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Authors

Brewster, Paul

Barnes, Lisa

Haan, Mary

et al.

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Progress and Future Challenges in Aging and Diversity Research in the United States

Paul Brewster, PhD[1], **Lisa Barnes, PhD**[2], **Mary Haan, PhD**[3], **Julene K. Johnson, PhD**[4], **Jennifer J. Manly, PhD**[5], **Anna María Nápoles, PhD**[6], **Rachel A. Whitmer, PhD**[7], **Luis Carvajal-Carmona, PhD**[8], **Dawnte Early, PhD**[9], **Sarah Farias, PhD**[9], **Elizabeth Rose Mayeda, PhD**[3,10], **Rebecca Melrose, PhD**[11], **Oanh L. Meyer, PhD**[9], **Adina Zeki Al Hazzouri, PhD**[12], **Ladson Hinton, MD**[13], **Dan Mungas, PhD**[9]

[1]Institute on Aging and Lifelong Health, University of Victoria, Victoria, BC

[2]Rush Alzheimer's Disease Center and Departments of Neurological Sciences and Behavioral Sciences, Rush University Medical Center, Chicago, IL.

[3]Dept. of Epidemiology and Biostatistics, UC San Francisco, San Francisco, CA

[4]Institute for Health & Aging, UC San Francisco, San Francisco, CA

[5]Taub Institute for Research on Alzheimer's Disease and the Aging Brain and the Dept. of Neurology, College of Physicians and Surgeons, Columbia University, New York, NY

[6]Center for Aging in Diverse Communities, UC San Francisco, San Francisco, CA

[7]Division of Research, Kaiser Permanente Northern California, Oakland, CA

[8]Dept. of Biochemistry and Molecular Medicine, UC Davis School of Medicine, Davis, CA

[9]Dept. of Neurology, UC Davis School of Medicine, Sacramento, CA

[10]University of California, Los Angeles Department of Epidemiology

[11]VA Greater Los Angeles Healthcare System, Los Angeles, CA

[12]Division of Epidemiology and Population Health, Department of Public Health Science, University of Miami, Miami, FL

[13]Dept. of Psychiatry and Behavioral Sciences, UC Davis School of Medicine, Sacramento, CA

Abstract

In 2016 the UC Davis Latino Aging Research Resource Center and UC Davis Alzheimer's Disease Center brought together experts from across the country to consolidate current knowledge and identify future directions in aging and diversity research. This report disseminates the research priorities that emerged from this conference, building on an earlier GSA preconference. We review key racial/ethnic differences in cognitive aging and dementia, and identify current knowledge gaps

Correspondence to: Paul Brewster, PhD, Institute on Aging and Lifelong Health, University of Victoria, PO Box 1700 STN CSC, Victoria BC V8P 2Y2, Canada, Telephone: 250-721-6369, Fax: 250-472-6499, pbrew@uvic.ca.

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in the field. We advocate for a systems-level framework for future research whereby environmental, sociocultural, behavioral, neuropathological, genetic, and psychometric levels of analysis are examined together to identify pathways and mechanisms that influence disparities. We then discuss steps to increase the recruitment and retention of racial/ethnic minorities in aging studies, as none of the recommendations will be possible without strong collaboration between racial/ethnic minority communities and researchers. This approach is consistent with the National Institute on Aging Health Disparities framework.

Keywords

Race/Ethnicity; Health disparities; Cognitive aging; Alzheimer's disease

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Several decades of research have characterized the trajectory of dementia-free normative cognitive aging, and the incidence, clinical course, and neuropathological mechanisms underlying Alzheimer's disease (AD) and other dementias. This research serves as the basis for health information that individuals receive, advancements in pharmacological and psychosocial intervention, and public policy regarding aging and dementia care. Although gradual progress is being made in engaging racially/ethnically diverse populations in health research, participants of aging and dementia research in the United States have historically been overwhelmingly non-Latino white (1). This is problematic because the natural history of normative cognitive aging and the incidence, risk factors, clinical course, and neuropathological features of dementia can all differ as a function of race/ethnicity (2, 3). Achieving progress on preserving the cognitive health of the U.S. population will require the active engagement of racial/ethnic minorities.

