

Computing Community Consortium's Computing Innovation Fellowship Program

2014 Comparative Evaluation Report

Prepared by
CRA's Center for Evaluating the Research Pipeline

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Table of Contents

| | |
|----|------------------------------------|
| 4 | Acknowledgments |
| 5 | About CERP |
| 6 | Executive Summary |
| 8 | Introduction |
| 9 | Evaluation Method |
| 10 | Evaluation Results |
| 21 | Summary and Conclusion |
| 22 | References |
| 23 | Appendix A: Sample Characteristics |
| 27 | Appendix B: Aggregate Survey Items |

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About CERP



The Computing Research Association's (CRA) Center for Evaluating the Research Pipeline (CERP) evaluates the effectiveness of intervention programs designed to increase retention of students from underrepresented groups in computing, namely men from underrepresented racial/ethnic groups and women of all racial/ethnic backgrounds. More generally, CERP strives to inform the computing community about patterns of entry, experience, progress, and success among individuals involved in academic programs and research careers related to computing.

CERP was created by the Committee on the Status of Women in Computing Research (CRA-W)/Coalition to Diversity Computing (CDC) Alliance and is funded by the National Science Foundation (NSF). Visit CERP online at <http://cra.org/cerp/> or contact cerp@cra.org to learn more.

Executive Summary

The Computing Community Consortium's (CCC) CI Fellows Program was established to provide recent computing PhDs with a valuable postdoctoral (i.e., postdoc) opportunity that would foster long-term success as computing researchers. To provide comparative evaluation of the CI Fellows program, CERP compared the experiences and outcomes of CI Fellows to those who had pursued Non-fellow Postdocs.

Findings suggest that CI Fellows had more positive postdoc experiences and, at the time of the survey, were earning higher salaries compared to Non-fellow Postdocs. Notably, these differences in outcomes emerged even after accounting for baseline differences in merit between the two groups.

In addition to providing comparative evaluation, results also provide insight into the strengths and weaknesses of computing postdoc programs as a whole. Although postdoc programs were rated positively on providing support and preparation for a research career, postdoc programs could be improved upon by providing accommodations for moving expenses and personal and family responsibilities.

“The postdoc was absolutely necessary to prepare me for academia . . . The CI Fellows award from CRA [was] absolutely critical in allowing me to achieve my dream of being a professor and [has] prepared me well for academic research.”

- CI Fellows Participant

Key Findings

Compared to Non-fellow Postdocs, CI Fellows:

- Experienced greater independence during their postdoc
- Were more satisfied with how their postdoc prepared them for balancing work-life responsibilities
- Received higher postdoc salaries that made it easier to live and relocate
- Had higher salaries at the time of the survey

Postdoc programs in general:

- Were rated positively in terms of support, opportunities, and skills preparation
- Could be improved to reduce negative impact of relocating
- Could be more accommodating of personal and family responsibilities

Introduction

This report presents findings from CERP's evaluation of the CCC's CI Fellows Program, which was funded by the NSF and implemented by the CCC to help retain recent PhD graduates in the computing research field during the financial crisis that began in 2008. The program was intended to help recent PhDs develop valuable experience and skills to become effective researchers and achieve long-term success. Awardees were awarded up to two years of financial support but were encouraged to pursue career opportunities that might arise during their fellowship. In addition, awardees were paired with a mentor of their choosing¹ at an institution that differed from their PhD institution. The program was designed to provide fellows with resources above and beyond the typical postdoctoral position, including higher salaries, supplemental funding for research expenses, and autonomy to develop their own research project. For brevity, we refer to postdoctoral position as *postdoc* throughout this report.

The CI Fellows program was implemented in three cohorts: 2009, 2010, and 2011. Eligible applicants must have graduated with a PhD degree in a computing field within one year of applying, proposed work related to computing research, and enlisted at least one mentor who agreed to be an advisor. Applicants submitted a statement of research accomplishments, statement of goals and plans, curriculum vitae, letters of reference, and a proposed list of

mentors. US citizens and permanent residents had preference, but others were considered during application review. Women and individuals from underrepresented racial/ethnic groups in computing (i.e., Black; Hispanic, Latina/o; Native American) were particularly encouraged to apply. Applications were judged based on the merit of their research proposal, mentoring plan, and research track record. The review committee also sought to provide funding for projects from a diverse array of sub disciplines in the field of computing research, and among a diverse array of demographic groups². Across all three cohorts, 852 applicants applied to the CI Fellows program and 127 were awarded (15% acceptance rate).

During the fall of 2013, the CCC requested that CERP provide external, post hoc evaluation of the CI Fellows program. This report presents findings from that evaluation, with the goal to contribute to the development of best practices for postdoc programs in computing research fields.

“The CI Fellowship allowed me to have far more control over my research than a typical postdoc.”

- CI Fellows Participant

“The fellowship was very useful in helping me start my research program in a new direction.”

- CI Fellows Participant

¹ Applicants provided up to three preferred mentors for their fellowship tenure; each fellow was assigned one of the three listed mentors by the application review committee.

² For more information on diversity selection criteria, visit <http://www.cra.org/ccc/leadership/cifellows-project/diversity>.

Evaluation Method

Procedure

Applicants who applied to the CI Fellows Program in 2009, 2010, or 2011 were recruited during the fall of 2013 to complete a survey designed to assess prior postdoc experiences, as well as current career status.

Survey Respondents

Of the 816 individuals who were contacted, 296 (36%) completed the survey. Respondents included 77 CI Fellows (individuals who had participated in or were currently participating in the CI Fellows program) and 146 Non-fellow Postdocs (individuals who had never been a CI Fellow, but had completed or were currently completing a postdoc)³. The distribution of the two groups for each cohort is displayed in Figure 4 of Appendix A.

Demographic characteristics, including gender, U.S. citizenship status, race/ethnicity, marital status, disability status, and age are also displayed in Appendix A, Figures 5-10. The two groups did not statistically differ across any of the demographic characteristics.

Analytic Strategy

To provide comparative evaluation of the CI Fellows program, the experiences and outcomes of CI Fellows were compared against those of Non-fellow Postdocs. Because both comparison groups derived from the pool of CI

Fellow applicants, CI Fellows and Non-fellow Postdocs are arguably equivalent in motivation level (i.e., motivation to apply for professional opportunities and external funding). This sampling strategy reduces the possibility that any positive outcomes among CI Fellows are due simply to CI Fellow's higher motivation level.

