

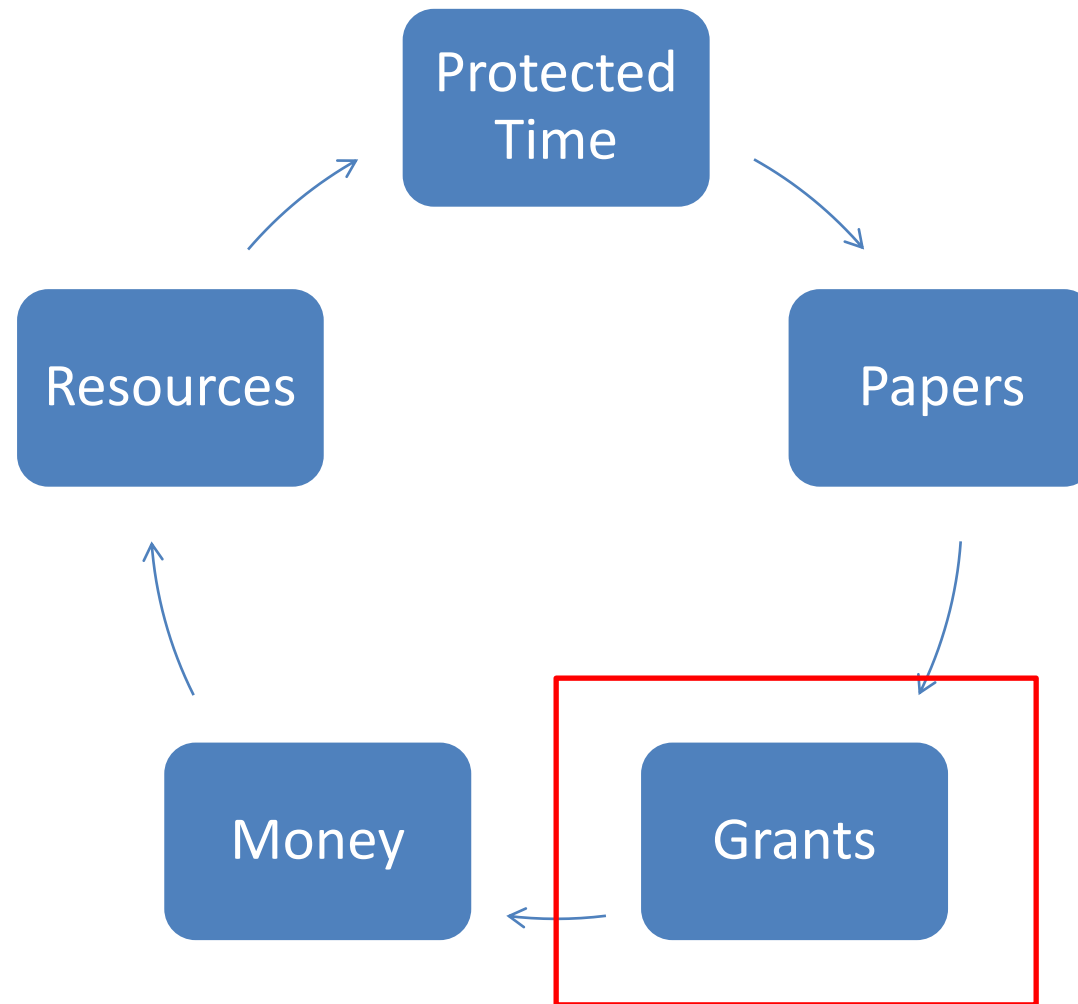
# **Roadmap for Early Investigators in Rheumatology**

**2 April 2024**

**VERITY/Brigham Course in Rheumatology Clinical Research**

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Associate Professor of Medicine  
Division of Rheumatology, Inflammation, and Immunity  
Brigham and Women's Hospital  
Harvard Medical School**

# Break the Vicious Cycle of Research!





## Roadmap to Developing a Research Career in Rheumatology

### Medical School/Residency: Perform research while obtaining medical training

- Devote extended periods of time to understand the workflow, methods, and research themes of lab/group
- Apply for local awards to provide research funds/stipend to protect time and demonstrate research interest
- Present at local and regional meetings, apply for ACR annual meeting travel award
- First-author original research paper is ideal but requires extensive time devotion; co-authored papers valuable
- Optimal time to write chapters, reviews, case reports
- Basic scientists/PhD may gain extensive research experience during formal training

### Fellowship Year 1: Find a mentor and research project while obtaining clinical rheumatology training

- ACR fellow-in-training roadmap: <http://www.rheumatology.org/I-Am-A/Fellow-in-Training/Career-Roadmap>
- Update CV and NIH biosketch throughout; discuss local strategies with peers; attend early career meetings
- Envision your overall research career (NIH-funded/clinical trials/collaborative; clinical/translational/basic)

*Mentor:* schedule meetings with all local research faculty during summer/early fall to find the best fit

- Disease/phenotype interest, methods expertise, available datasets/infrastructure, aligned goals
- Get to know your division: Master's opportunities, NIH T32/funds, GCRC, prior local paths to success

