

Experiences of Postdoctoral Scholars in Chemistry: Findings from an ACS Survey



J. C. Schlatterer*, T. Stevens[^], C. Y. Kuniyoshi*, C. Schiavone*, N. Martin*, M. S. Jackson*

*American Chemical Society, 1155 Sixteenth Street NW, Washington, D.C. 20036

[^] George Mason University, College of Science, 4400 University Dr., Fairfax, VA 22030



Background

Postdocs in chemistry are essential contributors to the promotion of progress of science and to the advancement of the national health, prosperity, and welfare in the U.S. About 5,300 postdocs¹ in chemistry work at universities alone. The number of chemistry postdocs in industry and non-profit research organizations is unknown. Besides the opportunity to advance research, the postdoctoral experience should also provide access to information and resources that help individuals plan for satisfying careers. The National Institutes of Health (NIH) and the National Science Foundation (NSF) define a postdoctoral researcher as "An individual who has received a doctoral degree (or equivalent) and is engaged in a *temporary and defined* period of mentored advanced training to enhance the professional skills and research independence needed to pursue his or her chosen career path."² The National Postdoctoral Association published six core competencies to offer guidance to individual postdocs "who must seek out relevant training experiences, in collaboration with mentors, institutions, and other advisors who provide this training."³ Lack of appropriate career guidance and mentoring, low salaries, and long training periods have been reported as main challenges for postdocs.⁴⁻⁹ Despite these challenges, comprehensive data on e.g. career goals and support for postdocs in chemistry have not been collected. In addition, inconsistent terminology for postdocs, postdoctoral mobility, and diverse employers complicates the collection of robust data.

Purpose

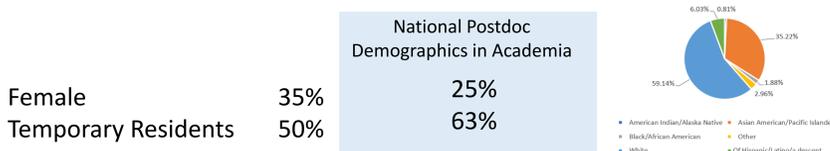
This project collected data on career plans, postdoctoral competencies, career resources, career choice factors, research mentors, salaries, and titles of academic postdocs in chemistry.

Methodology

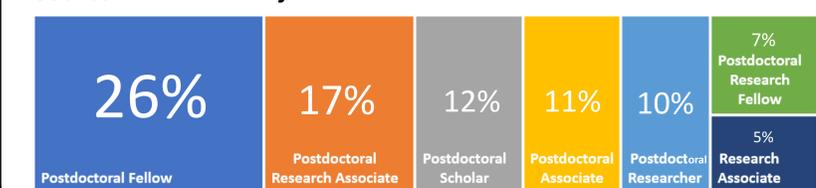
The ACS conducted a survey of its postdoctoral scholar members in summer 2019. The survey consisted of 41 questions and focused on career plans and preparation, postdoctoral education competencies, postdoc-mentor relationships, resource availability, satisfaction, and support mechanisms.

A total of 766 individuals responded to the survey. The final sample for analysis includes 550 respondents who are postdoctoral scholars in the United States. The data was disaggregated by gender. Responses from those identifying as non-binary/third gender were not included in the difference by gender analysis because of the small sample size. Across all survey items, only those differences that reached statistical significance at $p < .05$ are discussed.

Counted ACS Survey Responses (N=593)



