

Postdocs are doing it for themselves: peer mentorship and why it matters

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Abstract: Postdoctoral training offers an opportunity to further develop as a researcher, leader, and educator and is often required to be considered competitive in one's career path. This means that quality mentorship plays an enormous role in one's individual success, yet academic scientist who take on postdocs also experience pressures to teach, receive grants, publish, and produce novel research, leaving postdocs without effective mentorship. Thus, we developed a peer mentorship program for postdocs, designed to provide newer postdocs with guidance and support outside of their research space, and offer more senior postdocs an opportunity to explore and develop their mentorship skills. We matched 48 mentees to 36 mentors based on mentorship goals, mentorship areas of expertise, and language spoken to best facilitate a successful mentorship relationship. Demographic information from the application showed 68% of mentees, compared to 39% of mentors, used she/her/hers pronouns. Additionally, in a follow-up survey, we learned that 35% of mentees felt like they benefitted more than their mentor from the relationship. These outcomes echo cultural stereotypes from the United States in terms of perceptions of women's competency to lead (i.e., mentor), as well as misunderstanding about how good mentorship benefits all involved parties. Further, these outcomes indicate that such stereotypes are prevalent within the university setting, and that institutions as a whole need to invest in cultural shifts and policies that promote mentorship and diversity.

Keywords: Mentorship, postdoctoral training, career planning, professional development

Introduction

In the United States, scientific training centers on the Doctorate of Philosophy (PhD), often followed by additional postdoctoral training (postdoc).¹ A postdoc offers an opportunity to further develop as a researcher, leader, and educator in a selective field and for many, is required to be considered competitive for future positions.² The National Science Foundation estimates that there are 66,000 postdocs in the United States and over half (55%) hold temporary visas.¹ Over recent decades, the international postdoc population has steadily increased, making substantial contributions to scientific discovery and necessitating increased mentorship efforts that reflect an institution's commitment its diverse pool of postdocs.³

Mentorship is essential for the development and progression of science and promotes individual success.⁴ While most scientists receive mentoring well into their careers, successful mentorship requires clear expectations around each person's role.² However, many academic scientists face pressures to teach, receive grants, and publish and produce new research, which limit time to support trainees. For postdocs, the opportunity to advance their science may be thwarted without sufficient support from senior mentors. This is especially true for postdocs with underrepresented identities, including international and female scholars, because these groups consistently receive less funding and

fewer acknowledgements for their contributions to their fields.^{5,6}

In the present implementation project, we set out to develop a program to support postdoctoral trainees and work towards identifying solutions to retain postdocs in academia and science, particularly those with underrepresented identities. We identified peer mentorship as a promising, evidence-based strategy^{3,4} that could improve academic performance.⁵ Peer mentorship formalizes a relationship between individuals at the same career stage, however one may have additional experience that can provide support for the other. Peer mentorship has been demonstrated to increase confidence, retention, and academic achievement (e.g., published papers, higher promotion in academic rank).^{3,4} A formalized peer mentorship relationship benefits all participants but may be especially beneficial for underrepresented groups, including women.⁶ To retain the best and brightest, peer mentoring offers a promising strategy to support early career researchers.⁷

Methods

We developed and implemented the Postdoc Peer Mentorship Program (PPMP) across our University's two primary campuses, inviting all postdocs (n = 802) to apply as mentors or mentees in the program. Two postdoc coordinators led the program, working with University staff to disseminate information about the program. This non-experimental study outlines the program we developed and demonstrates its feasibility, acceptability, and potential for sustainability. Additionally, we offer a free, downloadable toolkit that includes guides for initiating a peer-mentorship program at your institution (bit.ly/PPMPtools).

The PPMP was designed to be a self-sustaining mentorship program that offers postdocs an opportunity to develop their mentorship skills while fostering community. The program was developed and piloted in 2021 to directly address the needs and concerns by postdoctoral

trainees. Per its design, each year PPMP-coordinators send out a call to all postdocs, inviting them to apply as either a mentor or mentee, depending on years of experience at the University. Once applications close, the coordinators match mentors and mentees with one another.

For this inaugural matching, mentors and mentees were paired based on mentorship goals, mentorship areas of expertise (see Table 1 for a summary of application questions), and language spoken.^{7,8} Coordinators considered the needs of each pair to facilitate greatest benefit for both participants. Additionally, as more mentees than mentors applied, mentors were asked about willingness to take on multiple mentees and were matched according to their response. No mentors had more than two mentees.

