

EDUCATION
RESEARCH ARTICLE

Strategies for enhancing research in aging health disparities by mentoring diverse investigators

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Introduction. The Resource Centers for Minority Aging Research (RCMAR) program was launched in 1997. Its goal is to build infrastructure to improve the well-being of older racial/ethnic minorities by identifying mechanisms to reduce health disparities.

Methods. Its primary objectives are to mentor faculty in research addressing the health of minority elders and to enhance the diversity of the workforce that conducts elder health research by prioritizing the mentorship of underrepresented diverse scholars.

Results. Through 2015, 12 centers received RCMAR awards and provided pilot research funding and mentorship to 361 scholars, 70% of whom were from underrepresented racial/ethnic groups. A large majority (85%) of RCMAR scholars from longstanding centers continue in academic research. Another 5% address aging and other health disparities through nonacademic research and leadership roles in public health agencies.

Conclusions. Longitudinal, team-based mentoring, cross-center scholar engagement, and community involvement in scholar development are important contributors to RCMAR's success.

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Introduction The Problem

The aging of the US population is reshaping priorities in healthcare, policy, and research. Adults ages 65 years and older represented about 14% of the national population in 2012, up from 10% in 1970 [1]. By 2060 they are projected to number nearly 92 million [2]. Racial and ethnic minority (REM) elders represent a rapidly growing segment of this population. Their percentage of all adults who are older than 65 years is expected to more than triple by 2060, from 13% to 44% [2]. The experiences and health risks of REM elders can differ in complex ways from those of White elders as well as from those of younger members of the same REM groups [3–7]. To date, however, research on these differences has been constrained by ineffective strategies to

recruit REM elders and measurement approaches that do not adequately account for their unique experiences and concerns [8–12]. This situation calls for a more comprehensive approach and a more diverse community of investigators with the knowledge and skills needed to pursue successful research with various racial/ethnic minority populations.

In 1985, the Heckler Report brought the first widespread attention to racial and ethnic health disparities in aging populations [13]. As we note its 31st anniversary, substantial investment in research infrastructure is still needed to better understand and reduce these disparities [14]. Healthy People 2020 envisions “a society in which all people live long, healthy lives” through goals that include eliminating health disparities, addressing the social determinants of health, and improving access to high-quality healthcare [15]. Achieving these goals will require culturally informed approaches and diverse investigators with appropriate knowledge and skills. Nevertheless, the Institute of Medicine noted in 2006 that few National Institutes of Health (NIH) institutes were actively working to expand investigator capacity in this field, despite their funding commitments to research on health disparities [16].

Members of most REM groups are underrepresented among health researchers. In 2010, only 5% of NIH-funded principal investigators were Black/African American, Hispanic/Latino, Native Hawaiian/Pacific Islander, or American Indian/Alaska Native. This percentage in itself evidences an extreme disparity, as these groups in the aggregate comprise 30% of the US population [17, 18]. Underrepresented racial and ethnic minorities (URMs) with PhDs also comprise a disproportionately smaller number of R01 applications to NIH [18]. Furthermore, even among R01 applicants, Blacks/African Americans are less likely than non-Hispanic Whites to be awarded an R01, even after adjustment for education, country of origin, experience, institution, and publication record [19, 20]. One explanation for these disparities might be that despite the growth of programs to build investigator capacity and diversity over the last decade, initiatives designed to mentor and support URM undergraduate and doctoral students, outnumber those for URM junior faculty and postdoctoral fellows [18]. The present discussion focuses on a program designed for the latter group: the Resource Centers for Minority Aging Research (RCMAR), which was first funded by the National Institute on Aging (NIA) in 1997.

RCMAR: A Model for Mentoring New Investigators

The purpose of RCMAR is to reduce health disparities among REM elders by building knowledge of these inequities and developing research capacity. It aims to increase the number of qualified researchers who focus on the health of aging REMs and to enhance the diversity of the scientific workforce through mentorship and career development. Six RCMAR centers including a coordinating center at one site were established by the first initiative; a total of 12 centers have been funded altogether; and 8 are currently funded (see Table 1). Each center includes an Administrative Core and an Investigator Development Core, plus an Analysis Core, or a Community Liaison Core, or both. The Administrative Core leads each center, co-ordinating activities, and ensuring effective internal and external communication. The Investigator Development Core develops and implements each center’s mentoring approach. The Analysis Core identifies, creates, catalogs, and disseminates methods, measures, and other tools to address research questions relevant to minority populations and aging health disparities. It also provides training and analytical support to RCMAR scholars. The Community Liaison Core identifies, creates, and promotes effective strategies for recruiting and retaining REM elders in research; forming research partnerships; promoting study enrollment; and disseminating findings to communities.

To date, RCMAR has provided mentorship, training, and pilot research support to a total of 361 scholars. They represent a wide range of disciplines and study a variety of largely social and behavioral influences on physical and mental health in REM elders. Some also use translational approaches to examine bench-to-bedside and bedside-to-community applications of new health knowledge. Several strategies underpin RCMAR’s success in using mentorship to promote minority aging research. We describe RCMAR scholars and their achievements, shared features of the mentorship models used across centers, features unique to specific centers, and challenges to increasing the diversity of the health research workforce. Given new NIH investments in promoting the diversity of this workforce, one of our goals is to inform discussions on optimal approaches to shaping and assessing mentorship programs for URMs in health research careers [21].

