Increasing Sex and Ethnic/Racial Diversity of Researchers in Aging: Some Promising Strategies at the Postdoctoral Level

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To increase recruitment of a diverse pool of women into research careers in aging, a postdoctoral training program was designed based on the premise that women would be attracted to a research training program that focused on older women's health; offered an individualized, competency-based career development plan; could commit multiple years of financial support; and provided career mentorship by senior women faculty and that ethnic/racial minority women would be attracted to a research training program that, in addition to these other aspects, focused on the study of health differences and disparities between populations of older women. All 15 trainees have been women, and since focusing on health disparities, recruitment of underrepresented minority trainees increased from 10% to 80%. Of the nine former trainees, five continue research-based academic careers in aging with demonstrable success in achieving academic benchmarks. Focusing on areas of research with personal relevance to applicants and individualizing the program can be used to recruit diverse postdoctoral fellows in aging research. Short-term career outcomes indicate that career persistence of trainees compares favorably with that in other National Institutes of Health (NIH) postdoctoral training programs.

The Institute of Medicine,[1] NIH,[2] the Council on Graduate Medical Education,[3,4] and the American Association of Medical Colleges[5,6] all cite the lack of sex and ethnic/racial diversity in leadership positions in academic health sciences as a matter requiring urgent attention. Rationale for this recommendation includes the rapidly changing demography of the United States, mounting research establishing the benefit of cultural congruence between patients and providers on health outcomes,[1,7] and the accumulating body of evidence[8] that diversity in all sectors promotes more-creative and -inclusive solutions to complex problems.[9,10] Although there are recommendations to value equally all efforts in academic health sciences—teaching, clinical care, and research[11]—the current career pathway to leadership is predicated on success in research. Increasing the sex and ethnic/racial diversity of trainees recruited to NIH programs is one of the most direct means of ensuring diversity among future leaders of academic health sciences.[12–14] This article reports on the success of one strategy to increase the sex and ethnic/racial diversity of postdoctoral trainees recruited into aging research.

METHODS

The strategy for designing a research training program in aging that would increase the recruitment of women and ethnic/racial minorities was based on discussions with male and female faculty at the University of Wisconsin (UW), colleagues at professional meetings,[15,16] personal experience,[17,18] institutional research,[19–21] and document review.[1–7,22–26] In this way, potential barriers to and facilitators of the advancement of women in academic health sciences were identified. A postdoctoral training program was designed to increase the sex and ethnic/racial diversity of researchers entering academic careers based on the premise that women would be attracted to a research training program that focused on some aspect of women's health (including the study of sex and gender differences in health and disease processes); offered an individualized, competency-based career development plan; could commit multiple years of financial support at the outset; and provided career mentorship by senior women faculty and that ethnic/racial minority applicants would be attracted to a research training program that, in addition to these other aspects, focused on the study of health differences and disparities in populations of women. The training programs focused on the conduct of research relevant to the health of older women. Geriatrics itself is a field with care providers from multiple disciplines in which women predominate and the majority of patients are women. Gerontological research generally already includes examination of sex or gender differences in health and disease. Therefore, in most

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cases, recasting existing gerontological research as older women's health research involved simply changing the rubric. The UW institutional review board approved the protocol for collection and presentation of data on trainees, and all trainees gave written informed consent to include their data. The first 6 years of these NIH-supported postdoctoral training programs are reported on here.

Selection of Research Mentors

Faculty members were invited to be research mentors on the training program if they were involved in some aspect of scientific inquiry centrally or peripherally related to older women's health research, had a track record of training successful investigators, and had well-established research programs with active grant funding. The panel of 20 research mentors included investigators studying breast cancer, obesity, osteoporosis, diabetes mellitus, Alzheimer's disease, cardiovascular disease, caregiver issues, and biopsychosocial determinants of healthy aging. Mentors came from fields including molecular biology, sociology, psychology, epidemiology, and health services, as well as clinical disciplines of geriatrics, endocrinology, cardiology, obstetrics and gynecology, nursing, and social work. After the training programs had been in place for 4 years, the training grant director (MC) and codirectors (LS, GS) identified opportunities for research on health differences and disparities within each area in discussion with research faculty. The potential for involvement in such investigation was purposefully highlighted in recruitment even where the mentors themselves were not focusing on this issue.

