# The IRACDA Cohort Model for Postdoctoral Training 1999-present

**Clifton A. Poodry, PhD**
**Tonewanda Seneca**

Envisioned and inaugurated the Institutional

Research and Career Development Award

(IRACDA) program for postdoctoral professional

development while appointed as Director of the

Training, Workforce Development and Diversity

Division at the National Institute for General

Medical Sciences (NIGMS).

**Two Inaugural Programs: Emory FIRST and University North Carolina SPIRE**

**Current IRACDA Network Encompasses 21 programs distributed across 16 states**

- Alabama, California (4), Georgia, Illinois, Kansas, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New Mexico, New York (3), North Carolina, Pennsylvania, Texas, Virginia.

**Unique Features of the IRACDA Cohort Model for Postdoc Training**

- Places emphasis on increasing STEM workforce diversity through a cohort training model that builds communities of practice and peer network
- Offers fellows structured professional development in preparation for independent academic careers
- Formal partnerships between Research Intensive and Minority Serving Institutions affords expert mentorship in research and best pedagogical practices AND opportunities for fellows to serve as role models to attract underserved and underrepresented students to STEM careers
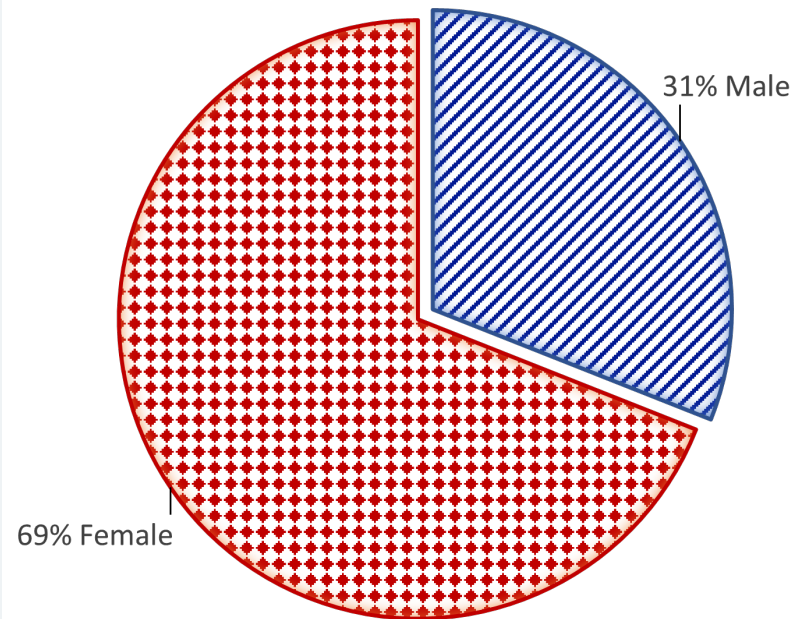
**Strategies for Tracking Outcomes and Evidence of Success?**
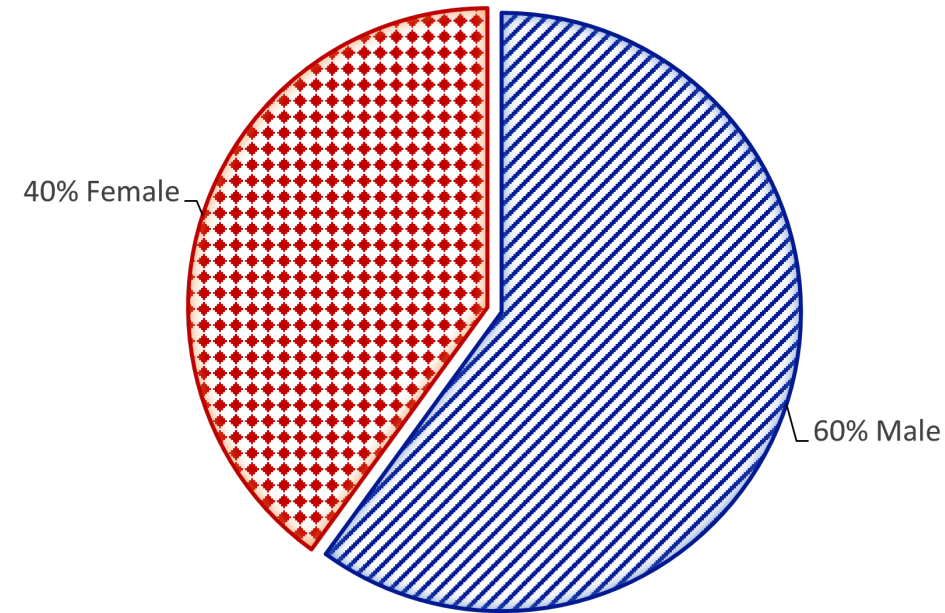
# Structured Training Increases Participation of Women