Once paired, the coordinators facilitated connection via email and provided a copy of the PPMP manual which included guidance for how to begin the relationship (e.g., discussion questions, local activities). A brief, virtual welcome meeting brought all mentors and mentees together, and then monthly emails were sent out to PPMP participants, offering resources, additional leadership trainings, and local events to possibly attend with one another.

A five-month follow-up survey was sent to all PPMP participants (Table 1). This survey was designed to provide the coordinators with feedback half way through the mentored experience and was not mandatory. As our goal was to simply elicit feedback, all follow-up surveys were anonymous and could not be linked to the participant's application.

Finally, the program's design allows individuals to move from mentee to mentor to coordinator. Each year's coordinators recruit the following year's coordinators from the pool of mentors and mentees. Thus, the program has the potential to continue each year while fulfilling its

purpose of helping postdocs develop mentorship and leadership skills.

Table 1. Summary of application and follow-up survey questions

Application Questions	Follow-up Questions
Name and contact information	What pronouns do you use?
How did you hear about the Postdoc Peer Mentorship Program?	Do you speak any other languages other than English? If so, which languages?
Which campus is your PRIMARY campus?	Have your mentorship meetings been in-person, virtual, or both?
Ethnic/Racial identity?	On average, how many times per month do you meet?
Were you a non-traditional student? (e.g. came back for degree after a professional career)	What have you discussed in your mentorship meetings?
Do you identify as LGBTQIA+?	Do you feel your relationship is beneficial?
What pronouns do you use?	I am overall satisfied with the PPMP*
Do you speak any other languages other than English? If so, which languages?	I feel supported by the coordinators*
Please list the top 2 factors that are important to you for your mentorship experience.	I feel a sense of community with others PPMP participants*
Current area of research (1-3 sentence description)	I would recommend participating in the PPMP to other postdocs*
Do you commit to regularly communicating with your mentor at least 1x per month? (Yes/No)	I have access to mentorship resources and trainings*
Briefly describe your interest in this program and what you hope to give and receive from participating?	I will maintain a relationship with my mentor/mentee after the program ends*
Anything specific you are seeking from this experience?	What suggestions do you have to improve the PPMP?

Summaries of the application and follow-up survey are provided above. Complete forms can be found in the toolkit (bit.ly/PPMPtools)

*possible responses were “Disagree,” “Slightly Disagree,” “Neutral,” “Slightly Agree,” and “Agree”

Results

Program Participants

For our PPMP program, we used a 2-year threshold such that postdocs with <2 years of experience at the University could apply as mentees, and postdocs with >2 years of experience could apply as mentors. A total of 84 postdocs indicated interest and enrolled in the program. From the applicants, we matched 48 mentees to 36 mentors, resulting in a 4:3

mentee to mentor ratio. This ratio mirrors our general postdoc population based on the 2-year threshold, suggesting a uniform desire for enhanced mentorship opportunities across our postdoc population.

Interestingly, 81% (39/48) of mentees and 70% (25/36) of mentors spoke a language other than English. While we did not collect data on citizenship, this indicates a high level of career development engagement in multilingual

postdocs, seeking additional opportunities outside the lab. Language and communication barriers between a principal investigator (PI) and postdoc, limited opportunities to speak their non-English language, and/or a lack of a sense of belonging and community in the lab space likely contribute to the increased interest in the PPMP from multilingual postdocs.

Of additional interest is that, in those who provided their pronouns, 68% (26/38) of mentees and 39% (12/31) of mentors use she/her/hers pronouns (Table 2), showing a distinct difference in mentorship roles that echo gender biases and stereotypes prevalent in U.S. culture.

Table 2. Demographics of PPMP participants

Demographics	Mentors (n = 36)	Mentees (n = 48)
Pronouns		
<i>he/him</i>	19	10
<i>she/her</i>	12	25
<i>undisclosed</i>	5	13
Language Other than English		
<i>Yes</i>	25	37
<i>No</i>	11	11
LGBTQIA+ Identified		
<i>Yes</i>	3	2
<i>No</i>	32	41
<i>Prefer Not To Say</i>	1	5
Ethnic/Racial Identity		
<i>Asian</i>	17	22
<i>Black, African American</i>	0	2
<i>Hispanic</i>	1	4
<i>Middle Eastern</i>	0	3
<i>White</i>	15	13
<i>undisclosed</i>	3	4

Follow-up Survey

We asked PPMP participants who they felt was benefitting from the mentorship relationship. Across the board of respondents (mentees = 18, mentors = 9), 100% (n = 9) of mentors indicated that both mentor and mentee benefitted. By contrast, 35% (n = 6) of mentees indicated that mostly the mentee benefitted. The discrepancy in the perceived benefits highlights that mentors acknowledge the reciprocal relationship inherent to peer mentorship that mentees may miss.

