



Special Issue Article

Advanced Research Institute (ARI): An Effective Model for Career Development and Transition to Independence

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The vitality of geriatric mental health research requires an ongoing infusion of new investigators into the career pipeline. This report examines outcomes of the NIMH-funded, Advanced Research Institute (ARI) in Geriatric Mental Health, a national mentoring program supporting the transition of early career researchers to independent investigators. Outcome data for 119 ARI Scholars were obtained from the NIH Reporter database, CVs, and PubMed: 95.0% continue in research, 80.7% had obtained federal grants, and 45.4% had achieved an NIH R01. Among all NIMH mentored K awardees initially funded 2002-2014 (n=901), 60.4% (32/53) of ARI participants vs. 42.0% (356/848) of non-participants obtained an R01. Controlling for funding year, ARI participants were 1.9 times more likely to achieve R01 funding than nonparticipants. These data suggest that ARI has helped new generations of researchers to achieve independent funding, become scientific leaders, and conduct high impact research contributing to public health and patient care. (Am J Geriatr Psychiatry 2019; 27:660–663)

OBJECTIVES

The transition to independence for the new generation of clinical and translational research

scientists remains a challenge. In their 2000 report, the National Academy of Science (NAS) flagged attrition of developing investigators in clinical research as a critical problem facing the National Institutes of Health.¹ In 2005, the NAS alerted the scientific

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community and policy makers that the average age of first-time recipients of an NIH research grant had risen to 42 years.² Despite efforts to change this trajectory, the age climbed to 45 years by 2013.³ These trends have prompted NIH to develop new, and strengthen existing, career development and policy initiatives that explicitly target early-career faculty.⁴

The Advanced Research Institute (ARI) in Geriatric Mental Health is an NIMH-funded mentoring network and education program established in 2004 with the goals of supporting early career geriatric mental health researchers in their transition to independent investigators and development as scientific leaders. The ARI national Mentoring Network is a multi-disciplinary team of senior and mid-career scientists with complementary skills spanning the translational spectrum from brain to implementation science. ARI's Educational Program supports 16 early-career faculty (called Scholars) annually; each Scholar participates for two years. As described earlier,⁵ key programmatic elements include: sustained mentoring and methodological consultation combined with tools and guidance in grant-writing, career strategy, and leadership development. The program includes an annual in-person Spring Retreat, structured long-distance follow-up, and web-based career development seminars.

In this report, we examine the career outcomes of 13 cohorts of ARI Scholars in terms of academic retention, productivity, and success in achieving independent funding. We also compare the success of ARI Scholars in achieving NIH R01 funding to early career faculty at a comparable career phase.

METHOD

Number and Characteristics of Participants

ARI has enrolled 15 cohorts of ARI scholars (n=138) from 2004 to 2018. As ARI is a two-year program, we examined outcomes of the 13 completed cohorts (2004-2016; n=119). Cohorts range from 8 to 12 scholars. Scholars came from 54 different academic centers in 32 states. Among 119 scholars, 75 (63.0%) were women, 20 (16.8%) were underrepresented minorities, 47 (39.5%) had MD degrees (including 12 MD/PhDs; the rest had other doctoral degrees). The majority (79; 66.4%) had been funded with an NIH mentored career development award; most others had career

development support from the VA or other sources and/or a history of small grant funding. Characteristics of Scholars did not vary over time.

Outcome Analyses

ARI's impact was evaluated in two ways. First, we examined success in scientific leadership and federal grand funding of the 13 graduated ARI cohorts (n=119). Data came from the NIH RePORTER database, PubMed and Scholars' CVs. We emailed each graduated scholar requesting an up-to-date CV as of February 2018. We received 115; missing data were augmented by internet search or otherwise counted '0' in these analyses. Outcomes included: 1. Publications; 2. Academic retention and promotion; 3. Scientific service (i.e., mentoring and/or serving on NIH Study Sections), and 4. Grant funding.

The second analysis compared the R01 grant funding of ARI Scholars to early career faculty at a comparable career phase with methods used previously.⁵ ARI was not a randomized trial and therefore has no control group to measure its "added value." A challenge to identifying a useful comparison group is "selection bias" - that is, ARI purposely recruited highly accomplished early career investigators with evidence of the capacity and the drive to benefit from the program's opportunities and resources. Our solution was to examine outcomes of all NIMH K awardees initially awarded between 2002 and 2014, comparing the success of the NIMH K awardees who attended ARI to those who did not. This time span includes Ks awarded in 2002 and therefore potentially eligible for ARI in 2004 (i.e., 2 years into their K) through Ks initially awarded in 2014 and potentially eligible for ARI in 2016 (leaving 2 years to achieve an R01 by 2018). The rationale was that all K awardees have already been "selected" through a competitive process that evaluated their potential success in developing into an independent investigator and achieving R-level funding.

RESULTS

ARI Graduates

Outcomes of 13 completed ARI cohorts (2004-2016; n=119) as of February 2018, include:

Peer Reviewed Publications: The average number of peer-reviewed publications per cohort was 62.3 (SD=39.3); cohort average ranged from 35.5 to 84.5.

Research Retention and Promotion: 113/119 (95.0%) of graduated Scholars remained engaged in research, including 110 in academic settings, one in government, and two in consulting firms. Six Scholars became fulltime clinicians. 90/119 (75.6%) had received an academic promotion including 36 who were now full professors.