Training

A key aspect of the curriculum is development of an individualized career plan for each trainee. Training experiences are designed in collaboration with the Clinical Investigator Preparatory Program (CIPP) established through the NIH K30 mechanism. The CIPP curriculum is built from a competency-based model incorporating principles of adult education. The theoretical rationale for this model and its corresponding evaluation have been described elsewhere.[27] This 2- to 3-year didactic training program is linked to mentoring and research to provide trainees with the knowledge and skills to achieve the following core competencies necessary to become successful clinical investigators.

- Select and apply appropriate study design and statistics to research problems.
- Conduct clinical research according to professional and legal ethics.
- Lead and manage a productive career in clinical or translational research.
- Teach and communicate scientific knowledge through verbal presentations.
- Write well-organized and logical journal publications, research proposals, and grant applications.
- Acquire expertise in a research domain with progressive independence from a mentor.

These competencies have been divided into 35 learning objectives on which each trainee is evaluated and monitored for achievement toward expected academic benchmarks along a mutually agreed upon timeline (e.g., submit an abstract to a national meeting within the first 6 months, complete a full manuscript within the first year, obtain a grade of B or higher in coursework). Furthermore, these objectives form the basis by which courses, workshops, seminars, and other learning activities are assembled to ensure achievement of these competencies.

Commitment of Multiple Years of Support

At the career juncture at which women would enter a research training program, many are considering starting a family or already have children and feel the need for a commitment for salary beyond 2 to 3 years. To relieve applicants of this concern, it was possible to offer at the outset the opportunity for multiple years of financial support depending on the training level at entry and with the understanding that continued support would be contingent on successful achievement of academic benchmarks along an estimated timeline. This has been accomplished through collaborations with medical subspecialty fellowships during which a focus on older women's health is mutually beneficial, including geriatrics, endocrinology, rheumatology, and cardiology; a Women's Health Fellowship from the Department of Veterans Affairs; a National Institute on Aging (NIA) postdoctoral National Research Service institutional training grant; and an NIA institutional mentored clinical scientist development grant.

Selection of Trainees

The program is open to candidates who have completed doctoral work (clinical doctorate or PhD). Candidates are recruited primarily through the local and national professional and academic networks of participating faculty and program leaders and by personal contact. When openings are anticipated, the program director sends an electronic advertisement to directors of academic programs in women's health and geriatrics and distributes brochures describing the program at local and national meetings. The qualifications for review and acceptance focus on demonstrated evidence of commitment to a research-based academic career, availability of an appropriate research mentor, and past performance in completing a research project independently within a mentored setting. Three of 15 trainees have entered the program from an institution other than UW. Those within UW have been recruited from eight different departments, three sections in one department, and five schools or colleges.

Mentorship

Trainees are immersed in the research milieu of their individual research mentor through the traditional apprenticeship model of research training. Each trainee receives additional career coaching and counseling through individual meetings with the program director and other senior women faculty mentors as often as weekly or as infrequently as every 6 months depending on the mutually agreed upon needs of the trainee. In this mosaic mentoring model, trainees also meet annually with a multidisciplinary advisory committee to present and discuss completed and planned research and career development activities, participate in a monthly administrative and research meeting with all trainees and other members of the academic women's

health community, and attend a monthly lecture on a women's health topic and an annual 1-day women's health and leadership conference. Within a learner-centered framework and the CIPP curriculum, program leaders make active attempts to funnel to the trainees additional career-development and skill-building opportunities whenever they arise. For example, trainees may be invited to collaborate on a review article, chair the program's annual conference committee, and attend the NIA Summer Institute on Aging Research. "Small" achievements such as completing a course or acceptance of an abstract for presentation at a national meeting, as well as more-substantial achievements such as acceptance of a peer-reviewed journal manuscript or completing a degree, are acknowledged and celebrated in multiple ways (e-mail notice, announcements at monthly meetings, personal congratulations from program directors, and an annual reception). Trainee feedback is solicited and the program modified in response. For example, a trainee-run monthly professional development and peer-mentoring luncheon began in 2005 in response to an expressed desire from the trainees. Although the expected benchmarks vary from one discipline to another and with the level of training, in general, all trainees are expected to write at least one research abstract and complete preparation of one manuscript annually. Before the final year of support, most trainees will be expected to have applied for grant funding to support the next stage of their research career development.