*Projects:* choose two main projects for clinical research (one secondary data analysis and one primary data collection); choose general research topic and mentor/laboratory for basic research

- Strategize on how to establish a research niche (disease, methods, cross-collaboration)
- Consider collaborations with investigators at other institutions
- Clinical projects: write reviews, case reports/series, small projects with clinicians

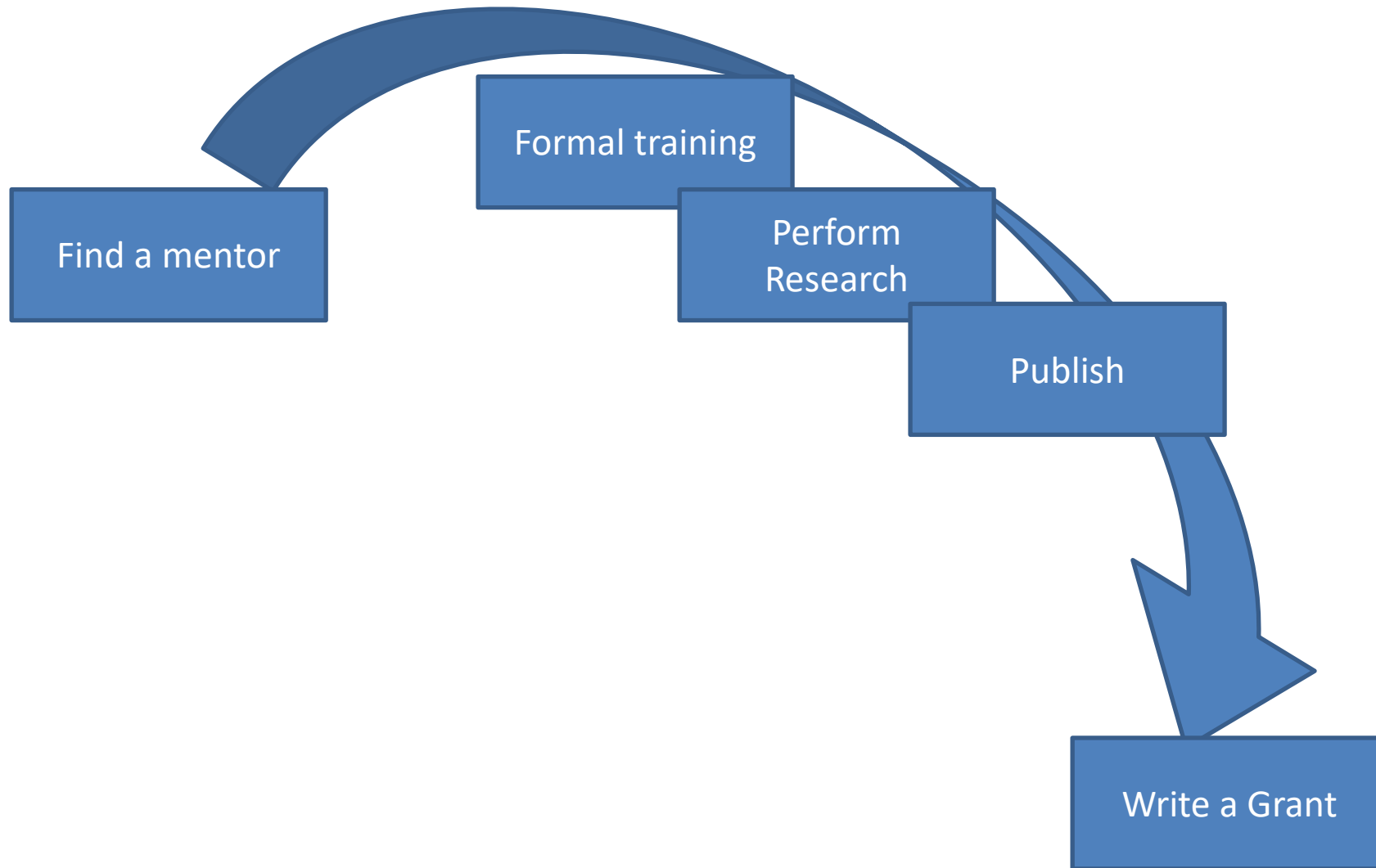
*Master's programs/certificates/formal didactics*

- MPH:** typically due fall/early winter; may need research proposal; discuss funding and time protection
- Other Master's degrees** are institution or content specific: MMSCI, MMSc, MSc, MSCE, MSHS, etc.
- Certificate programs: training in study design, programming, statistics, etc.; varies by site/GCRC
- Basic scientists: learn specific research skills, consider taking formal courses/PhD
- Consider initiating PhD, DSc, SD, or DrPH to gain extensive methods/topic expertise

### Fellowship Year 2: Perform research/publish, attend class, and write grant(s) for faculty position

- Limit adding projects that are not original research; limit involvement in projects if not first author; develop a career strategy with mentor(s); prioritize research endeavors; attend regional/national/intl. meetings

