Re-envisioning NIH-Supported Postdoctoral Training (ACD Postdoc WG)
Shelley Berger, PhD & Tara Schwetz, PhD
NIH Advisory Committee to the Director Meeting
December 8, 2022
The Seductive Promise

Postdocs – “worker bees” of academia that would one day be rewarded for their toils with hives of their own
(Paula Stephan, Economist, Georgia State University)
Decline in Postdocs – Not new, but growing challenge...

Rescuing US biomedical research from its systemic flaws

Bruce Alberts*, Marc W. Kirschner†, Shirley Tilghman‡, and Harold Varmus§

*Department of Biophysics and Biochemistry, University of California, San Francisco, CA 94158; †Department of Systems Biology, Harvard Medical School, Boston, MA 02115; ‡Department of Molecular Biology, Princeton University, Princeton, NJ 08540; and §National Cancer Institute, Bethesda, MD 20892.

Edited by Ingrid M. Verena, The Salk Institute for Biological Studies, La Jolla, CA, and approved March 18, 2014 (received for review March 7, 2014).

Science

The case of the disappearing postdocs

The dire need for federal support of molecular research, then and now

Lab leaders wrestle with paucity of postdocs

Even high-profile scientists are struggling to recruit qualified postdoctoral researchers.

The impact of postdoctoral training on early careers in biomedicine

Chasing the academic dream: Biased beliefs and scientific labor markets

‘The tipping point is coming’: Unprecedented exodus of young life scientists is shaking up academia
Initial Data Show Multiple Forces Driving Postdoc Decline

- Lower postdoc numbers overall
- Lower international grad students and postdocs
- Fewer F32 applications and awards
- NIH postdoc stipend has increased, but not pacing industry
- Grad students planning academic postdocs continues downward trend
- Grad students and postdocs report downward trend in quality of life, worse for international trainees
- Anecdotal discussions suggest trends worsening since 2020
Postdocs numbers have steadily increased since 1980, but stayed relatively flat for the last decade

Source: https://ncses.nsf.gov/pubs/nsf22319

(Updated data to be released in December 2022)
Postdoctoral Appointments by Citizenship
More than half of all postdocs are temporary visa holders

NSF Statistics: Citizenship of U.S. Postdoctoral Appointees

Citizenship of Postdoctoral Appointees in 2020

Source: https://ncses.nsf.gov/pubs/nsf22319

(Updated data to be released in December 2022)
Biomedical science postdocs: an end to the era of expansion

Howard H. Garrison, 1, 2 Louis B. Justement, 3 and Susan A. Gerbi 1
1 Office of Public Affairs, Federation of American Societies for Experimental Biology, Bethesda, Maryland, USA; 2 Department of Microbiology, University of Alabama, Birmingham, Alabama, USA; and 3 Department of Molecular Biology, Cell Biology and Biochemistry, Brown University, Providence, Rhode Island, USA

“After >3 decades of steady growth, the number of biological and medical science post-doctorates at doctoral degree-granting institutions recently began to decline.”

FASEBJ., 30, 41–44 (2016)
Declining International Student Graduate Enrollment in the U.S.

In 2020/21, the total number of international students declined by 15% from the prior academic year. This decrease was primarily due to the effects of the COVID-19 pandemic.

145,528 international students studied at their U.S. university for the first time in 2020/21.

Source: www.opendoorsdata.org
Postdoctoral Appointee Primary Source of Support
Over half of all postdocs are federally supported

National Statistics: Primary Source of Support for Postdoctorates
All Fields of Study

Primary Source of Support for Postdoctorates in 2020

Source: https://report.nih.gov/nihdatabook/report/263
NIH NRSA F32 Applications, Awards, and Success Rates
Decreasing applications and awards

Source: https://report.nih.gov/nihdatabook/report/62
NIH NRSA Postdoctoral Fellows and Trainees
Decreasing over time

Number of Postdocs Supported, 1998 - 2021

Source: NIH/OER
Next Steps for Life Science PhD Graduates

Since 2010, declining number of new PhDs undertaking immediate postdoctoral training

Percent of PhDs with Definite Postgraduate Plans Going into a Postdoc vs. Non-Postdoc Job

Employment Plans of PhDs in 2021

Doctorate Recipient Employment Commitments

Increasing percentage of earned doctorates commit immediately to industry/business

Employment Sector of Science & Engineering Doctorate Recipients with Definite Postgraduation Commitments for U.S. Employment

