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Enhancing the diversity and productivity of scientists in aging research: Contributions of the Resource Centers for Minority Aging Research, 2018–2023

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ABSTRACT

The Resource Centers for Minority Aging Research (RCMAR) is a flagship education, training, and development program of the National Institute of Health (NIH), and the National Institute on Aging (NIA) focused on increasing the number and diversity of researchers in aging. We sought to assess the program's contributions to geriatric and gerontology education by examining the scientific productivity of 294 RCMAR scientists who received pilot funding from the program during the last complete grant cycle, 2018 to 2023. Across the 18 funded sites, the scientists obtained 53 NIH grants and 29 NIA-specific grants. They published 281 manuscripts, of which 141 were noted as direct outcomes of the pilot funding and support received through the program. Findings indicated that the RCMAR program in its last cycle succeeded in promoting education and scientific career development of researchers from diverse backgrounds and researchers focused on health disparities to conduct transdisciplinary social and behavioral aging research.

KEYWORDS

Training programs; health disparities; diversity; scientific workforce

Introduction

The Resource Centers for Minority Aging Research (RCMAR, herein called “the Centers”) have been a flagship education, training, and development program of the National Institute of Health (NIH) focused on increasing the number and diversity of aging researchers. The program was initially funded by the National Institute of Aging (NIA), the National Institute of Minority Health Disparities (NIMHD), and the National Institute of Nursing Research (NINR) in 1997. Starting with six originally funded sites, the program has grown to 18 currently funded centers (National Institute on Aging [NIA], 2024b). The program includes a National Coordinating Center as a resource for RCMAR center leaders, scientists, and staff, and to support NIA's overall goal of increasing the diversity of the aging research workforce (Resource Centers for Minority Aging Research [RCMAR], 2024). The RCMAR program is in line with the numerous calls to diversify the biomedical workforce (Valantine & Collins, 2015), and to address the disproportionate NIH funding awarded to

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underrepresented minorities (URMs) (Ginther et al., 2011). It is an exemplar gerontology and geriatric education program committed to diversity, equity, and inclusion (DEI) efforts.

The Centers are designed to: (1) enhance the diversity of the aging research workforce by mentoring promising scientists from under-represented groups for sustained careers in aging research in priority areas of social, behavioral, and economic research on aging, and (2) to develop infrastructure to promote advances in these areas while simultaneously increasing the number of researchers focused on health disparities and the health and well-being of minority older adults. The program supports research at multiple levels, from genetics to cross-national comparative studies that range from basic to translational, with the goal of improving the health, well-being, function, and independence of older Americans. The Centers encourage transdisciplinary social and behavioral science research on any theme addressed in NIA's Strategic Plan (National Institute on Aging [NIA], 2024a). Although the main efforts of the Centers are to award pilot grants to early career scientists, they also provide individualized mentoring focused on the scientists' career development, analytic/research methods education and training, and peer support. The overall goal is to support the scientists in launching a career in social and behavioral aging research as demonstrated by the receipt of NIH research grants or their equivalents. The goals of the National Coordinating Center were to coordinate, facilitate, and disseminate the efforts of the various sites to diversify the scientific research workforce and to improve social, behavioral, and economic research on minority aging.

We sought to assess the program's impact on diversifying the scientific research workforce and its contributions to the fields of geriatric and gerontology education by examining the scientific productivity of early-career scientists who received pilot funding during the last complete grant cycle, 2018 to 2023. We sought to answer the following questions: (1) Did the Centers promote diversity of the scientific workforce? (2) Did the Centers promote diversity in aging research? (3) Did receiving a RCMAR pilot grant and participating in the RCMAR program result in scientific products by the scientists?

Methods

The National Coordinating Center at UCLA was funded during the latest complete grant cycle in 2018–2023. We used information collected annually by the Coordinating Center on RCMAR scientists' characteristics funded between July 1, 2018 and June 30, 2023 ($N = 294$) by all 18 sites, and scientific productivity information from scientists who had been funded through June 30, 2022. The data collected included scientists' demographics, pilot titles, publications, and grants reported by the sites. We did not request publication and grants information for scientists funded in 2023 ($N = 29$), as they had only been funded for a few months and would not have had time to complete their research. To address gaps and potential inaccuracies in the data collected by the sites, we conducted a rigorous verification process that was completed by May 2023. The verification process included requesting information from 27 contact Principal Investigators and site administrators. We asked them to verify their funded scientists' names, basic demographic information (e-mail, degree, discipline, gender, race, Latino identification, current Title/Position), and pilot project titles. We also asked for scientists' publications and grants, including whether the publication or grant was a "direct outcome" of their pilot grant to the best of their knowledge. Most (89%) of scientists' data were verified by the sites. We further assessed the accuracy of the

information provided on scientists' publications and related grants using PubMed and NIH RePORTER searches. We did PubMed searches for publications that cited the NIH P30 funding numbers for each Center, and NIH RePORTER searches for each individual scientist.