In 2016 the UC Davis Latino Aging Research Resource Center (LARRC) and UC Davis Alzheimer's Disease Center brought together experts from across the country to identify future directions in aging and diversity research in the United States. This conference built upon priorities established during a 2016 pre-conference of the Gerontological Society of America delivered by the Resource Centers for Minority Aging Research (RCMAR). The consensus emerging from this conference was that prioritizing the study of racial/ethnic disparities is essential both for achieving equity in healthy aging and dementia care, and for uncovering the fundamental mechanisms that cause cognitive impairment and dementia.

This report builds on the conference in three ways. First, we illustrate key racial/ethnic differences in cognitive aging and dementia. Second, we highlight knowledge gaps in our current understanding of aging in racial/ethnic minorities. Next, we offer methodological recommendations to increase the rigor and scope of diversity research. Finally, we discuss steps to increase the recruitment and retention of racial/ethnic minorities in research studies. Our aim is to offer recommendations that will foster an inclusive science that allows for the representation of diverse groups.

Racial/Ethnic Differences in Cognitive Aging and Dementia

Normative cognitive aging:

In order to ground research on pathological forms of aging, a strong understanding of normal cognitive aging is essential. Trajectories of cognitive change appear to be broadly similar among older nondemented African Americans, Latinos, and non-Latino whites (4, 5, 6), with some studies reporting greater decline among non-Latino whites relative to other groups (5, 6). However, most longitudinal studies of cognitive aging in racial/ethnic minorities have focused on pathological cognitive decline and determinants of poor cognitive outcomes in clinical or mixed clinical and community samples, rather than normative change in healthy community samples. This is problematic because the cognitive and neuroanatomical changes characteristic of normal aging among racial/ethnic minorities must be understood in order to differentiate normative cognitive aging from pathological processes. Illustrating the need for more high-quality longitudinal studies of normative aging, the finding of similar cognitive trajectories across racial/ethnic groups contrasts with the finding of poorer initial/baseline cognitive test performance among older African Americans and Latinos relative to non-Latino whites (6, 7). Group differences in socioeconomic status, health, educational quality and attainment all likely influence racial/ethnic differences in cross-sectional cognitive test performance (7) and measurement bias is an important concern, especially for cross-sectional assessments. More research, especially research examining cognitive aging in healthy racial/ethnic minority community samples, is needed to reconcile the longitudinal vs. cross-sectional cognitive aging literature.

Dementia prevalence and incidence:

Racial/ethnic differences in prevalence and incidence of dementia have been studied in a number of research cohorts in the United States, and these studies provide evidence that African Americans and Caribbean Latinos have elevated dementia incidence rates compared to non-Latino whites (8). The one available study of predominantly Mexican Latinos showed similar dementia prevalence rates in comparison with rates among non-Latino whites in other studies (9). Asian Americans have lower rates of dementia incidence than non-Latino whites, with some subgroup heterogeneity such that dementia incidence is slightly higher among Japanese and Filipino Americans relative to South Asian and Chinese Americans (10). A comprehensive study of enrollees in the Kaiser Permanente Northern California Health System, presented at the 2016 Cognitive Aging and Diversity conference, substantiated and extended prior evidence of racial/ethnic inequalities in dementia incidence (11). In this sample, cumulative incidence of dementia was highest among African Americans and American Indians/Alaska Natives, lowest among Asian Americans, and intermediate in Latinos and non-Latino whites. African Americans, the racial/ethnic group at highest dementia risk, had a 65% greater risk of dementia than Asian Americans, the racial/ethnic group at lowest risk. Of note, Mexican Americans comprised the largest subgroup of Latinos in this study, and thus the finding of similar dementia incidence rates between Latinos and non-Latino whites substantiates similar prevalence estimates previously observed between Mexican Americans and non-Latino whites (9). Hypertension, body composition, high cholesterol, and heart disease are all risk factors for dementia and AD. Differential prevalence of these conditions among racial/ethnic groups may contribute in

part to differences in dementia incidence. Ascertainment bias may further influence estimates of dementia incidence in racial/ethnic minority and socioeconomically disadvantaged groups. The cognitive tests upon which a dementia diagnosis is established are sensitive to educational attainment, which tends to be lower and of poorer quality among certain racial/ethnic minorities, which may also result in over-diagnosis of cognitive impairment and dementia among these groups (7, 11).