It is important to note that because respondents were selected into the CI Fellows program based on the merit of their application, any group differences in outcomes may be explained by group differences in merit. To help rule out this potential explanation for prospective group differences, a propensity score matching method was used. Propensity score matching is an analytic technique that “matches” individuals from a treatment group (e.g., CI Fellows) to individuals from a comparison group (e.g., Non-fellow Postdocs) who are as comparable as possible on relevant constructs (Shadish, Cook, & Campbell, 2002; Bai, in press).

In this report, a sample was constructed wherein each CI Fellow was “matched” with a Non-fellow Postdoc who had the most similar application score possible. Because the CI Fellows group contained some individuals with much higher application scores than Non-fellow Postdocs, not all CI Fellows were matched with a comparable Non-fellow Postdoc. As a result, the constructed, matched sample on which analyses were conducted was a subset of the original, full sample of CI Fellows and Non-fellow Postdocs.

³ Seventy-three individuals who had never participated in a postdoc (i.e., Non-postdocs) also completed the survey; however, these individuals were excluded from analyses because the small sample size of the group did not allow for propensity score matching methods (see Analytic Strategy for details on propensity score matching methods).

Evaluation Results

Two sets of results are presented below. The first set of results concerns **prior postdoc experiences**, which focuses on responses only from individuals who had completed at least one postdoc. The second set of results concerns **current career progression**, which focuses on responses from individuals who had completed, as well as individuals who were currently completing, a postdoc.

Prior Postdoc Experiences

This section focuses on responses of those who had completed at least one postdoc. For those who had completed more than one postdoc, respondents reported on their most recent postdoc experience⁴. A sample of 56 matched pairs (see Analytic Strategy) was used to examine outcomes for which merit may have played a causal role (e.g., number of journal publications). Of note, some aspects of the postdoc experience would not have been influenced by merit, such as postdoc salary and benefits, which tend to be set by factors external to the postdoc scholar. An unmatched sample (consisting of 66 CI Fellows and 124 Non-fellow Postdocs) was used to examine variables unrelated to merit. The analyses that follow are divided into two subsections identifying whether results are based on a matched or unmatched sample.

Analyses Using the Matched Sample

Management of Professional and Personal Responsibilities. Respondents indicated how well they felt they had managed aspects of their professional responsibilities (e.g., lab responsibilities) and their personal life (e.g., relationships with family) during their most recent postdoc experience (individual survey items can be found in Appendix B). As shown in Table 1, there were no significant differences between CI Fellows and Non-fellow Postdocs. Both groups reported feeling like they managed their professional and personal responsibilities well during their postdoc, as indicated by means significantly above the midpoint of the scale, $ps < .001$.

Table 1. Management of professional and personal responsibilities.

| <i>During your postdoc, how poorly or well did you feel like you managed the following?</i> <i>(1) Very poorly (2) Poorly (3) Neither poorly nor well</i> <i>(4) Well (5) Very well</i> | CI Fellows | Non-fellow Postdocs |
|---|------------|---------------------|
| Professional responsibilities (5 items) | 4.15 | 4.06 |
| Personal responsibilities (3 items) | 3.83 | 3.68 |

Note. Values indicate mean score across respondents for each comparison group.

⁴ Note that data from four of the Non-fellow Postdocs in the matched sample and seven of the Non-fellow Postdocs in the unmatched sample derived from past CI Fellows whose most recent experience had been a Non-fellow Postdoc.

Satisfaction with Postdoc Experience. Respondents indicated their satisfaction with aspects of their postdoc experience, including opportunities and resources provided by their postdoc, skills preparation, and preparation for balancing work-life responsibilities (individual items are reported in Appendix B). Both groups indicated overall satisfaction with the opportunities and skills preparation provided by their postdoc experience, as indicated by means significantly above the midpoint of the scales, $ps < .001$ (see Table 2). However, CI Fellows indicated greater satisfaction with how well their postdoc prepared them for balancing work-life responsibilities compared to Non-fellow Postdocs.

Table 2. Satisfaction with postdoc experience.

| <i>How dissatisfied or satisfied are you with the following aspects of your postdoc?</i> | | |
|---|------------|---------------------|
| <i>(1) Very dissatisfied (2) Dissatisfied (3) Neither dissatisfied nor satisfied (4) Satisfied (5) Very satisfied</i> | CI Fellows | Non-fellow Postdocs |
| Opportunities and resources provided during postdoc (5 items) | 4.18 | 4.07 |
| Skills preparation (9 items) | 3.90 | 3.70 |
| Preparation for balancing work-life responsibilities (2 items) | 3.73 | 3.30* |

Note. Values indicate mean score across respondents for each comparison group. * $p < .05$.

Ratings of Postdoc Advisor. Respondents indicated the extent to which their postdoc advisor inspired them to mentor others, engaged in positive behaviors (e.g., my postdoc advisor was respectful), and engaged in negative behaviors (e.g., my postdoc advisor micromanaged my work; see Appendix B for individual items). As shown in Table 3, both groups indicated that their advisor inspired them to mentor others and engaged in positive behaviors, at least “somewhat”. Further, both groups indicated that their advisor engaged in negative behaviors to a very low degree. There were no differences between the two groups.

Table 3. Ratings of postdoc advisor.

| <i>To what extent did your advisor...</i> | | |
|--|------------|---------------------|
| <i>(1) Not at all (2) A little (3) Somewhat (4) Mostly (5) Totally</i> | CI Fellows | Non-fellow Postdocs |
| Inspire you to mentor others | 3.27 | 3.35 |
| Engage in positive behaviors (7 items) | 3.30 | 3.32 |
| Engage in negative behaviors (2 items) | 1.39 | 1.65 |

Note. Values indicate mean score across respondents for each comparison group.

Independence during Postdoc. As shown in the top row of Table 4, all past postdocs indicated that they had achieved at least some level of independence during their tenure (e.g., choosing their research topic; see Appendix B for individual items). However, CI Fellows reported obtaining greater independence than Non-fellow Postdocs.

Supportiveness of Department. Respondents rated the degree to which they found their department to be supportive using four items (e.g., I felt encouraged; see Appendix B for individual items). All past postdocs tended to view their department as at least “somewhat” supportive (see bottom row of Table 4).

Table 4. Independence during postdoc and supportiveness of department.

| (1) Not at all (2) A little (3) Somewhat (4) Mostly (5) Totally | CI Fellows | Non-fellow Postdocs |
|--|-------------------|----------------------------|
| Independence during postdoc (7 items) | 4.19 | 3.78* |
| Supportiveness of department (4 items) | 3.79 | 3.90 |

Note. Values indicate mean score across respondents for each comparison group. * $p < .05$.