**SPIRE Structured Training:**

- teaching experiences as independent instructor

- professional development

- experience balancing teaching with research

### SPIRE (N = 81)



31% Male

69% Female

### NATIONAL DATA (N = 21,500)



40% Female

60% Male
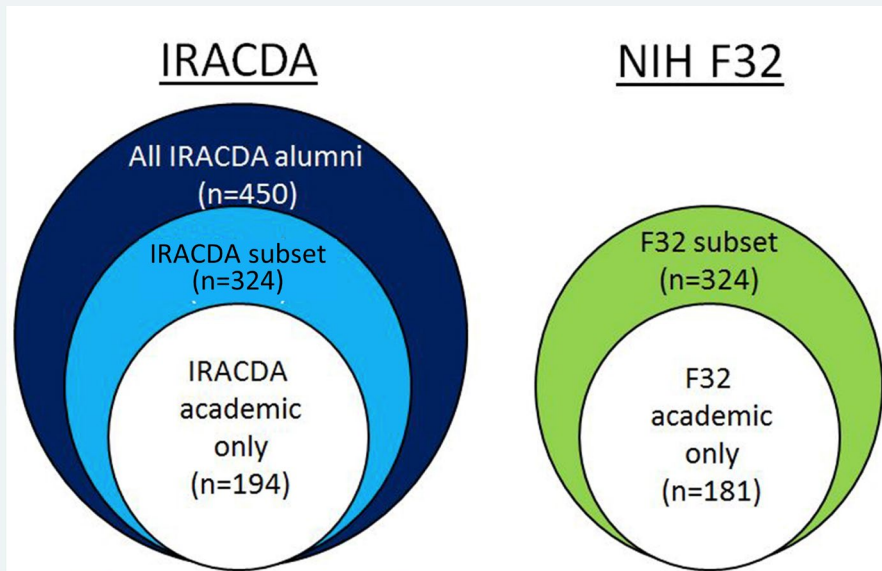
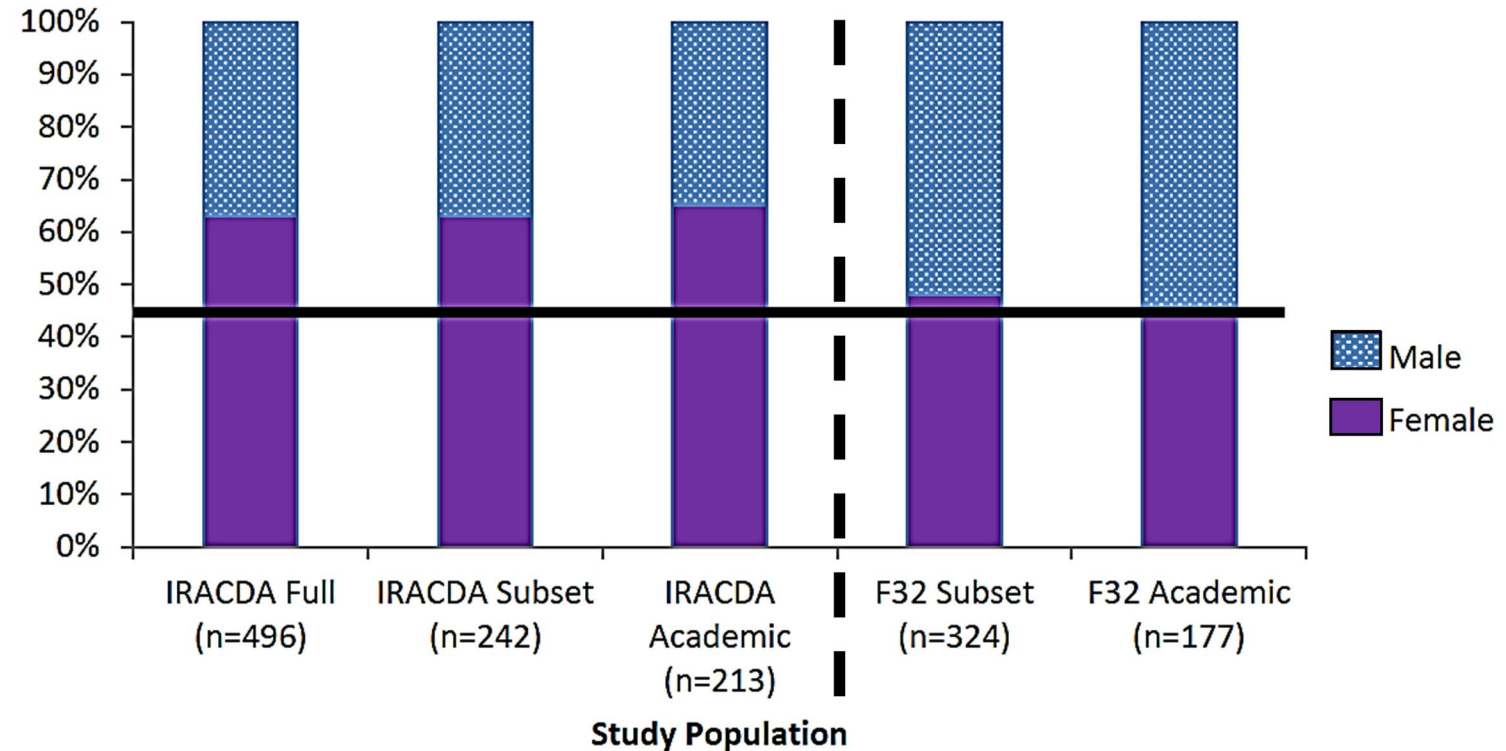# The IRACDA Network Increases Participation of Women

**NIGMS Analysis of IRACDA Training Impact 1999-2014**

Comparison groups included equal numbers of IRACDA and F32 awardees at the same institutions

