Developing the Next Generation of Researchers in Emerging Fields: Case Study of a Multisite Postdoctoral Research Training Program

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The aging of the U.S. population has been described as an approaching “demographic tsunami” that will challenge the capacity of an underdeveloped geriatric mental health service delivery system (1, 2). Despite a growing evidence-base of effective treatments for geriatric mental disorders (3–7), older adults have inadequate access to needed services (8–12) and are more likely to receive low-quality care (10–15), leading to excess morbidity, disability, and institutionalization (11–18). Older adults with mental disorders, including psychiatric illness and cognitive-impairment disorders, are associated with the highest per-person expenditures among the high-cost “dual eligible” Medicare and Medicaid beneficiaries (19). A major impediment to addressing these challenges is a lack of geriatric mental health services researchers with the necessary skills to bridge the gap between findings from research and “real-world” service delivery (20, 21). Further complicating this challenge, no single research setting has the sufficient depth or breadth of expertise to provide training that effectively spans the large array of skill-sets that comprise this developing field.

In response to the need to develop the field, we created a multisite, interdisciplinary research training program, linking leading geriatric mental health research institutions with web-based technology to provide a comprehensive program with diverse expertise and mentoring capacity. Distinct characteristics of the program include 1) a multisite, coordinated postdoctoral training program; 2) cross-site mentoring and training in relevant research methods and career-development strategies; 3) a core biweekly seminar of ongoing research; 4) cross-site peer review of manuscripts and grant proposals; and 5) site-specific seminars and degree programs.

Program Development and Design

In 2005, three leading researchers (Bartels, Bruce, Unützer) at three geographically dispersed universities

(Dartmouth College, Cornell University, University of Washington), implemented a novel multisite postdoctoral training program in geriatric mental health services research. In 2010, this program was expanded to include a fourth site and senior researcher (Blow; University of Michigan). A combination of mentoring and structured group training supports fellows in publishing peer-reviewed manuscripts, obtaining independent research funding, and securing post-fellowship academic appointments.

A principal rationale for our program is the need for training in a relatively new and developing field characterized by a wide breadth of methods and topic areas (i.e., health services research), coupled with a lack of senior faculty in the target specialized area (geriatric mental disorders). A multisite consortium was needed, with the capacity to cover core methodological and research content areas, while collectively sharing the responsibility for providing cross-site mentoring and early-career advancement opportunities. Figure 1 shows the diverse range of research content areas, study populations, disorders, research settings, and methodological approaches that are covered by blending the four collaborating sites. Also, the core cross-site fellowship activities are described, as well as numerous site-specific seminars and course offerings.

Cross-Site Shared Fellowship Activities

Postdoctoral Training Program Administration

Coordination of the program across the four sites is achieved through a monthly conference call of the site directors, with administrative support and training-grant management by the parent grant site (Dartmouth College, NIMH T32 MH 073553; PI: Bartels). Each site has two fellows (for a total of eight fellows across the program) who are assigned a primary mentor at their site (most commonly, one of the site co-principal investigators [PIs]). Site directors share in the recruitment, selection, and admission process. Reflecting the interdisciplinary nature of the field, fellows recruited to the program have doctoral degrees in medicine, psychology, social work, nursing, sociology, epidemiology, public health, health economics, or a related social science. At least 90% effort is committed to conducting research and to receiving research training for 2 years. The balance may be devoted to teaching or clinical work. A third year of support may be considered if there is a significant likelihood of achieving independent funding (e.g., favorable score on a K07 application)

Received July 18, 2011; revised February 17, June 8, 2012; accepted June 12, 2012. From Dartmouth College (SJB), Cornell University (MLB), University of Washington (JU), and University of Michigan (FB)

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FIGURE 1. Cross-Site and Site-Specific Fellowship Activities