Professional Experiences during Postdoc. Table 5 shows the percentage of CI Fellows and Non-fellow Postdocs who had various professional experiences during their postdoc. Non-fellow Postdocs were just as likely as CI Fellows to have submitted a grant proposal, published a journal article or conference paper, mentored students, and collaborated with researchers outside their program.

Table 5. Professional experiences during postdoc.

| Did you experience any of the following during your postdoc? | CI Fellows | Non-fellow Postdocs |
|---|-------------------|----------------------------|
| Submitted grant proposal as PI/Co-PI | 34% | 29% |
| Author on a journal publication | 64% | 70% |
| Author on a refereed conference paper | 88% | 77% |
| Author on a non-refereed conference paper | 13% | 23% |
| Mentored undergraduate or graduate students | 68% | 59% |
| Collaborated with researchers outside of program | 89% | 88% |

Note. Respondents could select more than one option. Values represent percentage within each group.

Career Interest Immediately Following Postdoc. Respondents indicated the type of position they were most interested in after their postdoc. As shown in Table 6, CI Fellows and Non-fellow Postdocs reported similar interests.

Table 6. Career interest immediately following postdoc.

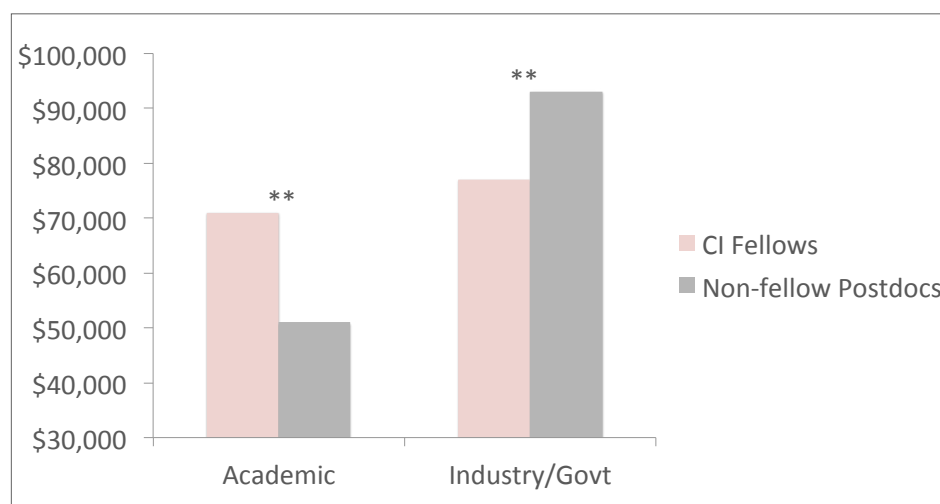
| <i>Which type of position were you most interested in after you finished your postdoc?</i> | CI Fellows | Non-fellow Postdocs |
|--|------------|---------------------|
| Another postdoc | 0% | 5% |
| Academia, tenure-track faculty | 71% | 55% |
| Academia, non-tenure track faculty | 7% | 5% |
| Government research | 2% | 2% |
| Industry research | 20% | 25% |
| Non-research industry | 0% | 4% |
| Other | 0% | 4% |

Note. Respondents could select only one option. Values represent percentage within each group.

Analyses Using the Unmatched Sample

Postdoc Salary. Respondents reported their pre-tax postdoc salary on a 9-point scale ranging from (1) Less than \$29,999 to (9) More than \$100,000, with \$10,000 increments. CI Fellows reported significantly higher salaries (average level between \$70,000 and \$90,000) compared to Non-fellow Postdocs (average level between \$50,000 and \$70,000), $p < .05$. However, when taking into account the postdoc setting, CI Fellows reported higher salaries than Non-fellow Postdocs for academic research postdocs, but lower salaries than Non-fellow Postdocs for industry research postdocs (see Figure 1).

Figure 1. Postdoc salary.

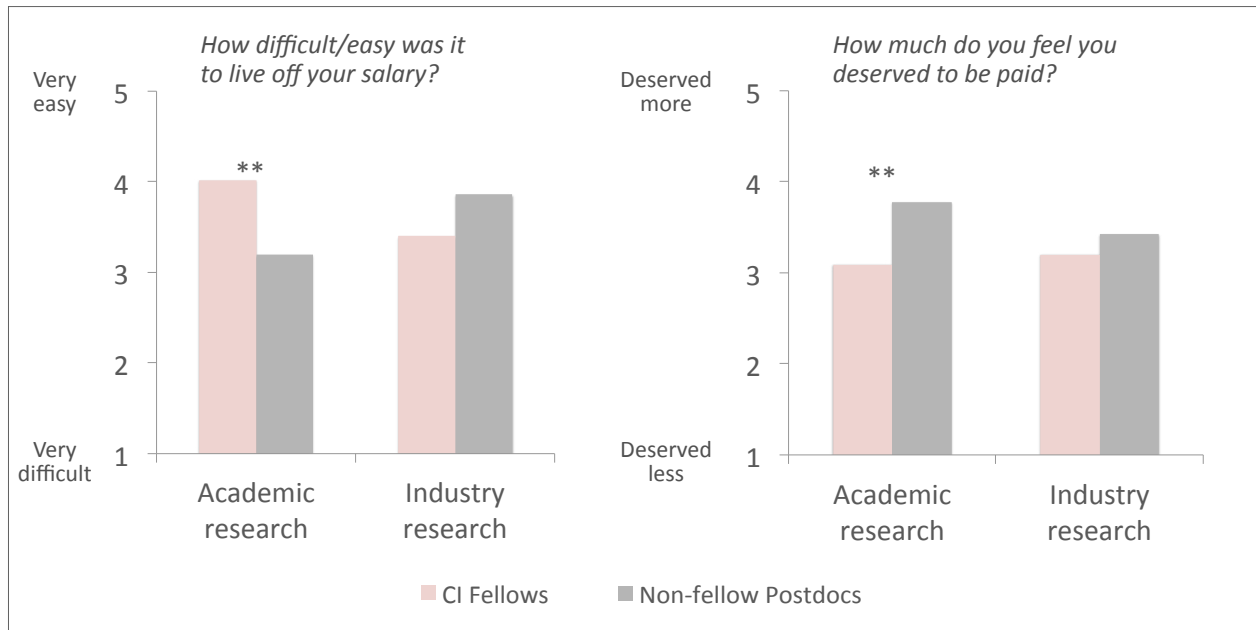


Note. ** $p < .01$.

