	23.4%	1.2
53 001-178 000	18.6%	1.0	19.6%	2.0	23.7%	4.5	19.1%	0.9
178 001-470 000	23.0%	1.1	16.8%	2.7	17.3%	3.6	22.0%	1.1
470 001 +	40.6%	1.7	9.8%	1.7	10.4%	2.7	35.5%	1.7
Current insurance								
Medicare	69.7%	1.4	60.7%	3.2	51.0%	3.4	67.4%	1.3
Medicare & Medicaid	4.1%	0.5	15.7%	2.8	24.9%	3.6	6.7%	0.7
Medicare & private	21.2%	1.1	17.4%	2.9	10.8%	2.2	20.1%	1.0
Other or no insurance	5.1%	0.7	6.2%	1.3	13.3%	3.6	5.8%	0.7

Abbreviations. HCAP, Harmonized Cognitive Assessment Protocol; SE, standard error.

[a]Weighted percentages were derived using the HRS sampling weights to adjust for the complex design of the HRS survey.

[b] The MMSE score cut points is a score above 25 for healthy, score of 18-24 for mild cognitive impairment(MCI), and score below 17 for dementia.

Table 2. Risk and protective factors of MCI/Dementia[a] at age 65 years or older in the 2016 HCAP cohort

VARIABLES	Model 1 (OR)	Model 2 (OR)	Model 3 (OR)	Model 4 (OR)
Demographics				
Race/Ethnicity (ref.: Whites)				
Blacks	3.6***	3.4***	2.9***	2.9***
	(0.6)	(0.6)	(0.5)	(0.6)
Hispanics	1.5**	1.4*	1.2	1.2
	(0.3)	(0.3)	(0.3)	(0.2)
Age category (ref.: 65-74 years)				
75-84	3.5***	3.5***	3.3***	3.2***
	(0.5)	(0.5)	(0.6)	(0.5)
85 +	7.9***	7.6***	5.7***	5.2***
	(1.7)	(1.7)	(1.4)	(1.3)
Females	0.6***	0.7***	0.5***	0.5***
	(0.1)	(0.1)	(0.1)	(0.1)
Early life				
Education (ref.: Less than high school)				
High school	0.3***	0.3***	0.3***	0.3***
	(0.0)	(0.1)	(0.1)	(0.1)
More than high school	0.1***	0.2***	0.1***	0.2***
	(0.0)	(0.0)	(0.0)	(0.0)
Midlife				
Cardiovascular risk factors				
Hypertension		1.0	0.9	0.9
		(0.2)	(0.2)	(0.1)
Stroke		1.8***	1.6**	1.5**
		(0.3)	(0.3)	(0.3)
Obesity		1.0	0.9	0.9
		(0.1)	(0.1)	(0.1)
Alcohol		1.2	1.4	1.4*
		(0.2)	(0.3)	(0.3)
Hearing loss (ref.: Good hearing)				
Poor hearing, wearing aid		1.7***	1.6**	1.5**
		(0.3)	(0.3)	(0.3)
Poor hearing, not wearing aid		1.7***	1.5**	1.4*
		(0.3)	(0.3)	(0.3)
History of no insurance		1.3	1.3	
		(0.2)	(0.3)	
Late-life (Current)				
Smoking (ref.: Current)				
Former			1.1	1.1
			(0.3)	(0.3)
Never			1.4	1.5
			(0.5)	(0.5)
Depression			1.4**	1.4*
			(0.2)	(0.2)
Physical inactivity			2.3***	2.3***
			(0.4)	(0.4)

Table 2 continued. Risk and protective factors of MCI/Dementia[a] at age 65 years or older in the 2016 HCAP cohort

VARIABLES	Model 1 (OR)	Model 2 (OR)	Model 3 (OR)	Model 4 (OR)
Wealth (ref. < 53 000)				
53 001-178 000			0.6***	0.6***
			(0.1)	(0.1)
178 001-470 000			0.5***	0.6***
			(0.1)	(0.1)
470 001 +			0.5**	0.5**
			(0.1)	(0.1)
Current insurance (ref.: Medicare)				
Medicare & Medicaid				1.2
				(0.3)
Medicare & private				0.7*
				(0.2)
Other or no insurance				1.3
				(0.4)
Constant	0.3***	0.2***	0.2***	0.2***
	(0.1)	(0.0)	(0.1)	(0.1)
Observations	3351	3338	3233	3218

Abbreviations. OR, odds ratio.