**Gender of IRADA Alumni and F32 Awardees**

# The IRACDA Network Increases STEM Workforce Diversity

**NIGMS Analysis of IRACDA Training Impact 1999-2014**
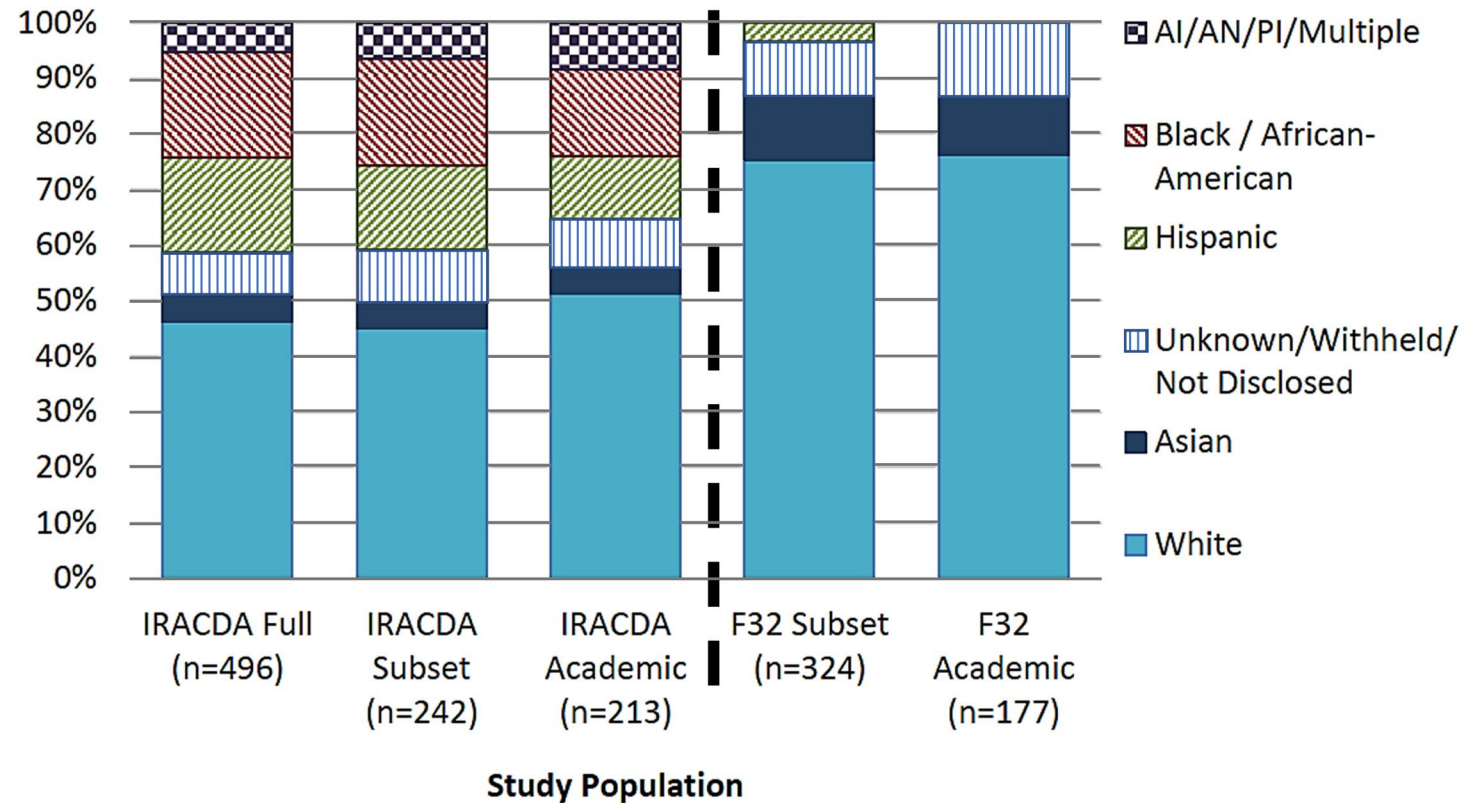


Race/Ethnicity of IRACDA Alumni vs. F32 Awardees

# The IRACDA Network Increases STEM Workforce Diversity

**NIGMS Analysis of IRACDA Training Impact 1999-2014 relative to Emory FIRST IRACDA**



Career Outcomes of IRACDA Alumni vs. F32 Awardees
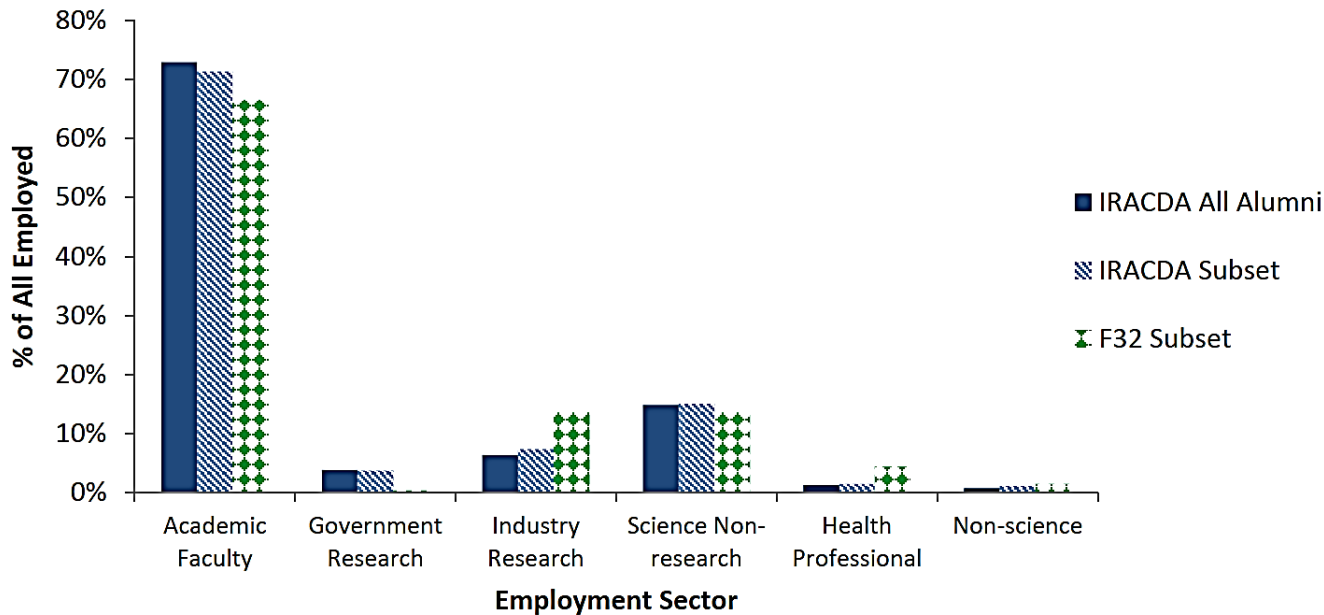


Career Outcomes of Emory FIRST Scholars

* Other includes self-employed; primary or secondary school teaching, or unknown
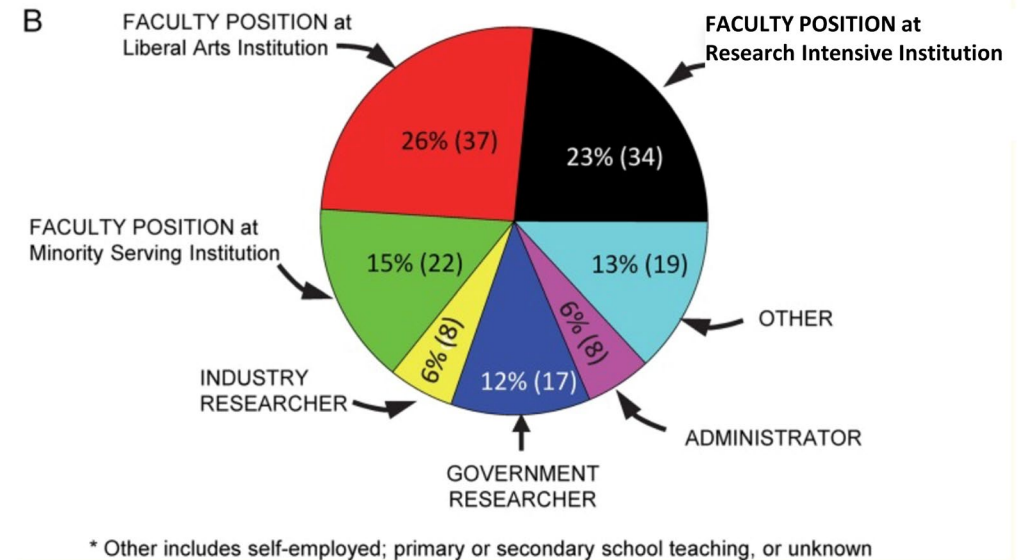
# Structured Training Broadens Participation

| | SPIRE ($n = 81$) | National data[a] ($n = 21{,}500$) |
|---|---|---|
| Female | 69% | 40% |
| Male | 31% | 60% |
| White/Asian | 68% | 89% |
| URM | 32% | 11% |
| No disability | 94% | 97% |
| With disability | 6% | 3% |

