Early Career Representative
Engagement Task Force

Final Report and Recommendations

FASEB
Federation of American Societies
for Experimental Biology

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Executive Summary

In 2022, the Federation of American Societies for Experimental Biology (FASEB) convened the Early Career Representative Engagement Task Force, charged with identifying

- needs of early-career scientists that can be addressed by scientific societies and
- ways to keep early-career scientist members and representatives on volunteer bodies as active, engaged members throughout their career.

Through Task Force deliberation, an online survey of hundreds of early-career scientists, virtual focus group sessions, and consultation of existing data rich resources, clear themes were identified where scientific and professional societies can make a positive impact. Overall, there is a perception among early-career scientists that societies can act as important spaces to find community and support.

The Task Force has developed the following best practices for scientific and professional societies to implement in order to support early-career scientists and encourage active membership contributing to the mission of the society throughout their career. A subset of recommendations is directed specifically to FASEB.

Theme 1: Networks and Mentors

- Recommendation 1.1: Connect scientists beyond local geography and home institution or organization to expand networks and mentors of early-career scientist members.

Theme 2: Career Exploration and Career Transition Readiness

- Recommendation 2.1: Actively combat negative stereotypes associated with pursuing careers other than academic tenure track research positions through programming and awards.
- Recommendation 2.2: Support members preparing for career transition, especially current PhD students and academic postdocs.

Theme 3: Safe and Inclusive Environments

- Recommendation 3.1: Create programming and awards to promote inclusivity of environments in the scientific ecosystem.
- Recommendation 3.2: Strive to diversify leadership, committees, task forces, and similar bodies, as well as staff. Be transparent about the diversity of leadership and track changes over time.
- Recommendation 3.3: Create and support affinity-based interest groups to combat isolation.
- Recommendation 3.4: If not already in place, establish a harassment policy. Additionally, for all events, enforce a code of conduct.

Theme 4: Support for International Scientists in the U.S.

- Recommendation 4.1: Despite not being able to change the complexities of the visa process, target programming and awards to support international scientists.

Societies may be successful in supporting early-career scientists' development and increased engagement in the society mission in a variety of ways. However, the Task Force resoundingly concluded that early-career scientist representation in society governance is a key catalyst to ensuring needs of early-career scientists are reflected in society programming, awards, and overall vision.

Theme 5: Society Structure and Governance

- Recommendation 5.1: Have at least one designated early-career representative on the highest body of governance with voting rights, codified in bylaws.
- Recommendation 5.2: Thoughtfully examine limitations placed on certain membership categories and consider revision to promote active participation from all members.
- Recommendation 5.3: Maintain an early-career membership category with reduced dues.
- Recommendation 5.4: Retain membership for individuals in a variety of career pathways, not only in research.
- Recommendation 5.5: Utilize inclusive language in membership category nomenclature as to not diminish other member categories.

Conclusion

Ample opportunity exists for societies to engage early-career scientists through programming and awards, aimed to elevate scientists on a national scale and provide opportunities for career growth. Volunteer service for individual projects may result in a larger leadership role over time. Accounting for needs of early-career scientists can help keep early-career scientists involved in the mission of the society as lifelong champions.

Introduction

The Federation of American Societies for Experimental Biology (FASEB) has a long-standing commitment to promoting training and career opportunities for early-career scientists—master's students, PhD students, postdoctoral scholars (postdocs), and independent scholars in a variety of careers. In 2020, the FASEB Board of Directors approved up to three positions each on the Board of Directors and FASEB's Science Policy Committee specifically for early-career individuals. These positions were deemed early-career representatives (ECRs). Having ECRs on FASEB's Board of Directors and Science Policy Committee ensures that opinions and insights from early-career scientists are represented and fosters dialogue between current and future leaders in the biological and biomedical sciences.

FASEB's ECR program has been ongoing and well-received. Yet still, the Board of Directors recognized that ECR positions alone likely do not fully engage early-career scientists in scientific societies. Therefore, the Board directed FASEB to launch an effort to investigate ways to better support early-career scientists and keep early-career representatives as active members of their societies. In December 2021, FASEB's Board of Directors approved the Early Career Representative Engagement Task Force ("Task Force") to address this directive.

Task Force Charge, Objectives, and Timeline

FASEB's Board of Directors charged the Task Force with identifying needs of early-career researchers that can be addressed by scientific societies and, additionally, identify opportunities to maintain ECRs' involvement in their scientific societies. The Task Force had three main objectives: understand interactions with scientific societies; understand career growth needs of early-career representatives; and develop recommended actions for FASEB and scientific societies at large.

To best achieve the objectives, the Task Force was composed of a Chair, Vice Chair, member of FASEB's Board of Directors, member of FASEB's Science Policy Committee, a current FASEB ECR, five ECRs or early-career scientists from different FASEB Member Societies, executive officers and/or staff from FASEB Member Societies, and a representative from the National Postdoctoral Association (NPA). For further details, see Task Force Members.

The first Task Force meeting was in March 2022, and the members quickly developed an online survey to assess needs of early-career researchers. The survey was deployed from late April through late May. Survey results and Task Force member discussion informed broad recommendation areas presented to the Board of Directors in June, which largely received positive feedback. These recommendation areas resulted in the themes presented in this report.

To delve deeper into survey topics, the Task Force also held focus groups in September 2022. Comprised of early-career scientists at different career stages, institutions, primary scientific society affiliations, and with a broad range of identities, these sessions provided additional insights to how early-career scientists engage with scientific societies, and what gaps they perceive in support that societies may be able to address.

Survey data, focus group feedback, and Task Force member input were all bolstered by existing data to help create well-informed recommendations. Additional resources utilized include surveys and reports from the National Science Foundation (NSF) such as the Survey of Earned Doctorates (SED), Survey of Doctorate Recipients (SDR), Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS), Science & Engineering Indicators, and the Women, Minorities, and Persons with Disabilities report; consensus studies from the National Academies of Sciences, Engineering, and Medicine (NASEM); and other publications in scholarly sources and by reputable organizations.

From June through November final recommendations were developed, with pertinent input and lively discussion from Task Force members. FASEB's Board of Directors received the report with Task Force approved recommendations in December 2022.

FASEB's Definition of Early Career

At FASEB, the definition of "early career," consistent for ECR positions and the Early-career Investigator Excellence in Science Award, is within seven years from the first independent position. Historically, this definition was influenced by the National Institutes of Health (NIH) Next Generation Researchers Initiative Working Group, which was charged with updating the definition of early-stage investigator at NIH. During Working Group deliberations, two approaches were highlighted: 1) status based on years since terminal degree or end of clinical training, or 2) status based on first independent position. FASEB adopted the latter, as it more easily accounted for various types of extended training periods that particularly impact clinician scientists in training, while NIH eventually adopted the former. The Task Force was not charged with updating FASEB's early-career definition.

A strong network helps early-career scientists develop deep disciplinary knowledge within their field and can help broaden perspectives on other disciplines and employment paths, which may serve them well in future careers. There has been a particular emphasis on the importance of networks, mentors, and sponsors in the biomedical sciences over the past decade or so, exemplified by NIH's National Research Mentoring Network, and NASEM's reports on Graduate STEM Education for the 21st Century and the Science of Effective Mentorship in STEMM.

The Task Force's findings continue to emphasize the importance of making connections between scientists. When asked what society offerings participants take advantage of, survey respondents noted networking opportunities the second most frequently, and mentoring opportunities came in sixth (see Figure 1).

FIGURE 1: What offerings from scientific/professional societies do you take advantage of?

Offering	Number of Survey Participants
Scientific webinars, short courses, and/or hand-on trainings	214
Networking opporunties	211
Professional development webinars and/or short courses	205
Access to journals and related publications	205
Subscribe to newsletter, blog, or similar	153
Mentoring opportunities	153
Service on committees, task forces, councils, Board or similar	141
Participate in organized outreach activities	100
Write content for newsletter, blog, or similar	95
Job services (job board, resume workshop, chalk talk prep, or similar; please specify)	88
Participate in organized advocacy actitivies	71
Not listed (please specify)	1

Figure 1. Data from Task Force survey. Participants were asked to indicate what society offerings they take advantage of and were allowed to make multiple selections. N=517.

"One-on-one interactions at conferences. Often from an explicit "career networking" awkward mixer where the goal is simply to make people sit at a random table and ask mentoring related questions. It's awkward and forced, but it does actually work." —Postdoc in Academia

"I would've liked the opportunity to have taken part in a mentoring program where I was specifically paired up with someone in a field that I was interested in exploring or interested in transitioning into." —Postdoc in Government

Qualitatively, in free text response options, survey participants frequently cited either already taking advantage of or wishing there were more opportunities for structured networking and mentoring events and programming.

The Task Force had concerns that some early-career scientists may have a limited network, therefore potentially impeding career opportunities. Results from the survey indicate that a vast majority, 88.9 percent, of participants do have a network or mentor beyond their past and current institution(s) and/or organization(s) *(see Figure 2)*.

FIGURE 2

■ Yes, I have a network beyond my current and prior organizations

■ No, my mentors and network are limited to my current and prior organizations

Figure 2. Data for Task Force survey. Participants were asked, "Do you seek or have you sought professional advice and/or mentorship from people outside of your current and prior institutions/organizations?" N=459.

When asked to reflect upon how these connections outside of the local geography were made, respondents noted meeting other people at conferences was key. Additionally, speed mentoring and networking sessions and paired mentee/mentor matches through a society program were stated to be beneficial. Increased normalization of virtual meetings, through platforms like Zoom, was also noted. While many expressed that in-person interactions offer unique opportunities for networking and identifying mentors, the ability to easily continue to foster these relationships via Zoom between in-person meetings, usually at the annual conference, was praised.

Networking and mentoring opportunities appeared to be particularly important for master's students, PhD students or candidates, and postdocs across all sectors—academia, industry, and government *(see Figure 3)*. While other early-career scientists who had completed training did note the importance of these activities, networking and mentoring appear to hold more weight for those more junior in their career path.