Source: https://ncses.nsf.gov/pubs/nsf22319

(Updated data to be released in December 2022)
NIH NRSA Postdoctoral Fellows and Trainees
Increasing stipend over time (starting at $55K in 2022)

Stipend Level, 2010 - 2022

Source: NIH/OER
Discrepancies in Starting Salary by Sector
Industry postdoc salaries exceed academic postdoc salaries

<table>
<thead>
<tr>
<th>Industry Postdoc (Biomedical Field)</th>
<th>Academic Postdoc</th>
</tr>
</thead>
<tbody>
<tr>
<td>$73,000</td>
<td>$55,000</td>
</tr>
<tr>
<td>$76,000</td>
<td>$65,000*</td>
</tr>
<tr>
<td>$84,000</td>
<td>$70,000*</td>
</tr>
</tbody>
</table>

*In response to the shortage of suitable postdocs, both MIT and St. Jude Children's Research Hospital have recently raised their starting postdoc salaries

According to NSF’s *Survey of Earned Doctorates*, biomedical Ph.D. graduates entering industry jobs can expect to make a median starting salary of $105,000 compared to $53,000 for an academic postdoc position.
Multi-Factorial Challenge
2020 Postdoc Career Satisfaction and Prospects Survey

Postdoctoral researchers worldwide are experiencing great distress around their career prospects, workload, and workplace culture.

What is your current gross annual salary/compensation (earnings before tax or other deductions) of your primary job?

<table>
<thead>
<tr>
<th>Salary Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;US$15,000</td>
<td>5%</td>
</tr>
<tr>
<td>$15,000–29,999</td>
<td>10%</td>
</tr>
<tr>
<td>$30,000–49,999</td>
<td>38%</td>
</tr>
<tr>
<td>$50,000–79,999</td>
<td>42%</td>
</tr>
<tr>
<td>$80,000–109,999</td>
<td>3%</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>2%</td>
</tr>
</tbody>
</table>

How satisfied are you in your current position?*

- Satisfied: 61%
- Dissatisfied: 26%
- Neutral: 14%

*Percentages do not add up to 100% because of rounding.

In the past year would you say your level of satisfaction has...

- Significantly worsened: 18%
- Worsened a little: 32%
- Stayed the same: 23%
- Improved a little: 19%
- Significantly improved: 7%
- Not applicable: 1%

Do you hope to pursue a career in academia?

- Yes: 63%
- Unsure: 26%
- No: 11%

How do you feel about your job prospects?

- Extremely negative: 17%
- Somewhat negative: 39%
- Neither positive nor negative: 13%
- Somewhat positive: 23%
- Extremely positive: 4%
- I don't know: 4%

Do you see your job prospects as better or worse than those of previous postdoc generations?

- Much worse: 37%
- Somewhat worse: 37%
- Neither worse nor better: 16%
- Somewhat better: 7%
- Much better: 1%
- N/A: 2%

Financial Pressures Threaten Graduate Student Stability

QUOTE OF THE DAY

“It’s hard to focus on researching, teaching, mentorship, writing papers, applying for grants, when you don’t even have enough money for food.”

A biology PhD student in the United States is one of the 85% of respondents to Nature’s 2022 survey of graduate students who said they worry about having enough money to buy food and cover rent and other expenses. (Nature | 9 min read)

QUOTE OF THE DAY

“Financial distress isn’t a rite of passage or a temporary inconvenience. It could be an existential threat to today’s PhD scholars and master’s students.”

The cost-of-living crisis is a fundamental threat to the progress of science, argues a Nature editorial. (5 min read)
2022 Challenges and Obstacles of Graduate Training Survey
PhD and master’s students worldwide struggle with work–life balance, cost of living, and support for training and mental health

What concerns have you had since you started your graduate degree?

- Difficulty of maintaining work–life balance: 68%
- Financial worries after my graduate degree: 65%
- Uncertainty about future employment/career prospects: 65%
- Concern about my mental health as a result of undertaking a graduate degree: 57%
- Inability to finish my studies in the time period I had set out to: 51%
- Political landscape: 49%
- Uncertainty about the value of a graduate degree: 47%

How satisfied are you with your graduate degree experience?

- Master’s: 68%
- PhD: 60%

Neutral: 17%
Dissatisfied: 15%

On average, how many hours a week do you typically spend on your graduate degree?