In addition, we sent e-mails to 265 scientists funded by Centers in 2018 – 2022, asking them to verify their publications and grant lists and to specify whether the publication or grant was a “direct outcome” of their pilot grant. The e-mails included each scientists' publication list as found on PubMed and/or their NIH grants as found on NIH RePORTER. We defined “direct outcome” for publications as being directly or very closely related to their pilot study. Examples of “direct” or “closely related” publications would include articles that reported results on data collected through their pilot grant, or related pilot activities that were reported in the publication. For grants to be a “direct outcome,” the title and/or activity had to be directly, or very closely related, to the funded pilot study. For example, data collected with Center funding was used as pilot data for a grant application or grant activities were directly related or very closely related to the pilot. Furthermore, we clarified that a “direct outcome” did not mean having received general Center support, like mentorship, education, or other professional development only. For those scientists who did not respond to our requests for information or verification, the Coordinating Center team carefully reviewed their pilot titles, associated publications, and grants and deemed them as “direct outcomes” if the titles of both the pilot and the grant or publication were exactly the same or very similarly worded.

Results

The cohort had more female scientists (68%) than males and included African American/Black (30%), Asian (25%), Hispanic/Latino (25%), and White (26%) scientists. Scientists were able to report more than one race/ethnicity category, and the reported categories are not mutually exclusive. Table 1 shows the focus of the sites and number of funded scientists in the grant cycle. Data show that the Centers focused on various aspects of behavioral and social science research per the program funding opportunity announcement, with eight new sites that were Alzheimer's disease-focused (AD-RCMARs). RCMAR sites focused on behavioral and social science research in a priority research area related to aging and/or to health disparities in older adults broadly or with special focus on specific populations. Similarly, AD-RCMAR sites focused on behavioral and social science research in a priority research area related to Alzheimer's disease and related dementia (ADRD) and some had a focus on specific populations. Data further show a total of 294 scientists funded, and the number funded by the site ranged from 6 to 33. The reporting categories are not mutually exclusive.

A review of the 294 scientist's pilot project titles revealed a wide range of study topics. Pilot titles included topics such as: “Perceptions of Biomarkers among Older Latino/as, Psychosocial Stress and Mental Health among Black Women across the Life Course;” “Beliefs and Attitudes toward Sleep Problems among Older Korean Immigrants;” “Stakeholder Perspectives on the Feasibility of Online Diabetes Nutrition Education Program for American Indian/Alaska Native Adults with Type 2 Diabetes;” and “Evaluating Cognitive Impairment in Blacks and Elderly Patients with transthyretin amyloid cardiomyopathy.” We conducted a thorough review of all the pilot titles to classify them

Table 1. RCMAR and AD-RCMAR sites, NIA grant numbers, and number of scientists funded in the 2018–2023 grant Cycle.