Materials and Methods

RCMAR centers track productivity and career advancement by periodically collecting data from current and former scholars. Data are stored and managed in a central database maintained by the coordinating center, and compiled for relevant cross-tabulations for the present article.

We obtained additional information on RCMAR mentorship from the 7 active centers. We implemented a series of formal sessions on monthly conference calls where each Investigator Development Core discussed their mentorship models. Through these discussions, we developed relevant variables for further study and a form that each center then used to characterize its approach in the following areas: (1) selecting, training, and matching mentors; (2) training scholars; (3) involving community in scholars’ development; (4) engaging scholars; (5) providing continuing mentorship after program completion; (6) measuring and evaluating success; and (7) addressing issues prevalent among URM scholars. Each center also provided details on at least one alumni scholar’s professional status and research, as well as training received and mentor interactions during and after the period of RCMAR funding. These qualitative data contributed important examples of mentor-mentee interactions and the longer-term effects of RCMAR mentorship.

During in-person meetings and teleconferences, the RCMAR Directors reviewed and discussed data summaries. These discussions elucidated additional, contextually significant aspects of the mentoring approaches while elaborating concerns and challenges.

Results

RCMAR Core Competencies

Five core competencies emerged across centers as consistent areas of focus for training scholars and building their skills. Centers use various approaches to provide support and instruction in these competencies that include: (1) developing research proposals; (2) effective scientific writing; (3) knowledge of REM aging and health disparities; (4) communicating findings to scientific and lay audiences; and (5) research methods, including strategies to include and retain elder minority research participants [12, 22]. In addition, most centers provide mentorship in community-partnered scholarship.

Scholar Selection

To reach potential scholars, each center issues an annual formal request for applications with a program description. Some centers select scholars only from their academic institutional partners; others also recruit from other institutions, including nonacademic health

institutions such as local health departments. Three centers advertise nationally through electronic mailing lists, Web site announcements, and direct emails. Applications are reviewed and scored by a scholar selection committee consisting primarily of center faculty members. Senior leadership at each center then reviews the committee's recommendations and makes final selections. Leadership often provides written suggestions for improving applicants' project proposals, whether they are selected for funding or not.

Scholars Mentored

RCMAR centers trained a total of 361 scholars through mid-2015 as shown in Table 1. Among them, 66% were members of REM groups that are underrepresented in health research (Hispanic/Latino, Black, American Indian/Alaska Native, and Native Hawaiian/Pacific Islander). This percentage increases to 70% if we include the 15 multiracial or multiethnic scholars, nearly all of whom indicated at least one underrepresented race or ethnicity. We note that the URM designation excludes specific Asian subgroups, such as Vietnamese and Filipino, that are also underrepresented in biomedical sciences. Several of the RCMAR scholars designated as Asian are from these subgroups. Across centers, 72% of scholars were women, although 3 centers trained both sexes in approximately equal numbers.

Table 2 illustrates the current positions and scholarly productivity of the 177 scholars who entered any of the 4 longstanding centers through 2012. These are the Center for Aging in Diverse Communities, Native Elder Research Center (NERC), Michigan Center for Urban African American Aging Research (MCUAAAR), and Center for Health Improvement of Minority Elderly (CHIME). More than 80% of these scholars remain in academia, including 15% who are now full professors or hold major leadership roles at their academic institutions. Nearly 45% have reached or exceeded the rank of associate professor. About 3% remain in a scholar or fellow role through other programs. This may be because RCMAR can be an appropriate stepping stone to a second round of early career funding, through such mechanisms as NIH career development awards and minority supplements. Among alumni who were no longer in academia, most continued working in health research or related policy roles, with 6.7% of scholars occupying major leadership roles at governmental or community health agencies.

Scholars' Publications and Grant Productivity

Table 2 shows the publications and research funding achieved by the 177 scholars who completed the program at its 4 longstanding centers through 2012, with an average of having been first awarded RCMAR funding 10 years earlier. Their research productivity is noteworthy. After they entered RCMAR, these 177 scholars produced 2607 published articles in scientific journals and were the first author of 39% of these. Because several articles included overlapping authorship, the mean number of articles per scholar is 15.9. This group has also garnered a total of 46 R01 or equivalent awards (R23, R29, R37) and 137 NIH awards of other types, along with 394 research awards from other funding sources. In terms of the 177 RCMAR scholars, 18% had received one or more R01-equivalent awards, and 56% had received any NIH award. We note that many NIH career development awardees receive their awards later in their careers than do RCMAR scholars. A common trajectory for RCMAR scholars includes a postdoctoral position, followed by a RCMAR award, followed by a diversity supplement or K award, and finally an NIH award in the R series.