Clinical dementia features and post-diagnosis survival:

Despite the high incidence of dementia among African Americans and Caribbean Latinos, post-diagnosis survival is longer in African Americans and Latinos relative to non-Latino whites (12, 13, 14). This finding has been reported in clinical and epidemiological samples, and is not explained by group differences in Braak and Braak staging or diffuse plaque frequency (13). Racial/ethnic differences in dementia care (e.g., home care vs. nursing home placement) may contribute to group differences in post-diagnosis survival (12), but longer post-diagnosis survival among racial/ethnic minorities with dementia mirrors a broader finding of lower mortality among racial/ethnic minorities relative to non-Latino whites (14). With the growing proportion of diverse elders in North America, post-diagnosis survival bears important implications for formal and informal caregiving. Several studies have found evidence that informal (e.g. family) caregiver report of neuropsychiatric symptoms in community-dwelling persons with dementia are higher among Latinos and African-Americans compared with white non-Hispanics (15, 16). Racial/ethnic differences in survival post-dementia diagnosis must be better understood in order to accurately anticipate associated infrastructural and health care needs, and the economic and psychosocial impacts on informal caregivers.

Neuropathological correlates of dementia:

Few prospective studies with autopsy data have sufficient sample sizes to examine racial/ethnic differences in neuropathological data (17). Existing data suggest broadly similar AD pathology across racial/ethnic groups, with higher proportions of comorbid non-AD pathology among African Americans relative to non-Latino whites (3, 18). A study examining neuropathological data from a cohort with a clinical diagnosis of probable or possible AD prior to death found higher comorbid AD/Lewy body neuropathology, and higher comorbid AD/Lewy body/cerebrovascular neuropathology among African Americans relative to non-Latino whites after matching participants based on MMSE score and demographic characteristics (18). African American participants of the National Institute on Aging Alzheimer's Disease Centers Program with all-cause dementia were similarly found to have higher levels of AD, Lewy body, and cerebrovascular neuropathology relative to non-Latino whites (3). A higher frequency of the APOE epsilon4 allele in the African American participants accounted for the finding of group differences in AD neuropathology. A lower frequency of FTLD-TDP and FTLD-Tau pathology was further observed in African Americans relative to non-Latino whites in this cohort (3). The causes of these differences are not known, but may reflect group differences in the prevalence of cerebrovascular risk factors (19, 20), and sampling bias, such that racial/ethnic minorities presenting to memory clinics may differ from their non-Latino white counterparts in terms of disease progression and comorbidity (17).

Environmental/contextual influences:

Racial/ethnic minorities, especially African Americans and Latinos, are much more likely than non-Latino whites to be born into poverty (7), to grow up in neighborhoods that offer limited opportunities for physical activity (21), to receive lower-quality education (22, 23), to experience poorer employment outcomes and less physical activity during adulthood (24, 25), and to experience interpersonal and structural discrimination (7). These exposures contribute to racial/ethnic disparities in late life cognition (5, 26). Educational attainment is a robust predictor of cross sectional measures of cognition in adults and is associated with reduced dementia risk in old age, but these associations are attenuated in African American and Latino samples due to racial/ethnic differences in access to quality education. Single word reading ability, a proxy for quality of education, better predicts adult cognition in these groups (22). Early-life deprivation is associated with lower cognitive level (27), but has paradoxically been shown to attenuate cognitive decline among African Americans in longitudinal studies (28). This finding has been attributed to selective survival, whereby racial/ethnic minorities surviving to old age may be “hardier” than non-Latino whites.