# Roadmap





# My path to a clinician-scientist

- U. of Arkansas Medical school (2003-07): basic science summer project (Nephrology)
  - Mechanisms of cisplatin-induced nephrotoxicity
- WashU Residency (2007-10): clinical research, first mentor (Infectious Diseases)
  - Accepted into program for epidemiology/study design didactics
- WashU Hospitalist (2010-11): wrote first paper
  - Influenza infection risk in kidney transplant recipients
- BWH Rheumatology Fellowship (2011-14): “serious” clinical research, worked with main mentor, on NIH T32 award
  - First paper accepted in 2012 (from residency!)
  - Scholars in Clinical Science Program at HMS (MMSc)
  - **Rejected** for NIH LRP in 2013
  - Awarded Rheumatology Research Foundation Scientist Development Award in 2014
    - DMARDs and risk of respiratory infections
  - Awarded NIH LRP in 2014



# Path to K and R01

- Instructor (2014-16)
  - **Rejected x2** for Harvard KL2 and institutional award in 2014
  - **Awarded NIH K23** in 2015
    - Rheumatoid arthritis and respiratory outcomes in prospective cohorts
- Assistant Professor (2016-2023)
  - Awarded RRF K Supplement in 2018
    - Biomarkers and imaging features of lung involvement in rheumatoid arthritis
  - Awarded NIAMS R03 in 2019
    - Bi-directional association of rheumatoid arthritis and obstructive lung diseases
  - Local/industry COVID grants **rejected x4** in 2020-21
  - **Rejected x4** for NIH R01s (x3) and R21 (x1) in 2020-21
  - Awarded RRF R Bridge in 2020: Pilot for prospective study of pulmonary phenotyping in early RA
  - **Awarded first NIH R01 in 2021**
    - ILD throughout the RA disease course (SAIL-RA)
  - **Paid off student loans in 2021! (NIH LRP renewed 4 times)**
  - Institutional award in 2022
    - COVID-19 outcomes among patients with rheumatoid arthritis
  - **Awarded second NIH R01 in 2022**
    - Immunologic and clinical sequelae of COVID-19 in rheumatic diseases



## Barriers to and Facilitators of a Career as a Physician-Scientist Among Rheumatologists in the US

ALEXIS OGDIE,<sup>1</sup> AMI A. SHAH,<sup>2</sup> UNA E. MAKRIS,<sup>3</sup> YIHUI JIANG,<sup>1</sup> AMANDA E. NELSON,<sup>4</sup> ALFRED H. J. KIM,<sup>5</sup> SHEILA T. ANGELES-HAN,<sup>6</sup> FLAVIA V. CASTELINO,<sup>7</sup> AMIT GOLDING,<sup>8</sup> EYAL MUSCAL,<sup>9</sup> J. MICHELLE KAHLENBERG,<sup>10</sup> AND FRANCES K. BARG,<sup>1</sup>

FOR THE AMERICAN COLLEGE OF RHEUMATOLOGY EARLY CAREER INVESTIGATOR SUBCOMMITTEE OF THE COMMITTEE ON RESEARCH

**Objective.** To determine perceived barriers to and facilitators of a career in rheumatology research, examine factors leading rheumatologists to leave an academic research career, and solicit ways to best support young physician-scientists.

**Methods.** A web-based survey was conducted among the domestic American College of Rheumatology (ACR) membership from January through March 2014. Inclusion criteria were ACR membership and an available e-mail address. Non-rheumatologists were excluded. The survey assessed demographics, research participation, barriers to and facilitators of a career in research, reasons for leaving a research career (when applicable), and ways in which the ACR could support junior investigators. Content analysis was used to extract relevant themes.

**Results.** Among 5,448 domestic ACR members, 502 responses were obtained (9.2% response rate). After exclusions (38 incomplete, 2 duplicates, 32 non-rheumatologists), 430 responses were analyzed. Participants included fellows, young investigators, established investigators, mentors, clinicians, and those who previously pursued a research career but have chosen a different career path. Funding and mentoring were the most highly ranked barriers and facilitators. Protection from clinical and administrative duties, institutional support, and personal characteristics such as resilience and persistence were also ranked highly. The most commonly cited reasons for leaving an academic research career were difficulty obtaining funding and lack of department or division support.

**Conclusion.** This is the first study to examine barriers to and facilitators of a career in rheumatology research from the perspectives of diverse groups of rheumatologists. Knowledge of such barriers and facilitators may assist in designing interventions to support investigators during vulnerable points in their career development.

*It is the progressive decline in the number of new entries that constitutes the danger to the survival of the species in the numbers and quality needed to maximize the rate of progress against the serious diseases of mankind.*