Additional findings reflect the higher average salary of CI Fellows versus Non-fellow Postdocs in academic settings:

- 100% of CI Fellows, but only 91% of Non-fellow Postdocs, received summer funding.
- In academic settings, CI Fellows found it easier to live on their postdoc salary than did Non-fellow Postdocs; there was no difference between groups in industry settings (see left panel of Figure 2).
- In academic settings CI Fellows were more satisfied with their pay than Non-fellow Postdocs (see right panel of Figure 2). In particular, whereas CI Fellows felt their pay was adequate for the amount of work expected (mean did not differ from the midpoint), Non-fellow Postdocs felt they deserved more pay (mean significantly above the midpoint, $p < .001$). By contrast, in industry settings, both groups felt they received adequate pay (means did not differ from the midpoint).

Figure 2. Reported adequacy of postdoc salary.



Note. Values indicate mean score across respondents for each comparison group. ** $p < .01$.

Resources Used to Identify Postdoc Advisor. Table 7 displays the various resources respondents used to find their postdoc advisor. CI Fellows were more likely than Non-fellow Postdocs to have used the CI Fellows mentor database and to have searched for faculty members with compatible research interests. CI Fellows and Non-fellow Postdocs were equally likely to use suggestions made by their PhD advisor. However, it was more likely that Non-fellow Postdocs' PhD advisor would actually serve as their postdoc advisor relative to CI Fellows.

Table 7. Resources used to identify postdoc advisor.

| <i>How did you find potential advisors for this postdoc?</i> | CI Fellows | Non-fellow Postdocs |
|---|------------|---------------------|
| I used the CI Fellow mentor database | 30% | 11%** |
| I looked for faculty members whose research interests aligned with my own | 54% | 36%** |
| My PhD advisor made suggestions | 32% | 34% |
| My postdoc advisor was my PhD advisor | 0% | 8%* |

Note. Respondents could select more than one option. Values represent percentage within each group. * $p < .05$ and ** $p < .01$.

Support for Childcare and Family Care. Six CI Fellows (9%) and five Non-fellow Postdocs (4%) reported that they had been the primary caregiver to children during their postdoc, and two CI Fellows (3%) and two Non-fellow Postdocs (2%) reported that they had been the primary caregiver to adult family members during their postdoc. As shown in Table 8, fewer than half of these individuals received various types of caregiver support, including sufficient salary, sufficient time to meet responsibilities, and emotional support from their advisor. These low levels of support may indicate potential avenues for improvement among postdoc programs. The small sample sizes did not allow for statistical tests of differences between CI Fellows and Non-fellow Postdocs.

Table 8. Support for childcare and family care.

| <i>How many of the following types of support did you have for child/family care during your postdoc?</i> | CI Fellows | Non-fellow Postdocs |
|---|------------|---------------------|
| Sufficient salary | 46% | 0% |
| Flexible work schedule | 55% | 50% |
| Sufficient time available to meet responsibilities | 27% | 25% |
| Emotionally supportive advisor | 36% | 25% |

Note. Respondents could select more than one option. Values represent percentage within each group.

Relocation. A majority of CI Fellows (68%) and Non-fellow Postdocs (67%) moved to another geographic location for their postdoc. Table 9 presents the proportion of CI Fellows and Non-fellow Postdocs who experienced negative effects of relocating. Whereas CI fellows were more likely than Non-fellow Postdocs to report that relocating interfered with their family planning, Non-fellow Postdocs were more likely than CI Fellows to report that relocating caused financial burden. Approximately one-third of respondents (both CI Fellows and Non-fellow Postdocs) reported that relocating put stress on their romantic relationships.

Table 9. Negative effects of relocation.

| <i>Did your relocation result in any of the following?</i> | CI Fellows | Non-fellow Postdocs |
|--|------------|---------------------|
| Interfered with family planning | 27% | 13%* |
| Caused financial burden | 16% | 40%* |
| Put stress on romantic relationship | 31% | 38% |

Note. Respondents could select more than one option. Values represent percentage within each group.

* $p < .05$.

Current Career Progression

This section focuses on the current career progression of survey respondents who had completed or were currently completing a postdoc. All analyses in this section are based on a sample of matched pairs⁵ (N = 60 CI Fellows and 60 Non-fellow Postdocs; see Analytic Strategy).

Leadership Roles. Table 10 shows the percentage of respondents who had experience with various professional leadership roles. CI Fellows and Non-fellow Postdocs did not differ in their leadership experiences.

Table 10. Leadership roles.

| <i>Please indicate whether you are currently holding, have held, or received one of the following.</i> | CI Fellows | Non-fellow Postdocs |
|--|------------|---------------------|
| Early career award (e.g., NSF CAREER; PECASE) | 0% | 5% |
| A faculty fellowship (e.g., Google; Microsoft) | 5% | 5% |
| Conference program committee member (beyond reviewing) | 55% | 45% |
| Conference program committee chair | 10% | 8% |
| Conference general chair | 7% | 2% |
| Editorial Board of a computing journal | 8% | 8% |
| Proposal reviewer for NSF or other agency | 33% | 33% |
| Other leadership or administrative role in the computing community | 8% | 7% |

Note. Respondents could select more than one option. Values represent percentage within each group.

“Having the CRA CI Fellowship gave me financial independence, which allowed me to work on my own projects, and seek out collaborations outside of the specific lab that I was in.”

- CI Fellows Participant

⁵ Recall that whereas the prior analyses focusing on past postdoc experiences only included individuals who had completed at least one postdoc, this section of analyses also includes individuals who were currently a postdoc, and had not yet completed a postdoc at the time of the survey. The inclusion of current postdocs increased the sample size during propensity score matching for this section, allowing for 60 matched pairs, as opposed to 56 matched pairs in the prior section that omitted current postdocs.

Grant Proposal Experience during the Past 24 Months. Table 11 displays the percentage of respondents who submitted or received funding for one or more proposals over the past 24 months. CI Fellows and Non-fellow Postdocs did not differ in their likelihood to submit or receive funding for grant proposals.

Table 11. Grant proposal experience during the past 24 months.

| | CI Fellows | Non-fellow Postdocs |
|---|------------|---------------------|
| Submitted one or more proposals | | |
| Submitted Federal Grants as PI/Co-PI | 60% | 47% |
| Submitted Industry Grants as PI/Co-PI | 27% | 13% |
| Submitted Other Grants as PI/Co-PI | 15% | 18% |
| Received funding for one or more proposals | | |
| Funded Federal Grants as PI/Co-PI | 30% | 17% |
| Funded Industry Grants as PI/Co-PI | 12% | 8% |
| Funded Other Grants as PI/Co-PI | 8% | 15% |

Note. Respondents could select more than one option. Values represent percentage within each group.