Genetic influences on dementia and cognitive decline:

The vast majority of human genetic material is identical, and the magnitude of within-race genetic variation appears greater than between-race variation (29). However, current evidence suggests racial/ethnic differences in the prevalence of established AD genetic risk factors, differences in the relative importance of genetic influences on AD, and ancestry-specific genetic variants that are predictive of AD and all-cause cognitive decline. The APOE epsilon4 allele is the most consistent AD genetic risk factor (30). Although the APOE epsilon4 allele is more frequent among African Americans relative to non-Latino whites, its association with AD risk is also less consistent among African Americans (31). In a community sample from Chicago, 42.1% of African Americans had at least one APOE epsilon4 allele, compared to 27.1% of non-Latino whites. However, while the APOE epsilon4 allele was associated with a 2.7-fold increase in AD risk among non-Latino whites, its association with AD risk in African Americans was small (OR = 1.02). The prevalence of homozygous or heterozygous APOE epsilon4 allele seems to be lower in Latinos relative to non-Latino whites, with 4% of Mexican American participants of the Sacramento Area Latino Study on Aging having one or more APOE epsilon4 allele (9). The association between the APOE epsilon4 allele and AD is also weaker among Latinos relative to non-Latino whites. In a Southern California sample, its frequency was 21.4% for individuals of Mexican ancestry with AD, relative to 42.9% for non-Latino whites with AD (32). Beyond the APOE epsilon4 allele, current genome-wide association studies have identified four loci that are specific to AD risk among African Americans (33).

There is great ancestral heterogeneity within all races and ethnicities, and some studies have explored racial/ethnic differences in genetic AD risk by classifying participants’ race or ethnicity using ancestry-informative genetic markers. In a Brazilian population-based brain bank, individuals of putative African ancestry had reduced neuritic plaques and tangles relative to other ancestral populations (34). This effect was not related to the APOE epsilon4 allele or environmental or health-related confounds. In a U.S. cohort, individuals of African ancestry were observed to decline more than black Americans of other ancestral

backgrounds, and bore more rare genetic variants associated with cognitive decline (35). Of note, ancestry studies are easily confounded by racial/ethnic differences in socioeconomic status and experiences of discrimination. Collaboration across disciplines is thus needed in order to most effectively incorporate genomics research into the study of health disparities (36).

Directions for Future Research: Knowledge gaps

As reviewed above, there is much left to understand about trajectories and determinants of trajectories in racial/ethnic minorities. Future aging and diversity research should shift from a descriptive focus to one of characterizing the mechanisms that underlie racial/ethnic differences, and the pathways through which they operate. Here we highlight substantive knowledge gaps and offer suggestions as to how future work can advance these areas.

Causal mechanisms of cognitive aging and dementia:

Significant advances have been made in our understanding of the amyloid metabolic cascade and posttranslational modification of tau protein that contribute to the development of AD, but a firm understanding of the causal mechanisms of AD is still lacking. This hinders the development of effective pharmacologic treatments for AD, and complicates our ability to understand the determinants of AD and racial/ethnic disparities in the incidence of AD. Cerebrovascular disease is another leading contributor to cognitive impairment and dementia in old age, especially among African Americans and Latinos (37). An improved understanding of the direct effects of cerebrovascular disease on cognition, and its involvement in the pathogenesis of AD, is needed. In addition, given their high prevalence among African Americans and Latinos, the pathogenesis, course, clinical outcomes, and treatment of mixed dementias must be a focus of future research. Mixed dementia is rarely an explicit focus of research or pharmaceutical trials, and a consequence of this is that empirically supported treatment options for racial/ethnic minorities with dementia may be less effective or inaccessible due to stringent criteria for inclusion in clinical trials.

Related to the causal mechanisms of AD is the underrepresentation of racial/ethnic minorities in clinical trials and development of new diagnostic approaches for AD. There is now greater awareness of the importance of racial/ethnic minority inclusion in research, but this did not translate into practice in the validation of amyloid imaging as a diagnostic marker for AD. This procedure, which now has regulatory approval and is used diagnostically and for screening into clinical trials, has not been sufficiently validated in racial/ethnic minority samples. Given the described racial/ethnic differences in the neuropathological correlates of dementia and cognitive decline, there is a pressing need for validation of this procedure for use with racial/ethnic minorities. As more biomarkers, such as tau PET imaging, are developed for diagnostic use, racial/ethnic minority participants should be included early in the validation process. This is important both to promote equitable access to cutting-edge diagnostic methods, and to establish the effectiveness of these methods for detecting AD in racial/ethnic minorities.