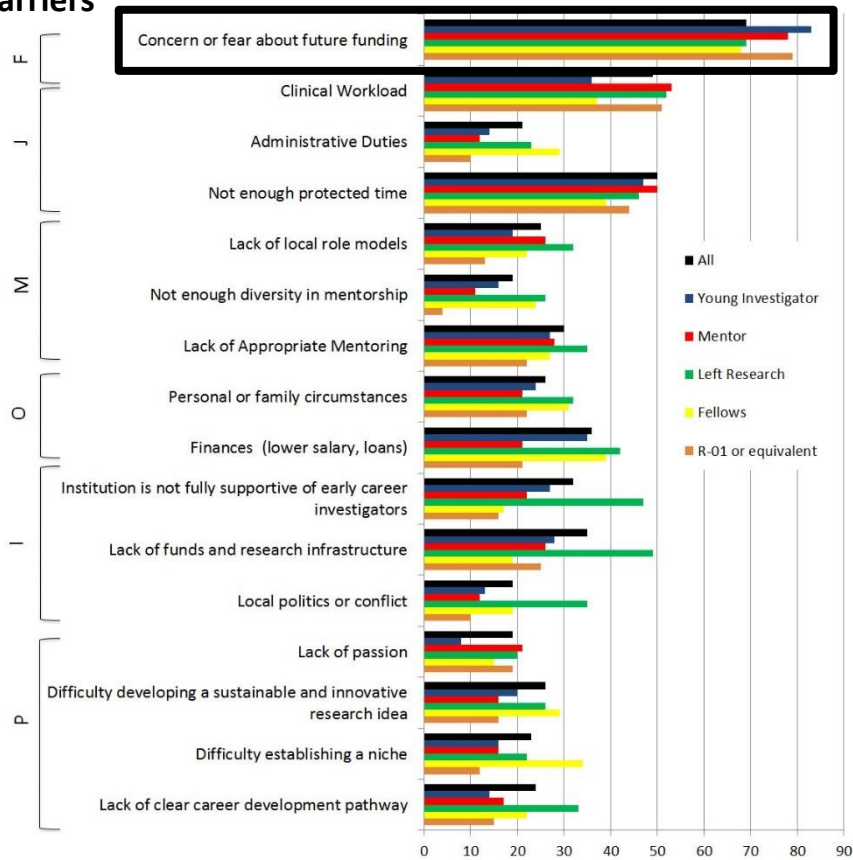
James B. Wyngaarden, MD (1)

clines over the previous two decades in the number of clinicians also trained in research methodology and simultaneously acting as a physician and “serious scientist” (1). While the American medical system has evolved and funding sources have risen and fallen in the decades following Dr. Wyngaarden’s paper, the same concern

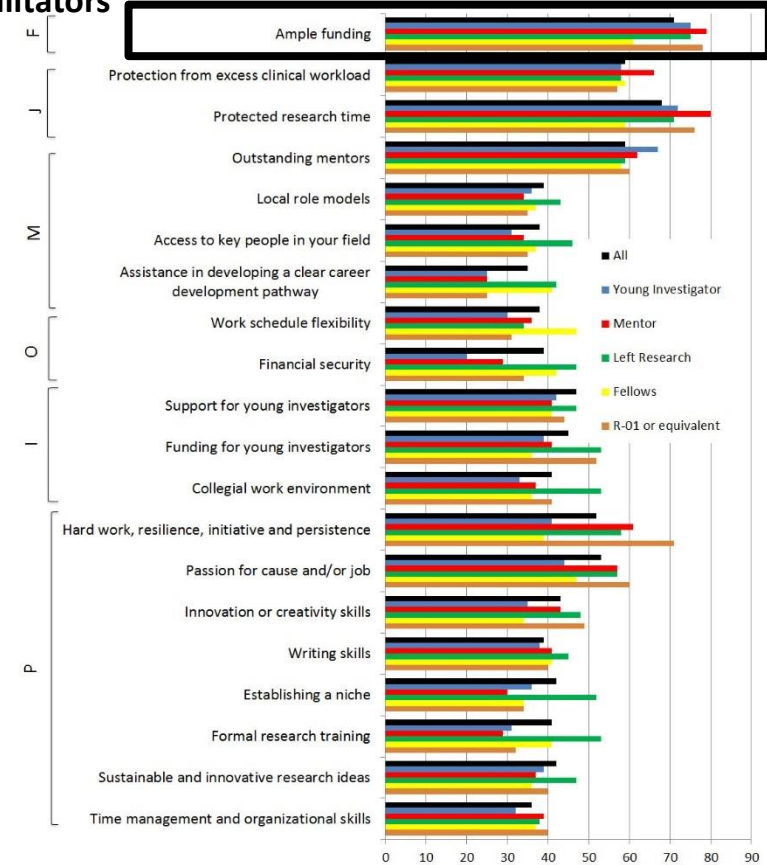


## Barriers and Facilitators of a Career and Research: Funding Funding Funding . . .

### Barriers



### Facilitators



# Barriers and Facilitators of Mentoring for Trainees and Early Career Investigators in Rheumatology Research: Current State, Identification of Needs, and Road Map to an Inter-Institutional Adult Rheumatology Mentoring Program

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**Objective.** To determine perceived barriers and facilitators to effective mentoring for early career rheumatology investigators and to develop a framework for an inter-institutional mentoring program.

**Methods.** Focus groups or interviews with rheumatology fellows, junior faculty, and mentors were conducted, audiorecorded, and transcribed. Content analysis was performed using NVivo software. Themes were grouped into categories (e.g., mentor-mentee relationship, barriers, and facilitators of a productive relationship). Rheumatology fellows and early career investigators were also surveyed nationwide to identify specific needs to be addressed through an inter-institutional mentoring program.