- Number of hours per week:
  - <11: 0%
  - 11-20: 10%
  - 21-30: 20%
  - 31-40: 30%
  - 41-50: 20%
  - 51-60: 10%
  - >60: 0%

Which of the following would you say are the most difficult for graduate students in the country where you are studying?*

- Overall cost of living: 57%
- Finding a permanent job after completing my education: 56%
- Work–life balance: 47%
- Lack of affordable housing: 43%
- Learning what career possibilities exist: 29%
- Living as an international student in another country: 23%
- Future student debt: 10%

Have you ever received help for anxiety or depression linked to your studies?

- Yes: 24%
- I want help but have not received it: 4%
- I want help but have not yet received it: 19%
- No: 50%
- Prefer not to say: 3%

Master’s:
- Yes: 24%
- I want help but have not received it: 4%
- I want help but have not yet received it: 19%
- No: 50%
- Prefer not to say: 3%

PhD:
- Yes: 36%
- I want help but have not received it: 4%
- I want help but have not yet received it: 16%
- No: 41%
- Prefer not to say: 3%

2022 Challenges and Obstacles for International Graduate Students Survey

Financial struggles, visa woes and other issues (e.g., discrimination or harassment) create barriers for many graduate scholars studying abroad.

**Are you studying in the country you grew up in?**

- Overall: Yes 71%, No 29%
- South America: Yes 91%, No 9%
- Asia (Including Middle East): Yes 85%, No 15%
- Africa: Yes 75%, No 25%
- North or Central America: Yes 74%, No 26%
- Australasia: Yes 58%, No 42%
- Europe: Yes 58%, No 42%

**What prompted you to study outside your country of upbringing?**

- To experience another culture: 49%
- Lack of funding opportunities in my home country: 45%
- More job opportunities post-study: 44%
- Lack of quality graduate-degree programmes in my home country: 37%
- Chance to pursue a specific research question: 33%
- Higher salaries post-study: 30%
- Lack of graduate-degree programmes in my subject of choice: 24%

**Have you experienced discrimination or harassment during your programme?**

- International students: Prefer not to say 4%, Yes 26%
- Domestic students: Prefer not to say 3%, Yes 17%

**If you've experienced discrimination or harassment, what form did it take?**

- Racial discrimination or harassment: 17%
- Sexual harassment: 22%
- Age discrimination: 35%
- Gender discrimination: 51%

Source: Woolston, Nature Career Feature 2022
2022 Challenges and Obstacles for International Graduate Students Survey

Despite challenges, majority remain satisfied with their experience

**How satisfied are you with your graduate-school experience?**

- **International**
  - Dissatisfied: 22%
  - Satisfied: 65%
  - Neither satisfied nor dissatisfied: 13%

- **Domestic**
  - Dissatisfied: 23%
  - Satisfied: 61%
  - Neither satisfied nor dissatisfied: 17%

*Percentage does not add to 100% because of rounding.

Source: Woolston, Nature Career Feature 2022
Charge to the Working Group

- **Evaluate** evidence on the perceived shortage in PhDs seeking U.S. postdocs
- **Assess and consider** factors influencing the scope and persistence of the issue
- **Review and compare** other approaches to postdoctoral training
- **Consider** ways to support postdocs’ quality of life and work-life balance, increase retention
- **Engage** key internal and external stakeholders
Proposed Activities

Gather Community Feedback*
- Request for Information
- Listening Sessions
  Early 2023

Consult Experts
- Workforce Economists
- Heads of Graduate Student and Postdoc Offices
- Industry Scientists
- International Student Organizations

Review Available Data
- National Science Foundation – *updates expected in December 2022*
- NIH RePORTER
- Organizations Conducting Surveys and Polls
- Published Literature (e.g., Nature workforce surveys)

*Focus on those most impacted—postdocs and grad students*
ACD Working Group

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Shelley Berger, PhD
Principal Investigator,
Daniel S. Och University Professor at University of Pennsylvania

Tara Schwetz, PhD
Acting Principal Deputy Director,
National Institutes of Health

Executive Secretaries:
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- Laura Long, PhD
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Jodi Yellin, PhD
AAMC

*ex officio
Timeline

- Nov 2022: Invite WG Members
- Dec 2022 – May 2023: Meet & Work
- June 2023: Draft Recommendations
- Dec 2023: Final Recommendations

ACD Meeting
Welcome ideas, thoughts, and questions from ACD members