# ASERT IRACDA Structured Mentoring and Professional Development

**Structured Mentoring**

**Mentor training**

**Mentoring team: primary and research co-mentor, education mentor**

**Individual Development Plans required with formal twice annual mentor team meetings and reporting**

**Targeted Skill Development**

**Focused monthly meetings on defined topic of interest led by PIs or pair of fellows**

**Coursework and workshops in: 1) Education pedagogy and teaching, 2) Responsible Conduct in Research, 3) Grant writing, 4) Immersive teaching or curriculum development project at MSI, 5)** *FAIR Data standards, biostatistics, machine learning*
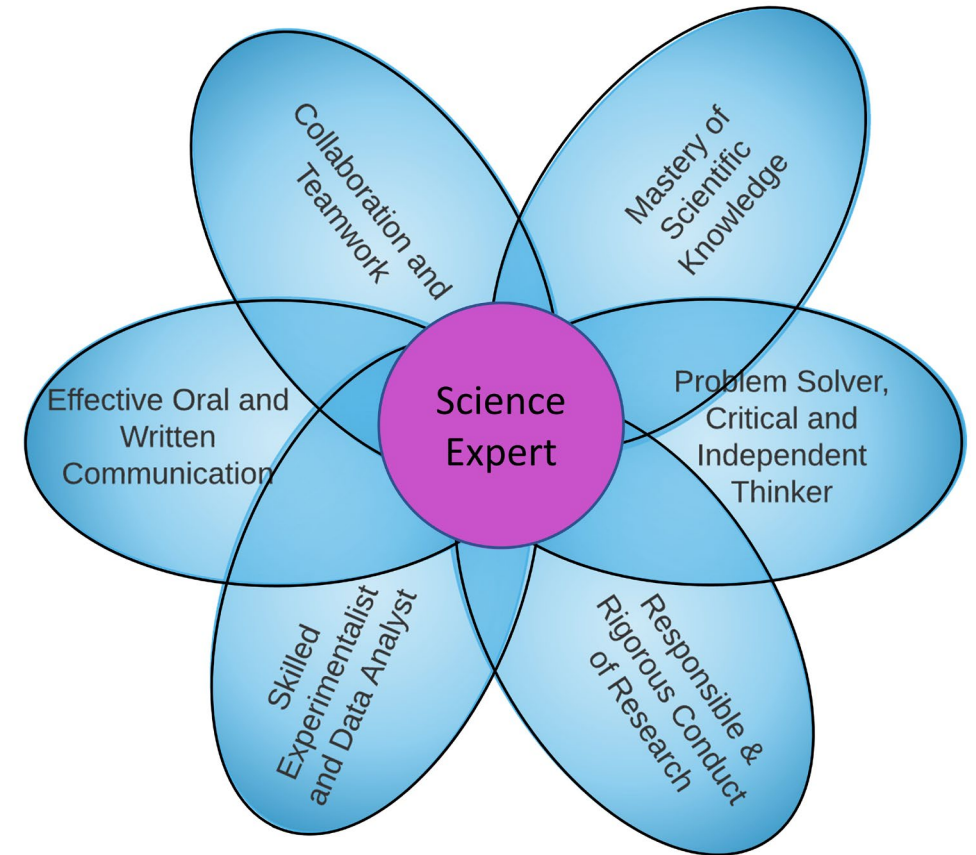
# Logic Model Guided Evaluation Plan Short-Term and Long-term Outcome Measures

| Activities | Outputs | Short-term Outcomes | Long-term Outcomes | Broad Impact |
|---|---|---|---|---|
| *For Fellows*<br>Provide teaching opportunities and mentorship<br><br>Provide research opportunities and mentorship | *For Fellows*<br>Progress in research (e.g., study completed, manuscript submitted)<br><br>Progress in teaching (e.g., updated / newly designed curricula) | *For Fellows*<br>Papers published<br><br>Curricula adopted / disseminated<br><br>Increased self-efficacy, independence, & understanding of challenges of teaching/research<br><br>Improved teaching techniques (active learning, inclusive teaching) | More research and teaching collaborations between RIIS and partner institutions<br><br>*For Fellows*<br>More remaining in science fields<br><br>Career success in research and teaching in academia | More diverse workforce in biomedical research<br><br>Community better informed in science<br><br>New curriculum development |
| Host annual retreat events | *For students at partner institutions*<br>Access to new learning experiences | *For students at partner institutions*<br>Increased interest in pursuing careers in science | *For faculty at partner institutions*<br>New course and curriculum implementation | |
| Professional development activities led by directors and fellows | | | | |

# Outcomes of ASERT IRACDA at the University of New Mexico: A Research Intensive MSI

**ASERT IRACDA 2009-present:**

**Lead:** University of New Mexico a Hispanic and Minority Serving Institution

**Minority Serving Institution Partners:**

- Central New Mexico Community College (MSI, high non-traditional student enrollments)

- New Mexico State University (RI MSI)

- Southwestern Indian Polytechnic Institute (National tribal college)
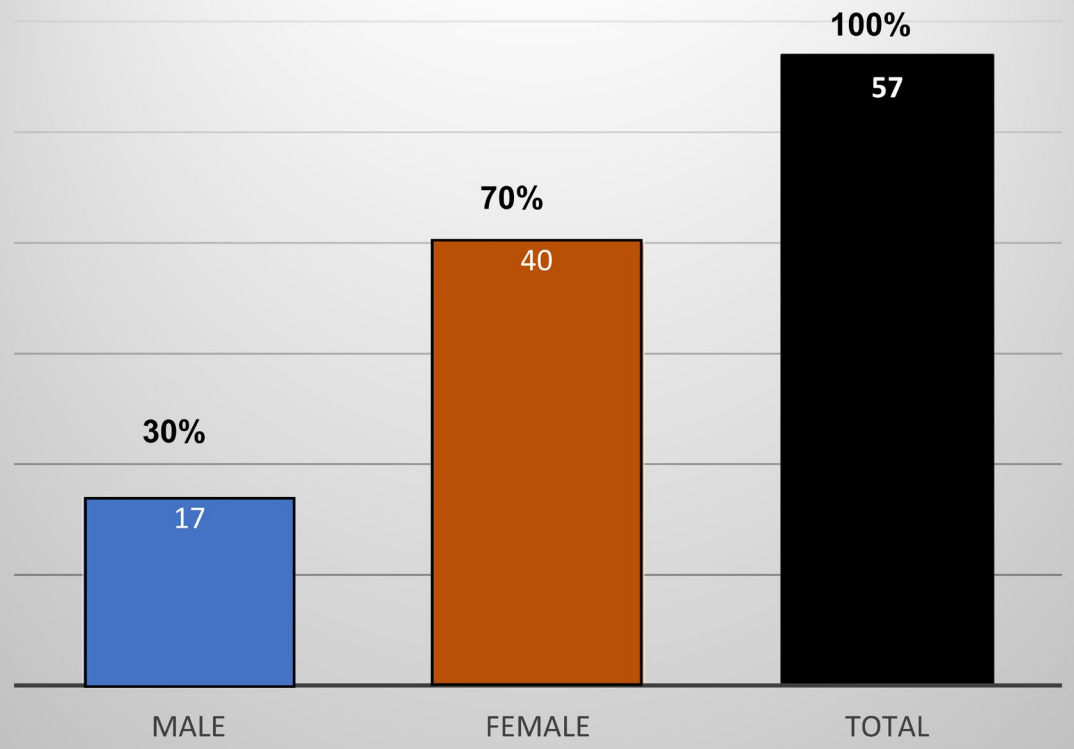
4 fellows/year 2009-2022 drawn from national pool