FIGURE 3

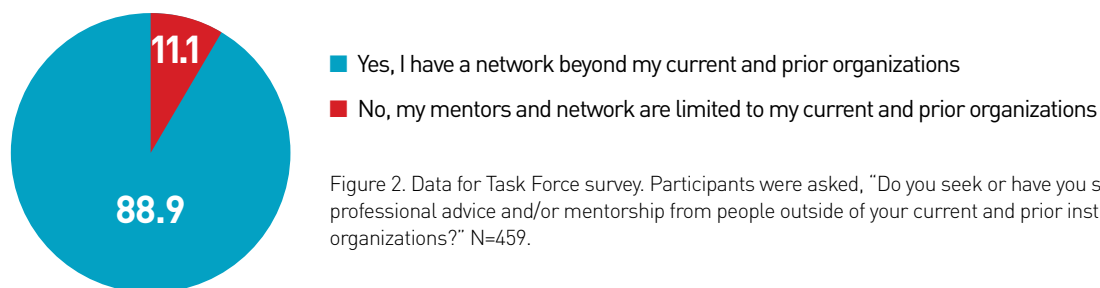■ Mentoring opportunities ■ Networking opportunities

Percentage of Participants Utiliizing the Society Offering
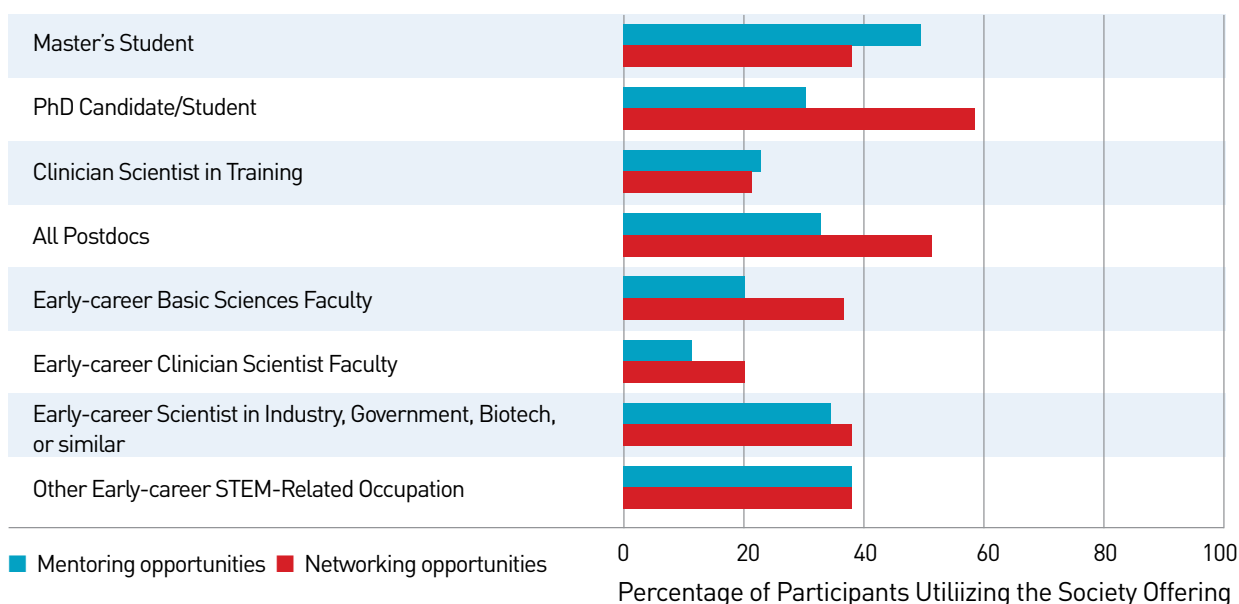
Figure 3. Data from Task Force Survey. Participants were asked what society offerings they take advantage of; this figure shows those who answered utilizing the networking and mentoring opportunities offered by their society split by career stage. Participants were allowed to select more than one response option. Master's N=63; PhD N=76; Clinician Scientist in Training N=49; All Postdocs N=134; Early-career Basic Sciences Faculty N=71; Early-career Clinician Science Faculty N=53; Early-career Scientist in Industry, Government, Biotech, or similar N=41; Other Early-career STEM-Related Occupation N=19.

Recommendation 1.1: Connect scientists beyond local geography and home institution or organization to expand networks and mentors of early-career scientist members.

Societies are well suited to enhance networks of their early-career scientist members. There are many ways to go about this, including some low-cost options. For example, societies may be able to add an option for members to identify themselves as open to being contacted for networking or informational interviews via a flag or badge on their member profile. Societies may also consider partnering with affinity-based organizations—such as Women in Bio, Out in STEM, Society for the Advancement of Chicanos/Hispanics, and Native Americans in Science, and similar—to expand networks beyond the scientific area of the society.

Structured Programming. A clear value add based on survey free response feedback and focus group participant discussion is structured mentoring and networking sessions, held either in person or virtually. It is imperative that societies do not ignore the power dynamics engrained into academic ranks, leaving some early-career scientists feeling uneasy about approaching established scientists. With the society prompting these interactions in a more formal setting, the trainees may feel more empowered to identify mentors and expand their network beyond the research advisor.

What society activities have been helpful to you as an early-career scientist?

"Mainly just an in to start interacting with other members of my field of study. Starting out, seeing so many established and well-known individuals, it can be intimidating, and you often feel like an outsider since you haven't achieved some level of "notoriety" yet. Having an official space to introduce yourself is nice." —PhD Student/Candidate

"[Society's] trainee forum and trainee/mentor luncheon helped me meet other trainees in my field as well as established researchers early in my career. It helped me start building my professional network." —Postdoc in Academia

"I really like the random paired one-on-one mentoring services. It's a great way to make a contact with someone at a different university who you might not ever meet through your PI. And they have the ability to connect you to people in their network. Those connections have helped me a lot." —Postdoc in Academia

"Networking events help me to meet people in an organized fashion, which is sometimes intimidating without structured time for it." —Early-career Scientist in STEM-Related Occupation

"Networking opportunities through formal means of connecting with a mid-career/senior faculty in my research area." —Early-career Basic Sciences Faculty

Although it's easy to assume power dynamics are most prevalent for those still in training, the disparities exist for independent scientists early in their careers as well. This can be particularly true for assistant professors who will, to some degree, rely on recommendations from more established scientists in their field when being evaluated for promotion and tenure. Additionally, even for those in independent positions outside of academia, networking is vital for continued success and opening doors for next career steps. When designing networking and/or mentoring programs and activities, consider carving space out for early-career independent scientists, who also appreciate structured opportunities, in addition to trainees.

Job shadowing can also be tremendously valuable for growing ones' network, without requiring the full-time commitment of a traditional internship. International scholars may be able to participate in job shadowing more easily than on-the-job learning experiences. Societies coordinating job shadowing may be difficult, as these are activities tied to local geography of the members. However, societies with region specific subgroups may be able to support volunteer region leaders creating a job shadowing matching program, and job shadowing might be able to be organized in concert with the annual meeting.

Theme 2:
Career Exploration and Career Transition Readiness

Task Force members have personal experience, and a broad sense, that many academic trainees are relatively unaware of career pathways available to them. Identifying a career route one is passionate about when the only primary path typically modeled is academic sciences can be reasonably challenging. Furthermore, once the chosen career path is known, successfully transitioning into that career can be difficult. The Task Force was interested in delving deeper into the topics of career exploration and career transition readiness, and how societies may be able to better support their early-career members in these endeavors.

In the online survey, participants were asked to rank their top five biggest professional development needs. While all options received some number one rankings and held value to survey participants, early-stage career preparation stands out. Early-stage career preparation—such as career exploration, help with building a CV or résumé, conducting informational interviews, shaping your online professional identity via website or LinkedIn or similar—was ranked the most important the most frequently by all respondents (*see Figure 4*).

FIGURE 4: Most Important Professional Development Need
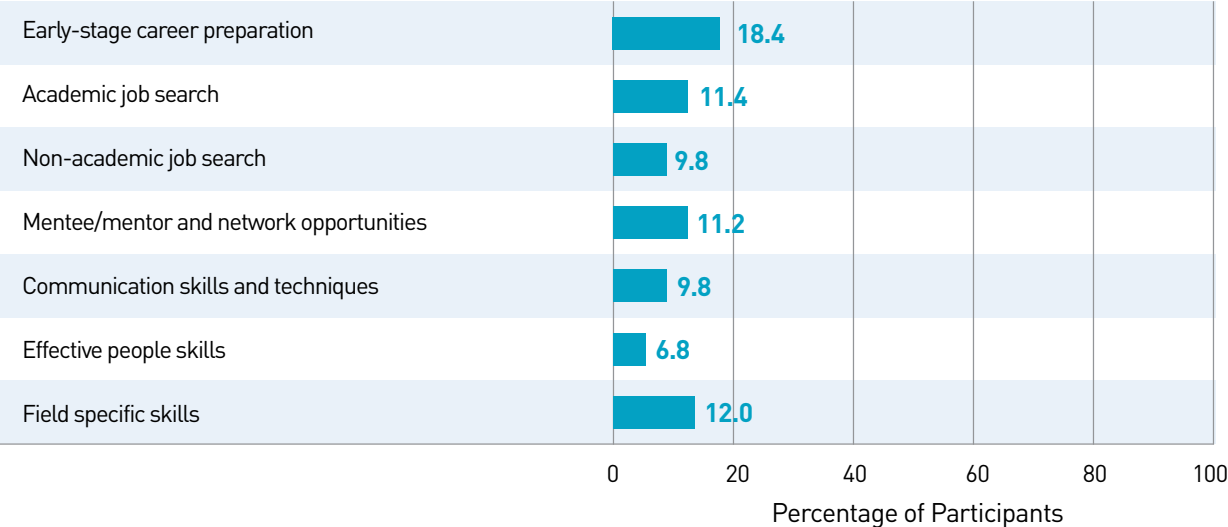
Figure 4. Data from Task Force Survey. Participants were asked to rank up to five of their biggest professional development needs. Chart shows percentage of participants who ranked the category listed on the left as the most important. "Not listed" category not shown. N=457 for overall ranking question and percentage shown based off this sample size; N=373 for participants that chose a number one rank (i.e., not all participants that ranked items chose a number one ranking).

When disaggregating data by career stage, perhaps unsurprisingly those earlier in their careers tended to rank early-stage career preparation as the most important more frequently than those already in independent positions. Master's students, clinician scientists in training, and academic postdocs all ranked early-stage career preparation as their most important professional development need more frequently than the overall sample *(see Figure 5)*.