Factors influencing normal and pathological cognitive change:

As was described earlier in this report, African Americans and Latinos are at higher risk of dementia diagnosis (11), but do not experience more rapid cognitive decline than non-Latino whites when followed longitudinally (4, 5, 6). These paradoxical findings are reflective of a broader phenomenon whereby established risk factors for cognitive impairment and dementia, including neuropathological markers and demographic and socioeconomic exposures, seem to predominantly influence initial cognitive level, rather than longitudinal cognitive change. After accounting for individual differences in initial cognitive level, much of the between-person variation in cognitive change is left unexplained even in studies with comprehensive imaging and neuropathology data. Future studies can increase statistical power for characterizing individual-and group-level differences in cognitive change by increasing the total duration of longitudinal studies, narrowing assessment wave intervals, and by embedding intensive measurements that increase statistical power to detect change, such as measurement burst designs, in early phases of longitudinal studies (38).

Between-group and within-group heterogeneity among racial/ethnic minorities in the United States:

There is significant cultural, geographic, ancestral, and socioeconomic variation between and within racial/ethnic minority groups in the United States. For example, African American older adults obtain lower cognitive test scores in all U.S. states, but this effect is most pronounced in the South, and among individuals born in the South who migrated to other regions (39). Latinos of Caribbean descent perform more poorly on cognitive tests than Latinos of other heritage groups (40), and have higher rates of dementia incidence compared to Latinos of Mexican descent (8). Neighborhood economic disadvantage is associated with lower cognitive test scores and cognitive decline among Mexican Americans in the southwestern United States, but living in an ethnically homogenous Mexican-American neighborhood attenuates this effect (41). These findings illustrate the complex and multidetermined nature of associations between race/ethnicity and late-life cognition.

As already described, dementia incidence and post-dementia survival varies across racial/ethnic minority groups (11, 12), and cognitive trajectories and genetic risk factors for AD can vary within racial/ethnic minority groups as a function of genetic ancestry (34, 35). The vast majority of research examining racial/ethnic minorities in the United States focuses on African Americans and Latinos, but the experiences and health outcomes of these groups cannot be assumed to generalize to other racial/ethnic minority groups, including Asian Americans, American Indians, and Alaska Natives. Asian Americans have the lowest dementia incidence when examined as a homogenous group (11), and subgroup analysis reveals higher dementia incidence in Japanese Americans relative to Americans of South Asian descent (10). This heterogeneity is rarely a direct focus of research, but will become increasingly important as datasets and statistical approaches capable of capturing this level of analysis become available.

Directions for Future Research: Methodology recommendations

In order to make significant progress, research methodology must be cognizant of the complex interactions between determinants of health disparities. Here we highlight methodological approaches that can be applied to all topic areas with aging and diversity research.

Increased rigor in aging research methodology:

Most research designs and statistical methods used to study cognitive aging and dementia are associative in nature and not sufficient for establishing causality (42). Researchers can directly test causality through the use of randomized controlled trials or natural experiments, but not all research questions can be addressed through these methods. In such cases, sensitivity analysis can be helpful to assess direction and magnitude of potential biases, and clear specification of causal assumptions and their implications can reduce bias or confounding (42). Studies of racial/ethnic disparities in aging are also vulnerable to confounding due to differential survival of racial/ethnic minorities relative to non-Latino whites, and differential measurement error of some cognitive assessment measures among racial/ethnic minorities (43). In addition, the potential impact of racial/ethnic differences in selection bias should be considered when comparing community-based and clinic-based cohorts (17).

Moving beyond “entry-level” studies of racial/ethnic differences in late life cognition:

Risk factor studies feature prominently in aging and dementia research, including research examining racial/ethnic minority populations. Such efforts have contributed importantly to current understanding of variables that may influence racial/ethnic differences in cognitive impairment and dementia. However, there is longstanding criticism of the reductionism inherent in traditional risk factor models, whereby researchers seek to identify and delineate singular effects at the expense of focusing on the social context in which these effects operate (44). Going forward, a more nuanced approach to understanding cognitive health disparities among racial/ethnic minorities is critical because racial/ethnic diversity is complexly interwoven with socioeconomic status, access to quality education and medical care, and experiences of stigma and discrimination. These variables contribute importantly to heterogeneity between and within diverse groups, but conventional cohort study designs are ill-equipped to capture their dynamic relationships, the contexts in which they operate, or their collective influences on late life cognition.