Note. Standard errors in parentheses.

*** $P < .01$, ** $P < .05$, * $P < .10$.

[a] The MMSE score cut points is a score above 25 for healthy, score of 18-24 for mild cognitive impairment(MCI), and score below 17 for dementia.

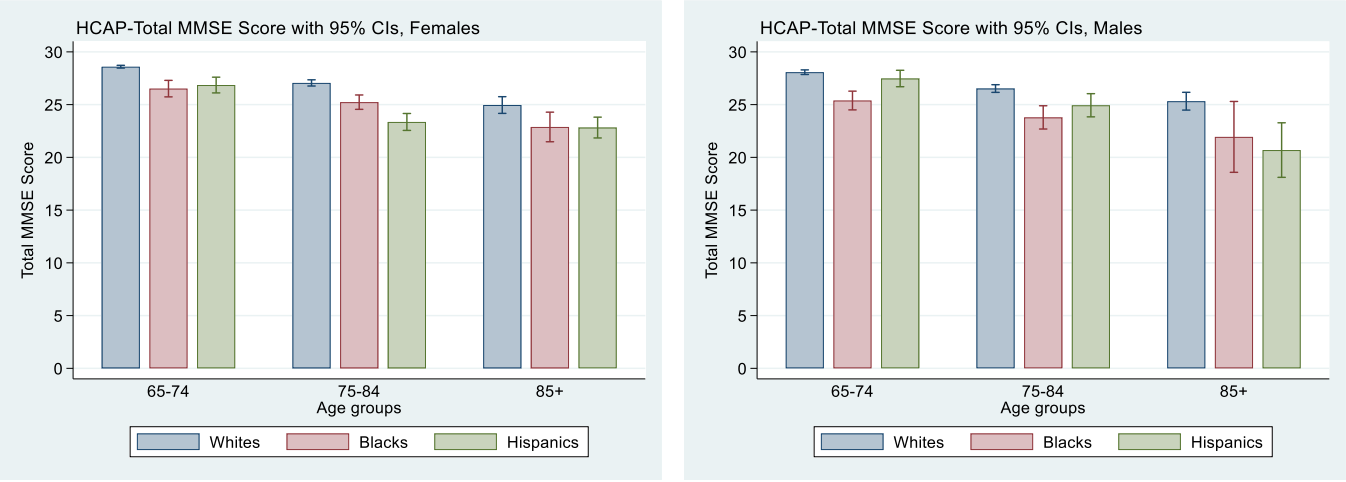
Table 3. Racial and ethnic disparities in cognitive functioning at age 65 years or older in the 2016 HCAP cohort

	Whites vs Blacks (n = 3023)		Whites vs Hispanics (n = 2837)	
	Whites	**Blacks**	**Whites**	**Hispanics**
Mean	27.7***	25.6***	27.7***	25.9***
	(0.1)	(0.2)	(0.1)	(0.3)
Difference	2.1*** (0.2)		1.8*** (0.3)	
Explained				
Total	0.7*** (0.1)		1.3*** (0.2)	
Percent	32%		70%	
Demographics characteristics	0.3** (0.1)		0.8*** (0.1)	
Mid-life characteristics	0.0 (0.0)		0.1 (0.1)	
Late-life characteristics	0.4*** (0.1)		0.4*** (0.1)	
Unexplained				
Total	1.4*** (0.2)		0.5** (0.2)	
Percent	68%		30%	
Decomposition				
Endowments	0.6 (0.4)		1.3*** (0.3)	
Coefficients	1.4*** (0.2)		0.6** (0.2)	
Interaction	0.1 (0.4)		-0.1 (0.3)	