FIGURE 5: Early-Stage Career Preparation Ranked Most Important Professional Development Need
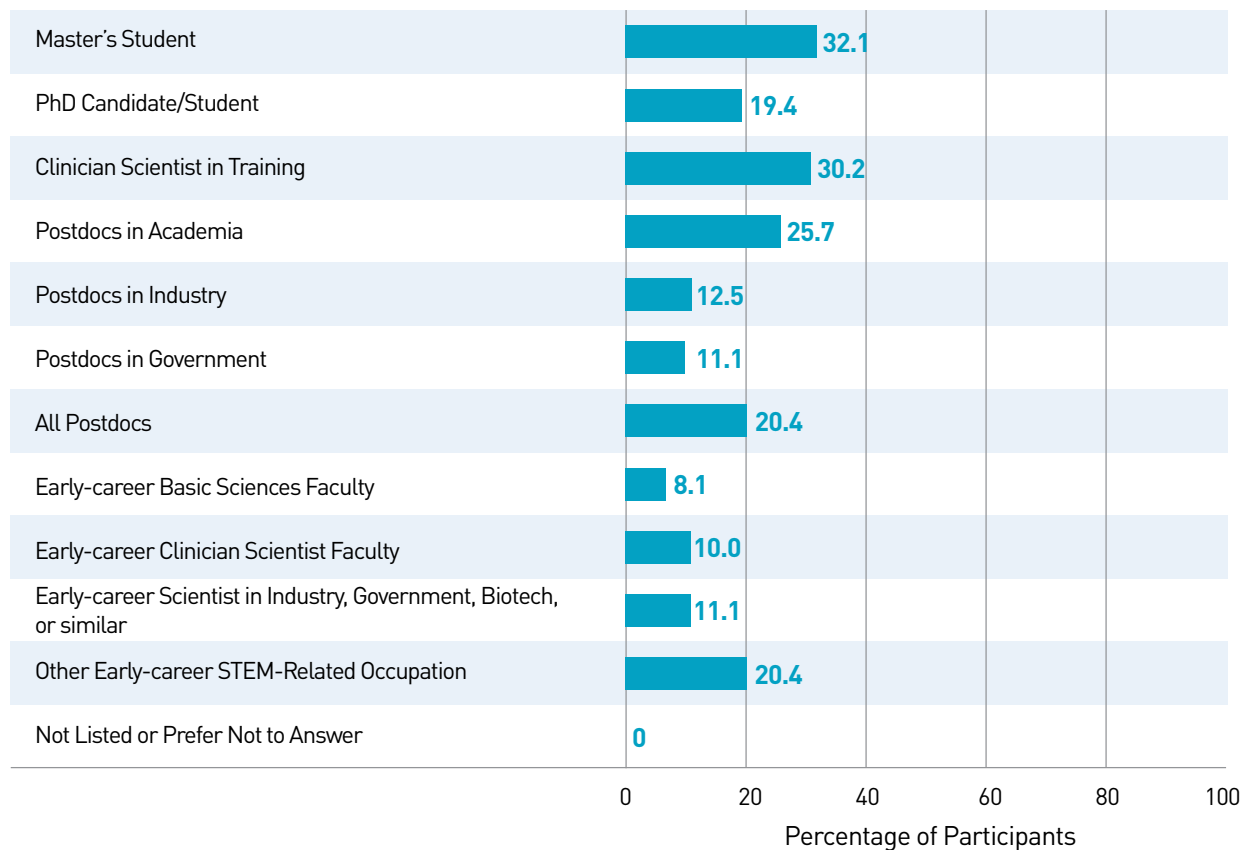
Figure 5. Data from Task Force survey. Percentage of participants who ranked early-stage career preparation as their most important career development need, disaggregated by respondent career stage. Master's Student N=56; PhD Candidate/Student N=72; Clinician-Scientist in Training N=43; Postdocs in Academia N=70; Postdocs in Industry N=16; Postdocs in Government N=27; Early-career Basic Sciences Faculty N=62; Early-career Clinician Scientist Faculty N=50; Early-career Scientist in Industry, Government, Biotech or similar N=18.

Appreciable differences by demographics also exist in addition to variation by career stage. Largely, respondents with a historically excluded background ranked early-stage career preparation most important more frequently compared to those who hold majority identity *(see Figures 6-13)*. Women notably were no different from men, but those who identified as genderqueer, agender, non-binary, or similar had a distinct need for career preparation assistance. Additionally, those who identified as non-white racially all desired help with career preparation more than their white counterparts. Similarly, respondents who identified as Hispanic, caregivers, disabled, having a disadvantaged socioeconomic background, temporary or permanent U.S. residents, and part of the LGBTQIA+ community all had increased need for career exploration professional development compared to their peers who hold the more typical majority identity.

FIGURES 6-13: Early-Stage Career Preparation Ranked Most Important Professional Development Need

Legend: ■ Minority identity　▨ Not minority per NIH but trends with minority in survey data　■ Majority identity

FIGURE 6

	Percentage of Participants
Genderqueer, non-binary, agendar, and similar	47.5
Woman	15.0
Man	15.0
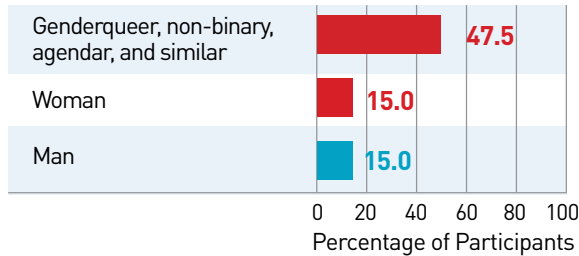
Figure 6. Genderqueer and similar N=40; Woman N=180; Man N=214. Data for not listed not shown.

FIGURE 7

	Percentage of Participants
American Indian or Alaska Native	26.7
Asian	28.2
Black or African American	19.1
Native Hawaiian or Other Pacific Islander	30.3
White	12.4
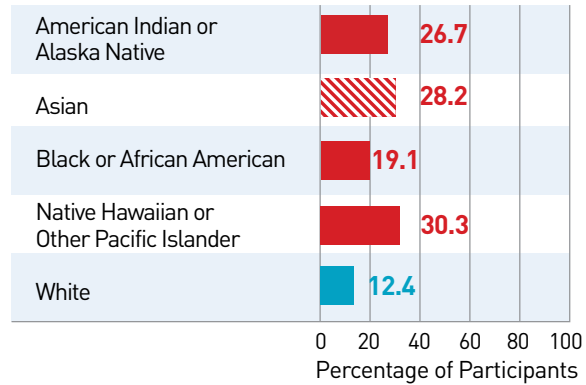
Figure 7. American Indian or Alaska Native N=60; Asian N=78; Black or African American N=94; Native Hawaiian or Other Pacific Islander N=33; White N=202. Data for multiracial, and not listed not shown.

FIGURE 8

	Percentage of Participants
Hispanic	24.2
Not Hispanic	15.2
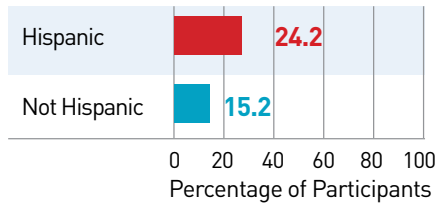
Figure 8. Hispanic N=149; Not Hispanic N=283.

FIGURE 9

	Percentage of Participants
Primary caregiver	22.9
Shared caregiver	15.3
No caregiving responsibilities	14.3
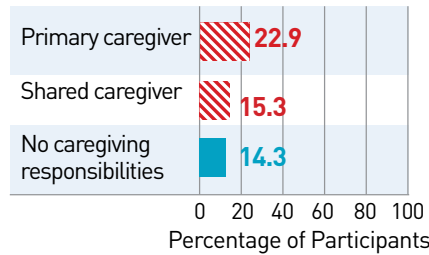
Figure 9. Primary caregiver N=170; Shared caregiver N=144; No caregiving N=119.

FIGURE 10

	Percentage of Participants
Disabled	28.6
Non-disabled	14.7
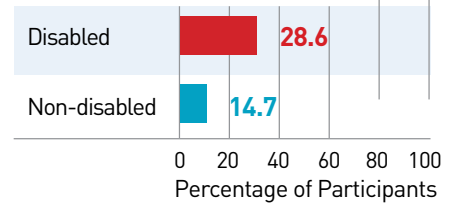
Figure 10. Disabled N=105; Non-disabled N=326.

FIGURE 11

	Percentage of Participants
Disadvantaged background	19.6
Not from a disadvantaged background	14.7
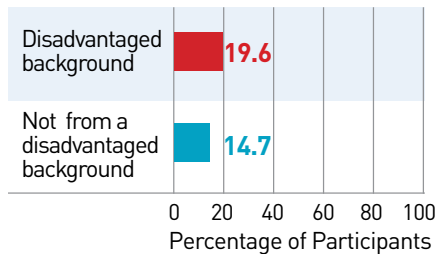
Figure 11. Disadvantaged background N=316; Not from a disadvantaged background N=116.

FIGURE 12

	Percentage of Participants
Temporary resident	25.6
Permanent resident	20.3
U.S. Citizen	17.1
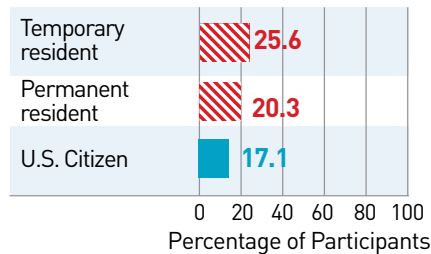
Figure 12. Temporary U.S. resident N=39; Permanent U.S. resident N=64; U.S. Citizen N=327.

FIGURE 13

	Percentage of Participants
LGBTQIA+	20.8
Not LGBTQIA+	15.2
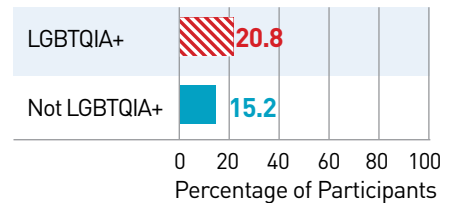
Figure 13. Identifies as LGBTQIA+ N=236; does not identify as LGBTQIA+ N=197.