Despite this difference in mentorship perceptions, the follow-up survey indicated a broad array of topics being discussed between mentors and mentees. When asked what the pairs discuss, participants indicated topics on career development and goals (n = 23), lab work and experiments (n = 18), personal challenges (n = 13), and family (n = 7). It is not surprising that career development and lab work are the most common discussion topics as the postdocs are peers of one another, making such topics easy points of connection. What we are happy to

observe is that mentors and mentees reported discussing personal challenges and family, indicating at least the start of more personal connections within the pairing after only five months.

The follow-up survey also asked participants about their agreement with different statements about the program (Figure 1), and for both mentors and mentees, the sense of community was low, especially when compared to all other questions. PPMP participants wanted more opportunities to get together with one another, whether with other mentors, with mentees, or with PPMP participants in general.

Discussion

We set out to implement a peer mentorship program that would provide opportunities for postdocs to learn about and practice mentorship skills. Over a tenth of the postdoctoral population at the University participated in the program, and after just five months, they felt like they received benefit from the peer mentor relationship.

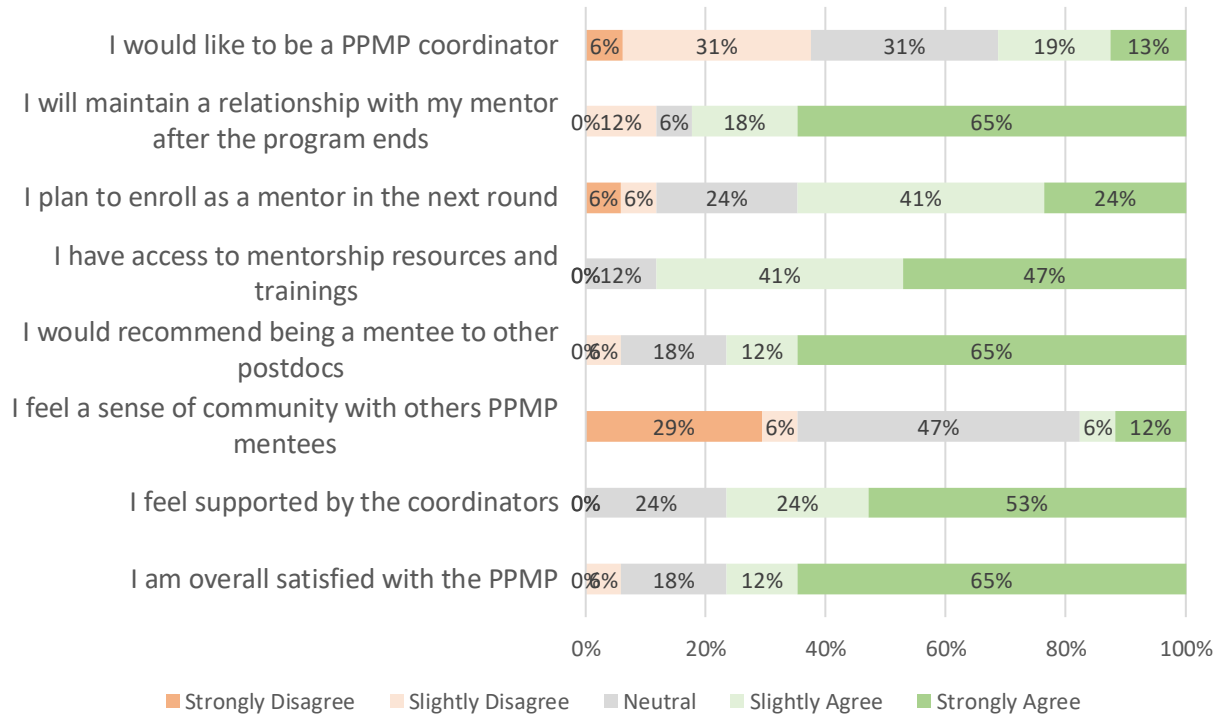
Mentorship Perceptions

Results from the follow-up survey indicated a discrepancy in the perceived benefits between mentors and mentees, suggesting that mentees feel they benefit more than the mentors. While mentors have experience to help support mentees, mentors also gain significant benefit in terms of their own development as leaders, teachers, and mentors. Couple these outcomes with the PPMP's gender breakdown and it further highlights the need for institutions to make a cultural shift around mentorship and its benefits for everyone in the community.