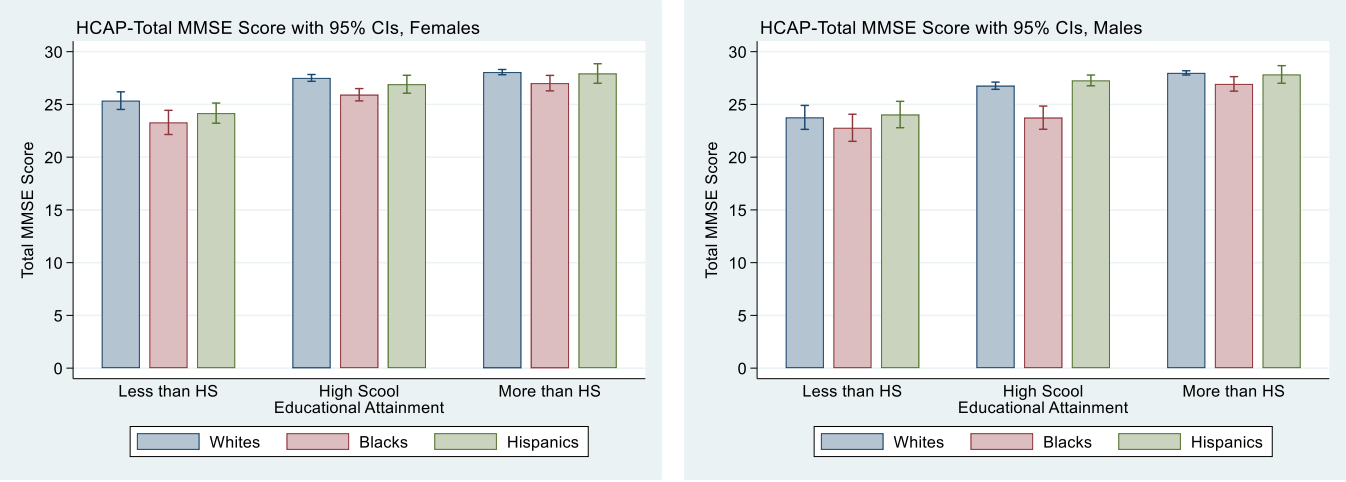
Note. Standard errors in parentheses. Controlled for demographics (age categories, gender, and education), midlife factors (hypertension, stroke, obesity, alcohol, hearing loss, and history of not being insured during midlife), and current factors (smoking, depression, physical inactivity, and wealth).
*** $P < .01$, ** $P < .05$, * $P < .10$.

Figure 1- Racial/Ethnic difference in gender-specific MMSE scores of HCAP participants by socioeconomic categories, 2016

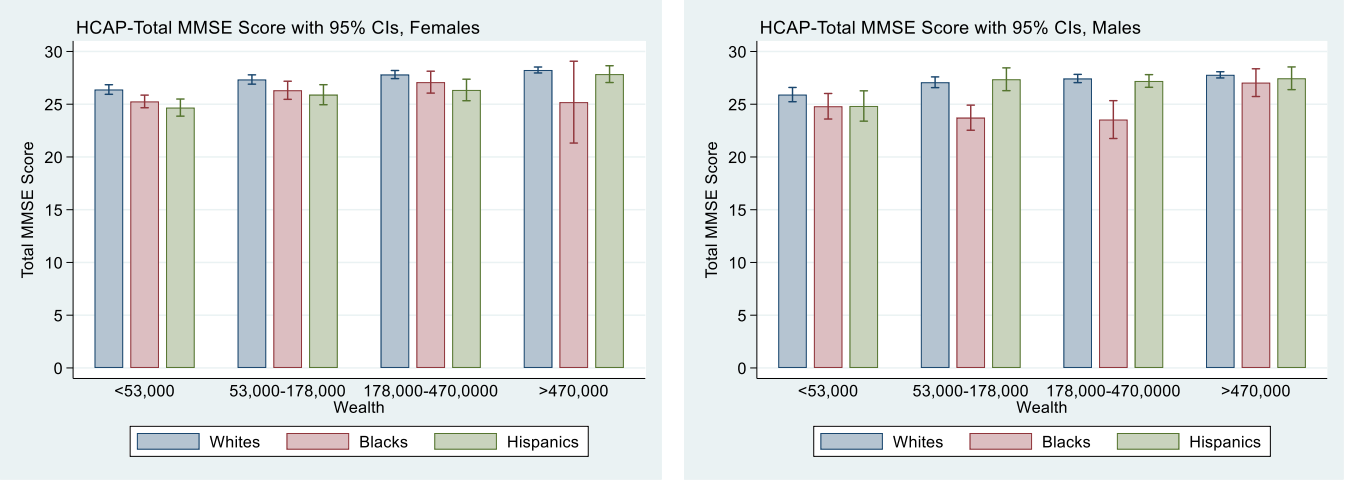
Panel A



Panel B



Panel C



Abbreviations. MMSE, Mini-Mental State Examination; HCAP, Harmonized Cognitive Assessment Protocol; CI, confidence interval; HS, high school.