Evaluation of Trainees

The outcomes of the program's trainees relevant to the goal of increasing the sex and ethnic/racial diversity of leaders in academic health sciences will determine its ultimate success. Because the timeline from postdoctoral training to achieving confirmation of academic success such as an NIH R01 grant or tenure at an academic medical center may be more than 10 years, intermediate markers of successful academic career development, including research presentations, peer-reviewed publications, recruitment to tenure-track faculty positions, and attainment of independent grant funding, are used. The progress of trainees and their interactions with mentors are monitored formally and informally through the interactions previously described. Mid-course adjustments for individual trainees resulting from these have included changing research mentors, entering a graduate program, adding new collaborators, and taking additional coursework. Beyond recruitment, it has been found that the program must be flexible and creative in addressing and responding to individual trainee's needs, including culturally sensitive assessment of mentor–mentee fit and assurance that a desire to engage in health disparities research is respected once a trainee is on site.

RESULTS

Tables 1 and 2 describe the 15 trainees in the first 6 years of the program who have completed or are currently enrolled. All applicants and trainees have been women. Before research on health differences and disparities was purposefully focused on, only one of 10 trainees was from an underrepresented minority group (10%), compared with four of five trainees since then (80%). Of the nine trainees who have finished or will be completing training this year, five continue research-based academic career development—two of whom are on tenure track at a major research university. Of these five, three have NIH or other federally funded awards, one who is in a field not typically funded by NIH (history of medicine) has a prestigious book contract, and one is supported on institutional funds pending review of a well-reviewed and resubmitted NIH K-award. Four former trainees are no longer on an academic career trajectory (although one is completing research begun during training). Of these four, two are in teaching positions and two are physicians in private practice. Trainees remained in the NIH-supported training program for 2 ($n = 5$) or 3 ($n = 4$) years. There was no difference in the amount of time in the program and the decision to remain or leave research-based academic careers. Examining the credentials at the time of recruitment and the experiences during training revealed no obvious predictors to explain why these four women left academic careers, although it may be noteworthy that the two PhD scientists left for predominantly personal reasons (health and family, respectively), whereas the two physicians left for predominantly institutional reasons (unsupportive climate for women and low salary). The two physicians who entered private practice after training would have been predicted to succeed in academic careers by any traditional measure. Both had published their research in well-regarded journals, expressed enjoyment of the research process, wrote well, were well-evaluated teachers and clinicians, and had completed a curriculum in clinical research. Both had been successful in obtaining funding to support their further research career development for 3 and 5 years, respectively, and both turned these offers down.

DISCUSSION

A focus on older women's health research in a postdoctoral training program, along with a competency-based curriculum, mentoring by senior women, and the ability to offer financial support for several years, proved to be successful in recruiting women into postdoctoral research training. Similarly, a purposeful emphasis on research into health differences and disparities between populations of older women was strikingly successful in recruiting underrepresented minority women. This is particularly notable in light of the diversity of the potential applicant pool, in which only 9% of biomedical and 15% of behavioral science doctorates are awarded to underrepresented men and women.[13] An even lower percentage of underrepresented minority physicians would be in the eligible applicant pool.[28] Although these strategies have been successful for recruitment, the need for the program to be flexible and creative in its ability to respond to the needs of individual trainees was also found. The 55.5% persistence (5/9) in research-based academic career paths of former trainees is higher than that found by a previous study,[29] which found that 36% of 146 graduates from 25 NIH-funded postdoctoral fellowships in primary care were on faculty tracks, but lower than the 74% of graduates in faculty positions from one Medical Scientist Training Program.[30] Given the explicit goal of the training program to train future researchers and leaders in academic health sciences,

Table 1. Description of Trainees: Recruitment with Research Focused on Older Women's Health