Mentees should never feel like they are a burden to their mentors, and our PPMP continues to provide a space for peer mentorship and dialogue to help minimize or remove these barriers.

From our pool of participants, from those who provided pronouns, 68% (26/38) of mentees and 39% (12/31) of mentors use she/her/hers pronouns (Table 2). These numbers directly reflect gender biases that pervade U.S. culture, such as women being less likely to self-promote beside men of equal ability and women perceiving themselves as having less leadership ability than men.^{9,10} Indeed, even though the popular stat of men apply for jobs when they meet 60% of the qualifications, while women apply only if they meet 100% of the qualification has been debunked, that bias still impacts our institutions and systems.¹¹ We know that gender does not predict quantitative performance, and it is important to recognize how biases learnt from the cultures in which we live consistently influence perceptions of one's self and others. For example, there is no causative association between gender and behavior that would support statements like "Women cannot lead because they are weak," and yet in the United States, culturally males are associated with characteristics such as "mighty" or "strong," whereas females are associated with "gentle" or "weak,"¹² which can lead to males being promoted to leadership positions more readily than females.¹³ Thus, academic institutions need to invest in culture change, normalizing formal mentorship (both peer and otherwise) for everyone at every level. Such a culture shift will reduce the gender gap in research, empowering women to not only recognize their worth as mentors, but to also make institutions

A.



B.

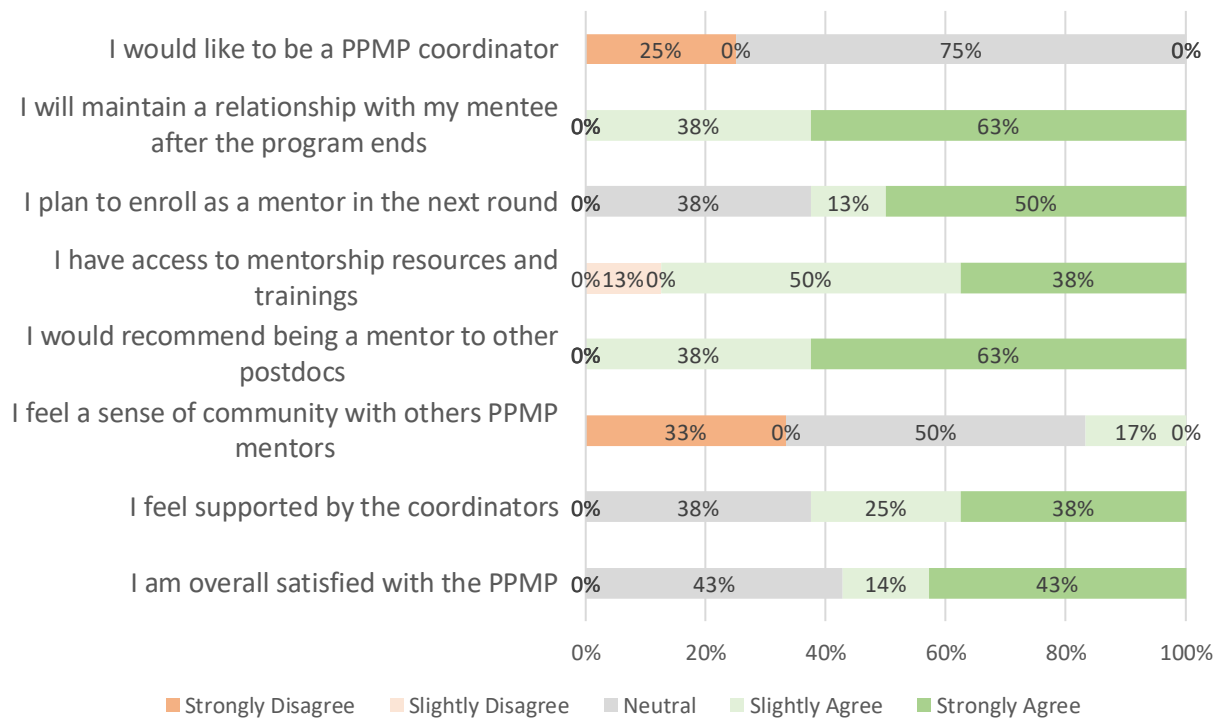


Figure 1. Follow-up Assessment. Show are the responses from the follow-up survey's Likert-scale on the program's strengths, with possible responses of "Disagree," "Slightly Disagree," "Neutral," "Slightly Agree," and "Agree." Percentage of responses are provided in the bars. A) Mentee responses; B) Mentor responses.

recognize women's contributions to the research ecosystem. Everyone should feel comfortable with asking for and offering help.