PhDs in anthropology, engineering, biology, ecology, chemistry, immunology, biomedical sciences
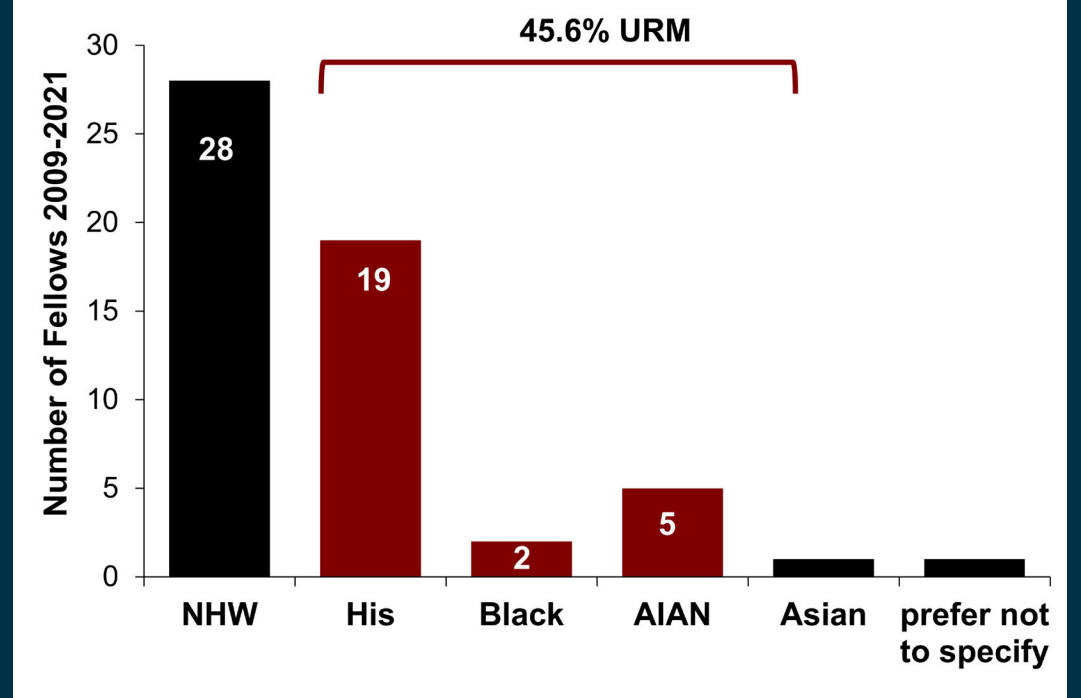
# Outcomes of ASERT IRACDA at the University of New Mexico: A Research Intensive MSI — Part 2

# ASERT AI Scholar Highlights



**Olivia George, PhD**

**Mentor: S. Ness (CMO)**
**Myc-regulated Oncogenesis**

- Navajo Nation
- Associate Professor, Biology
- University of Hawai'i
  West O'ahu



**Naomi Lee, PhD**

**Mentor: B. Chackerian (CT)**
**Vaccines / HPV in AI Communities**

- Seneca Nation
- 2018 AISES Professional of the Year
- Assistant Professor Chemistry;
  Health Equity Research
- Northern Arizona University



**Sheldwin Yazzie, PhD, MPH**

**Mentor: C. Wiggins (CCPS)**
**Radon Exposure & AI Cancer Incidence**

- Navajo Nation
- Deputy Director, Albuquerque Area
  SW Tribal Epidemiology Center
  (NIGMS/IHS NARCH X)
- UNMCCC Advisory Committee



**Tammi Duncan*, PhD, MS**

**Mentor: L. Hudson (CMO)**
**Environmental Exposures &**
**Immune Dysregulation**

- Navajo Nation
- Assistant Professor Biology
- Univ New Mexico Valencia

**Paradigm Shifting IMPACT** ➤ **Developing Native American Talent** ➤ **Expanding SACNAS and AISES Scholars** ➤ **Appointed in faculty, industry and leadership** ➤ **Research with AI Communities**

* Retained and promoted to faculty track at UNM

# ASERT Alumni Career Outcomes

**ASERT IRACDA 2009-2018:**

- **12.5% in science industry**

- **81% in academia and 62% appointed as faculty**
  - ✓ **Private school**
  - ✓ **community colleges (4%)**
  - ✓ **PUI (27%)**
  - ✓ **RI Institution (33%)**

- **31% of fellows appointed as**
  - ✓ **Staff scientists**
  - ✓ **Research fellows**
  - ✓ **Administration**

A.