Outreach and Service. Table 12 displays the percentage of respondents who participated in outreach and service activities during the past 24 months. CI Fellows and Non-fellow Postdocs did not differ in outreach participation, but they did differ in service participation: CI Fellows were more likely than Non-fellow Postdocs to have participated in departmental service during the past 24 months.

Table 12. Outreach and service.

| Over the past 24 months, have you been involved with any of the following activities? | CI Fellows | Non-fellow Postdocs |
|--|------------|---------------------|
| Formal outreach programs to K-12 students | 27% | 15% |
| Formal outreach programs to students in higher education | 12% | 7% |
| Formal outreach programs to broaden gender and minority diversity in the field | 17% | 13% |
| Departmental Service | 45% | 25%* |
| Organizer or a conference(s) or workshop(s) | 38% | 28% |

Note. Respondents could select more than one option. Values represent percentage within each group.

* $p < .05$.

Current Position. Respondents who were currently employed reported on various aspects of their position, including the field, setting, and if applicable, tenure-track status. Note that only those who indicated they were currently employed in a non-postdoc position were included in these analyses; current postdocs were excluded from the percentages.

Field. Approximately 90% of respondents who were employed held positions in the field of computing; there were no group differences.

Career Setting. Table 13 presents the percentage of employed respondents who currently held positions in various settings. Most respondents (approximately two-thirds) held positions in academia. There were no group differences across settings.

Table 13. Career setting.

| <i>What is your employment setting?</i> | CI Fellows | Non-fellow Postdocs |
|---|------------|---------------------|
| Academia | 64% | 62% |
| Industry Research | 28% | 19% |
| Industry Non-Research | 8% | 11% |
| Government Research | 0% | 6% |
| Other | 0% | 2% |

Note. Respondents could select only one option. Values represent percentage within each group.

Tenure-track Status. Table 14 shows the tenure-track status of those who currently held positions in academia; status did not differ between CI Fellows and Non-fellow Postdocs. Notably, over 80% of academic positions were tenure-track.

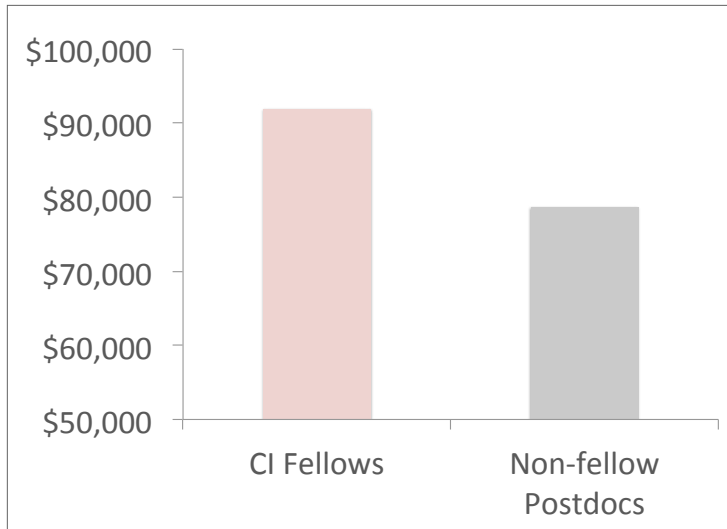
Table 14. Tenure-track status

| <i>Are you tenure-track faculty?</i> | CI Fellows | Non-fellow Postdocs |
|--------------------------------------|------------|---------------------|
| Tenure-track | 83% | 80% |
| Non-tenure track teaching | 6% | 12% |
| Non-tenure track research | 8% | 8% |
| Non-faculty member | 3% | 0% |

Note. Respondents could select only one option. Values represent percentage within each group; only respondents who hold positions in academia were included in the calculation.

Current Annual Salary. Respondents reported their current pre-tax salary on a 9-point scale ranging from (1) Less than \$29,999 to (9) More than \$100,000, with \$10,000 increments. As shown in Figure 3, CI Fellows reported higher salaries compared to Non-fellow Postdocs, $p < .01$ ⁶.

Figure 3. Current annual salary.



Note. Significant difference between groups, $p < .01$.

⁶ Small sample sizes did not allow for analyses of salary differences within particular settings (e.g., academic settings, industry settings).

Summary and Conclusion

Results suggest that postdoc experiences were more positive for CI Fellows than Non-fellow Postdocs. In particular, CI Fellows experienced greater independence, were more satisfied with how their postdoc prepared them for balancing work-life responsibilities, and received higher salaries that made it easier to live and relocate, compared to Non-fellow Postdocs. CI Fellows also fared better in terms of professional outcomes: CI Fellows currently earn higher salaries in the workforce compared to Non-fellow Postdocs. Notably, these differences emerged even after matching CI Fellows and Non-fellow Postdocs on application scores, reducing the likelihood that results are due to group differences in merit. In sum, results suggest that the CI Fellows program fares just as well, if not better, than other computing postdoc programs in preparing individuals for successful computing research careers.

Importantly, results shed light on the experiences of computing postdoc positions in general, including both positive aspects as well as ways in which programs could improve. Regarding positive aspects, respondents overall reported feeling supported by their departments during their postdoc, felt satisfied with the opportunities

“The CI Fellowship was a tremendous support for me. It gave me a chance to work with the best people in my field and get experience needed for an independent career.”

- CI Fellows Participant

and preparation provided by their postdoc, and rated their postdoc advisors positively. However, postdoc programs also have room for improvement, as many respondents indicated that relocating for their postdoc put a burden on their personal finances and relationships. In addition, postdocs who were primary caregivers reported a lack of support or accommodation for their caregiving responsibilities. Thus, postdoc programs could be improved upon by providing moving expenses and being more accommodating of personal responsibilities.

““The research funds from the CI Fellows award let me decide how to pursue my research, what workshops/conferences I needed to attend, and to purchase supplies that I thought I needed. This independence was invaluable.”