Supplementary Materials

Supplement A. Racial and ethnic decomposition of cognitive functioning and dementia

Using Oaxaca-Blinder decomposition, we compared each pair of racial/ethnic groups (Whites vs Blacks, Whites vs Hispanics and Blacks vs Hispanics). Here we only describe the methods comparing Whites and Blacks. Our regression models were specified as follows, for each pair:

$$M_i = \beta_0 + \beta_1 demographic_i + \beta_2 early_i + \beta_3 mid_i + \beta_4 late_i + \varepsilon_i \quad (3)$$

where M_i denotes Mini-Mental State Examination (MMSE) score. For simplicity, we represent all measured characteristics as X and their coefficients as β:

$$\mathrm{M} = \beta_0 + \beta X + \varepsilon \quad (3)$$

We ran identically specified regressions for White, Black and Hispanic older adults, denoted by w, b, and h, respectively:

$$M_l = X_l'\beta_l + \varepsilon_l\,; \quad E(\varepsilon_l) = 0 \quad \& \quad l \in (w, b, h) \qquad (4)$$

Using the estimated coefficients from the equation for Black older adults' equation ($\bar{\beta}_b$) and characteristics from the White older adult's equation ($\bar{X}_w$), we generated counterfactual estimates as follows:

$$\widehat{M}_b = \bar{X}_w\hat{\beta}_b$$

where $\widehat{M}_b$ represents the expected MMSE score for Black older adults given average White older adults characteristics. The difference between the average observed Black older adults MMSE ($\bar{X}_b\hat{\beta}_b$) and the counterfactual estimate ($\bar{X}_w\hat{\beta}_b$) represents the explained variation in MMSE score, while the remainder of the differences is due to differences in coefficients of older Black and White adults, or differences in the marginal effect of individual characteristics on MMSE score, dubbed "unexplained" variation.

$$\Delta M = E(M_b) - E(M_w) = \bar{X}_b\beta_b - \bar{X}_w\beta_w = \bar{X}_b\beta_b - \bar{X}_w\beta_w + \bar{X}_w\beta_b - \bar{X}_w\beta_b$$
$$= (\bar{X}_b - \bar{X}_w)\beta_b + \bar{X}_w \times (\beta_b - \beta_w) = \Delta M_{Explained} + \Delta M_{Unemplained}$$

We repeated this estimation for each pair of racial/ethnic groups.

Supplemental Table 1. Cognitive functioning at age 65 years or older in the 2016 HCAP cohort—comparing HRS and HCAP measures

Cognitive functioning	Whites		Blacks		Hispanics		Total	
	%[a]	SE	%[a]	SE	%[a]	SE	%[a]	SE
Definition 1—MMSE								
Demented	2.07%	0.3	5.51%	1.2	5.27%	1.2	2.65%	0.3
MCI	8.99%	0.6	24.41%	2.7	20.10%	2.8	11.31%	0.6
Healthy	88.94%	0.6	70.08%	2.9	74.63%	3.2	86.04%	0.6
Definition 2— Langa–Weir								
Demented	3.81%	0.4	13.31%	1.6	15.34%	2.7	5.62%	0.5
CIND	15.03%	0.7	34.65%	3.7	25.70%	2.5	17.70%	0.9
Normal	81.17%	0.8	52.05%	3.8	58.96%	3.5	76.68%	0.9

Abbreviations. HCAP, Harmonized Cognitive Assessment Protocol; HRS, Health and Retirement Study; SE, standard error; MMSE, Mini-Mental State Examination; MCI, mild cognitive impairment; CIND, cognitive impairment no dementia.
Note. N = 3347.

The MMSE score cut points is a score above 25 for healthy, score of 18-24 for mild cognitive impairment, and score below 17 for dementia.

HRS dementia for self-respondents is a score 6 or less, 7–11 for CIND, and 12+ (of 27) for normal. With proxy reports of mental status, instrumental activities of daily living difficulties, and interviewer assessment of cognition for proxy cases, a score 6+ (of 11) is demented, 3–5 is CIND, 2 or less is normal. HRS imputed these measures when missing, because they tend to be missing for the more cognitively impaired.

[a]Weighted percentages were derived using the HRS sampling weights to adjust for the complex design of the HRS survey.