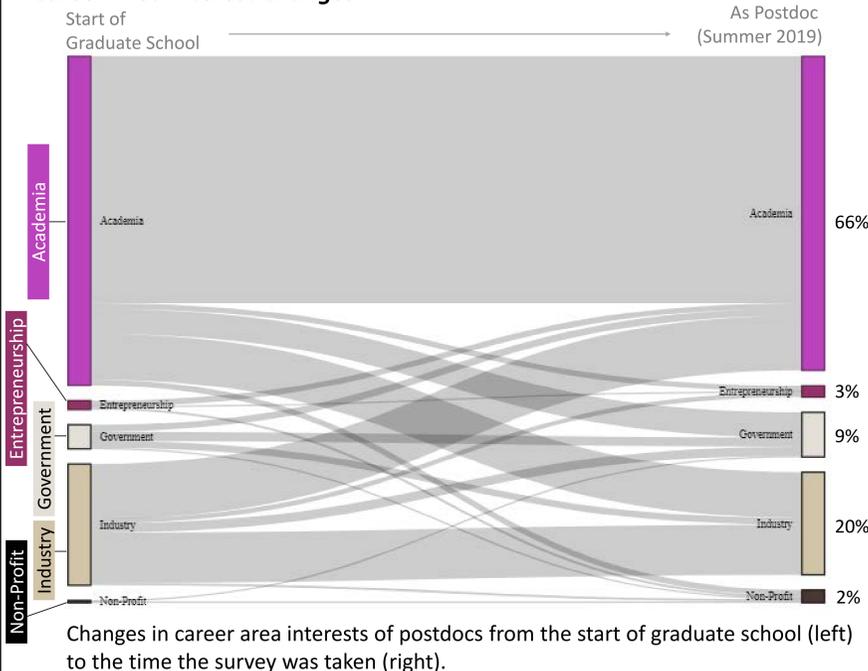
Results



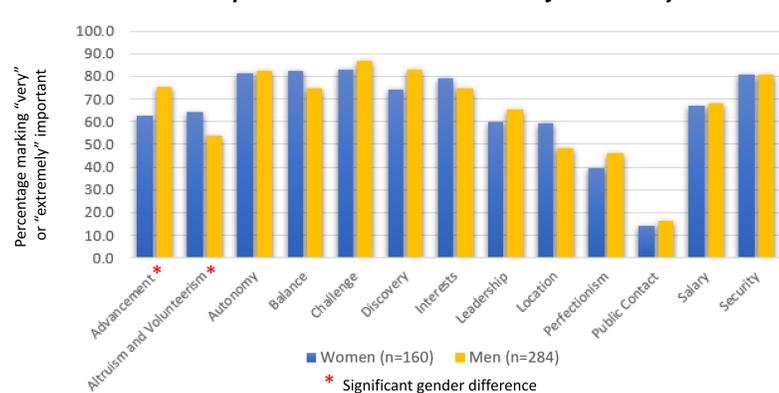
Current Career Area Interest by Gender

Career Area	Percentage of Ranking	
	Women (n=164)	Men (n=298)
Academia	61	68
Industry	23	19
Government	12	8
Entrepreneurship	0	4
Non-Profit	4	1

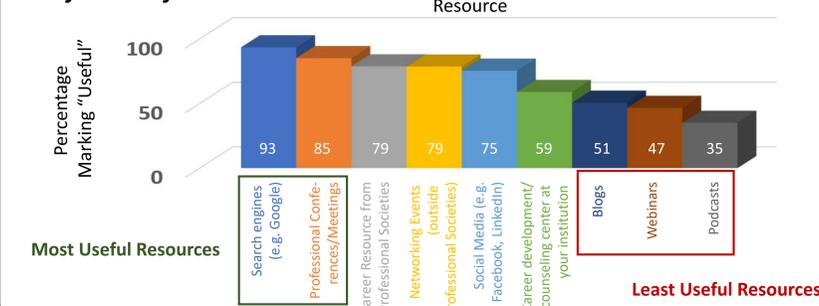
Career Area Interest Changes



Internal Factors Important to Postdocs Choice of Careers by Gender



Usefulness of Career Resources



Behaviors by Primary Research Mentor

Respondents were asked "To what extent does each of the following behaviors describe your primary research mentor?" Respondents answered on a 5-point Likert scale where 1 was "Not at all" and 5 was "To a very great extent".

Behavior	Mean (SD)
TOP THREE	
Gives the appropriate level of credit to me for my research contributions	4.37 (0.90)
Encourages me to work independently over the course of my postdoctoral research	4.37 (1.01)
Encourages me to take on challenging opportunities	4.27 (0.95)
LOWEST THREE	
Engages me in writing grant proposals	3.05 (1.49)
Provides information about academic career paths	3.00 (1.36)
Provides information about non-academic career paths	2.63 (1.35)

Annual Income of Postdoctoral Respondents



Note: The FY2019 NIH NRSA Postdoc Stipend Levels were:

Years of Experience	FY 2019 Stipend Level
0	\$50,004
1	\$50,376
2	\$50,760
3	\$52,896
4	\$54,756
5	\$56,880
6	\$59,100
7	\$61,308

Conclusion

- "Postdoctoral Fellow" is commonly used to describe postdocs in academia.
- Postdocs are mostly interested in **academic careers**.
- Career area **interests change**.
- The value of **advancement, altruism, and volunteerism** in careers was **significantly different** between respondents identifying as **women and men**.
- Search engines** are popular tools to access career information.
- Research mentors are **good in providing challenging research opportunities** and research guidance.
- Research mentors could involve postdocs **more in grant proposal writing** and provide **career path information**.
- Some postdocs (~17%) receive a salary that is **below the NIH minimum** postdoctoral **salary** recommendation.

Acknowledgements

The project has support from the American Chemical Society. The authors would like to thank Dr. Michael Eagle for discussion.

References

- Two-year averages (2018-2017) from the Survey of Graduate Students and Postdoctorates in Science and Engineering
- https://www.training.nih.gov/resources/faqs/postdoc_irp (accessed 6/7/2022)
- <https://www.nationalpostdoc.org/general/custom.asp?page=CoreCompetencies> (accessed 6/7/2022)
- National Research Council. 1969. Invisible University: Postdoctoral Education in the United States. Report of a Study Conducted Under the Auspices of the National Research Council. [Richard B. Curtis, Study Director]. Washington, DC: The National Academies Press.
- Alberts B, Kirschner MW, Tilghman S, Varmus H. 2014. Rescuing US biomedical research from its systemic flaws. PNAS 111:5773-5777.
- Davis G. 2005. Doctors without orders. American Scientist. <http://postdoc.sigmaxi.org/results/>
- Sauermann H, Roach M. 2016. Why pursue the postdoc path? Science 352:663-664.
- National Academy of Sciences. 2014. The Postdoctoral Experience Revisited. Washington, DC: The National Academies Press.
- National Institutes of Health. 2012. Biomedical Research Workforce Working Group Report National Institutes of Health. https://acd.od.nih.gov/documents/reports/bmw_report.pdf.