- CI Fellows Participant

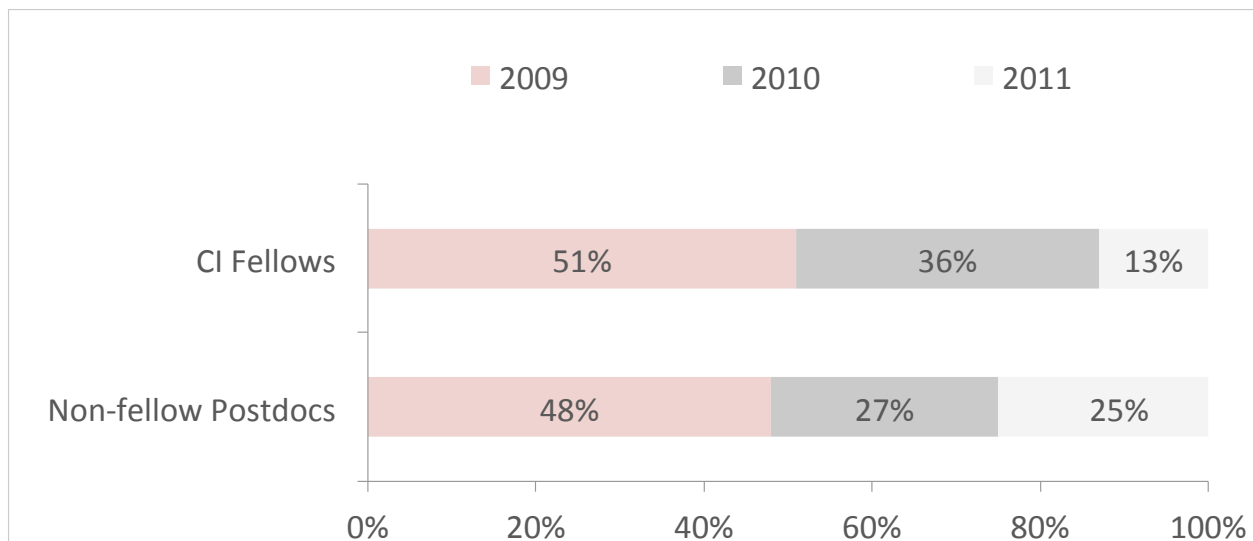
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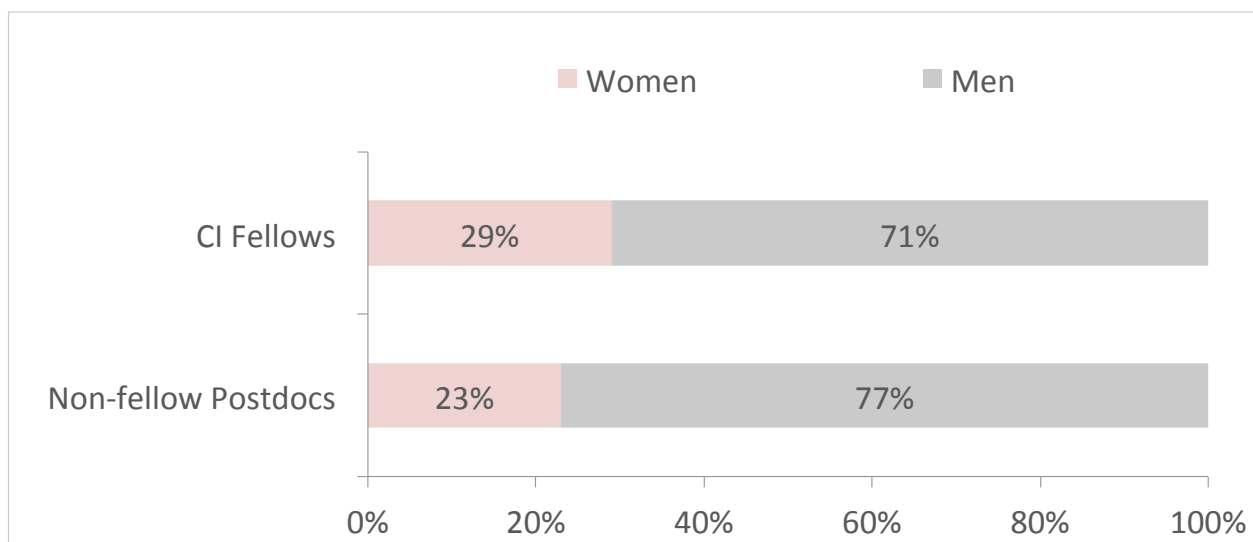
Appendix A: Sample Characteristics

Figure 4. Year respondents applied to the CI Fellows program.



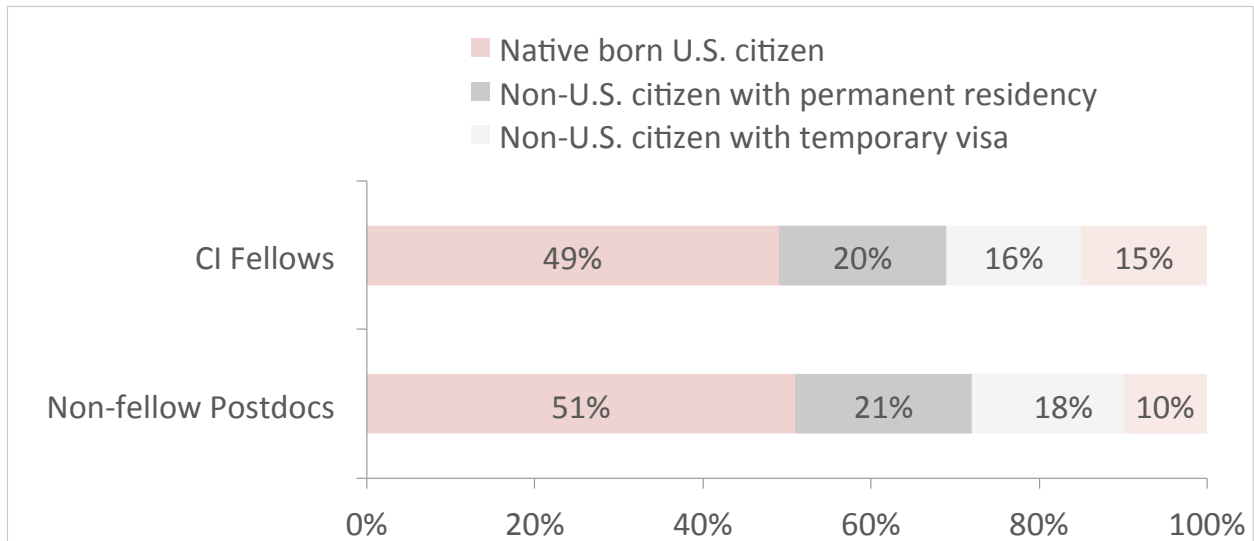
Note. CI Fellows and Non-fellow Postdocs were equally likely to be from the 2009 and 2010 cohorts. However, CI Fellows were less likely than Non-fellow Postdocs to be from the 2011 cohort, $p < .05$.