Cross-Site Shared Fellowship Activities			
<ul style="list-style-type: none"> Shared administrative oversight of fellowship by Co-P.I.s (Bartels, Bruce, Unützer, Blow) Shared fellow selection, program admissions, monitoring of progress, and resource allocation Bi-weekly web-based core seminar: Fellows' presentations of works-in-progress (research findings, manuscripts, grant proposals) and career-development plans; feedback from faculty and fellows Cross-site mentoring Cross-site research collaboration and access to secondary data analyses Cross-site reviews of selected grant proposals and manuscripts before formal submission 			
Site-Specific Activities			
Site	Core Research Areas	Site-Specific Seminars	Optional MS/MPH Coursework
Dartmouth College	Serious Mental Illness; Medical Comorbidity; Health Promotion; Illness Self-Management; Primary Care; Shared Decision-Making; Implementation Research	Dartmouth Psychiatric Research Center Services Research Seminar; Geriatric Health Services Research Fellow Seminar	Health Services Research; Health Care Delivery Science
Cornell University	Depression in Home Healthcare; Primary Care; Community Aging Services; Rehabilitation Hospitals; Access to Care and Adherence; Implementation Research	Department-Wide Seminar; Advanced Center in Interventions and Services Research (ACISR) Fellows Seminar	Epidemiology & Health Services Research
University of Washington	Depression in Primary Care, Nursing Homes, and Community-Based Settings; Integrated Mental Health Care; Chronic Illness Care; Chronic Pain; Psycho-Oncology; Implementation Research	Psychiatry Health Services Research Works-in-Progress; Biomedical Integrity in Research	Health Services Research; Epidemiology
University of Michigan	Bipolar Disorder; Substance Abuse; Depression/Medical Comorbidity; Dementia; Nursing Home Care; Aging Bioethics; Racial/Ethnic Minorities; Claims Analysis	Psychiatry Health Services Outcomes and Translation Seminar; Bioethics Seminar; VA Health Services Research Seminar	UM School of Public Health; Robert Wood Johnson Clinical Scholars Program

or if pursuit of a formal degree is necessary to achieve basic skills (e.g., Masters in Public Health or Evaluative Sciences).

Web-Based Works-in-Progress Seminar

The core cross-site activity consists of a biweekly, web-based seminar, featuring ongoing presentations by the participating fellows. The seminar, program description, and educational materials are supported on a website describing related research training programs (<http://www.mentalhealthtrainingnetwork.org/institutes/t32/home>). At the beginning of the year, each fellow is highlighted in a session that includes a presentation of his or her scientific biography and an overview of his or her research interest area and proposed career-development goals. Thereafter, fellows rotate presentations on works-in-progress, including pilot-study aims, methods, pilot data, drafts of manuscripts, and developing grant proposals. Fellows are encouraged to present early ideas and formative projects. Discussions address

methodological challenges in conducting research and preliminary results, allowing for real-time consultation from the four senior faculty members and feedback from other fellows.

Mentoring, Collaboration, and Review of Manuscripts and Grant Applications

A natural outgrowth of the research seminar is the development of ongoing co-mentoring relationships and opportunities for cross-site collaborative research projects. Fellows frequently seek out additional one-to-one phone meetings or travel to one of the partnering sites to engage in consultation and co-mentoring. Faculty have fostered early-career collaboration through identifying existing data-sets for fellows to use in secondary analyses leading to cross-site co-authored manuscripts. Fellows are encouraged to submit draft manuscripts or grant proposals to cross-site faculty for review and feedback before formal submission.

Site-Specific Fellowship Activities

In addition to cross-site activities, each site provides specialized seminars and advanced degree offerings. As shown in Table 1, the four sites provide different, but complementary health-services research content areas and methodological areas of strength. Core components include developing a mentoring plan, attending an individually-tailored program of didactic seminars, course work in biostatistics and methods, hands-on experience conducting secondary data analyses and/or a pilot study, engagement in critical career-development activities, and developing an application for an early research career-development (K) award or other first grant.

Developing a Mentoring Plan

In the first month of the fellowship, fellows and primary mentors work together to identify training and mentoring needs, resulting in an individualized training curriculum reflecting the 2-year timeline (see Table 1). This includes 1) development of a mentoring plan and identifying milestones; 2) acquisition of core research skills; 3) outline of a research project; 4) development of a detailed research proposal; 5) conducting a study; and 6) presenting and writing up results. Responsibilities and an associated timetable with deadlines for both the fellow and the mentor are routinely reviewed, and, if necessary, fellows are matched with additional consultation and co-mentors. The structured mentoring plan is reviewed twice yearly by the multisite senior faculty.