Mentor Selection and Training

Mentors are chosen by the scholars themselves, by center leadership, or by both parties together. Knowledge of the scholar's research topic and the methods required for the proposed pilot study is the primary

criterion for matching mentors with scholars. Nearly all centers rely heavily on their faculty to serve as mentors. Nevertheless, external faculty often participate in multidisciplinary mentoring teams, which might include the scholar's existing mentors, faculty from affiliated institutions, RCMAR alumni, and community affiliates. When RCMAR began, few formal training programs for mentors in the health sciences existed, so mentors tended to be senior faculty with extensive mentorship experience, and centers generally did not provide formal mentor training. However, with the emergence of the science of mentor training, centers have begun to incorporate this. For example, all mentors with the Latino Aging Research Resource Center (LARRC) complete training modules offered by the Mentoring Academy of the University of California Davis Health System (<http://www.ucdmc.ucdavis.edu/mentoring/curriculum.html>).

Some RCMAR mentors receive salary support from the center grant as a coinvestigator or from their mentee's pilot funding. Others donate their time as affiliated or core RCMAR faculty. Many career development activities in RCMAR stem from partnerships with other research centers, including Project EXPORT, funded by the National Institute on Minority Health and Health Disparities; the Clinical and Translational Science Institutes, funded by the National Center for Advancing Translational Sciences; and the Alzheimer's Disease Research Centers, funded by NIA. These partnerships often lead to mutually beneficial arrangements that include co-mentoring and co-promotion, co-development, and co-sponsorship of other activities.

Scholar Training

All centers provide formal scholar training, ranging from basic instruction in research methods, grant acquisition, and scientific writing to an extensive program devoted to faculty development, bioethics, minority aging research, biostatistics, epidemiology, qualitative research methods, and proposal development. Most centers also offer training in community-based research, cultural competency, leadership, measurement methods, intervention development, dissemination, and use of national data sets. Through the Analysis Core, RCMAR scholars have access to many national leaders in the development and refinement of measures for minority aging research. With this mentorship, scholars often broaden their knowledge beyond their individual disciplines. In addition, the Analysis Core provides many formal training opportunities, including preconference workshops offered by the Gerontological Society of America (GSA), which reach the larger community of behavioral and social science researchers on aging [23].

Some centers offer unique programs, including the training provided by the University of Southern California RCMAR in using medical claims data and dynamic micro-simulations; NERC's seminar series on health and healthcare in American Indian and Alaska Native communities; Center for Aging in Diverse Communities' course on health disparities research methods; and MCUAAAR's Summer Training Workshop on African American Health Research, which attracts investigators and trainees from across the country. Collaborations with other NIA Centers and NIH institutes provide additional training and research opportunities. Examples include the 2014 GSA preconference workshop on cognitive health disparities offered with the Alzheimer's Disease Research Centers, as well as pilot research grants co-funded with other NIH Centers, such as through CHIME and the UCLA Clinical and Translational Science Institute.

Community Involvement in Mentorship

Many advocates believe that community-engaged research approaches are essential to understand and effectively address health disparities. Accordingly, most RCMAR centers include Community Cores [24–28]

Table 1. Description of the 361 current and former Resource Centers for Minority Aging Research (RCMAR) scholars funded from Fall 1997 through Fall 2015 by gender, center, and race/ethnicity

	Women	Men	Total
Center			
Center on Minority Aging University of North Carolina at Chapel Hill Funded: 1997–2002	11	9	20
Native Elder Research Center University of Colorado, Denver University of Washington Washington State University* Funded: 1997–present	29	11	40
Center for Aging in Diverse Communities University of California, San Francisco Funded: 1997–present	58	17	75
Michigan Center for Urban African American Aging Research University of Michigan, Ann Arbor Wayne State University Funded: 1997–present	51	11	62
Resource Center for African American Aging Research Henry Ford Health System† Funded: 1997–2002	10	3	13
Columbia Center for Active Life of Minority Elders Columbia Presbyterian Medical Center Funded: 1997–2007	20	9	29
SC Cooperative for Healthy Aging in Minority Populations Medical University of South Carolina Funded: 2002–2007	9	6	15
Center for Health Improvement of Minority Elderly University of California, Los Angeles† Funded: 2002–present	30	10	40
Penn Minority Aging Research for Community Health University of Pennsylvania Funded: 2007–2012	12	3	15
Deep South Resource Center for Minority Aging Research University of Alabama at Birmingham Morehouse School of Medicine Tuskegee University University of Alabama Funded: 2007–present	20	15	35
Latino Aging Research Resource Center University of California, Davis Funded: 2012–present	8	2	10
University of Southern California USC—Minority Aging Health Economics Research Center Funded: 2012–present	7	5	12
Subtotals‡	265	101	366
Race/ethnicity§			
Hispanic/Latino, any race	39	22	61 (17%)
Black/African American	104	31	135 (38%)
American Indian/Alaska Native	26	7	33 (9%)
Pacific Islander	1	1	22 (1%)
Asian	62	10	72 (21%)
White	16	17	33 (9%)
Multiracial/Multiethnic	8	7	15 (4%)
Subtotals§	256	95	351

USC, University of Southern California.

*A multi-institute collaboration with Washington State University was formalized during the 2012–2017 RCMAR funding cycle.

†Included the RCMAR Coordinating Center.

‡Subtotals add up 366 because 5 scholars received funding from 2 different centers and are counted twice.