Figure 5. Gender of respondents.



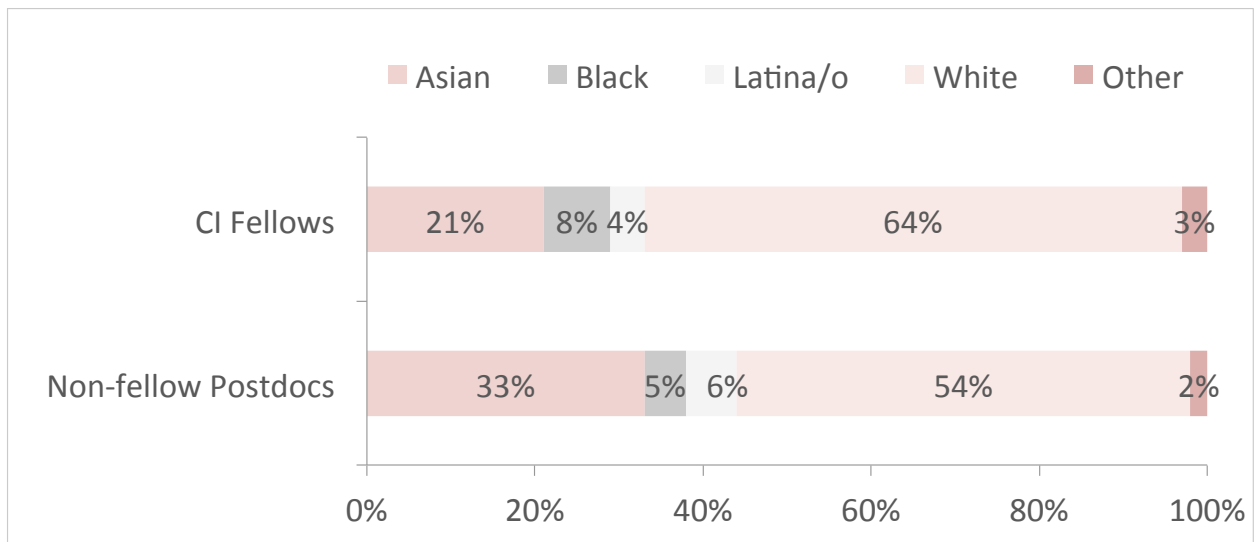
Note. Groups did not significantly differ.

Figure 6. Citizenship status of respondents.



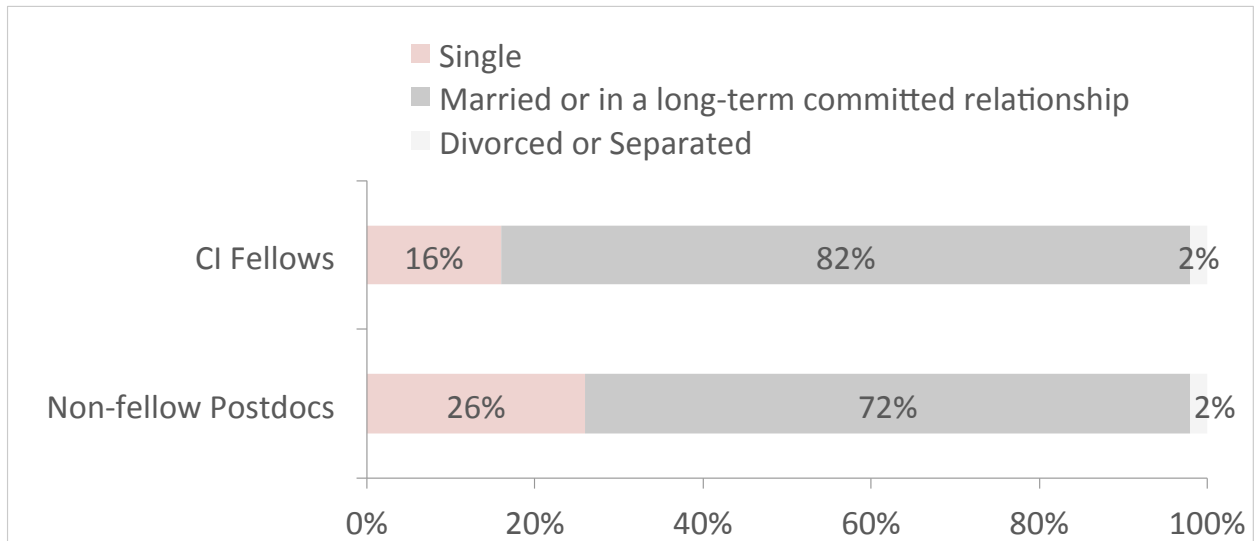
Note. Groups did not significantly differ.

Figure 7. Race/ethnicity of respondents.



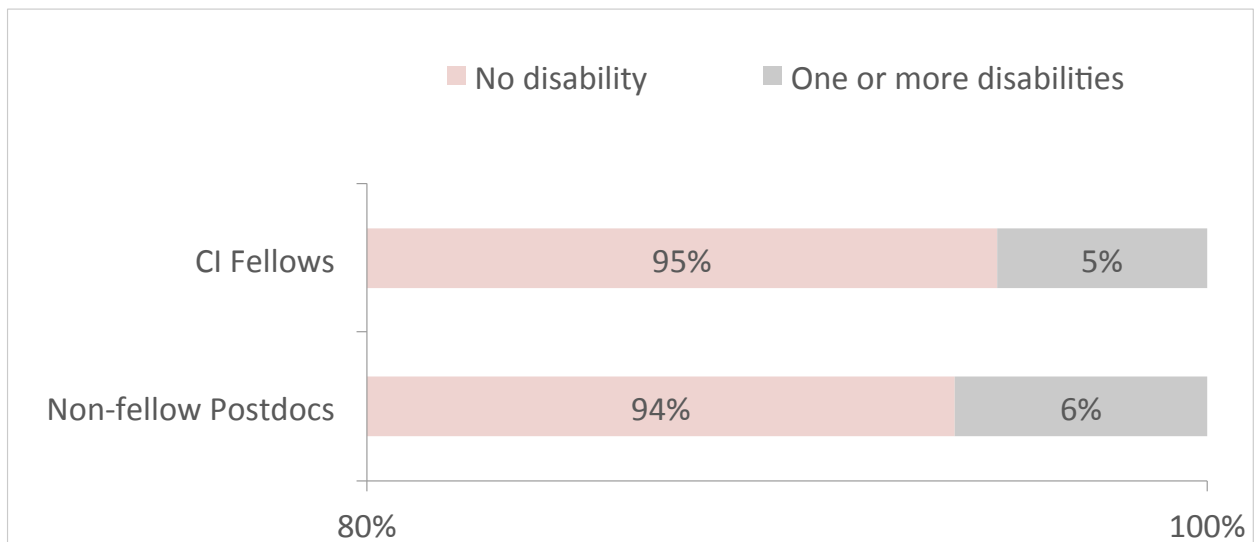
Note. Groups did not significantly differ.