Site Name	Focus	NIA P30 Grant #	# Scientists Funded
Asian Resource Center for Minority Aging Research (Asian RCMAR)	Asian Americans	AG059304	33
Deep South Resource Center for Minority Aging Research (Deep South RCMAR)	African Americans	AG031054	17
University of Florida Resource Center for Minority Aging Research (UF-CAMPAS)	Pain and disability among older adults	AG059297	15
Michigan Center for Urban African American Aging Research (MCUAAAR)	African Americans	AG015281	19
Center for Aging in Diverse Communities (CADC)	Racial/ethnic and sexual & gender minority (SGM) populations	AG015272	19
The Center for Health Improvement of Minority Elderly (CHIME)	African Americans, Hispanic/Latinos and other underrepresented minorities	AG021684	18
Native Elder Research Center (NERC)	American Indians and Alaska Natives	AG015292	6
The Texas Resource Center on Minority Aging Research (UTMB Texas RCMAR)	Hispanic/Latinos	AG059301	13
Stanford Aging & Ethnogeriatrics Transdisciplinary Collaborative Center (SAGE)	Technology	AG059307	19
Center for Improving Care Delivery for the Aging (CICADA)	Health Services Research	AG059302	14
AD-RCMAR Site Name	Focus	NIA P30 Grant #	# Scientists Funded
Michigan Center for Contextual Factors in Alzheimer's Disease (MCCFAD)	African Americans, Hispanic/Latinos, Arab Americans, Alzheimer's Disease	AG059300	17
Native Alzheimer's Disease Resource Center for Minority Aging Research (NAD-RCMAR)	American Indians and Alaska Natives, Native Hawaiians and Pacific Islanders, Alzheimer's Disease	AG059295	12
USC Resource Center for Minority Aging Research (USC AD-RCMAR)	Alzheimer's Disease	AG043073	16
Carolina Center on Alzheimer's Disease and Minority Research (CCADMR)	Alzheimer's Disease	AG059294	10
Rio Grande Valley Alzheimer's Resource Center for Minority Aging Research (UTRGV RCMAR)	Hispanic/Latinos, Alzheimer's Disease	AG059305	14
Columbia Center for Interdisciplinary Research on Alzheimer's Disease Disparities (CIRAD)	Alzheimer's Disease-related dementia inequalities	AG059303	19
San Diego Resource Center for advancing Alzheimer's Research in Minority Seniors (San Diego AD-RCMAR)	Alzheimer's Disease, Hispanic/Latinos and other underrepresented groups	AG059299	18
The Johns Hopkins Alzheimer's Disease Resource Center for Minority Aging Research (JHAD AD-RCMAR)	Alzheimer's Disease	AG059298	15
TOTAL			294

as social, behavioral, and economic research, health disparities research, and/or studies focused on the health and well-being of minority older adults. Most of the pilot grants (80%, $N = 234$) were classified as social, behavioral, and economic research. Most (72%, $N = 213$) were also classified as health disparities research, or studies focused on the health and well-being of minority older adults. More than half of the awards (59%, $N = 173$) fell into both categories, and only 17 did not fall into either. The 17 pilot awards that could not be classified as either social, behavioral, and economic research, health disparities research, or studies focused on the health and well-being of minority older adults, were focused on the biology of aging or were clinically relevant studies. Eleven of these 17 studies were awarded to scientists who identified as URM.

Table 2. Direct outcomes of funded scientists and sites, 2018–2023.

	# of NIH grants	# of NIA funded grants	# of publications citing the site P30 numbers	# of pilot-related publications
RCMARs (<i>N</i> = 173)	25	11	169	88
AD-RCMARs (<i>N</i> = 121)	28	18	112	53
Total	53	29	281	141

In regards to scientific productivity, we received confirmation of “direct outcomes” of pilot awards from 113 scientists themselves. [Table 2](#) shows the number of NIH grants and publications attributed to RCMAR pilot funding to scientists in the 2018–2023 grant cycle by traditional and ADRD sites. Results show that there were 29 attributable grants funded by the NIA, and 53 were funded by other NIH Institutes. About half of the publications that cited the RCMAR sites’ P30 numbers were directly attributed to RCMAR pilot grants.

Discussion

Overall, we found that the RCMAR program outcomes in the last funded cycle were closely aligned to their stated NIA program goals. First, the program contributed to the diversity of the aging research workforce by funding pilot grants proposed by diverse early career scientists and/or by funding studies focused on health disparities and the health and well-being of minority older adults. Second, the program contributed to the career development of aging-focused researchers by supporting and promoting their scientific productivity.

The Centers, by design, are an educational and scientific career development program, supporting researchers from diverse backgrounds and/or researchers focused on health disparities to embark on transdisciplinary social and behavioral science research on any theme addressed in the National Institute on Aging Strategic Plan. (NIA, [2024a](#)) From their inception, the Centers’ model of support for diverse, early career scientists has been to support both the scientist and their science. Through the efforts of a diverse community of senior faculty leaders and purposeful engagement of emerging leaders, the Center leaders and National Coordinating Center have built a national community for early career scientists to belong to. The local mentoring provided to scientists includes not only support and training for them to complete their pilot studies but also a national-level of mentorship that shepherds them into the aging research community via formal and informal networking opportunities, as well as purposeful promotion and sponsorship of scientists.