§Race/ethnicity information is unavailable for 5 male and 5 female scholars.

and systematically incorporate community-engaged research skill development in their mentorship. They also create opportunities for community representatives to offer feedback to scholars. In some

centers, community members provide direct mentorship, particularly to those scholars engaged in community-based projects [29]. Many centers have disseminated information about how they approach

Table 2. Current positions and research productivity through mid-2015 of 177 scholars that were first funded between 1997 and 2012 by the 4 longstanding* Resource Centers for Minority Aging Research (RCMAR)

	n of scholars (%)
Center name [†]	
Michigan Center for Urban African American Aging Research (MCUAAAR)	51 (28)
Native Elder Research Center (NERC)	35 (19)
Center for Health Improvement of Minority Elderly (CHIME)	33 (18)
Center for Aging in Diverse Communities (CADC)	61 (34)
Current positions—university (type of university position)	
Major leadership role	10 (5.6)
Professor	15 (8.5)
Associate Professor	51 (29)
Assistant Professor	53 (30)
Adjunct/instructor	6 (3.4)
Scholar/fellow	10 (5.6)
Other	5 (1.7)
Subtotal	150 (85)
Current positions—non-university (type of non-university position)	
Major leadership role	10 (6.7)
Researcher/Scientist/Statistician	12 (6.8)
Nonacademic clinician	4 (2.3)
Retiree	1 (0.6)
Subtotal	27 (15)
Scientific publications	n per scholar
Mean number of total scientific journal articles published by scholar, starting with first year of RCMAR support (all authorship roles)	15.9
Mean number of total first author, scientific journal articles, starting with first year of RCMAR support	6.2
Grant success as Principal Investigator (PI)	% of scholars
PI on any R01/equivalent grant	18
PI on any NIH grant, including R01/equivalent	56
PI on any non-NIH Federal research grant	24
PI on any non-Federal grant	58

*Currently funded and have completed at least two 5-year funding cycles.

[†]Numbers add to 180 because 3 scholars were a part of 2 different RCMARs and are counted twice.

community engagement and incorporate it into their scholars' career development through publications [29–34] and GSA preconference workshops.

Three centers—CHIME, the Deep South Resource Center for Minority Aging Research, and LARRC—include members of local RCMAR community boards in reviews of scholars' pilot proposals. NERC includes members of collaborating communities in interactions with scholars, soliciting their contributions to scholar training and requesting their insight into community research priorities and values during mock proposal reviews for their scholars. Finally, through its community outreach programs, MCUAAAR has assembled a large registry of potential research participants and made it available to RCMAR scholars. Community members review and approve all applications to use this registry.

Scholar-Mentor Engagement and Expectations

The frequency of meetings between mentors and scholars varies on the basis of scholars' needs, the stage of their research projects, and the approach used by each center. Nevertheless, most scholars meet in person with their mentors or with fellow scholars at least monthly, and many engage in more frequent contact by email, telephone, and trainings. Some centers (eg, Deep South Resource Center for Minority

Aging Research, LARRC, University of Southern California RCMAR) establish formal agreements between mentors and scholars, with clearly defined roles and expectations; others do not. Scholars report seeking their mentors' assistance at virtually every step of the research process. Assistance might be needed for conceptualizing research questions, assessing the fit of specific theories to specific methodological approaches and data sets, developing manuscripts and proposals, implementing community-engaged research, developing study instruments, resolving technical issues associated with specific data sets, selecting appropriate analytical approaches, interpreting and presenting results, and discussing the policy implications of study findings. Scholars also report seeking mentorship in such career development processes as securing faculty positions, negotiating salaries and protected time for research, strategic planning for research proposals, selecting service commitments, and managing work-life issues.

Scholars across centers are expected to attend designated trainings and to share their work with other scholars, RCMAR faculty, and affiliates in the academy and the community. In several centers, works in progress are shared at monthly or bimonthly scholar meetings in which center faculty offer comments and suggestions to supplement the guidance of individual mentors. More formal presentations of research findings also can occur at these meetings, as well as during monthly research seminars, and local meetings and retreats. These forums facilitate the dissemination of data and the provision

of critical advice on study focus, study design, and interpretation of results.

Annual RCMAR meetings, which rotate among the centers' home institutions, convene RCMAR scholars and faculty from all currently funded centers for a day and a half of sessions, meetings, and social gatherings. Scholars from all centers are expected to offer poster or podium presentations on their pilot research. NIA program officers also attend these meetings to present new scientific directions and funding opportunities, and to interact closely with scholars.

All scholars must also write at least one scientific manuscript based on their research for a peer-reviewed publication. Some centers also require scholars to prepare and submit grant proposals that incorporate findings from their pilot studies, with RCMAR mentors providing feedback during proposal development.

Metrics for Success and Evaluation

Consistent with NIH expectations, all centers assess scholars success in large part, according to scientific papers published and competitive grants awarded, as well as career positions or academic promotions attained. The RCMAR Coordinating Center compiles and forwards these data to NIA. Several centers also track other types of publications, as well as conference presentations and national honors. So far, data collection has been largely manual, requiring scholar input. Most centers request updated curricula vitae to track productivity and then validate this information by searching PubMed and NIH RePORTER. However, if scholars do not respond or do not update their curricula vitae, the productivity data will be incomplete. Centers also routinely collect process measures, such as attendance at training and work-in-progress sessions and evaluations of speakers and seminars.