Business/Industry (12.5%)
Other (6.3%)
University (81%)
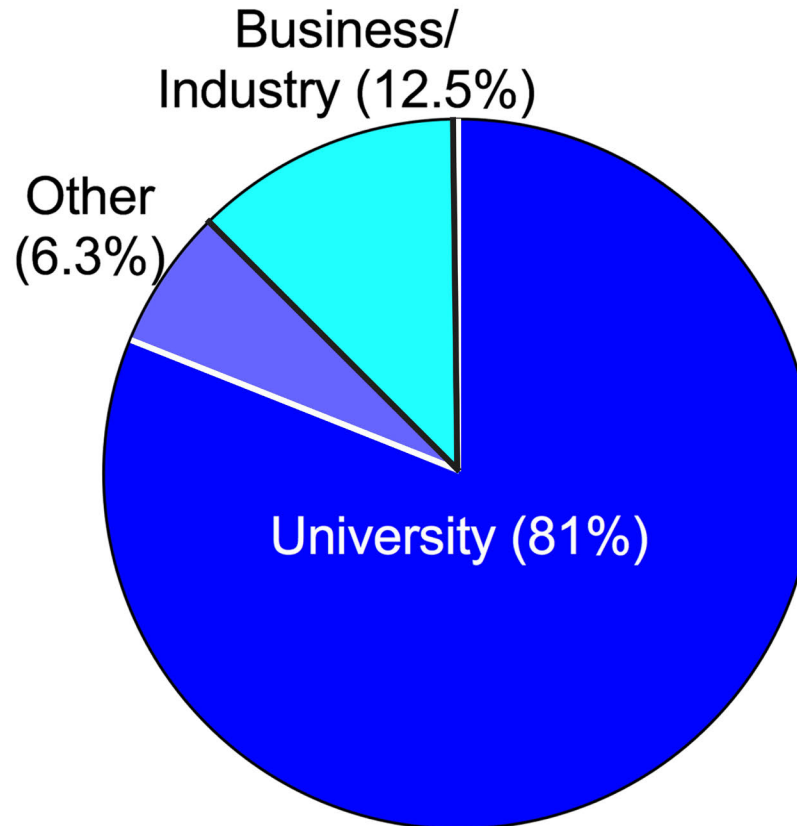
B.

Academic Appointments
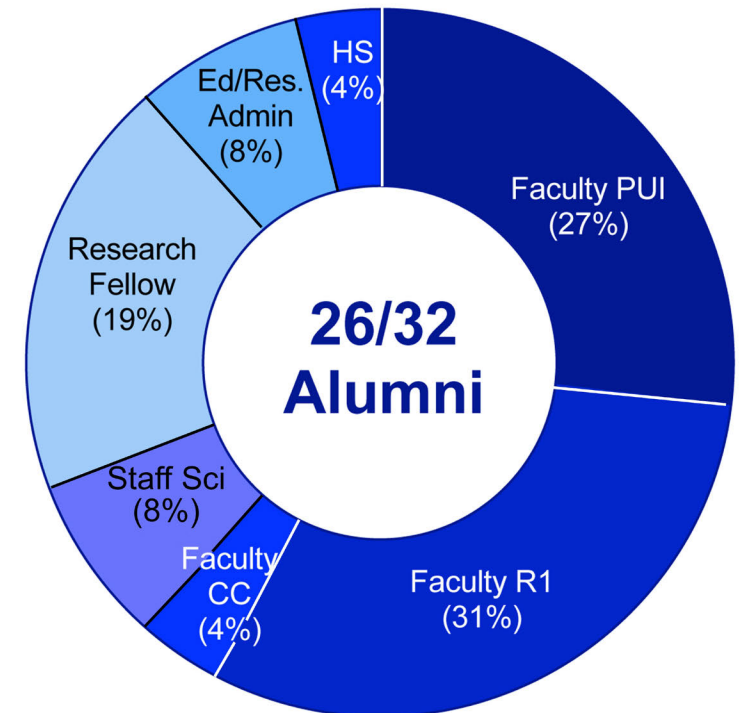


26/32 Alumni

HS (4%)
Ed/Res. Admin (8%)
Research Fellow (19%)
Staff Sci (8%)
Faculty CC (4%)
Faculty PUI (27%)
Faculty R1 (31%)

# Outcomes of ASERT IRACDA at the University of New Mexico: A Research Intensive MSI

**ASERT IRACDA 2009-present:**

- **45 alumni in academic and private industry science careers in 19 states**

- **49% (22/45) employed in New Mexico**

- **150 publications  (avg. 3.3 publications/scholar)**



ASERT Alumni in Science Careers

# Comparative Fellow Publication Frequency as a Measure of Program Efficacy

**FIRST 2000-2016:**

- **177 participants over 17 yr period**

- **84% scientific academic or research and teaching-intensive**

- **Demographics:**

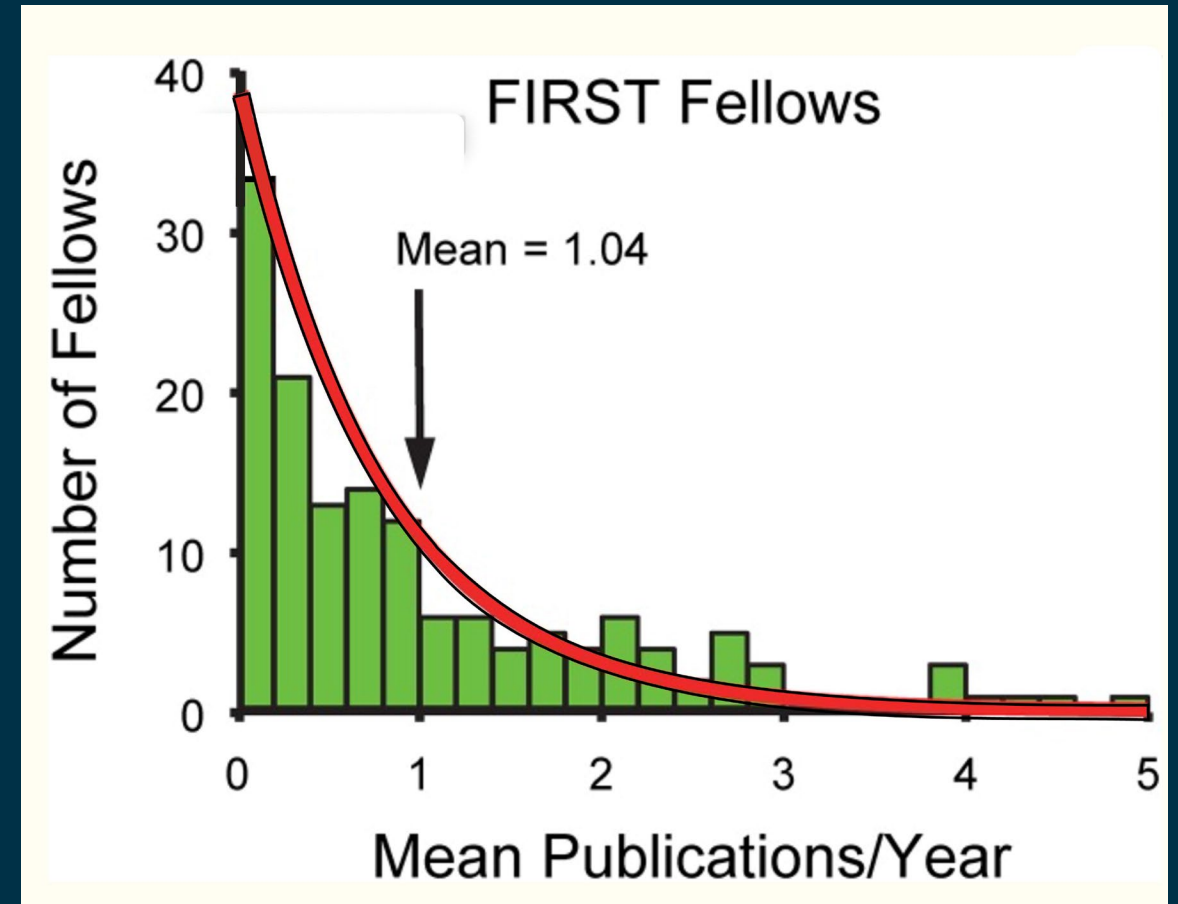| FIRST Postdocs | All US Science Engineering Postdocs |
|---|---|
| 50% African American | <3% African American |
| >70% female | 41% female |