Figure 8. Marital status of respondents.



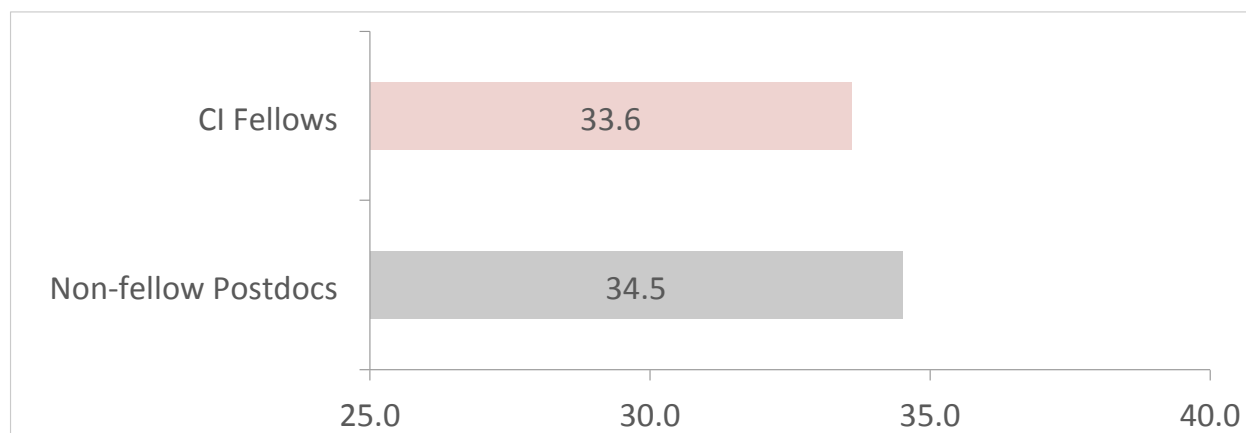
Note. Groups did not significantly differ.

Figure 9. Disability status of respondents.



Note. Groups did not significantly differ.

Figure 10. Average age of respondents.



Note. Groups did not significantly differ.

Appendix B:

Aggregate Survey Items

We determined reliability for multi-item constructs using Cronbach's alpha (α). Alpha levels $\geq .70$ are considered acceptable. Items for each construct were averaged together to form composite scores. Individual items are listed below.

Management of Professional and Personal Responsibilities

We assessed survey respondents' feelings of how poorly or well they managed professional responsibilities (5 items) and personal responsibilities (3 items) during their postdoc. Individual items are listed below.

During your postdoc, how poorly or well did you feel like you managed the following?

(1) *Very poorly* (2) *Poorly* (3) *Neither poorly nor well* (4) *Well* (5) *Very well*

Management of professional responsibilities ($\alpha = .89$)

- Lab responsibilities
- Research responsibilities
- Career development
- Relationship with your advisor
- Relationships with co-workers or colleagues

Management of personal responsibilities ($\alpha = .85$)

- Activities outside of work
- Relationships with friends
- Relationships with family

Satisfaction with Postdoc Experience

We assessed respondents' satisfaction with their postdoc experience across three constructs: opportunities and resources provided during postdoc (5 items), skills preparation (9 items), and preparation for balancing work-life responsibilities (2 items). Items for each construct were averaged together to form composite scores. Individual items are listed below.

How dissatisfied or satisfied are you with the extent to which your postdoc prepared you in the following areas?

- (1) *Very dissatisfied* (2) *Dissatisfied* (3) *Neither dissatisfied nor satisfied*
(4) *Satisfied* (5) *Very Satisfied*

Opportunities and resources provided during postdoc ($\alpha = .76$)

- Your research topic
- Opportunities to work with undergraduates
- Opportunities to present at conferences
- Opportunities to network
- Office space

Skills preparation ($\alpha = .93$)

- Specific technical knowledge
- Time management skills
- Research skills and experience
- Starting up a research program
- Developing research collaborations
- Maintaining collaborations
- Networking
- Job search strategies
- Negotiating job offers

Preparation for balancing work-life responsibilities ($\alpha = .92$)

- Balancing work and family responsibilities
- Balancing work life and social life

Ratings of Postdoc Advisor

We assessed respondents' ratings of their postdoc advisor across three constructs: the extent to which their advisor inspired them to mentor others (1 item), positive behaviors (7 items), and negative behaviors (2 items). Items for each multi-item construct were averaged together to form composite scores. Individual items are listed below.

Rate the degree to which your advisor did the following during this postdoc.

(1) Not at all (2) A little (3) Somewhat (4) Mostly (5) Totally

Inspired you to mentor others (single item)

- During this postdoc, to what extent did your advisor inspire you to mentor others?

Engaged in positive behaviors ($\alpha = .84$)

- Was respectful
- Helped guide your research
- Took note of your strengths
- Helped you work on your weaknesses
- Promoted your work within the research community
- Informed you about career options outside of academia
- Encouraged you to teach

Engaged in negative behaviors ($\alpha = .59$)

- Micromanaged your work
- Asked you to do administrative work unrelated to your postdoc research

Independence during Postdoc

We assessed respondents' perception of independence during their postdoc with seven items. We averaged across items to form a composite score ($\alpha = .92$). Individual items are listed below.

How much control did you have with the following aspects of your postdoc?

(1) No control (2) A little control (3) Some control (4) Mostly in control (5) Total control

- Choosing your mentor
- Choosing your research topic
- Choosing your research methodologies
- Choosing your teaching topics
- Choosing what you wanted to present at conferences
- Deciding on authorship when publishing
- Deciding where to submit manuscripts for review

Supportiveness of Department

We assessed respondents' sense of supportiveness of their department during their postdoc with four items. We averaged across items to form a composite score ($\alpha = .87$). Individual items are listed below.

Think about the social environment in the department where you completed this postdoc. To what extent did you feel...

(1) Not at all (2) A little (3) Somewhat (4) Mostly (5) Totally

- Welcomed
- Supported
- Encouraged
- Alienated (Reverse coded)