Didactics in Biostatistics and Health-Services Research Methods

Basic knowledge in research biostatistics and health-services research methods is acquired through individually-tailored programs of lectures, guided readings, and formal coursework. Fellows without a clinical background in geriatric psychiatry, psychology, or aging research attend clinical case conferences and clinical rounds and participate in clinical research assessment training. Others, who come to the program with a clinical background, may also complete an M.P.H. or M.S. program to establish foundational knowledge and skills in health-services research. Responsible conduct of research is integrated into all phases of the training program, including a specific course provided during one of the seminars.

How to Design, Implement, and Conduct a Pilot Study

Fellows learn to conduct a comprehensive literature review, understand key study designs, identify appropriate data-collection methods, and participate in data collection and analysis. They commonly “apprentice” in an ongoing study to acquire firsthand exposure to implementation, conduct, and oversight of research. Fellows participate in study staff meetings, shadow the study coordinator and research assistants, and take leadership responsibility for selected study tasks. This practical experience helps to inform pilot-study design. Fellows prepare a formal protocol describing project aims and methodology, to be reviewed by senior

TABLE 1. Two-Year Research Training Timeline

Month	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24
Develop mentoring plan	X X							
Identify research focus	X X X							
Develop study plan and review with mentors		X X X X X X						
Apprentice on ongoing study and literature review/secondary analyses	X X	X X X X X X	X X X X	X X X				
Submit final proposal to faculty steering committee for review				X				
Submit protocol to local research review committee and IRB				X				
Conduct study					X X X X X X X X	X X X X X X X X		
Research progress report and presentation to multisite seminar			X	X		X		X
Submit results for poster/paper presentation and for publication								X X X
Formal coursework	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X
Meet with primary and secondary mentors	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X
Core multisite seminar and local health-services research seminars	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X	X X X X X X

“X”s represent relevant months for training item.

faculty and presented at the biweekly work-in-progress seminar.

By the end of their first year, fellows initiate their own research under the close supervision and frequent evaluation of their primary mentor. Quarterly web-based presentations highlight challenges and strategies in implementing pilot-study protocols and interpretation of results. Fellows discuss and brainstorm solutions with faculty to address common concerns in services research, including recruitment, unanticipated changes in the service delivery system, and data-management strategies. Presentation of early drafts of research manuscripts for peer review in the research seminar is also encouraged. In their second year, fellows also learn how to present results through both the multisite seminar and as posters or paper presentations at national research meetings.

A primary goal for fellows is to develop an application for a mentored career-development (K) award or first research (R21, R01) grant. Alternatively, fellows may pursue local (university) funding for a career-development award or pilot-study funding. Fellows are required to provide a web-based presentation of their career goals and research aims with a preliminary description of a pilot-study design. Based on feedback from the cross-site mentoring team and their peers, they develop written drafts for additional review, with a goal of submitting an application during their second year.

Program Outcomes

Over the first 5 years of the program, 2005–2009, the program successfully achieved 100% enrollment, retention, and completion at all three sites, resulting in a total of 12 graduates. Seven of the graduates earned master's degrees (M.S. or M.P.H.) while participating in the program. Two-thirds of current fellows and alumni are women; one-third are from underrepresented minorities; and one-fourth have a disability.

The effectiveness of the program was evaluated with respect to the following outcomes: survey ratings by fellows on program effectiveness, number of fellows' publications, number of grants received, and proportion achieving academic appointments after graduation. A nine-item survey was administered to program graduates that included ratings on the effectiveness of the program in developing the following core skills: conducting health-services research, preparing research manuscripts for publication, presenting research findings to others, writing grant proposals, and achieving academic positions and advancement. On the basis of numerical ratings (1: poor, 2: fair, 3: good, 4: excellent, 5:

outstanding) the effectiveness of the program was judged by graduates as Excellent-to-Outstanding (mean score: 4.64 [SD: 0.5]). Counts of publications and grants confirm significant productivity. In aggregate (as of June 2012), fellows have published over 125 peer-reviewed articles (44% as first-author) and over 85 research abstracts. Among the 12 graduates, 8 have been awarded externally-funded grants as Principal Investigator and 11 as Co-Principal Investigator or project director. All 12 graduates have received appointments at academic institutions.