**Results.** Twenty-five individuals participated in focus groups or interviews. Attributes of the ideal mentee-mentor relationship included communication, accessibility, regular meetings, shared interests, aligned goals, and mutual respect. The mentee should be proactive, efficient, engaged, committed, focused, accountable, and respectful of the mentor's time. The mentor should support/promote the mentee, shape the mentee's goals and career plan, address day-to-day questions, provide critical feedback, be available, and have team leadership skills. Barriers included difficulty with career path navigation, gaining independence, internal competition, authorship, time demands, funding, and work-life balance. Facilitators of a successful relationship included having a diverse network of mentors filling different roles, mentor-mentee relationship management, and confidence. Among 187 survey respondents, the primary uses of an inter-institutional mentoring program were career development planning and oversight, goal-setting, and networking.

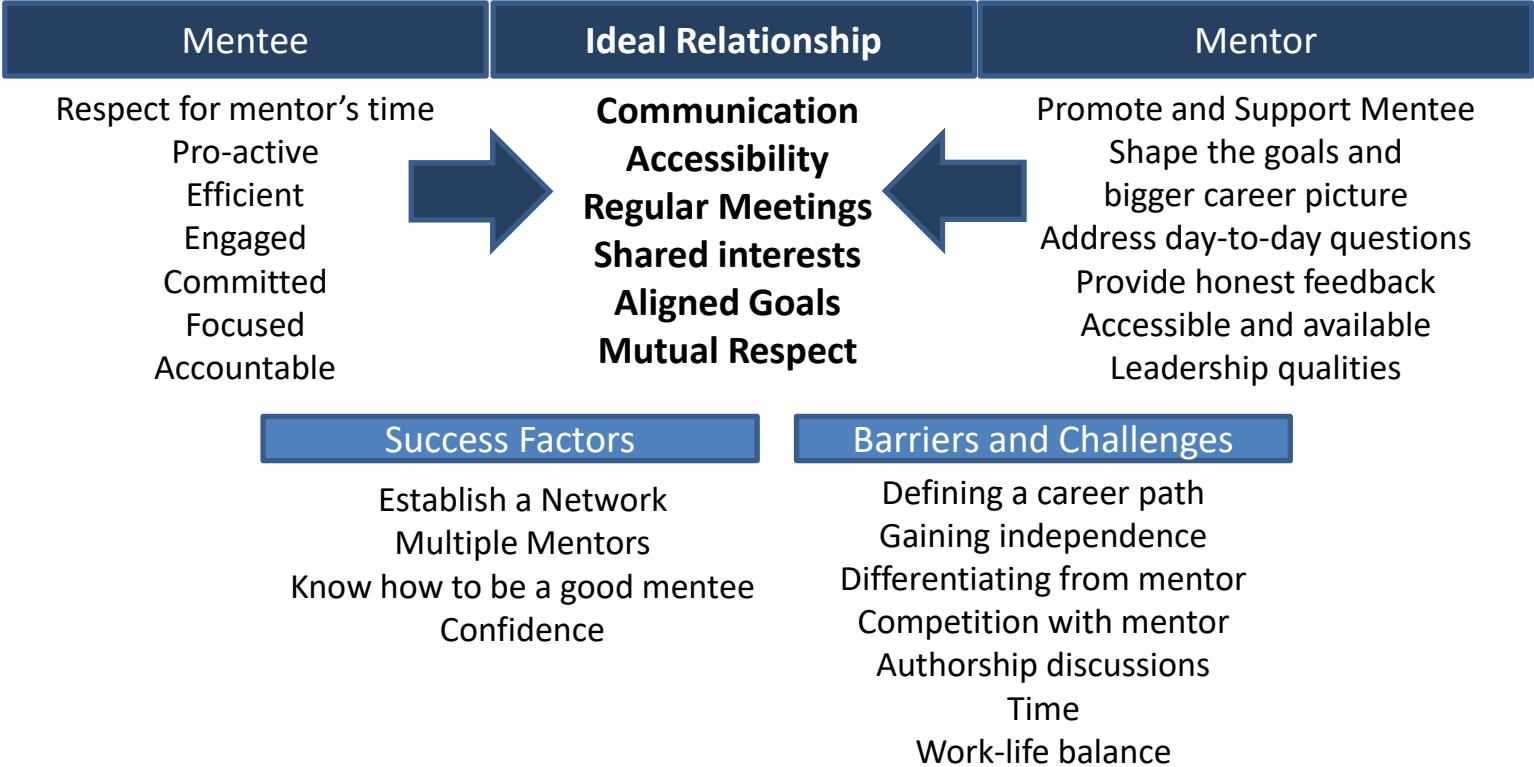
**Conclusions.** In this mixed-methods study, tangible factors for optimizing the mentor-mentee relationship were identified and will inform the development of an adult rheumatology inter-institutional mentoring program.