Most centers conduct direct assessments of mentoring relationships, in which scholars detail their experiences and opinions through printed or Internet-based surveys. However, some scholars report discomfort with providing candid responses regarding their mentors and mentorship experiences. Because each center serves a small number of scholars and each mentor actively serves an even smaller number of mentees, these scholars assume that even information they provide anonymously could be linked to them. They worry that negative assessments could damage their career aspirations. To address this concern, one center has replaced their evaluation surveys with facilitated, focus group-like discussions among scholars. They report that this approach is more informative than collecting survey data. Just one center routinely assesses the number of mentoring sessions attended and hours devoted to mentoring; it also surveys mentors on their scholars' progress. However, directors of other centers indicate that adding assessments for mentors to complete would be viewed as overly burdensome given their already impacted schedules.

Ongoing Scholar Engagement and Program Tailoring

RCMAR centers use a longitudinal approach to mentoring. Although the funding period for training and pilot projects lasts a maximum of 2 years, scholars are encouraged and welcomed to maintain long-term relationships with their mentors and centers. Alumni are frequently invited to participate in annual meetings, research seminars, and training sessions, and to serve as reviewers and mentors for new scholars. For example, MCUAAAR routinely asks alumni to assist with workshops in research methods, whereas CHIME, MCUAAAR, and NERC have structures in place to retain alumni as mentors and Core Directors. The current Co-directors and Core Directors of these centers include mid-level faculty who were RCMAR scholars themselves, and 24% of the RCMAR scholars from the 4 longstanding

centers later served as RCMAR faculty. Interactions between current RCMAR scholars and alumni who are a few years ahead of them in the faculty development process can illuminate the pathway leading from scholars' current positions (eg, as postdoctoral fellows or junior faculty) to the more senior roles of the RCMAR faculty. This approach fosters multigenerational mentoring and knowledge transfer between scholar cohorts. Facilitating relationships among RCMAR scholars and faculty through formal and informal opportunities for interaction, follows a key recommendation of Vincent Tinto's model of academic persistence [35]. According to Tinto [36–38], integrating scholars into a university's social as well as academic realms can foster their long-term engagement or "persistence" in the academy. RCMAR achieves this goal, not by integrating scholars within a single academic institution, but by building a whole community of scholars, composed largely of URMs who are active in minority aging research. Network analysis of the relationships among NERC scholars and faculty attests to the benefits of such interactions in terms of collaboration on future research proposals and publications [39].

"Once a RCMAR Scholar, always a RCMAR Scholar": this frequently used statement of RCMAR leadership encapsulates the philosophy of continuous mentorship. They argue that the most significant mentorship received by scholars often occurs after RCMAR funding ends, in the form of guidance during pivotal periods in career development. Examples include negotiating salary for a new position, navigating the promotion process, weighing offers to pursue nonresearch careers or move to new institutions, overcoming barriers to protecting research time, and making career decisions prompted by family issues. During these transitions, RCMAR mentors offer advice and advocacy, sometimes by pushing for retention packages or by identifying strategies to address personal or family concerns without disrupting research careers. Such support is especially beneficial for URM faculty, who are often the first in their families to pursue graduate education and academic careers. Mentors also provide instrumental support in the form of reference letters, co-authorship opportunities, introductions to leaders in the field, and inclusion on grant proposals.

Discussion

Implications of Standard Metrics for Success and Evaluation

Traditional NIH metrics for success focus on research productivity and, to a lesser extent, academic positions. This productivity is typically defined in terms of peer-reviewed publications and receipt of research funding, especially NIH-funded R-series grants. However, several other kinds of research products can contribute to RCMAR's overarching mission of reducing health disparities in aging populations. These include lay publications, presentations, and social media that disseminate research findings to community audiences and educate REM elders and their caregivers; community organizing activities; policy-related papers, presentations, and testimony; and curricula or trainings that influence health-related behaviors and healthcare practices. In fact, several RCMAR scholars who may not have stood out with regard to the traditional metrics nevertheless improved the health of minority elders by pursuing careers in the public and private sectors. Such careers enabled them to develop and implement beneficial population health policies and innovations. These scholars have served as leaders in the field of public health (Director of the Indian Health Service, Chair of the US Preventive Services Task Force, Chair of the President's Commission on Asian and Pacific Islanders, and Policy Analyst for the Los Angeles Department of Health Services), in philanthropic organizations (Mission Economic Development Agency), and in nonprofit health and research organizations (Director of Research, Southcentral Foundation). They have also held research-related positions in NIH (Deputy Chief Scientific Officer) and the Patient Centered Outcomes Research Institute. Such influential roles

merit acknowledgment not simply for their prestige but, far more importantly, for their potential to effect change on a national scale. Furthermore, those RCMAR scholars who now work in nonresearch-intensive institutions have the potential to improve institutional research capacity and to serve as research-friendly gatekeepers for academics.