The range of RCMAR site foci in the last funding cycle was broad, comprehensive, and inclusive of different underrepresented populations and scientific foci. These variations and the unique site-level programming provided to scientists contributed to the breadth of pilot studies awarded. Hence, the Centers provide a model for gerontology and geriatric education committed to diversity, and to broad, multi-disciplinary, and collaborative research. The program enhanced the diversity of the aging research workforce by adding almost 300 early career scientists to the pool of trained aging researchers and by contributing hundreds of publications to the scientific literature on older adults.

A study of the previous funding cycle conducted by the National Coordinating Center found that more than 80% of the 117 RCMAR scientists funded by long-standing Centers between 1997 and 2012 had remained in academic settings (Harawa et al., [2017](#)). The

authors also reported that over half of those scientists received NIH grants, and the mean number of articles published per scientist was 16. Analysis of the 2004 Butler-Williams Scholars, another NIA training program focused on emerging aging researchers, reported that 64 grant applications were submitted in one year by 44 scholars. They also had an average of 4.2 years to the first application and 6.6 years to the first NIA award after training (Hill et al., 2023). Similarly, a study of the Network of Minority Health Research Investigators (NMRI), launched by NIH to address lack of diversity in the research workforce, showed an increase in grant funding and academic promotion through participation in the network over 10 years (Blanchard et al., 2019). These various studies highlight the impact of NIH training programs on the productivity and career trajectories of their participants, but also demonstrate the lack of consistency in how outcomes of NIH training programs are reported. They suggest the need for the development of consistent training outcome metrics while also respecting the unique elements of each program. Assessing the additional impacts of the Centers on the scientists' career trajectories requires looking at the cumulative and longitudinal impact of staying connected to the Centers' research network, and of the education, mentoring, and career development support received.

Limitations

Additional program details are needed to describe the success of the RCMAR program as an educational intervention for early career scientists. The Coordinating Center did not have detailed information about local site programming, making it difficult to provide information about unique features of each site. Future studies will need more detailed programmatic data from each site to understand their analytic/research education offerings, mentoring models, and career development support to assess program "dose" with the productivity of their scientists. More data are required to measure other important objectives of the RCMAR program, including tracking pre/post-program changes in increased knowledge of specific research methods, sense of belonging to a community of scientists, commitment to aging research, or DEI leadership capacity, all of which are also tangential outcomes of the program.

Unfortunately, we lacked adequate data to further examine additional characteristics of the scientists, such as the scientists' own educational backgrounds or professional goals, to assess the impact of the program on their future careers. Further research is needed to assess the long-term contributions of the Centers by looking at the overall career trajectories of funded scientists. Furthermore, we acknowledge that scientific productivity should be measured at much longer intervals than was possible with our data. Attributing grants and publications to pilot funding was challenging given the extended time it takes for publications to be written, reviewed, and finally accepted for publication and for grants to get submitted, reviewed, potentially resubmitted, and eventually funded. In addition, we used relatively conservative criteria while attributing grants or publications to the program, which may have excluded publications or grants that used titles that were less closely aligned to their pilot titles, or that did not cite their P30 grant numbers. Assessment of the program's impact on diverse early career scientists requires a deeper understanding of the impact of nuanced differences between sites such as number of times renewed and subsequent maturity of their programming versus nascent sites on scientists' outcomes. The impact of other contextual factors during this

particular grant cycle, such as the effects of COVID-19 pandemic on productivity of scientists and supports provided by sites to overcome those challenges, also require further study in the long term. The National Coordinating Center noted variations in site responses to the pandemic circumstances. There was shifting from planned activities to remote programming, and some scientists funded in the last cycle were unable to start or complete their in-person data collection efforts or their community-based pilot studies. We also know that scientists were further affected by the personal toll of managing illness, loss, schooling for school-age children, and other pandemic-related stressors which may have affected scientific productivity.

Conclusions

We assessed the outcomes of the RCMAR program during its last complete funding cycle in 2018–2023 and found evidence of success as a key DEI program and in promoting the total number of diverse scientists engaging in aging research, the scope and breadth of aging research conducted, and productivity of the early career scientists. Yet, our findings highlight the need for a consistent and rigorous methodology to assess the Centers and other education and training programs with similar goals in order to accurately measure and document outcomes.

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Disclosure statement

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