Trainee Number	Years of Training	Degree at Entry	Discipline	Ethnic/Racial Category	Research	Current Status
1	1999–2001	PhD	Psychology	White	Effect of birth weight on development of chronic illnesses in later life	Lecturer (nonresearch academic position)
2	1999–2001	PhD	History of medicine	White	History of menopause in the United States	Tenure-track faculty position; book contract
3	2000–2002	PhD	Nutritional sciences	Hispanic	Dietary composition and energy metabolism	Teaching physiology in massage therapy school
4	2000–2003	PhD	Nutritional sciences	White	Basic mechanisms of obesity: lipid metabolism	Postdoctoral fellow, U.S. Department of Agriculture grant; interviewing for faculty positions
5	2001–2004	MD	Internal medicine	White	Effect of discontinuous insurance on health of aging women	Private practice
6	2002–2004	MD	Internal medicine (geriatrics)	White	Lipid metabolism and Alzheimer's dementia	Tenure-track faculty position; NIH K23 Beeson Award
7	2002–2005	MD	Internal medicine (endocrinology)	White	Effect of aging and sex on metabolic measures in polycystic ovary syndrome	Completing research project; private practice
8	2002–2005	DVM	Veterinary medicine	White	Prolactin receptor biology in estrogen receptor–positive breast cancer	Postdoctoral fellow; NIH K01 well reviewed and resubmitted
9	2002–present	MD	Psychiatry	White	Neurobiology of fibromyalgia	Remains in training program
10	2002–present	MD	Family medicine	White	Osteoporosis in aging women with developmental disabilities	Remains in training program

NIH = National Institutes of Health.

Table 2. Description of Trainees: Recruitment with Research Focused on Health Differences and Disparities Between Older Women

Trainee Number	Years of Training	Degree at Entry	Discipline	Ethnic/Racial Category	Research	Current Status
11	2003–2005	PhD	Counseling psychology	Black	Older African-American women's attitudes and beliefs about mental illness	National Institutes of Health Roadmap K12
12	2004–present	PhD	Health services research	Black	Physician trust in older African-American women	Remains in training program
13	2005–present	MD	Internal medicine (cardiology)	Black	Endothelial dysfunction and cardiovascular risk factors	Remains in training program
14	2005–present	MD	Internal medicine (endocrinology)	Hispanic	Mechanisms of type II diabetes mellitus	Remains in training program
15	2005–present	MD	Internal medicine (geriatrics)	Asian	Osteoporosis	Remains in training program

the fact that 44% of the trainees left research-based academic careers is disappointing.

A strategy that is remarkably effective in recruiting a diverse group of women into the academic career pipeline and tracking them toward careers in aging research has been demonstrated. Although the program has not been in place long enough to assess whether these trainees will become leaders in academic health sciences, their short-term success in achieving academic benchmarks including NIH funding and tenure track faculty appointments is encouraging. Nevertheless, even armed with all the necessary competencies to succeed, continuation in an academic career is not assured. The relatively low compensation and the perceived climate for women in academic medicine were the major concerns for the two physicians who left for private practice. Although demands of family and health were overriding concerns for the two PhD scientists who left research, these factors interact with nonprofessional gender roles and women's biology. Women are more likely to assume family responsibilities and be susceptible to reproductive-related health issues early in their careers, whereas health problems for men are more likely to arise in midlife after their careers are established. Multiple controlled research studies have documented the numerous institutional and attitudinal barriers women, particularly those from ethnic/racial minority groups, face as they ascend to leadership in any field.[31–38]

A strategy that is clearly successful to increase the sex and ethnic/racial diversity of the academic pipeline in health sciences has been demonstrated. This is only a first step. If we are to capitalize on all available talent to help address the complex challenges to the health of our populations, the extant research indicates that we must continue to work toward transforming the culture of academic science to make it welcoming and supportive of the career advancement of women.[5,39,40] Low salary relative to the private sector has been identified as important for retaining men and women in academic careers, and NIH is addressing this through programs that allow for repayment of student loans and higher salary caps on NIH grants. A review of interventions to specifically address the retention of women in academic careers, with an extensive list of online resources, was recently published.[40] Critical to success in achieving gender equity is the open commitment and support of top institutional leadership. Also essential is education of the entire academic community to the widely pervasive and deeply embedded unconscious gender bias which consistently results in lower evaluations of women and the work performed by women relative to men and the work performed by men even for identical achievements.[31–37,41] Finally, if we are to retain our most talented physicians and scientists in academic settings, all members of the academic community need to advocate for programs that reduce the conflicts between personal and professional life including dual-career hiring programs, tenure clock extensions for childbirth and adoption, and on-campus child care facilities.

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