There are methodological approaches that allow for departure from focusing on singular associations between variables and an outcome of interest. Complex systems models emphasize interrelations and interactions among multiple levels of relevant variables, and on characterizing how these interactions contribute to heterogeneity between and within groups (45). Following this approach, relationships among variables are structured based on theory and published data and parameterized based on census data, published studies, and standardized estimation approaches. The cumulative influence of variables and their interactions are examined in relation to an outcome of interest, and simulated changes within the model can be used to estimate how interventions targeting specific variables may

influence the distribution of the outcome in a population. Because the effect of a variable on an outcome of interest depends on the other variables in the model and the interrelations specified among them, this approach shifts focus from specific risk factors to the functioning of the system as a whole. This approach been used to examine determinants of racial/ethnic disparities in obesity (46) and HIV transmission (47), but has not yet been applied to the study of racial/ethnic differences in late-life cognition.

The complex systems approach is usually carried out using computationally intensive simulations that rely entirely on the quality of the data that were used to specify model parameters. Reliable estimates for the relationships between multiple variables are difficult to obtain from a single data source, especially for racial/ethnic minority populations, and thus estimates are usually "quilted" together from various sources (44). The specification of interrelations and interactions among variables, similarly, is usually driven by theory rather than data. However, as high-quality representative data becomes available, the complex systems emphasis on characterizing interrelations and interactions among relevant variables, rather than simply the linear relationships between variables and an outcome of interest, will become increasingly important for understanding racial/ethnic disparities in cognitive impairment and dementia.

Recruitment and Retention of Racial/ethnic Minorities in Aging and Dementia Research

None of the aforementioned recommendations are feasible without increased focus on the recruitment and retention of racial/ethnic minorities in research studies. Strides are gradually being made in achieving more representation of racial/ethnic minorities in heath research through approaches that increasingly emphasize building lasting and sustainable partnerships with target communities. Resources are available to help investigators recruit and retain members of diverse populations (1), and the NIA's Office of Special Populations has promoted racial/ethnic minority representation at all levels of research. A wide range of specific barriers to recruitment and retention of racial/ethnic minorities have been identified, including knowledge gaps affecting prospective participants (48, 49), outdated recruitment strategies that primarily target non-Latino whites, distrust of scientific research among racial/ethnic minorities, and failure to address costs and logistical concerns associated with research participation (50). Of note, it is insufficient to address these barriers mechanistically (51), but rather by establishing a lasting presence within the communities that one is trying to engage (17, 52). Here we outline three empirically supported avenues for building sustainable research collaborations with diverse communities.

Develop partnerships:

African Americans and Latinos express more mistrust of clinical research than non-Latino whites due to lived experiences of racism and historical mistreatment of racial/ethnic minorities in research (17, 52). It is thus important for researchers to establish trust and affirm commitment to the health and wellbeing of the communities that they are recruiting. This can be accomplished by forming strategic partnerships with community centers, churches, and other trusted community organizations. Centering the involvement of partner

community organizations at all stages of research is helpful for obtaining buy-in from the broader community, thereby improving participant recruitment and retention (50). Researchers should establish a presence within these organizations (e.g., by delivering presentations on aging and dementia), and utilize their presence as an avenue to inform potential participants of the study and the costs and benefits of participation (53). Depending on the level of buy-in from partner organizations, recruitment efforts can be facilitated by training organization staff to directly recruit potentially eligible community members, utilizing organization mailing lists to inform community members of the study, and having partner organizations promote the merits of the study to affiliated community groups (50). In order for these partnerships to be productive and sustainable, study objectives should align with the needs of the community, as identified by community partners, and partnerships should extend well beyond the enrollment and date collection phases of the study. Along similar lines, intervention studies may collaborate with existing community services to evaluate the cognitive health and wellbeing effects of activities that are enjoyable and culturally meaningful.