Strategies to Address Issues Common to Faculty Underrepresented in the Biomedical Sciences and Health Professions, Including Many Racial/Ethnic Minorities (URM)

Although certain aspects of RCMAR mentoring programs are similar to those of efforts aimed at non-URM investigators, RCMAR also addresses issues specific to NIH-designated underrepresented persons including URMs. Many RCMAR faculty are URMs themselves, or have successfully mentored several URM faculty and students. This experience sensitizes them to the unique challenges, opportunities, and demands experienced by their mentees. For example, URM faculty often face unreasonable demands on their time, as they are frequently expected to represent faculty, students, and researchers of color in a range of university and community venues, over and above their traditional academic responsibilities. This phenomenon has been called “cultural taxation” [40]. RCMAR mentors guide their mentees in selecting which extracurricular requests to accept while encouraging them to limit such activities so they can devote their efforts to scholarship and career advancement. In addition, by offering opportunities for URM junior faculty to interact with each other through regularly scheduled meetings, the RCMAR model enables scholars to develop bonds with peers who can offer understanding and support.

As just 1 example, NERC’s program has at its center efforts to address issues experienced by American Indian and Alaska Native junior faculty. One key strategy it uses is to seek Native mentors for its scholars [35]. Such mentorship offers a nonthreatening space in which to voice concerns, express self-doubt, vent anger, and benefit from lessons learned by others. NERC also negotiates with its scholars’ institutions to ensure that 1 full day per week is set aside for NERC-funded activities, resulting in 20% protected time for research and related career development activities. In addition, NERC leadership recognizes that few Native scholars have sufficient resources to cover travel costs for program activities. Therefore, they cover all program-related travel and lodging expenses for a week-long onsite training session for scholars at the start of their first program year and regular 2-day meetings with additional training throughout the 2-year program. NERC extends Tinto’s model of persistence by emphasizing the individual, structural, and organizational elements necessary for a successful career in health disparities research. This extension explicitly acknowledges the family histories, educational experiences, and institutional environments that shape the lives and work of Native scholars [35].

All RCMAR center awards have gone to research-intensive institutions. This funding strategy builds on the strengths of resource-rich environments, where RCMAR can potentially enhance diversity by attracting minority scholars and promoting their retention as faculty. Nonetheless, some centers have also recruited or actively collaborated with promising junior faculty from nonresearch-intensive institutions. Such partnerships address vital needs, because these faculty might face substantial barriers in building research programs, including limited resources and infrastructural support; insufficient protected time for research; an absence of available mentors; and insufficient opportunities for training in research methods [34, 41, 42]. Without advanced graduate programs in aging research, few nonresearch-intensive institutions can attain a critical mass of researchers and mentors in this field.

Challenges

RCMAR leadership acknowledges that the limited resources available to compensate mentors might limit both the number of willing mentors and the amount of time that each can dedicate to mentees, especially mentees outside their home institutions. Because universities increasingly require faculty to report the source of salary support for all activities, limitations on mentor compensation have become a major challenge for RCMAR, reshaping funding allocations, and calling for a re-examination of approaches to mentor engagement.

RCMAR Directors and Core Leaders have also struggled with the ethical implications of training URM junior faculty for roles in which fewer and fewer of them may manage to succeed, at least according to the metric of NIH funding receipt. For example, the funding rate¹ for R01-equivalent proposals in 1999 was 32% compared with only 14% in 2014 [43]; for first-time investigators, the rate was 23% in 1999 but only 14% in 2014. Still worse, fewer and fewer US institutions provide tenure-track opportunities for faculty, making these positions increasingly harder to obtain [44]. At many research institutions, faculty are expected to acquire R01 funding before they even can be considered for a tenured position. The steady decline of tenure reinforces the relevance and attractiveness of high-impact careers outside the academy.

Although many RCMAR faculty are from diverse racial/ethnic groups, many RCMAR mentors belong to the majority group, and thus might not fully appreciate how racial and ethnic statuses affect the experiences and choices of their mentees. Mentor training and diverse mentoring teams can help address this gap. Nonetheless, these strategies alone might be insufficient to guarantee appropriate support for mentees as they navigate day-to-day issues—such as working to achieve success while maintaining personal integrity, handling micro-aggressions, and negotiating the competing expectations of their communities of origin, their work settings, and their professions [40, 45, 46]. Personal stressors may be especially relevant, as the families of URM scholars, like the communities they study, often experience disproportionate rates of financial instability and of caretaker burden and grief due to elevated rates of premature morbidity and mortality [47–49]. These challenges add to the importance of providing opportunities for RCMAR scholars to interact with one another.

Conclusions and Future Directions

Although much attention has been devoted to “pipeline” programs designed to raise the number of entry-level URM faculty in the scientific workforce, programs like RCMAR provide crucial support after URM trainees have successfully transitioned to faculty status and face new challenges. RCMAR’s successful model develops a well-trained workforce—including many racially and ethnically diverse investigators—who are prepared to improve outcomes for minority elderly and supports their progress toward research independence.