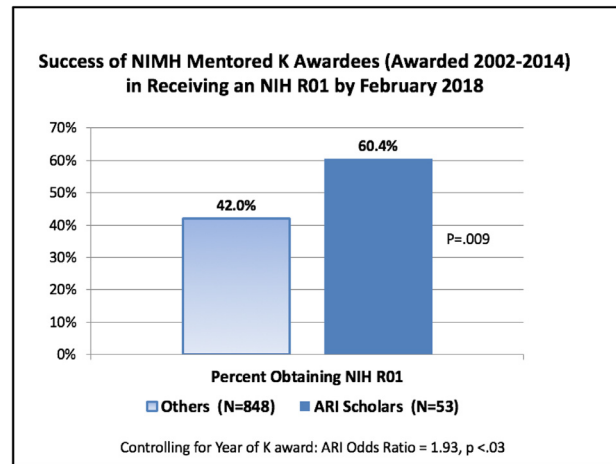
Scientific Leadership: The majority (76/119; 63.9%) reported evidence of scientific leadership through mentoring early-career research faculty and postdocs or serving on NIH study sections.

Post-ARI Grant Funding: After participating in ARI, 45.4% (54/119) of Scholars received NIH R01 funding. Over two thirds (82/119; 68.9%) received some type of NIH grant and 80.7% (96/119) received any federal grant funding (e.g. NIH, CDC, VA). Years since ARI participation increased the likelihood of having received each type of funding. In separate logistics regression models controlling for ARI cohort year, the likelihood of R01 funding did not vary significantly by gender (female vs. male: OR=1.38, $p=.41$), minority status (minority vs. other: OR=0.38, $p=.09$), or degree (MD vs. other: OR 1.61, $p=.22$) but was significantly higher for K awardees (K vs. other: OR=2.28, $P=.05$). Controlling for cohort year, the likelihood of obtaining any NIH or federal funding did not significantly vary by any variable.

Comparison Among NIMH K Awardees

We used the NIH RePORTER system to examine R01 grants awarded to all NIMH mentored K awardees (2002-2014; $n=901$) as of February 2018. Our analysis compared the likelihood of receiving an R01 between NIMH K awardees who did vs. did not participate in ARI. Seen in [Figure 1](#), among 901 K awardees, 60.4% (32/53) of ARI Scholars vs. 42.0% (356/848) of nonparticipants achieved an R01 ($p=.009$). Controlling for their first year of K funding, ARI Scholars were 1.93 times more likely ($p<.03$) to achieve an R01 than other NIMH K awardees.

FIGURE 1.



CONCLUSIONS

The vitality of geriatric mental health research requires ongoing infusion of new investigators into the pipeline. The paper reports outcomes of the Advanced Research Institute (ARI) in Geriatric Mental Health, a mentoring network and education program dedicated to developing the next generation of independent investigators and scientific leaders conducting high impact research in mental health and aging. ARI was established in 2004 with NIMH funding. We analyzed outcomes as of February 2018. Of 119 ARI graduates (Cohorts 2004 - 2016), 45% were subsequently funded with a NIMH R01, 81% received some type of federal grant and 95% remained active researchers.

Consistent with data on NIH K awards generally,⁶ ARI Scholars with K awards were more likely to achieve R01 funding than other Scholars. But in comparison analyses of all NIMH mentored K awardees from 2002-2014 ($n=901$), ARI participants were 1.9 times more likely to achieve NIH R01 funding than nonparticipants suggesting the added benefit ARI.

The unmet mental health needs of older adults is a significant public health problem that affects not only those who suffer from mental disorders but their families, care providers, communities, and institutions that deliver and pay for care. The impact of late life mental

illness will only intensify as the nation's population ages. The research challenges include reducing the burden of mental illness in older adults while also explicating how the process of aging contributes to the risk, expression, and outcomes of mental illness throughout the adult life span. The capacity of research to meet these challenges rests largely on ongoing enrichment of the field with new independent investigators from across the translational spectrum with state-of-the-art training and innovative ideas. Thus, evidence that ARI has contributed to the retention and success of early career scholars in geriatric mental health research is important to the field's future.

ARI's educational model is designed to provide tools and guidance to help early-career faculty respond strategically to the opportunities posed by new NIH policies and to countervailing challenges such as competition for research funding, educational debt, competing institutional demands, and family needs.⁴ These outcomes suggest that the key elements of ARI's model include: sustained mentoring focused on grant-writing and career development, biostatistical consultation, and professional development.

Mentoring is core to ARI's success. The National Academy of Science has identified mentoring as key to reducing individual-level barriers to bridging the transition to independence.⁷ A growing body of empirical evidence demonstrates that mentoring is associated with an early-career investigator's greater productivity and retention.⁸⁻¹⁰ Working with a

national network of mentors informs Scholars of scientific advancements in terms of theories, research findings, and methods including those that fall outside their immediate area of research. Mentors from outside Scholar's home institutions offer new perspectives on career paths and career development strategies, including decisions relevant to long-term leadership development.⁸ The network can promote interdisciplinary collaborations, foster team science, and provide guidance in responsible conduct of research when working with high-risk or complex participants.

The ongoing development of independent investigators contributing to the health of individuals and the public is integral to the NIH's mission. It also promotes a vibrant culture of research essential to ensuring that patients receive the highest quality of care. Over the span of 15 years, ARI's model of mentorship and career research development has demonstrated success in preparing a new generation of researchers to achieve independent funding, become scientific leaders, and conduct high impact research in mental health and aging. Given the nation's struggle to reduce attrition from the research career pipeline, evidence of the model's effectiveness is relevant to the wider community of clinical and translational researchers, research institutions, policy-makers and funders committed to promoting the pipeline of early career researchers and their transition to independence.

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