Build relationships:

While true for all research participants, widespread mistrust of scientific research among racial/ethnic minorities makes trust-building and relationship-building especially crucial for these groups (17, 52). It is essential for investigators to be transparent with prospective racial/ethnic minorities about the benefits and costs associated with research participation, to anticipate and address costs and logistical challenges associated with participation, to use linguistically and culturally appropriate research materials, and to demonstrate genuine investment in the interests and wellbeing of the engaged community. Trust is best developed in the context of established relationships with research staff, and this can be supported by hiring research personnel who are members of the recruited group, ensuring that research staff are easily accessible to study participants, matching participants with one research staff person who serves as their contact person throughout their involvement in the study, and maintaining communication between data collections in the form of birthday cards, holiday cards, and newsletter updates (53). Racial/ethnic minorities are more likely than non-Latino whites to express reluctance to commit to more invasive aspects of research participation, such as brain donation and lumbar punctures. Allowing participants to decline or defer consent to undergo these procedures respects their agency, and has been shown to increases the number of racial/ethnic minority participants who ultimately agree to these procedures (52).

The concept of “experiential similarity” represents another approach to trust-building (53). This refers to history or experience that may be shared by the researcher and the prospective research participants. Examples could include the experience of immigration to or major relocation within the United States, or having a loved one with cognitive impairment or dementia. Identifying these similarities during community presentations and other interactions with prospective research participants serves as a cue for trust, and has been identified as a motivator for racial/ethnic minority participation and retention in research.

Establish reciprocity:

Bidirectional benefit is essential for maintaining research partnerships at the level of the participant and the partner organizations (17, 50, 52). Although research ethics boards often place restrictions on participant compensation, a tangible acknowledgment of participant contributions to research is important to build mutual trust and respect with prospective participants. This may take the form of financial compensation or non-financial incentives, such as free lunch or free health examinations. Because racial/ethnic minority communities often face greater challenges with healthcare access and quality, and improved health is often a motivation for research participation, ensuring that mechanisms are in place to allow routinely collected health information (e.g. blood pressure, glucose levels) to be made available to participants to improve their own health may help with recruitment efforts. Bidirectional benefit can also be established by communicating the importance of the proposed research for the community. This could take the form of testimonials from community members who are personally affected by dementia, or research presentations communicating the increased dementia risk among racial/ethnic minorities and their underrepresentation in aging and dementia research.

Conclusions

In 2012 President Obama signed the National Alzheimer's Plan Act with an objective to decrease disparities in Alzheimer's disease by increasing clinical, research, and service efforts targeted to racial/ethnic minorities. Evidence-based resources are now available for improving recruitment and retention of racial/ethnic minority research participants (1), and for designing studies that capture the environmental, sociocultural, behavioral, and biological processes that contribute to racial/ethnic health disparities (54). As high-quality racially/ethnically representative data becomes available, aging and dementia researchers will need a sophisticated understanding of scientific rigor and interdisciplinary approaches in order to use these data to advance knowledge of racial/ethnic disparities and fundamental causes of cognitive impairment and dementia.

This report sought to disseminate to a wider audience the perspectives and research priorities that emerged from the 2016 UC Davis Aging and Diversity Conference. We advocate for a shift away from research designs that emphasize singular explanations for racial/ethnic disparities in cognitive impairment and dementia in favor of approaches that are better equipped to capture the multi-level complexities underlying racial/ethnic health disparities in the United States. This is consistent with NIA Health Disparities Framework which includes a multi-level approach encompassing environmental, sociocultural, behavioral and biological within a life course perspective (54). We further identify knowledge gaps and methodological limitations of the current literature that serve as obstacles to the application of systems-level analysis of racial/ethnic disparities in cognitive impairment and dementia. This report is not intended as an exhaustive review of racial/ethnic differences in aging and dementia. The emphasis of this report on cognitive impairment and dementia is reflective of the current state of aging and diversity research, whereby most work has examined pathological aging at the expense of understanding the normative trajectories of cognitive aging among racial/ethnically diverse groups. More observational studies of normal aging

among racial/ethnic minorities are needed to differentiate normative cognitive aging from pathological processes. We emphasize African Americans and Latino populations in this work, but the experiences of Asian Americans, American Indians, Pacific Islander Americans, and Alaska Natives are also greatly underrepresented in aging and dementia research. Sustainable and mutually beneficial research partnerships must be built with these communities in order to advance equity in healthy aging and dementia care, and to advance understanding of the multi-level pathways and mechanisms that influence racial/ethnic disparities in cognitive impairment and dementia.

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