## INTRODUCTION

As the population ages, the demand for rheumatologists in

to physician-scientists in other specialties in the US) due to time demands, insufficient funding, clinical workload, and a relative lack of mentorship (2,3). Sustaining a

# Distilled themes





# Attend Meetings, Write, and Publish!

## *Ask important questions*



# Understand Your Local Landscape

- Talk to upper-level fellows
  - How did they get their mentor and project?
  - Are they pursuing advanced didactics? How was Master's funded?
- Talk to junior faculty
  - How are they funded?
  - How much protected time do they have for research?
  - How did they join the faculty? Process for promotion?
- Does your division have a **T32**? Do they support 3rd year of fellowship?
- Understand where recent graduates are now and why
  - Community, academic, research, education, industry?
- Meet all relevant senior research faculty, even if not in rheumatology!
  - Methods expertise
  - Available resources
  - Show your interest in research!
  - Create your niche if something is not there

# The Ideal Research Mentor

- Qualities that impress grant reviews
  - Track record of mentoring (ideal=prior K awardees)
  - Many (senior) author original science publications in good journals
  - NIH funding (ideal=R01 and K24 funding)
  - Associate professor or higher
- Important qualities for you
  - Research methods expertise
  - Available datasets/infrastructure/support staff
  - Disease/phenotype **research** expertise
  - Aligned research goals
  - Approachable and enough bandwidth
- Mentor not ideal? Recruit another to “create your niche”



# Project(s) During Fellowship

- At least 2 **first-author** original science projects
  - **Secondary data analysis**: data are already collected, you need to analyze it (goal: publish during fellowship)
  - **Primary data collection**: new protocol or measure enacted; data would not exist without your involvement
  - **First-author on mentor's funded aim**
  - **Caution!**: over-involvement in clinical trials
- **Caution!!!**: Reviews, case reports, case series, small projects with clinicians

# Formal Didactics

- Master's degree starting in Year 2 of fellowship
  - Find out if your site has a GCRC
    - Educational component with many free/discounted resources
  - Funding and time protection: discuss early with mentor and division
  - Applications due in late fall, early winter
  - MPH, MMSc, MSc, MSCE, MSHS, etc.
- Certificate programs for specific skills
- Initiate PhD if Master's is already attained

# Fellowship Years 2-3

- Limit adding projects that are not original research
- Limit time involvement in projects where you are not first author
- **Write abstracts and original science manuscripts**
- Consider writing a grant (talk to your mentor and chief)
- Start to develop a career strategy with your mentor
  - **Prioritize research!**



# Why write a grant?

- **Answer important questions / move the field forward**
- **Enable something to happen that otherwise could not**
  - **Study visits, biomarkers, imaging, etc.**
- **Pay yourself**
  - Apply before you “need” the grant
- **Pay your current staff / enable new staff to be hired**
- **Solidify your research team/question**
  - The grant process is a “stress test” for your research
- **Prioritize your question / develop your expertise**
- **Generate preliminary data for a larger grant**
- **You can reasonably complete what you are proposing**
  - Power/sample size calculations, recruitment goals, research skills/infrastructure

# Research Grants for Fellows

- **RRF Scientist Development Award**
- NIH F32 Kirschstein Award: individual training grant
- Disease-specific foundations
- **NIH Loan Repayment Award:** \$50K per year for 2 years, can renew indefinitely
  - Due in November, awarded in summer
  - Need institutional support, 2-year commitment, 50% protected time for research

# RRF Scientist Development Award

- Helps fund junior faculty salary
  - \$150K for 2-3 years
  - \$50K/year for 50% salary
  - \$25K of research support in Year 2 of award
- Timeline: Due August, decision by December, funding starts next July
- Training plan and support is very important
- Extensive track record not necessary
- Discuss timing with institution early
- **Present early and often- typically start by March**
  - Perfect your Specific Aims page before moving on to other parts
- Use boilerplates: compose all materials including letters of support
  - MANY materials to collect
- Papers: typically 1-3 original science first-author papers in the topic area (ideally with primary mentor as senior author)



# “Pre-K” Awards

- RRF SDA
- Small grants: **VERITY P&F grant**
- Local grants
- Institutional K awards: through larger grant or GCRC; internal rules at each institution
  - 75% of salary to support 1-2 years while working on NIH K
- **RRF Investigator Award**
  - Up to \$375K for 1-3 years (\$75K salary; \$50K research)
  - NIH K submission or equivalent required

# RRF career development grants

## Established Career

- [Norman B. Gaylis, MD, Research Award for Rheumatologists in Community Practice](#)
- [Innovative Research Award](#)
- [Pediatric Visiting Professorship](#)

## Mid-career

- [Clinician Scholar Educator Award](#)
- [Career Development Bridge Funding Award: R Bridge](#)
- [Career Development Bridge Funding Award: K Supplement](#)

## Early Career

- [Career Development Bridge Funding Award: K Bridge](#)
- [Investigator Award](#)
- [Scientist Development Award](#)
- [Tobé and Stephen E. Malawista, MD, Endowment in Academic Rheumatology](#)

# VERITY Pilot & Feasibility grant



- **\$30,000 grant opportunity available now**
  - Total budget (directs and indirects)
  - 1-year project (September 1, 2024-August 31, 2025)
- Simple application: Biosketch, LOS, 3-page proposal, abstract
- Young investigators and projects using VERITY Cores prioritized
- **Due date: June 5, 2024 at 5pm ET**
- Project must have IRB approval by August 1, 2022
- Application included in VERITY materials
- Further details at [www.verityresearch.org](http://www.verityresearch.org)