# Fellow Publications as a Measure of Academic Career Goal Attainment

**SPIRE 1999-2014:**

- **81 participants over 15 yr period**

- **Scholars transition to faculty positions at 3x national avg. with higher proportion of URM and female scholars**

- **Logistic regression models indicate significant predictors are intended career track at start of fellowship and # publications**



| | industry/admin/ other (n=12) | Instructor Teaching Professor (n=14) | Tenure-Track Teaching/Research (n=46) | Tenure-Track Research-R1 (n=5) |
|---|---|---|---|---|
| Female | 7 (58%) | 11 (79%) | 31 (67%) | 3 (60%) |
| URM | 5 (42%) | 6 (43%) | 12 (26%) | 1 (20%) |
| F/URM/D | 8 (67%) | 13 (93%) | 38 (83%) | 4 (80%) |
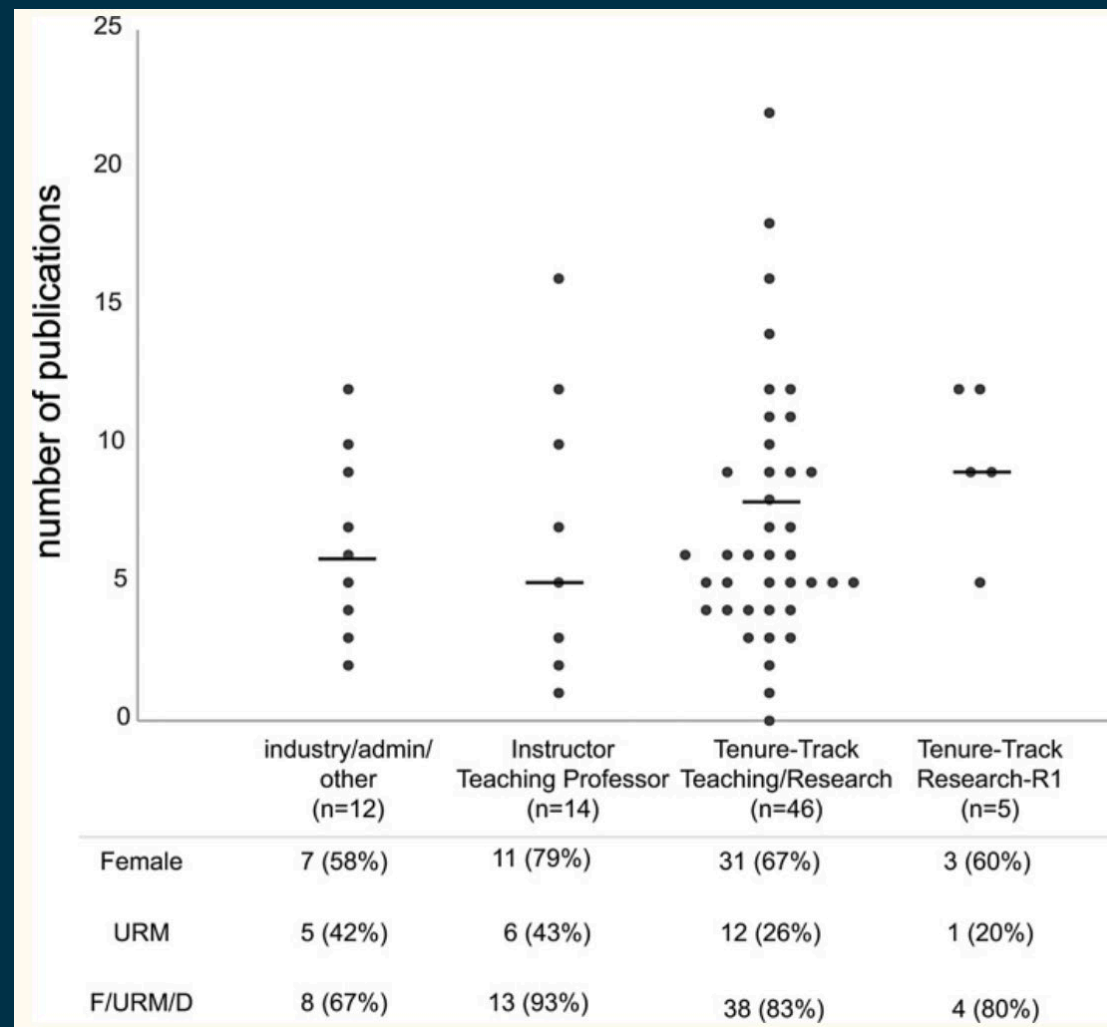
# Fellow Impact on Undergraduate Education and Broadening STEM Participation