RCMAR leadership is currently exploring how to capture not only the traditional “visible skills” (eg, grant and manuscript writing) that are vital to all research training, but also the informal or “invisible skills” that are critical to career success. URM faculty have a particular interest in learning how to navigate daily issues, apply constructive strategies to cope with stressors, and balance the demands of family, community, and the academy. Although we have not formally measured these skills, our discussions with RCMAR mentors suggest that many work to foster them in mentees.

RCMAR has helped to launch several hundred successful careers in aging-related research and policy for a diverse group of scholars, most

¹Percentage of R01-equivalent proposals eventually awarded.

of whom are URM faculty. We believe that the success of the RCMAR programs is attributable to the knowledge, skill development, experience, and emotional/instrumental support that it offers scholars, while acknowledging the community and cultural contexts in which scholars live and work. In the future, additional longitudinal data will permit us to capture important predictors of success that likely vary across scholars' backgrounds, enabling us to hone and more precisely target our training strategies.

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Disclaimer

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Declaration of Interest

No conflict of interest exists with industry or any other entities.

References

- Hogan H, Ortman JM, Velkoff VA.** *An Aging Nation: The Older Population in the United States.* Current Population Reports. P25-1140. U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. 2014, May 6.
- US Census Bureau.** U.S. Census Bureau projections show a slower growing, older, more diverse nation a half century from now. News Release. U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau; 2012, Dec 12.
- Yan G, et al.** The relationship of age, race, and ethnicity with survival in dialysis patients. *Clinical Journal of the American Society of Nephrology* 2013; **8**: 953–961.
- Harawa NT, et al.** Racial/ethnic and gender differences among older adults in nonmonogamous partnerships, time spent single, and human immunodeficiency virus testing. *Sexually Transmitted Diseases* 2011; **38**: 1110–1117.
- Zhang Q, Wang Y, Huang ES.** Changes in racial/ethnic disparities in the prevalence of type 2 diabetes by obesity level among US adults. *Ethnicity & Health* 2009; **14**: 439–457.
- Traylor AH, et al.** Adherence to cardiovascular disease medications: does patient-provider race/ethnicity and language concordance matter? *Journal of General Internal Medicine* 2010; **25**: 1172–1177.
- Mehta KM, et al.** Race/ethnic differences in AD survival in US Alzheimer's Disease Centers. *Neurology* 2008; **70**: 1163–1170.
- Levkoff S, Sanchez H.** Lessons learned about minority recruitment and retention from the Centers for Minority Aging and Health Promotion. *Gerontologist* 2003; **43**: 18–26.
- George S, Duran N, Norris K.** A systematic review of barriers and facilitators to minority research participation among African Americans, Latinos, Asian Americans, and Pacific Islanders. *American Journal of Public Health* 2014; **104**: e16–e31.
- Moreno-John G, et al.** Ethnic minority older adults participating in clinical research: developing trust. *Journal of Aging and Health* 2004; **16**(Suppl.): 93S–123S.
- Penner LA, et al.** Racial healthcare disparities: a social psychological analysis. *European Review of Social Psychology* 2013; **24**: 70–122.
- Curry L, Jackson J.** (eds) *The Science of Inclusion: Recruiting and Retaining Racial and Ethnic Elders in Health Research.* Washington, DC: Gerontological Society of America, 2003.
- U.S. Department of Health and Human Services (USDHHS), Task Force on Black and Minority Health.** *Report of the Secretary's Task Force on Black and Minority Health.* Washington, DC: U.S. Department of Health and Human Services, 1985.
- Gracia JN, Ruffin J.** Partnership, research, and leadership to advance health equity and eliminate health disparities. *American Journal of Public Health* 2014; **104**(Suppl. 4): S520–S521.
- USDHHS, Healthy People 2020.** Objective development and selection process [Internet]. 2010 [cited Jan 19, 2015]. (<http://www.healthypeople.gov/2020/about/history-development/Objective-Development-and-Selection-Process>)
- Thomson GE, et al.** (eds) *Examining the Health Disparities Research Plan of the National Institutes of Health: Unfinished Business.* Washington, DC: The National Academies Press, 2006.
- United States Census Bureau.** 2010 U.S. Census Bureau Report [Internet]. [cited Feb 1, 2016]. (<http://2010.census.gov/2010census/data/2010>)
- Working Group on Diversity in the Biomedical Research Workforce (WGDBRW), The Advisory Committee to the Director (ACD).** *Draft Report of the Advisory Committee to the Director Working Group on Diversity in the Biomedical Research Workforce (WGDBRW).* Bethesda, MD: National Institutes of Health, 2012.
- Ginther DK, et al.** Race, ethnicity, and NIH research awards. *Science* 2011; **333**: 1015–1019.
- Ginther DK, et al.** Are race, ethnicity, and medical school affiliation associated with NIH R01 type I award probability for physician investigators? *Academic Medicine* 2012; **87**: 1516–1524.
- Valantine HA, Collins FS.** National Institutes of Health addresses the science of diversity. *Proceedings of the National Academy of Sciences of the United States of America* 2015; **112**: 12240–12242.
- Chadiha LA, et al.** Building a registry of research volunteers among older urban African Americans: recruitment processes and outcomes from a community-based partnership. *Gerontologist* 2011; **51**(Suppl. 1): S106–S115.
- Teresi JA, Stewart AL, Stahl SM.** Fifteen years of progress in measurement and methods at the Resource Centers for Minority Aging Research. *Journal of Aging and Health* 2012; **24**: 985–991.
- Nápoles-Springer AM, et al.** Clinical research with older African Americans and Latinos: perspectives from the community. *Research on Aging* 2000; **22**: 668–691.
- Ferdinand KC, Norris KC.** Eliminating disparities in hypertension, metabolic syndrome, kidney failure, and cardiovascular disease: basic science, clinical practice and community initiatives. Foreword. *Ethnicity & Disease* 2009; **19**(Suppl. 5): S5iii–S5iv.
- Chung B, et al.** Story of stone soup: a recipe to improve health disparities. *Ethnicity & Disease* 2010; **20**(Suppl. 2): S2-9–S2-14.
- Jones L, et al.** The vision, valley, and victory of community engagement. *Ethnicity & Disease* 2009; **19**(Suppl. 6): S6-3–S6-7.
- Aguiar-Gaxiola S, et al.** Towards a unified taxonomy of health indicators: academic health centers and communities working together to improve population health. *Academic Medicine* 2014; **89**: 564–572.
- Moreno-John G, et al.** Mentoring in community-based participatory research: the RCMAR experience. *Ethnicity & Disease* 2007; **17**(Suppl. 1): S33–S43.
- Carrasquillo O, Chadiha LA.** Development of community-based partnerships in minority aging research. *Ethnicity & Disease* 2007; **17**(Suppl. 1): S3–S5.
- Daniels NA, et al.** Effectiveness of adult vaccination programs in faith-based organizations. *Ethnicity & Disease* 2007; **17**(Suppl. 1): S15–S22.