# NIH K Awards

- Supports up to 5 years
- Up to \$100K/year at 75% effort
- \$30K/year of research funds (directs)- indirects also covered
- Each NIH institute has different payline
  
- K01: “research scientist” (PhD)
- K08: “clinical scientist”: basic/translational/genetics and secondary data analysis (MD, PhD)
- K23: “patient-oriented scientist”: recruitment of patients (MD, MPH)
- K99/R00: transition to independence



# When to Apply for an NIH K?

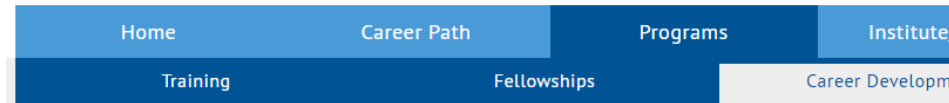
- Rule of thumb: 3+ first-author original science papers in topic area
  - Ideal: all of these papers with your mentor as senior-author
  - Ideal: directly related to your topic
- Training still required to become an independent investigator
  - Education
  - Research skills
  - Supervisory skills
  - Methods
- Rare for fellows to get K's funded, typically 2-5 years into junior faculty
- Apply one year before you “need” it
- Some grants require K submission (Institutional K, RRF Investigator Award)

# K Application

- Very large, detailed application- start very early!
- Send Specific Aims page to program officer
- Supporting documents: institutional support, mentoring team, training plan, referees, letters of support, collaborators
- Three submission cycles: February, June, October
- Impact score about 5 months after submission
- Funding starts about 10 months after submission
  
- NIH awards pay full indirects!

# NIH K Awards

<https://researchtraining.nih.gov/programs/career-development>



## Research Career Development Awards

RTCD Home > Programs

To provide institutional research training opportunities (including international) to trainees at the undergraduate, graduate, and postdoctoral levels.

### 1. Select Role



Awardee



Appointee

### 2. Select Career Level

Select

APPLY FILTER

RESET FILTER

K01

### Mentored Research Scientist Career Development Award

For support of a postdoctoral or early career research scientists committed to research, in need of both advanced research training and additional experience.

Details

[View Current Funding Opportunities](#)

K02

### Independent Research Scientist Development Award

For support of an early to mid-career scientists with research funding, in need of additional protected time committed to research.

Details

[View Current Funding Opportunities](#)