The Cycle Continues

One of the main goals of the PPMP is to ensure continuity through its self-sustaining capacity, thriving off the continuous movement of postdoctoral talent moving through research programs. Thus, a priority for the coordinators of this pilot PPMP program was not only to promote the mentorship benefits of the program but also the leadership and program management opportunities that the PPMP offers. The PPMP was initially developed in 2020 and launched in 2021 during a global pandemic, adding additional challenges to early implementation because of the virtual nature of all interactions during this time. Indeed, one theme that emerged from the follow-up survey was feedback on community development (Figure 1). PPMP participant responses showed a high interest in additional opportunities to get together with other PPMP participants. The coordinators heard this feedback loud and clear, realizing that participants were connecting in their pairs at a deeper level and wanted to enhance those connections through additional group events.

To address this request, a small, in-person, outdoor event was coordinated to safely bring participants together while maintaining COVID-19 precautions. This outdoor event offered an opportunity for participants to connect with and to recruit two interested PPMP participants as coordinators for the next cycle. An additional two participants emailed their interest in being a coordinator after the in-person event. This recruitment success, especially considering that interest in being a PPMP coordinator had low agreement (Figure 1), demonstrated the continued interest in a PPMP, highlighted a

desire for leadership opportunities for postdocs, and ensured the program's continuance. The high interest in this program also underscores the importance of person-to-person connection for mentorship and the self-sustaining pillar of our program. Successful mentorship grows from a solid, positive, interpersonal connection between mentor and mentee. Thus, the program's success does as well, as shown by the coordinator-recruitment success after a single in-person interaction.

Conclusions

We started this program to meet a need of the postdoc community: improved mentorship and mentorship training. We chose to design a program that would leverage one's peers and be self-sustaining. Our PPMP has received undeniable engagement from our postdoc community as well as support from our University, highlighting its feasibility and acceptability in spades. Further, the incoming PPMP coordinators have already been selected and begun to organize for the next cycle of applications, incorporating additional community building structures into the program to promote its longevity.

Our toolkit with materials, tools, and resources used to develop the program is freely available at bit.ly/PPMPtools. This includes a manual with guidance for mentors and mentees, as well as program expectations. Additionally, templates for the applications and guidance for the coordinators can be found in the toolkit. We encourage anyone committed to the success of their peers to explore the materials and develop a program that works for their community.

The events of 2020 pushed institutions to invest in diversity, equity, and inclusion. Initiatives have largely focused on racial diversity, and while hiring more people of color is an absolutely

necessary step, diversity does not start nor stop there. Initiatives to increase diversity must also include culture, sexual orientation, gender, ability, language, etc. Further, institutions must create inclusive spaces for their diverse workforce. If you look at your institution, what initiatives exist to ensure a PI mentors their postdocs? What policies exist to help prevent PI-bias (conscious or unconscious) from impacting the postdoc and their career?

At many universities, any PI with the adequate funding can hire a postdoc. Thus, a postdoc may join a lab where the PI has zero experience supporting trainees with a different background. Since international postdocs make up over 50% of our postdoc population, the probability of an already vulnerable individual entering into a potentially uncomfortable, if not outright toxic, environment is high. Further, while the universities have resources for international postdocs, these resources are limited and rarely support integration and adaptation to a new culture. Programs like our PPMP can help with ensuring that postdocs have a community, offering an opportunity to receive support from someone outside of the lab.

Today's postdocs will make up the next generation of Neil deGras Tysons, Alice Ballses, Ben Barreses, and Stephen Hawkingses, but only if they have the opportunity to thrive. Establishing the future of scientific development requires cultural shifts at our institutions and policies that celebrate mentorship and diversity. Cultivating programs like our peer mentorship program is a simple, free step toward such cultural shifts and policies.

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