Supplemental Table 2. Risk and protective factors of cognitive functioning at age 65 years or older in the 2016 HCAP cohort—using MMSE score as a continuous outcome

VARIABLES	Model 1	Model 2	Model 3	Model 4
Demographics				
Race/Ethnicity (ref.: Whites)				
Blacks	-1.789***	-1.697***	-1.401***	-1.386***
	(0.212)	(0.220)	(0.208)	(0.206)
Hispanics	-0.699***	-0.648**	-0.513**	-0.473**
	(0.258)	(0.243)	(0.204)	(0.209)
Age category (ref.: 65-74 years)				
75-84	-1.378***	-1.317***	-1.019***	-1.001***
	(0.134)	(0.140)	(0.110)	(0.107)
85 +	-3.058***	-2.838***	-2.048***	-2.028***
	(0.302)	(0.289)	(0.230)	(0.225)
Females	0.502***	0.324**	0.518***	0.517***
	(0.130)	(0.144)	(0.126)	(0.125)
Education (ref.: Less than high school)				
High school	2.221***	2.075***	1.750***	1.720***
	(0.214)	(0.211)	(0.180)	(0.191)
More than high school	2.928***	2.674***	2.361***	2.323***
	(0.205)	(0.210)	(0.184)	(0.191)
Midlife				
Cardiovascular risk factors				
Hypertension		-0.109	0.0500	0.0466
		(0.143)	(0.116)	(0.117)
Stroke		-0.955***	-0.669***	-0.660***
		(0.237)	(0.209)	(0.208)
Obesity		-0.00977	0.0455	0.0558
		(0.102)	(0.0941)	(0.0925)
Alcohol		0.0571	-0.0427	-0.0552
		(0.171)	(0.139)	(0.139)
Hearing loss (ref.: Good hearing)				
Poor hearing, wearing aid		-0.717***	-0.520***	-0.505***
		(0.220)	(0.152)	(0.153)
Poor hearing, not wearing aid		-0.708***	-0.486***	-0.480***
		(0.167)	(0.147)	(0.150)
History of no insurance		-0.128	-0.00285	
		(0.131)	(0.152)	
Later Life (Current)				
Smoking (ref.: Current)				
Former			0.206	0.208
			(0.201)	(0.201)
Never			0.111	0.103
			(0.216)	(0.215)
Depression			-0.477***	-0.400**
			(0.179)	(0.175)

Supplemental Table 2 (continued). Risk and protective factors of cognitive functioning at age 65 years or older in the 2016 HCAP cohort—using MMSE score as a continuous outcome

VARIABLES	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Physical inactivity			-1.202***	-1.175***
			(0.198)	(0.192)
Wealth (ref. < 53 000)				
53 001-178 000			0.702***	0.654***
			(0.162)	(0.155)
178 001-470 000			0.795***	0.727***
			(0.149)	(0.131)
470 001 +			0.816***	0.756***
			(0.182)	(0.165)
Current insurance (ref.: Medicare)				
Medicare & Medicaid				-0.341
				(0.270)
Medicare & private				0.0513
				(0.140)
Other or no insurance				-0.0760
				(0.256)
Constant	25.57***	26.25***	25.60***	25.67***
	(0.221)	(0.259)	(0.332)	(0.330)
Observations	3,351	3,338	3,233	3,218

Abbreviations. MMSE, Mini-Mental State Examination.
Note. Standard errors in parentheses.
*** $P < .01$, ** $P < .05$, * $P < .10$.

Supplemental Table 3. Racial and ethnic disparities in cognitive functioning at age 65 years or older in the 2016 HCAP cohort—comparing Blacks and Hispanics

	Blacks vs Hispanics (N = 916)	
	Blacks	**Hispanics**
Mean	25.57***	25.89***
	(0.236)	(0.268)
Gap	-0.316 (0.373)	
Explained		
Total	0.683** (0.321)	
Demographic characteristics	0.674*** (0.22)	
Mid-life characteristics	0.00532 (0.103)	
Late-life characteristics	0.00825 (0.0946)	
Unexplained		
Total	-0.999*** (0.278)	
Decomposition		
Endowments	0.421 (0.351)	
Coefficients	-1.092*** (0.314)	
Interaction	0.356 (0.275)	

Note. Standard errors in parentheses.
*** P < .01, ** P < .05, * P < .10.