FIGURE 14: Rank Up to 5 Most Important Professional Development Needs

Category	Weighted Average
Early-stage career preparation	3.54
Mentee/mentor and network opportunities	3.30
Non-academic job search	3.29
Academic job search	3.15
Field specific skills	2.97
Not Listed	2.90
Effective people skills	2.79
Communication skills and techniques	2.73

Weighted Average

Figure 14. Weighted average calculated from survey respondents ranking up to five professional development needs, where 1 is the most important and 5 is the least. Answers of 1 were weighted as 5, answers of 2 were weighted as 4, and so on. Then the average was taken based on the number of respondents in each category. Overall N=457, though not every respondent selected five options.

In addition to early-stage career preparation being the most frequently highest ranked professional development need, this category also had the highest weighted average from all participants (*see Figure 14*).

While there are many professional development needs to explore, including topics not covered in the Task Force online survey, it seems apparent that overall early-career scientists desire support in career exploration and preparation, and this may be particularly true for those from historically excluded communities.

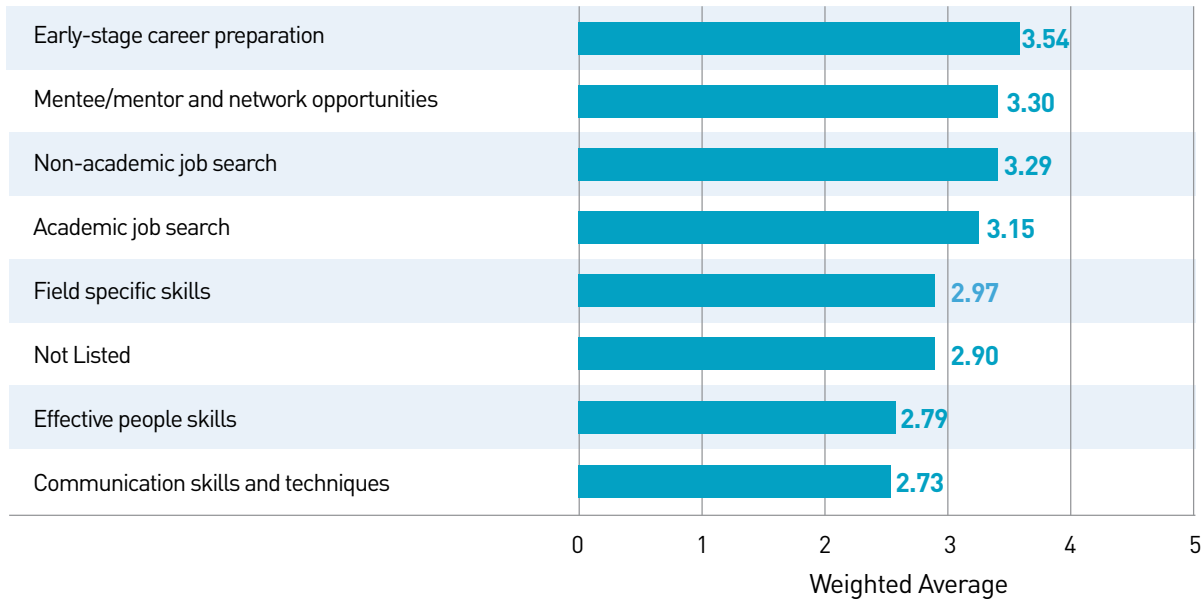Career transitions are an especially tenuous time for anyone but may prove even more stressful for early-career scientists than more established scientists due to a variety of reasons. An overall lack of safety net–financially, through a large network, and from being geographically separated from close family and friends–may be key factors. More than three-quarters of the survey sample felt ready for the next career transition (*see Figure 15*), which is generally promising.

FIGURE 15

- 21.3
- 78.7

■ Yes, I feel ready for the next career transition
■ No, I do not feel ready for the next career transition
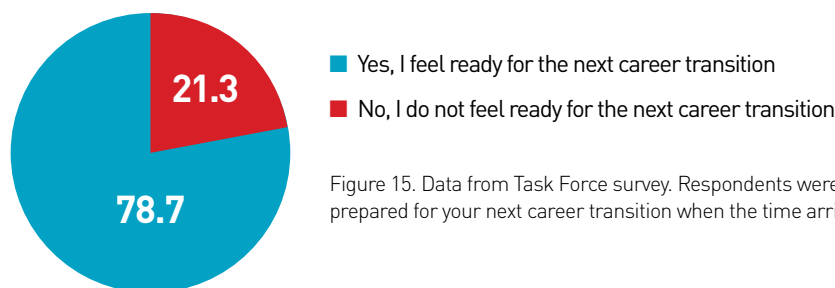
Figure 15. Data from Task Force survey. Respondents were asked, "Do you feel confident that you will be prepared for your next career transition when the time arrives?" N=431.

However, when broken down by career stage, there are apparent differences (*see Figure 16*). Academic postdocs, and to some extent PhD students and candidates, are immediately recognizable as feeling less ready for the next career transition compared to the overall sample.

FIGURE 16
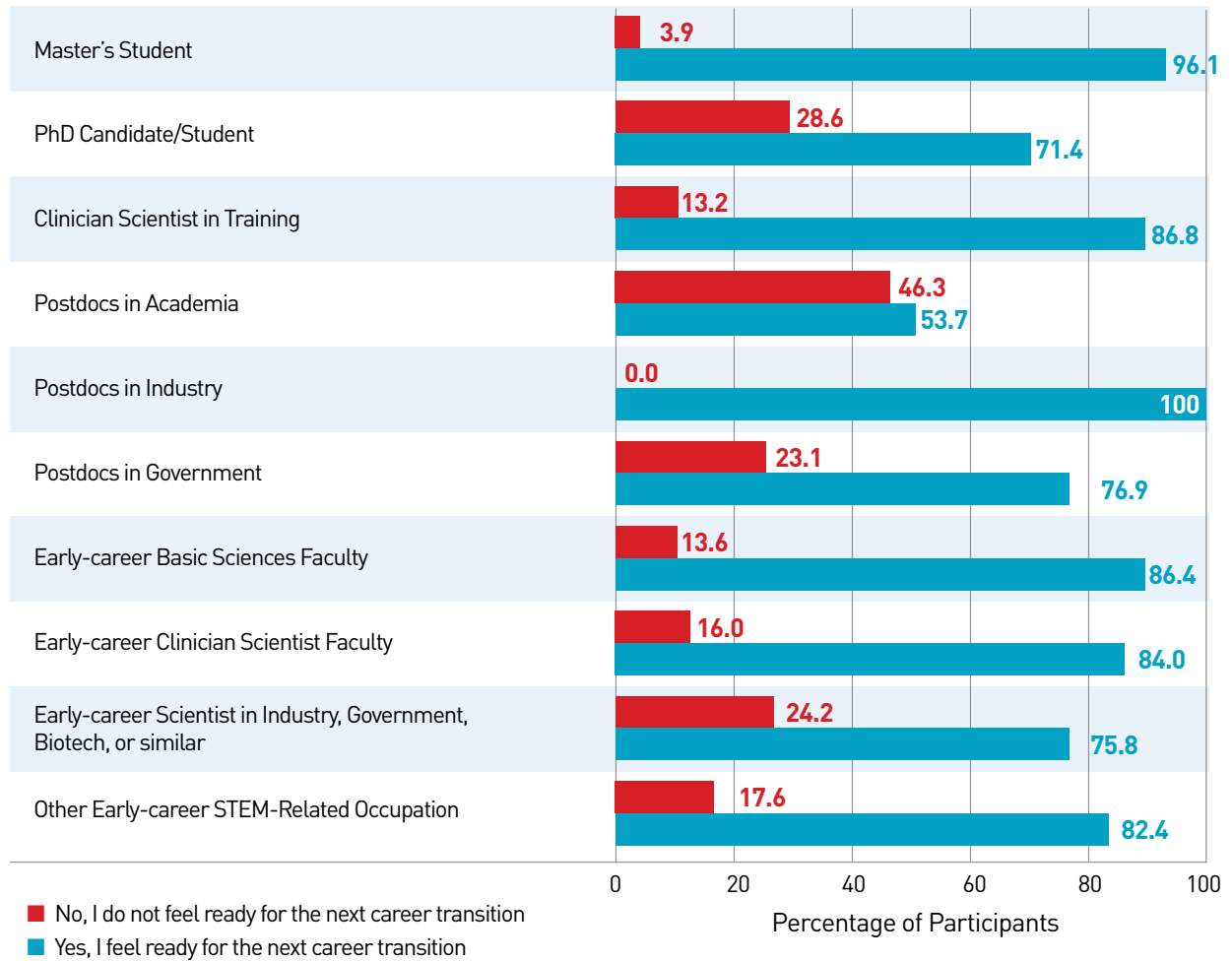
Figure 16. Data from Task Force Survey asking respondents if they feel confident for their next career transition. Master's student N=51; PhD student or candidate N=70; clinician-scientist in training N=38; academic postdoc N=67; industry postdoc N=15; government postdoc N=26; early-career basic sciences faculty N=59; early-career clinician-scientist faculty N=50; early-career scientist in industry, government, biotech, or similar N=33; other early-career STEM-related occupation N-17.

Furthermore, when analyzing data by demographics rather than career stage, the stark trends for historically excluded communities, as in the importance of early-stage career preparation, were not present across majority of identities collected; yet differences by gender were present. Women particularly did not feel prepared for career transition compared to men and their genderqueer, non-binary, agender, and similar colleagues (*see Figure 17*).

FIGURE 17
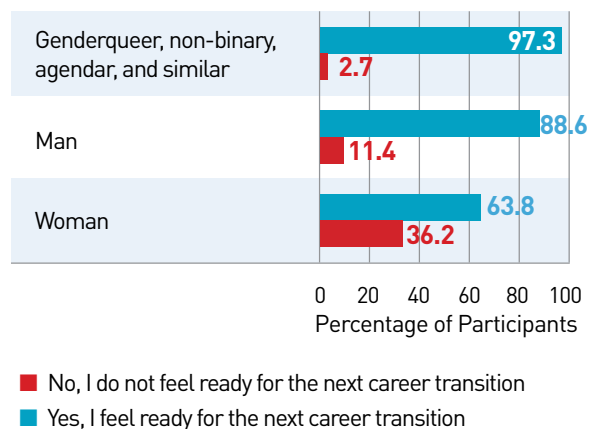
Figure 17. Data from Task Force survey on career transition readiness. Genderqueer and similar N=37; man N=210; woman N=177.

Recommendation 2.1: Actively combat negative stereotypes associated with pursuing careers other than academic tenure track research positions through programming and awards.