Discussion

This multisite research training program brings together senior mentors and fellows from four geographically distant sites to create a unified 2- to 3-year, intensive postdoctoral (T32) research training program. Cross-site features include shared administration, fellow selection, oversight, core seminar activities, co-mentoring, and peer-review process for grants and manuscripts. Outcomes of this program suggest that a unified multisite research postdoctoral training program linked by a core web-based seminar and common administrative oversight is feasible and associated with high participant satisfaction and productivity.

Our fellowship program also supports early-career investigators in pursuing related training and collaborative opportunities. For example, all 12 of our program graduates were selected to attend the Summer Research Institute in Geriatric Psychiatry (SRI), a weeklong program that focuses on training in geriatric mental health (22). This program provides a series of intensive workshops in an early career-development "boot camp," spanning topics from career guidance to research methods and grant-writing, and provides an opportunity for young investigators to receive personalized consultations from leaders in the field. Informal contact is encouraged at the discretion of the students and faculty, and graduates meet annually at the meeting for the American Association for Geriatric Psychiatry. Additional career-development support is also available for minority fellows by participating in other specialized programs such as the University of Pittsburgh's Summer Research Career Development Institute (23) and the New Mexico Mentorship and Education Program (24).

Several of our earliest graduates have also attended the Advanced Research Institute in Geriatric Mental Health (ARI). The ARI targets junior faculty who have achieved an early-career development award (e.g., K award) and are in the process of developing a first R01 or other major research grant application. This program includes an annual 4-day

retreat featuring fellows' presentations on works in progress, as well as faculty presentations on grant and career-development strategies. Participants are matched with a senior mentor at a different university for distance co-mentoring and attend web-based research presentations as well as networking workshops with NIMH program officers or other experts in their field over the subsequent 2 years of the program. Seventy-one percent of ARI participants have achieved a first R01, R34, or R21 NIH grant, almost double the average (38%) for other NIMH K-awardees (25). The combined resources of our multisite postdoctoral training program, the Summer Research Institute in Geriatric Psychiatry, and the Advanced Research Institute in Geriatric Mental Health provide a model for a stepped approach to developing the pipeline of early-career investigators in a small, but developing research field (2).

Our description adds to a growing literature describing innovative methods for improving early-career research training by linking multiple sites through web-based seminars and pooled resources. For example, the Veteran's Administration Special Fellowship Program in Advanced Psychiatry and Psychology (26) consists of 10 VA research sites and a core curriculum of bimonthly web-based seminars to support a common set of career-development mechanisms. This program covers a broad array of topics, including neuroimaging and neuroscience, translational research, pharmacological and behavioral treatments for alcohol and cocaine abuse, treatment of behavioral and cognitive symptoms of dementia, and treatment-effectiveness research on posttraumatic stress disorder. This approach provides another example of leveraging economies of scale and multisite expertise to mitigate barriers in training the next generation of researchers.

Conclusions

A multisite research training program that shares administrative oversight, co-mentoring, peer-review, and web-based seminars is a practical model for developing early-career investigators by capitalizing on training resources and methodological expertise pooled from different research groups and mentors. This approach also has the potential to disseminate training more broadly and help expand fields where individual academic centers typically lack sufficient capacity, expertise, or depth to provide needed training and mentoring. Finally, this program description adds to a growing literature, directly responding to the need for innovative strategies that successfully leverage sparse resources for mentoring and early-career

development during increasingly challenging times for obtaining research-training funding (27).

Supported in part by NIMH T32 MH 073553 "Training Geriatric Mental Health Services Researchers," NIMH-06SBIR-Phase II, Topic 044 "Interactive Web-Based Networking Tool for Linking Services and Interventions Research Training and Education Programs," and NIMH K24MH066282 "Interventions and Services for Older Adults with SMI."

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