32. **Laken MA, Wilcox S, Swinton R.** Working across faith and science to improve the health of African Americans. *Ethnicity & Disease* 2007; **17**(Suppl. 1): S23–S26.
33. **Noe TD, et al.** The influence of community-based participatory research principles on the likelihood of participation in health research in American Indian communities. *Ethnicity & Disease* 2007; **17**(Suppl. 1): S6–S14.
34. **Norris KC, et al.** Historically black medical schools: addressing the minority health professional pipeline and the public mission of care for vulnerable populations. *Journal of the National Medical Association* 2009; **101**: 864–872.
35. **Manson SM.** Personal journeys, professional paths: persistence in navigating the crossroads of a research career. *American Journal of Public Health* 2009; **99**(Suppl. 1): S20–S25.
36. **Tinto V.** Dropout from higher education: a theoretical synthesis of recent research. *Review of Educational Research* 1975; **45**: 89–125.
37. **Tinto V.** Theories of college student departure revisited. In: Smart J, ed. *Higher Education: Handbook of Theory and Research*. New York, NY: Agathon, 1985, pp. 359–384.
38. **Tinto V.** *Leaving College: Rethinking the Causes and Cures of Student Attrition*, (2nd edition). Chicago, IL: University of Chicago Press, 1993.
39. **Buchwald D, Dick RW.** Weaving the native web: using social network analysis to demonstrate the value of a minority career development program. *Academic Medicine* 2011; **86**: 778–786.
40. **Padilla AM.** Ethnic minority scholars, research, and mentoring: current and future issues. *Educational Researcher* 1994: 24–27.
41. **Ofili EO, et al.** Models of interinstitutional partnerships between research intensive universities and minority serving institutions (MSI) across the Clinical Translational Science Award (CTSA) consortium. *Clinical and Translational Science* 2013; **6**: 435–443.
42. **Waller LS, Shofoluwe MA.** A qualitative case study of junior faculty mentoring practices at selected minority higher educational institutions. *Journal of Technology, Management, and Applied Engineering* 2013; **29**: 1–11.
43. **USDHHS.** *Success Rates and Funding Rates R01-Equivalent Grants: Competing Applications, Awards, and Success Rates*. Bethesda, MD: National Institutes of Health, 2015.
44. **Jaschik S.** Skepticism about tenure, MOOCs and the Presidency: a survey of provosts [Internet]. 2013, Jan 23. (<https://www.insidehighered.com/news/survey/skepticism-about-tenure-moocs-and-presidency-survey-provosts>)
45. **Chang MJ, et al.** Considering the impact of racial stigmas and science identity: persistence among biomedical and behavioral science aspirants. *Journal of Higher Education* 2011; **82**: 564–596.
46. **Hurtado S, et al.** Predicting transition and adjustment to college: biomedical and behavioral science aspirants' and minority students' first year of college. *Research in Higher Education* 2007; **48**: 841–887.
47. **Carr PL, et al.** 'Flying below the radar': a qualitative study of minority experience and management of discrimination in academic medicine. *Medical Education* 2007; **41**: 601–609.
48. **Mahoney MR, et al.** Minority faculty voices on diversity in academic medicine: perspectives from one school. *Academic Medicine* 2008; **83**: 781–786.
49. **Cropsey KL, et al.** Why do faculty leave? Reasons for attrition of women and minority faculty from a medical school: four-year results. *Journal of Women's Health (Larchmt)* 2008; **17**: 1111–1118.