Many scientific societies already play an important role in promoting a variety of career pathways as valuable options for early-career scientists. The Task Force would like to see this continue and encourages societies with less support for the multitude of career paths available to scientists to bolster those efforts. Societies actively fostering early-career exploration and preparation would likely be beneficial to many early-career scientist members.

> *"I wish [society] had better professional development opportunities for scientists who are pursuing careers outside of academia. Right now it's very stuffy and isn't very welcoming for [early-career researchers]."* —PhD Student/Candidate

Early-career Exploration and Preparation Programming. Developing and running programming takes considerable staff time, but there are some smaller activities that can be pursued more readily. As individual members from the society are invited to give talks about their science, ask them to set aside a small portion of time to discuss their career journey as well. Further, resources may also be collected and promoted on the society website such as a careers value assessment guide, how to do informational interviews, and links to outside resources that explore other career pathways for early-career scientists. Specific to graduate students and postdocs, societies could be more vocal in emphasizing the dual-role of trainees—both as workers and trainees—and therefore these members should be permitted to use standard work hours to engage in career exploration and professional development activities. Societies reminding their senior members and encouraging more established scientist research advisors to support their trainees' involvement in activities beyond the laboratory may help shift attitudes in scientific environments overall to be more welcoming of early-career scientists pursuing diverse careers.

> *"[Leadership] should be understanding that as postdocs we aren't permanent and are looking for our own niches and sometimes these niches are outside of the academic realm. Openness to this is extremely helpful and comforting because then you don't feel as if you're betraying your PI whilst trying to find out your path."* —Postdoc in Government

As time allows, more rigorous programming may be developed. For example, society staff could create a structured program for early-career scientists to conduct informational interviews with senior scientist members; peer mentoring groups could be coordinated; advisory committees for postdocs could be convened with outlined goals and regular meetings; dedicated time at the annual meeting could be set aside for career exploration panels and networking sessions; training materials and/or sessions for established scientists on how to be open to the multitude of career paths that exist for their trainees and how to be supportive in their trainees' career exploration could be organized; and engagement with research advisor members and trainee members on how to have productive conversations with each other about experiential learning and internship opportunities. As societies develop and host robust programming, a certificate or micro-badge for participation and/or completion could be implemented. A certificate, or similar, may engender further participation in society activities from members who may otherwise only attend a single webinar, and provides members with an item to include on their CV.

> *"Webinars featuring successful and/or early-career researchers, describing their career paths, and providing guidance and advice; it's always useful to hear the perspectives of others, and sometimes, their advice is very memorable and useful."* —Postdoc in Academia

The Task Force was sympathetic to strains on staff time and recognized activities are demanding. Consider the feasibility of having member organized programs, akin to member organized sessions at the annual conference. This may allow the society to offer more webinars and resources on career exploration and provide opportunities for members to enhance their involvement with the society and organizational skills to demonstrate on future job application materials.

Early-career Preparation and Exploration Awards. Similar to lifetime fellowship awards that honor individuals' service to the society, societies should consider awards for those who go above and beyond to help early-career scientist members of the society. Participating in informational interviews, promoting openness to a variety of career paths for trainees, actively expanding networks, and contributing to society resources on career exploration and preparation take time and dedication. An award to recognize this work may help create additional value for these activities, and, even if only in a small way, help offset the diversity tax.

Additionally, if members are involved in helping to create content and organize activities, societies should explore the possibility of creating an award for early-career scientists based on service to the society. While lifetime fellows awards are fairly common, there are not many examples of a similar award for those earlier in their career. The availability of this type of award may boost participation, and would provide awardees a valuable service credential on their CV. While monetary additions to awards are always appreciated, Task Force members recognize that may not be feasible for many societies. Yet, an award, even sans monetary value, helps elevate early-career scientists through the national platform of the society.

Recommendation 2.2: Support members preparing for career transition, especially current PhD students and academic postdocs.

Figure 16 demonstrates disparities in feelings of readiness for the next career transition by career stage, with PhD students and candidates and especially academic postdocs feeling unprepared. Career transitions can be a tumultuous time, and societies should, to the extent possible, offer support through programming and awards.

Career Transition Programming. Comparable to early-career exploration programming, career transitions can be highlighted in a variety of impactful ways. Sessions at the annual meeting and webinars that take time to showcase career journeys, in addition to science, will necessarily highlight key points of transition. Peer mentoring groups and structured networking and mentor/mentee pairings may also provide needed support to prepare for and successfully execute career transition.

Additional activities may also be useful to those specifically approaching career transition. For example, job centered programming such as networking sessions with potential employers, structured mentor/mentee and networking programs to help facilitate employment opportunities (see Recommendation 1.1), and resources focused on skills needed to enter certain career fields may be desirable to early-career scientist members. As possible, programming and activities should be tailored to the relevant audience. Postdoc specific programming for academic job searches, for example, may not be as relevant to PhD candidates; still, there exists an obvious need that societies could help address.

Furthermore, opening programming to non-members may be beneficial for both the society and early-career scientists at large. The Task Force understands that exclusive programming is part of the society's benefits to entice individuals to join as members. Still, charging a fee to non-members to participate in webinars or networking sessions may uncover previously untapped revenue while making programming accessible to non-members.

The Task Force noted it may be possible for societies to offer internships or other experiential learning opportunities to early-career scientist members, which may be particularly useful for those looking to transition to a non-research intensive role. The logistics of running a typical internship program are understandably daunting, but smaller tasks as part of society service may be manageable. For example, offering opportunities for early-career scientists to review conference abstract and/or journal submissions, organize a webinar or a webinar series, write blogs and newsletters, and draft social media posts may engage

early-career members in the society and help them prepare for a variety of career pathways. Societies should consider what may be possible on the staff side, and ask members what type of opportunities they are interested in.

Moreover, many survey respondents noted feeling unprepared in their people and management skills. These transferrable skills are key tenants to success in most industries, including those that are not primarily research based. Programming on self-advocacy, how to have productive conflict, and interpersonal skills may be of interest to the broad membership. As with career exploration programming, a certificate or micro-badge could be developed to incentivize participation and further engagement with the society.

Programming for Academic Postdocs. Current academic postdoc survey respondents frequently expressed needing help preparing for the realities of an academic tenure track research position. Sessions at the annual meeting, webinars, or topics for mentee/mentor pairs on strategies for the academic job search, grant writing workshops, funding opportunities for early-career scientists, chalk talk practice, writing pods, budgeting, and management skills may be vital in helping to prepare academic postdoc members feel more prepared for career transition.

What opportunities do you wish your scientific/professional societies offered to help early-career scientists?

"Grant writing, lab management, leadership skills" —Postdoc in Academia

"Doing the day-to-day academic life—strategies to keep up with literature, strategies to network, forming healthy collaborations, managing multiple projects, managing personnel, etc." —Postdoc in Academia

"Trainings focused on management as well as other soft skills." —Postdoc in Academia

Task Force members emphasized the need to support postdocs preparing for career transition. Although survey results demonstrate other career stages feel unprepared for career transition, academic postdocs starkly stood out (see Figure 16). At many highly resourced institutions, PhD students and candidates may already have access to robust career programming through a university career center with graduate student specific support staff or department courses, seminars, and informal sources of support. Postdocs typically do not have access to similarly thorough programming at their institution. In fact, a majority of postdoc offices are responsible for all postdocs at their institution, with only a fraction having postdoc office structures that allow for discipline-specific support or multiple postdoc offices across campus. Furthermore, most postdoc offices only have one full-time employee to service all postdocs at the university. Even when university systems are in place to help postdocs, which is less common at lower resourced institutions, support is lacking. One postdoc office staff person can only do so much. Societies can play a vital role in supplementing career transition programming available to academic postdocs, and may serve as the primary source of community building and support for postdocs engaged in research at less well resourced institutions of higher education.

Awards to Ease Career Transition. The positive impact of societies elevating early-career scientists to their national, and sometimes international, audience cannot be overstated. This is particularly true for early-career scientists, who benefit greatly from a spotlight of this magnitude. Similar to awards for early-career exploration, an award based on service to the society may meaningfully strengthen early-career scientists' CV. Additionally, "rising star" awards for research impact can help job candidates stand out. Again, a monetary value is appreciated, but if not feasible then not completely necessary. Giving early-career scientists an award that grants a talk at the annual conference is incredibly helpful for national recognition, networking, and CV building.

As detailed in NASEM's 2018 Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine consensus study report, sexual harassment is common in academic sciences, engineering, and medicine. These environments exhibit four characteristics that create higher levels of risk for sexual harassment to occur: male-dominated environments, organizational tolerance for sexually harassing behavior, hierarchical and dependent relationships between faculty and their trainees, and isolating environments. In addition to gender harassment being prevalent and problematic in the sciences, other types of harassing behavior, such as racial discrimination, also contribute to an unwelcoming environment.

While many recent efforts to study the culture of science have focused on academia, this issue does not exist in the silo of higher education. Harassment and discrimination were frequently cited by women working in technology fields in NASEM's 2021 Transforming Trajectories of Women of Color in Tech consensus study report. Furthermore, women and Black scientists in STEM jobs, compared to women in non-STEM jobs or non-Black scientists in STEM jobs, respectively, are more likely to say they have experienced discrimination in the workplace.

The Task Force was appreciative of recent increased attention to the importance of the climate of scientific workplaces, both inside and outside of academic sciences. However, much of the focus and recommendations have been pointed towards individuals and the workplaces themselves—laboratories, departments, and institutional or organizational leadership. The Task Force strongly believes scientific societies have an important role in promoting safe and inclusive environments as standard bearers in their fields. To that end, the Task Force explored ways societies are fostering healthy environments and identified potential gaps to address.

Happily, of the overall survey respondent sample, more than 90 percent of participants noted that they had largely worked in safe environments (see Figure 18). However, as with prior survey findings, there were some appreciable differences by career stage and demographics.