K05

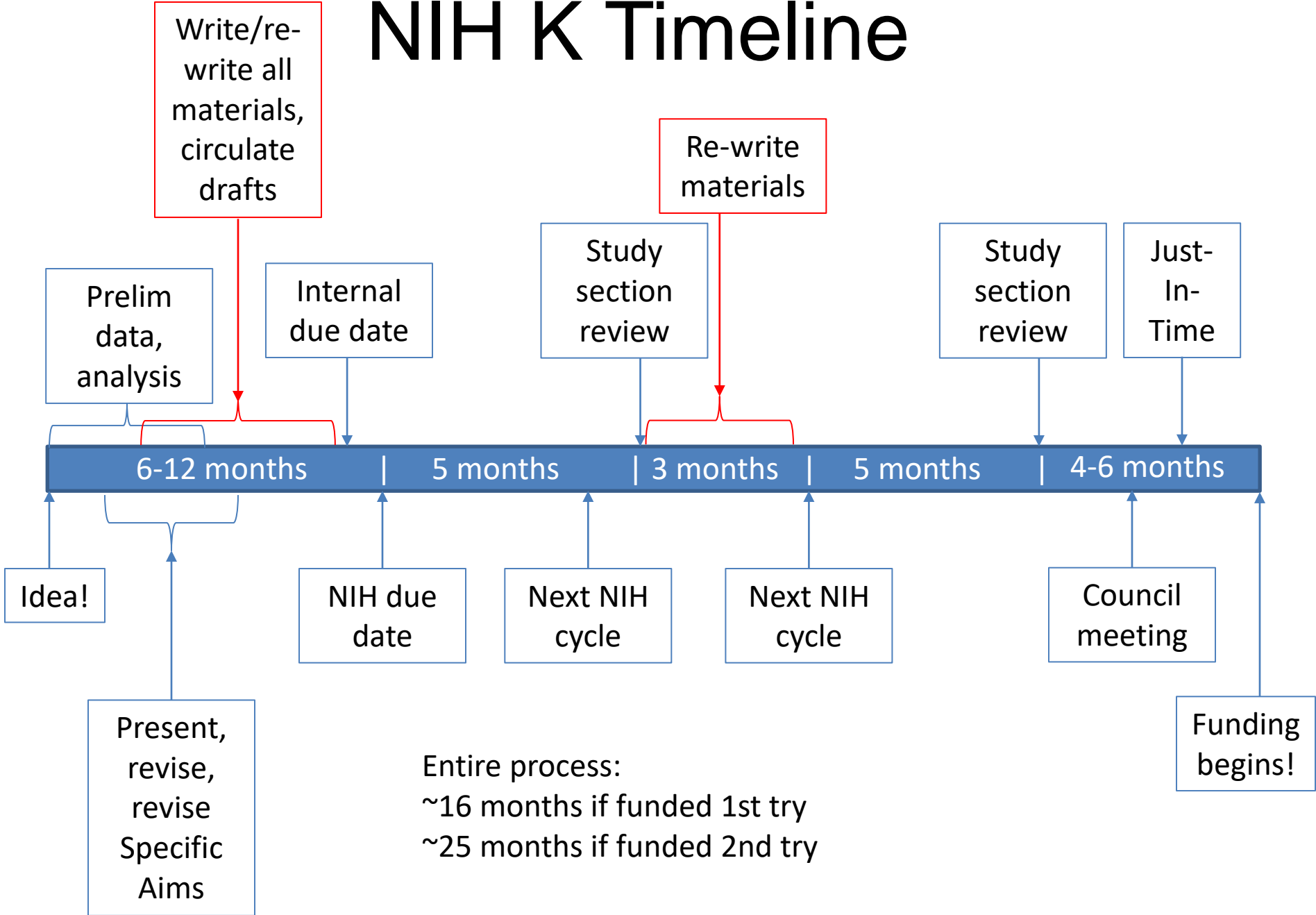
### Senior Research Scientist Award

For the support of a senior research scientist with research funding, to pursue independent research, and to serve as a mentor to more junior research scientists.

Details

[No Funding Opportunity Announcement Currently Available](#)

# NIH K Timeline



# Other NIH Considerations

- ESI: Early Stage Investigator (ESI)
  - 10 years after **terminal research degree** (MD or PhD, NOT Master's) or end of **post-graduate clinical training**
  - R01 ESI applications have slightly relaxed payline
  - Childbirth/similar life event: extra year of ESI status
- NIAMS: R03 for K08/K23 awardees
  - Apply in Years 2-4 of K
  - \$50k x 2 years
- R21: Develop preliminary data for R01
  - \$275k over 2 years
  - Can have in Years 4-5 of K



# Local Resources/Career Development

- Grant-writing programs
- Research methods certificates/workshops
- Leadership programs
- Mentorship programs
- Statistical consults
- GCRC resources
  - Research clinic rooms
  - Research lab discounts/allotment
  - Study coordinator support

# Other Grants/Support

- Governmental
  - **VA Career Development Award**
  - NIH Lasker Clinical Research Scholars Program
    - 5-7 years as “visiting scholar” at NIH then 3 years extramural
  - Agency for Healthcare Research and Quality
  - Centers for Medicare & Medicaid Services
  - Department of Defense
- Pharmaceutical companies/industry
  - Investigator-initiated
- Other Foundations: National Science Foundation, Doris Duke, Robert Wood Johnson, Wellcome Trust, Burroughs Wellcome
- Philanthropy
- Divisional support/start-up funds

# Resources for Young Investigators

- ECI/ACR Rheumatology Research Workshop (**RRW**)
  - Abstract for submission: study design, in progress, or completed
  - Concurrent with ACR Education Exchange
  - Late April
- ECI/**Meet the Funders** session at ACR Annual Meeting/Convergence
- AMIGO: mentorship program for pediatric rheumatology
- United States Bone and Joint Institute (USBJI): grant writing program
- ACR/EULAR exchange program

# Creating Adult Rheumatology Mentorship in Academia



- Structured mentorship program to provide **long-distance career development guidance** for early career rheumatology investigators
- Mentees apply and fill out matching survey in summer
- Mentees are matched to senior investigators not at their institution
- Mentees and mentors receive “CARMA participant guide”
- In-person meeting and CARMA reception at ACR Convergence
- Three phone/video meetings and one in-person annually

# Being Funded → Obtaining Funding

- During fellowship: paid (poorly) by others
- As faculty: paid by yourself
  - Percent effort quantifies how your time is spent
    - Clinical
    - Administrative
    - Teaching
    - Research
      - Your grants
      - Other grants
      - Division/Department
      - Yourself (sundry from start-up or retention package)
- Contingency plan for every grant
  - Plan to not receive the grant on the first application
- You may have to fund your own raise!



# Indirects

- Funds benefits, research infrastructure, building, space, etc.
- Varies by geography, institution
- Know your institution's indirect rate (20-79%)
- Foundations often cap indirect rates or may only pay directs
  - Who will make up the difference?
- NIH pays full indirects
- Example
  - Research assay: \$50/sample x 1000 samples
  - Direct cost: \$50,000
  - Indirect rate: 79%
  - Actual cost: \$89,500



# Build Your Research Infrastructure

- Mentees not requiring funding
  - Graduate/medical students
  - Residents
  - Fellows
- Paid research staff
  - Research assistant/coordinator
  - Programmer/analyst
  - Laboratory assistant
  - Post-doctoral fellows
- Equipment/software
- Datasets
- Collaborations
- Shared resources with your mentor



# Thank you!

Email: [jsparks@bwh.harvard.edu](mailto:jsparks@bwh.harvard.edu)