**Impact of Fellows on Partnered MSIs documented through:**

- **New and revised courses**

- **MSI student course evaluations**

- **Research mentorship of MSI undergraduates**

- **Scholarship in teaching and learning**

- **Faculty appointment at MSIs**

- **Sustained commitment to training underrepresented students**
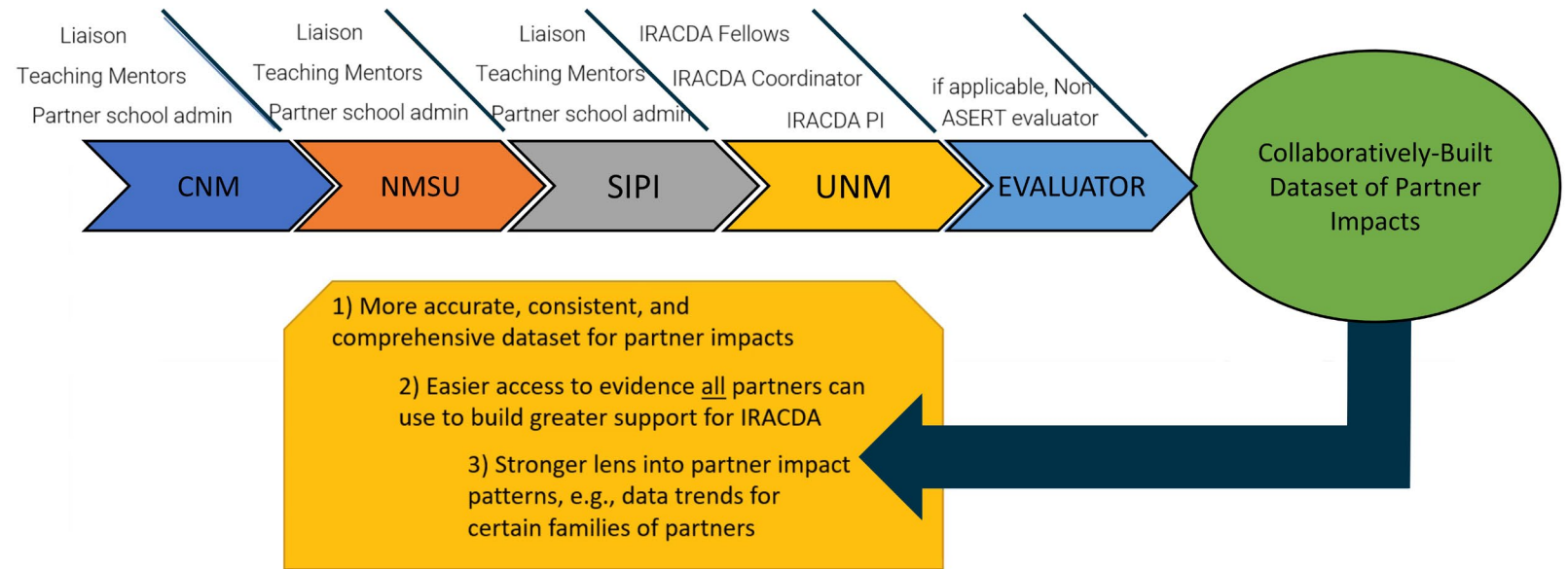
| Activity | Number |
|---|---|
| New courses and labs developed and taught | >35 |
| Existing courses and labs revised | >40 |
| MSI undergraduates mentored by FIRST fellows in research labs | 19 |
| Peer-reviewed teaching publications coauthored by fellows and MSI teaching mentors | 9 |
| FIRST fellows hired as faculty by partner MSIs | 19 |

# Tufts: Webtool to Track and Quantify Partner Impact

**Webtool Development for Individual Program Data and to Facilitate Data Sharing:**

- Administrative Supplement 3K12GM133314-02S1 to Enhance IRACDA Program Evaluation Capacity

- **In partnership with Strategic Evaluations, Inc.**

- **IRACDA National Conference Presentation, Albuquerque, NM July 2022**

## Partner Impact Portal "Big Idea"

CNM → NMSU → SIPI → UNM → EVALUATOR → Collaboratively-Built Dataset of Partner Impacts

Liaison
Teaching Mentors
Partner school admin

Liaison
Teaching Mentors
Partner school admin

Liaison
Teaching Mentors
Partner school admin

IRACDA Fellows
IRACDA Coordinator
IRACDA PI

if applicable, Non-ASERT evaluator

1) More accurate, consistent, and comprehensive dataset for partner impacts

2) Easier access to evidence all partners can use to build greater support for IRACDA

3) Stronger lens into partner impact patterns, e.g., data trends for certain families of partners

PIs Moore CL, McVey M with Strategic Evaluations, Inc. Whittington D

# IRACDA Builds Community

- Informal evidence that structured support develops community and peer-networks through formal and informal sharing in
  - ✓ research scholarship and exchange
  - ✓ pedagogical training and experiences
  - ✓ peer and senior mentoring
  - ✓ professional development activities

- Intentional inclusion of developmental opportunities to build community was found important for women and individuals underrepresented in STEM

- Benefits of lasting relationships reported at annual IRACDA meetings

doi: 10.1187/cbe.17-03-0051; anecdotal

# Summary

- IRACDA programs attract and retain women and others underrepresented in science through intensive, structured professional development in both research and teaching that has durable, long-term impact on trainee self-efficacy, career attainment and satisfaction

- IRACDA program outcomes across myriad institutions and stakeholders show benefit for increasing diversity in academia and related science professions

- Partnered MSI faculty and students benefit through interactions with  scholars that share interest in teaching and education pedagogy and serve as relevant role models

- IRACDA programs coalesce communities of practice through explicit structured training  and shared teaching and research experiences

# Limitations

- Relevant comparator groups are needed for IRACDA outcome evaluation; I

- Institutional T32 trainees as comparators have limitations due to differences in programming and participants; calls for caution when extrapolating from one program to another

- Most analyses are retrospective and use output measures such as publications, grants, classes taught, trainees mentored, and job attainment, as surrogates for training outcomes. These measures are multi-factorial and do not directly measure the benefit of specific training activities/interventions

- Inclusion of self-efficacy surveys can improve assessment of trainee confidence development in response to individual interventions

# References for Measuring Postdoctoral Outcomes

**SPIRE Program University of North Carolina Chapel Hill**

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- Analysis of Postdoctoral Training Outcomes that Broaden Participation (2016) Rybarczyk B, Lerea L, Whittington D, Dykstra L. doi: 10.1187/cbe.16-01-0032

**FIRST Program Emory University**

A Model for Postdoctoral Education That Promotes Minority and Majority Success in the Biomedical Sciences. (2017) Eisen A., Eaton DC. doi: 10.1187/cbe.17-03-0051

**NIGMS Program Officer Report**

- Institutional Research and Academic Career Development Awards (IRACDA) (K12) Outcomes Assessment. (2016) Faupel-Badger J, Miklos A with assistance from Shaw C, and Oh A. https://www.nigms.nih.gov/News/reports/Documents/IRACDA-outcomes-report.pdf

**NCI Cancer Prevention Fellowship Program Outcomes**

- Alumni Perspectives on Career Preparation during a Postdoctoral Training Program: A Qualitative Study. (2015) Faupel-Badger JM, Raue K, Nelson DE, Tsakraklides, S. doi: 10.1187/cbe.14-06-0102

Funding

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                      Biomedical Scientists

3K12GM133314-02S1    Tufts University Administrative Supplement to Enhance IRACDA
                      Program Evaluation Capacity

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