FIGURE 18

Yes, I've largely experienced supportive, inclusive, safe work environments
No, I have not largely experienced safe work environments
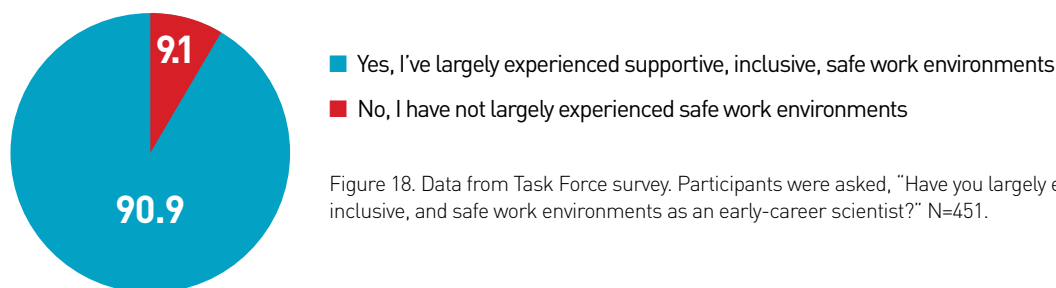
Figure 18. Data from Task Force survey. Participants were asked, "Have you largely experienced supportive, inclusive, and safe work environments as an early-career scientist?" N=451.

PhD students or candidates, academic postdocs, early-career basic sciences faculty, and those working in STEM-related occupations all noted experiencing problematic work environments slightly more than rate of the overall sample (see Figure 19). Interestingly, contrary to findings in the 2018 NASEM report on sexual harassment of women, the clinician scientists in training and clinician scientists faculty in the survey sample did not cite issues of unsafe work environments. Medical trainees and workers are particularly vulnerable to harassment, because in addition to unwanted behavior from peers, faculty, and those in leadership, they are also subject to harassment by patients and patients' families. The small sample size of clinician scientists in training and clinician scientists faculty in the Task Force survey data may help explain the discrepancy.

Similar to data on feelings of career transition readiness, analysis for many demographic categories did not point to clear disparities for survey respondents from historically excluded communities. However, women did note more frequently experiencing unsafe work environments than the overall sample and when compared to their male counterparts (see Figure 20).

FIGURE 19

	No	Yes
Master's Student	3.6	96.4
PhD Candidate/Student	11.3	88.7
Clinician Scientist in Training	0.0	100
Postdocs in Academia	16.9	83.1
Postdocs in Industry	0.0	100
Postdocs in Government	7.7	92.3
Early-career Basic Sciences Faculty	13.3	86.7
Early-career Clinician Scientist Faculty	0.0	100
Early-career Scientist in Industry, Government, Biotech, or similar	11.4	88.6
Other Early-career STEM-Related Occupation	11.1	88.9

- ■ No, I have not largely experienced safe work environments
- ■ Yes, I've largely experienced supportive, inclusive, safe work environments

Percentage of Participants

Figure 19. Data from Task Force Survey on safe and inclusive work environments, separated by career stage. Master's student N=55; PhD student or candidate N=71; clinician-scientist in training N=41; academic postdoc N=71; industry postdoc N=16; government postdoc N=26; early-career basic sciences faculty N=60; early-career clinician-scientist faculty N=50; early-career scientist in industry, government, biotech, or similar N=35; other early-career STEM-related occupation N=18.

FIGURE 20

	Yes	No
Genderqueer, non-binary, agendar, and similar	95.0	5.0
Man	95.8	4.2
Woman	85.0	15.0

Percentage of Participants

- ■ Yes, I've largely experienced supportive, inclusive, safe work environments
- ■ No, I have not largely experienced safe work environments

Figure 20. Data from Task Force Survey on prevalence of working in safe and inclusive environments separated by gender identity. Genderqueer, non-binary, agender, and similar N=40; man N=214; woman N=180.

Recommendation 3.1: Create programming and awards to promote inclusivity of environments in the scientific ecosystem.

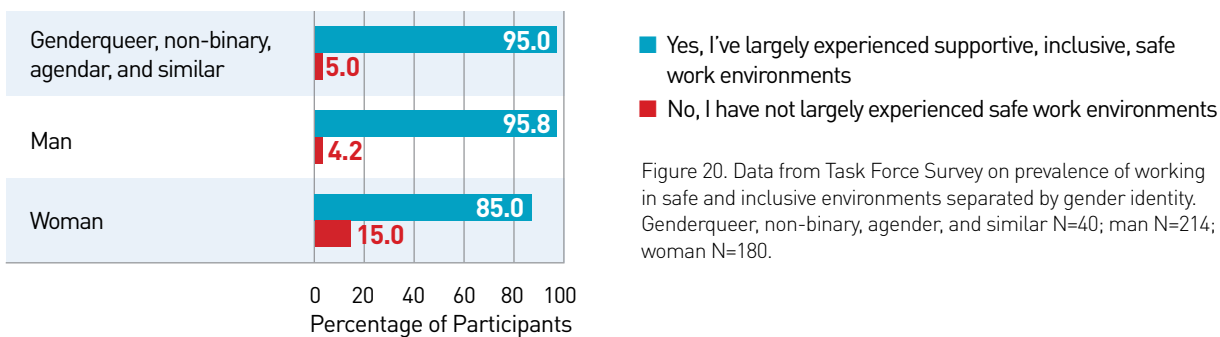**Programming to Promote Safe Environments.** Recognizing the burden on staff time, as possible, programming and awards that promote safe, welcoming, and inclusive environments should be implemented. Ideally, offerings should be catered to a variety of audiences—not only early-career scientists, but also those in leadership with the power to set the tone of the environments—and conducted by qualified individuals who include examples of inappropriate conduct in realistic scientific environments. The Task Force also strongly encourages bystander intervention training to be included. As with earlier recommendations, a certificate or micro-badge can accompany the programming to increase member engagement.

> *"How to get help when you're not treated with respect in the workplace. PhD students and postdocs are vulnerable to abuse of power situations, which appears to be very common. There is not adequate infrastructure to deal with this issue."* —Postdoc in Academia

Awards for Champions of Inclusive Environments. Often, these types of events attract audiences already engaged in creating supportive environments. Getting messaging, research findings, and resources to those who need it most can be challenging. While there is no easy solution for this issue, societies should consider creating awards for established researchers who actively work to create and maintain safe, inclusive, and supportive work environments. With an accolade attached as a clear signal to members that inclusive environments are valued at the society, this may entice more reticent members to engage in the topic.

Recommendation 3.2: Strive to diversify leadership, committees, task forces, and similar bodies, as well as staff. Be transparent about the diversity of leadership and track changes over time.

Echoing a finding from NASEM's 2018 consensus study on harassment of women in STEMM, environments most associated with higher rates of sexual harassment have male-dominated gender ratios and leadership. The Task Force encourages societies to examine current strategies for recruiting staff and volunteer leaders. As appropriate, implementing methods to diversify the pool of applicants and/or nominees may help enrich the diversity of the society.

Depending on the size of the society, publishing self-identified demographic data on membership may be difficult due to privacy concerns — particularly for certain historically excluded groups. However, leadership of the society will hopefully fully support the mission of fostering safe and inclusive environments and be willing to submit their demographics to staff to then publicly share aggregate data. If possible, societies should consider collecting self-identified demographic information on past bodies of leadership and continue these efforts into the future to show change over time. Ideally, this practice will extend to all volunteer leaders in the society—not only the highest body of governance—including committees, task forces, and similar.

Recommendation 3.3: Create and support affinity-based interest groups to combat isolation.

Spaces for members to gather based on shared backgrounds, values, or similar can help create community and combat feelings of isolation and loneliness. Affinity groups have long been utilized for undergraduates in spaces of higher education and have more recently expanded to some corporate workplaces as well (sometimes called employee resource groups). Affinity groups in the workplace can increase reports of an engaging and fulfilling work experience and play a role in making spaces more inclusive for those with disabilities.

> *Community: having a consistent space with people sharing similar experiences, values, and purposes."*
> —PhD Student/Candidate

Societies may also work to foster this sense of belonging and improved inclusivity in the field through online affinity groups. Members of the group may form natural connections with peers and senior mentors. Early-career scientists from historically excluded communities may be able to identify role models with shared backgrounds through the affinity group membership, that may otherwise be an extremely limited or nonexistent pool of established scientists at their institution or organization. In addition to broad help with science and navigating a scientific career, specific resources of interest may also be distributed to those with shared identity. Affinity group forums may also help society staff identify what the members want the society to be actively engaged with to improve culture and climate and change behaviors in the field. These online spaces can be fruitful ways to stay engaged with members between the annual meeting and may also spark session ideas for the next national conference.

Recommendation 3.4: If not already in place, establish a harassment policy. Additionally, for all events, enforce a code of conduct.

The Task Force recognized that many harassing actions take place in the local environment and are sometimes a result of deeply entrenched power dynamics present in academic sciences. This leaves much of the responsibility up to the individual research advisor, as well as the department and/or organization as a whole, to address the safety and inclusivity of the environment. However, there are actions societies can take to set the standards of excellence in the field and promote professional and ethical conduct.

> *"There is little oversight and professional management training required of PIs, which leads many labs to become mismanaged, negative, unproductive, and potentially abusive."* —PhD Student/Candidate

Harassment Policy. Societies should create a harassment policy and make it publicly available to help dissuade unacceptable behavior and show support for those experiencing harassment. This policy should be applicable for both society staff and society members. Ideally, transparency and accountability are incorporated as critical elements of the policy. For example, a range of progressive disciplinary consequences could be provided to help complainants understand potential outcomes. Also, stating mechanisms to help protect complainants from retaliation may be beneficial; for example, ensuring the respondent will not review abstract or paper submissions from the complainant if applicable. Additionally, the timeframe for investigation and determination is also crucial information to communicate to potential complainants. As possible, consider incorporating mechanisms for target-led resolution options, in which the complainant has a role in deciding what happens if the respondent is found to have broken the policy. Restorative justice practices can be beneficial for both the complainant and the respondent.

If a harassment policy already exists, depending on the current language, societies should consider strengthening statements on sexual harassment, discrimination, and bullying to be as serious as research misconduct. Scientists have the responsibility to create safe environments for all to thrive—failing to do so compromises the integrity of the research. NIH has stated "[o]nly in safe and respectful work environments can individuals achieve their greatest potential and carry out the important work that supports the NIH mission," and societies are well equipped to echo this sentiment.

Code of Conduct. For all events, virtual or in person, societies should have a code of conduct, standards of behavior, or similar that clearly states harassment is not tolerated and targets will be supported. While many harassment policies and procedures focus on the aftermath of when inappropriate behavior occurs, a code of conduct sets expectations prior to any unwanted actions taking place. Society members could be required to acknowledge the code of conduct in writing during conference registration and membership sign-up or renewal. A brief statement about the code of conduct can be read at the start of events, with a link to the full policy provided in the chat during virtual events.

Akin to the harassment policy, transparency is key for an effective code of conduct. A section of the policy should address escalating consequences for repeat offenders that may grow from being removed from a single event to being banned from society membership. To support reporting, if possible, societies should consider a trustworthy mechanism available to complainants such as an ombudsperson.

There exist a multitude of challenges associated with carving out a career path as an early-career scientist, of which, to some extent, those hurdles and barriers are exacerbated for temporary visa holders. In 2020, 23.6 percent, 33.8 percent, and 52.8 percent of master's students, PhD students, and postdoc appointees, respectively, in science fields were temporary visa holders (GSS Table 1-3b). For biological and biomedical sciences specifically, 11.8 percent, 24.4 percent, and 54.6 percent of master's students, PhD students, and postdoc appointees, respectively, were temporary visa holders in 2020 (GSS Tables 4-7a, 4-7b) (see Figure 21). For both science overall and the field of biological and biomedical sciences, more than half of the postdocs at U.S. institutions of higher education in 2020 were temporary visa holders. While the share of international graduate students is not as high as postdocs, it has been steadily increasing over time (GSS Table 1-3b). A significant portion of the trainees pursuing scientific pathways are non-U.S. citizens, which produces unique challenges along their career route.

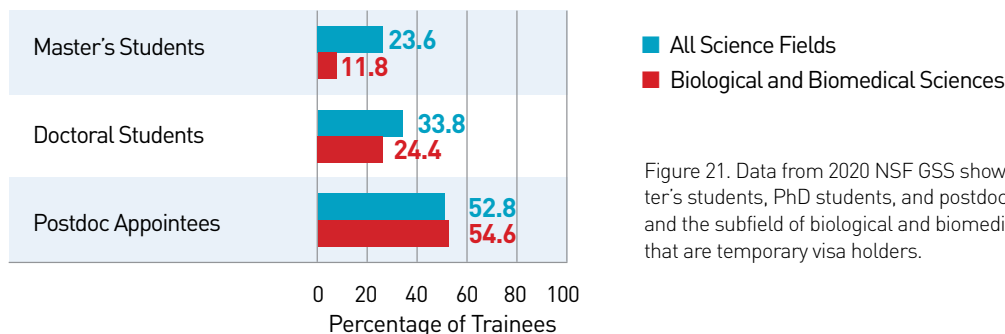**FIGURE 21: Temporary Visa Holders in 2020**

Figure 21. Data from 2020 NSF GSS showing percentage of master's students, PhD students, and postdocs in science (blue bars) and the subfield of biological and biomedical sciences (red bars) that are temporary visa holders.

Furthermore, these trainees eventually go on to jobs—be that inside or outside of the U.S. Recent PhD graduates from U.S. institutions of higher education in science and engineering fields who are temporary visa holders tend to plan to stay in the U.S. to work more than they are realistically able to definitely stay in the U.S. through a firm work offer (Science and Engineering Labor Force, supplemental materials S3-24; see top figure in this FASEB factsheet). From 2014 through 2017, 76.5 percent of visa holding recent science and engineering PhD recipients planned to stay in the U.S., but only 45.8 percent had a definite work offer. In the biological and biomedical sciences, 79 percent planned to stay versus only 46.2 percent with a firm work offer during the same period.

Despite data pointing to the U.S. losing talented foreign born scientists who wish to stay, the scientific ecosystem still relies on foreign born talent (NSF SDR Table 9; see Figure 22). As of 2019, approximately 29 percent of U.S. residing employed doctorate recipients in all science fields and 30 percent of those in biological and biomedical sciences are not native-born U.S. citizens.

FIGURE 22: Number of Employed Doctorate Recipients in 2019

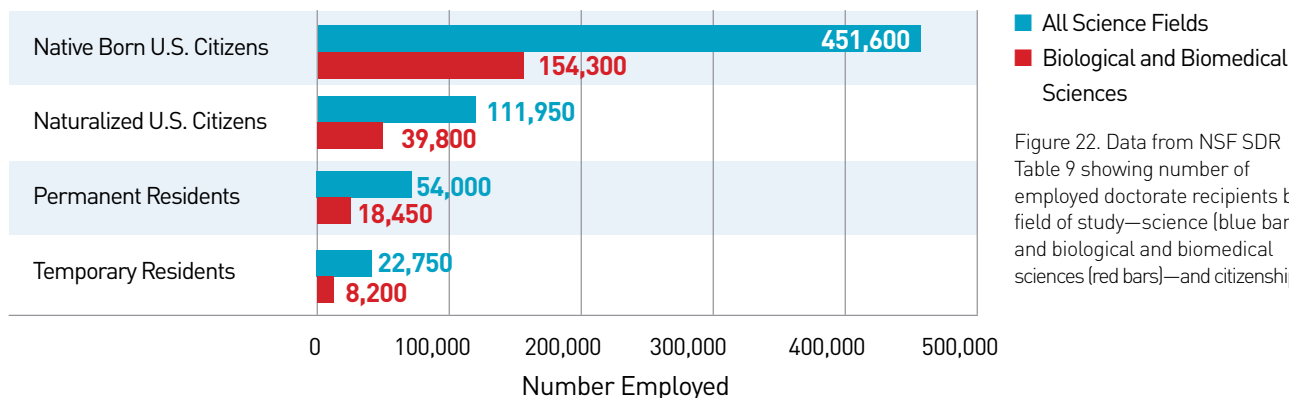Figure 22. Data from NSF SDR Table 9 showing number of employed doctorate recipients by field of study—science (blue bars) and biological and biomedical sciences (red bars)—and citizenship.

While many go on to naturalized citizenship, approximately 12 percent of both broad science and biological and biomedical sciences PhD recipients employed in the U.S. are either permanent or temporary residents.

Although the Task Force did not specifically ask questions about the challenges faced by international early-career scientists in its online survey, concerning trends emerged when analyzing the data by citizenship. In addition to temporary residents placing larger emphasis on early-stage career preparation than their U.S. citizen counterparts *(see Figure 12)*, they also appear to have more limited networks *(see Figure 23)*, experience unsafe work environments more frequently *(see Figure 24)*, and feel less prepared for their next career transition *(see Figure 25)*. While the sample size of temporary residents from the online survey was small, results were still striking. The Task Force felt strongly that there was an opportunity for scientific societies to better support these individuals.

FIGURE 23: Networks and Mentors

■ Yes, I have a network beyond my current and prior organizations

■ No, my mentors and network are limited to my current and prior organizations
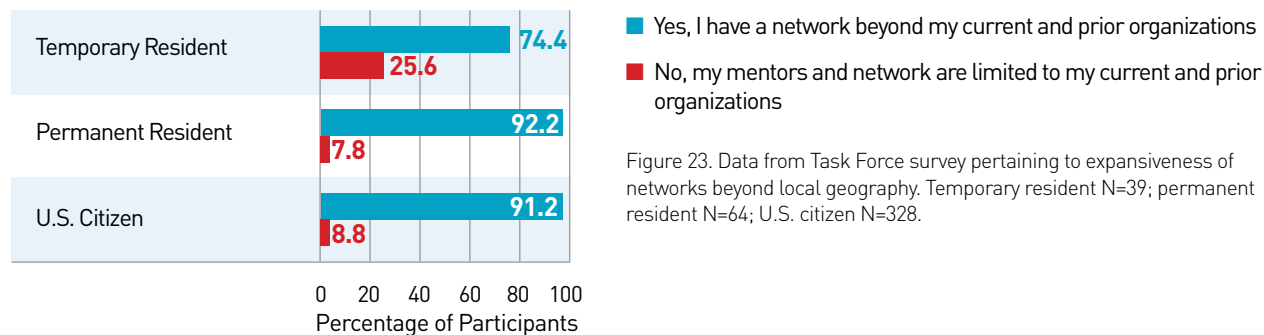
Figure 23. Data from Task Force survey pertaining to expansiveness of networks beyond local geography. Temporary resident N=39; permanent resident N=64; U.S. citizen N=328.

FIGURE 24: Safe and Inclusive Work Environments

■ Yes, I've largely experienced supportive, inclusive, safe work environments

■ No, I have not largely experienced safe work environments
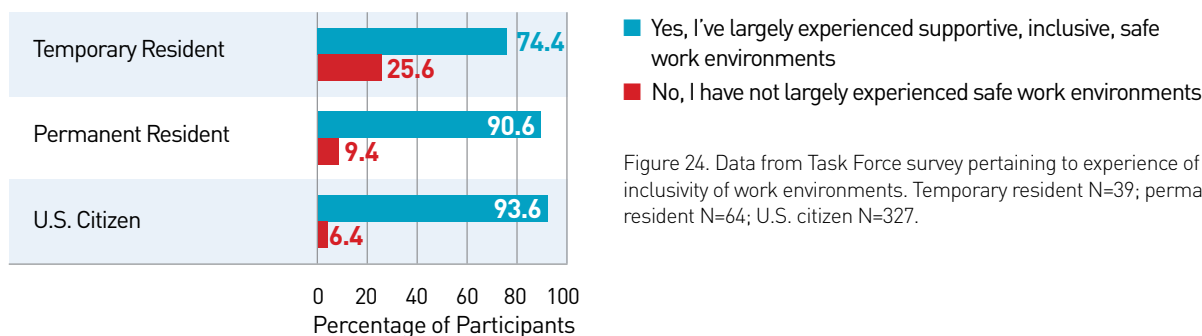
Figure 24. Data from Task Force survey pertaining to experience of inclusivity of work environments. Temporary resident N=39; permanent resident N=64; U.S. citizen N=327.

FIGURE 25: Career Transition Readiness

■ Yes, I feel ready for the next career transition

■ No, I do not feel ready for the next career transition
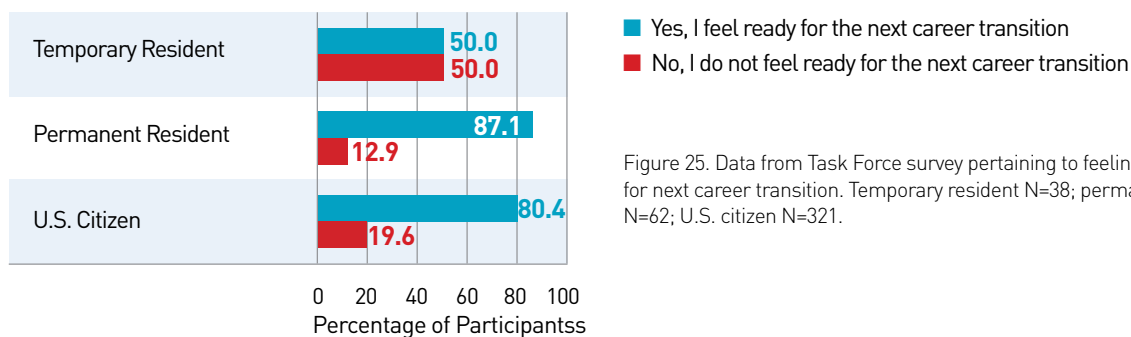
Figure 25. Data from Task Force survey pertaining to feelings of readiness for next career transition. Temporary resident N=38; permanent resident N=62; U.S. citizen N=321.

Recommendation 4.1: Despite not being able to change the complexities of the visa process, target programming and awards to support international scientists.

Affinity Groups. There are many non-monetary ways societies can support their international scholar members. As with Recommendation 3.3, affinity groups may help combat feelings of isolation. Events of interest may also grow from affinity groups, such as a multilingual science seminar series.

> *"But moving from a different country... always the same circus. How do taxes work? What about the health system?"*
> —Postdoc in Academia

Intentionally Highlighting and Including International Members. Similar to Recommendation 2.1, highlighting international members is another nonmonetary way to provide support. Providing a national platform to give scientific talks, in-person or virtual, creates exposure advantageous for cultivating a professional network and accolades to add to the CV. Just as time can be carved out to highlight career journeys during scientific talks, societies may also ask international scholars to discuss how they are navigating the visa process as part of their career progression. Additionally, intentionally including international members on volunteer bodies such as the highest body of governance, task forces, committees, and similar, ensures their perspective is incorporated, and provides a valuable opportunity for networking and career growth for the member.

American Work Norms. Moving to a new country is often accompanied by some level of culture shock, of which resources may be created and/or disseminated to help ease the transition. American work culture may differ among various individual organizations, but there are typically some common threads that persist. Having this information readily accessible, instead of hidden away only to learn through potentially uncomfortable interactions, may help international scholars adapt to their new environment. Akin to the "hidden curriculum" in academia for students, societies can make efforts to unearth aspects of American work culture that may not be intuitive.

> *"Doing fundamental biology, there is no funding for me without a green card. Funding is very restrictive for people without a green card."* —Postdoc in Academia
>
> *"Opportunities that are offered for young researchers who are in the minority... they come with some green card or citizenship [requirement]. ... For me, that's a major, major barrier."* —Postdoc in Academia

Monetary Support. The Task Force enthusiastically supports societies providing financial awards to international scholars, given the lack of fellowship opportunities for scientists who are not U.S. citizens or permanent residents. However, there is recognition of federal mandates that limit societies' ability to distribute funds. For example, if the society is acting as a passthrough for federal funds, those likely can only be distributed to U.S. citizens and permanent residents. Furthermore, federal sanctions may prevent payments being made to citizens of some countries, even if they are researchers currently in the U.S. Finally, tax law plays a role. Nevertheless, as possible, providing small awards, fellowships, and/or grants that support research and/or professional development activities for international scholars is laudable.

One suggestion from a Task Force member was for societies to provide travel awards as stipends instead of reimbursements. Additional financial burdens for early-career scientists, such as waiting for reimbursement for conference-related expenses, can be extremely difficult to withstand. Some international scholars, depending on their visa restrictions, may face financial stress even larger than their U.S. citizen counterparts. For example, an international postdoc may be in the U.S. with a spouse who is not allowed to work, providing for their entire family on the postdoc salary. Offering a stipend prior to costs being incurred helps alleviate this burden. However, this is a prime example where tax law implications may be an influential factor. For all awards, recipients should consult with a tax expert to determine if it should be included on their taxes, but some awards require extra administrative work for the society staff. For awards of $600 or more, the society is required to send a 1099 form to the recipient and the awardee must provide a W-9 form to process the payment. Reimbursements also take administrative work, but typically less than paperwork associated with making substantial awards. The Task Force understands these logistical limitations, yet still encourages societies to analyze how awards are being made and identify if there is an opportunity to award stipends instead of providing reimbursements.

Theme 5:
Society Structure and Governance

Scientific societies have the opportunity to meaningfully engage early-career scientists in their membership and governance. Rather than be passive members, early-career scientists can actively contribute to the mission of the society if given the opportunity. Guaranteeing the early-career perspective is represented helps ensure programming, awards, advocacy efforts, and policy statements reflect concerns of current early-career scientists. Early-career representation in society governance and maintaining membership as trainees pursue a variety of career paths helps catalyze activities detailed in Themes 1 through 4.

Recommendation 5.1: Have at least one designated early-career representative on the highest body of governance with voting rights, codified in bylaws.

As of May 2022, 12 of the 28 FASEB Member Societies had some type of ECR on their highest body of governance. Of these 12 societies, 9 include voting rights as part of the ECR position (*see Figure 26*). FASEB itself has at least one, and up to three, ECRs on its Board of Directors. These ECR positions include voting rights, as specified in the bylaws.
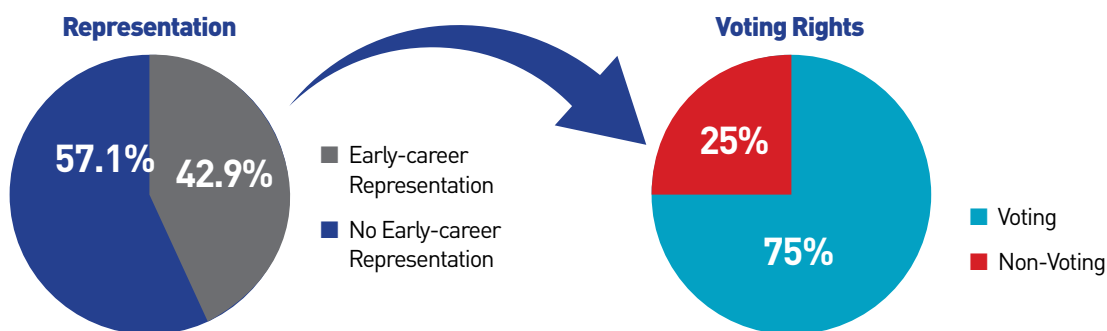
FIGURE 26: FASEB Member Societies

Figure 26. Pie charts showing the percentage of FASEB Member Societies with early-career representation on the highest governing body, and how many of those have voting rights included with the position.

Early-career Representatives. The Task Force asserts that early-career scientists have an important point of view to contribute to governance discussions. If societies wish to engage the full breadth of membership, it is vital that the voice of early-career scientists have representation on the highest body of governance. While some topics, such as operating budgets, impact members of the society relatively equally, other items, such as policy positions and programmatic investments, may have dramatically larger effect on early-career scientists compared to more senior members. Furthermore, as society governance discusses items either directly about or that will impact early-career scientists, it is relevant to have contributions from the early-career scientist perspective to ensure decisions being made are not without input from the target audience. To borrow from the famous disability activism phrase: nothing about us without us.

Ideally, the Task Force endorses societies having multiple ECRs on the highest body of governance. Ensuring there is at least one ECR is critical to have the early-career perspective present but being the "only one" may be intimidating and subtly discourage a lone ECR from speaking up. However, the Task Force understands that for smaller governance bodies having multiple ECRs may be unreasonable. For example, if a Board of Directors is typically only eight members, adding three ECRs would be a dramatic shift. Overall, the Task Force encourages societies to examine the current makeup of the highest body of governance and consider adding multiple ECRs if possible.

Voting Rights. Empowering ECRs to actively contribute to discussion is vital, and providing ECRs voting rights is one effective tool. Additionally, if ECRs are expected to perform all other duties of serving on the highest body of governance—including fiduciary responsibilities and adequate preparation to attend and actively participate in meetings—it follows that performing the duties should come with the full breadth of abilities, including voting rights. In the majority of highest governing bodies, most voting members will likely outrank ECRs in their occupation; it is critical that societies do not ignore or exacerbate this inherent power differential. Limiting ECRs to be nonvoting only helps to perpetuate the power dynamic, rather than enable ECRs to be fully productive members in society governance.

Codified in Bylaws. Some current leadership, be that officers, highest governing body members, and/or society staff, have placed emphasis on the value of ECRs, which has created significant opportunity for the ECRs as well as for the society itself to incorporate diverse perspectives in decision making bodies. However, attitudes may shift over time. Informal processes are simple to undo. Codifying that the highest body of governance have at least one ECR in the society bylaws formalizes the position and makes it more difficult to revoke if future leaders are more ambivalent toward ECR inclusion. The Task Force acknowledges that bylaws changes can be an arduous process but supports undergoing the task to reinforce the importance of ECRs on the highest body of governance.

Recommendation 5.2: Thoughtfully examine limitations placed on certain membership categories and consider revision to promote active participation from all members.

Engaging members across the society is beneficial to all parties involved. In some cases, societies limit the ability for members outside of the "full" or "regular" category to participate in activities such as service on committees, task forces, and leadership. Restrictions are also sometimes placed on voting rights. Early-career scientist survey respondents remarked at the usefulness of being able to serve on committees.

> *"Serving on committees ... allowed me to hone my leadership, organizational, and communication skills."*
> —Postdoc in Academia
>
> *"The service on society committees has been instrumental in the development of my leadership skills. As a postdoc, I didn't have opportunities to lead teams of peers, which is different than leading teams of undergraduate or graduate trainees. I learned a lot."* —Postdoc in Academia
>
> *"The leadership opportunities through the professional societies have been instrumental in hands-on leadership and managerial experience. Academic and industry employers have asked me about any leadership or management experience that I have outside my postdoc. So, the opportunities have been very important for my professional development, especially since I did not have access to these as a PhD student."* —Postdoc in Academia

The Task Force encourages all societies to meaningfully engage in discussion of any currently existing limitations to a subset of members and why those restrictions exist. Depending on overarching society goals, including increased equity in the sciences, it may be appropriate to revise existing norms.

Recommendation 5.3: Maintain an early-career membership category with reduced dues.

As of May 2022, nine of the 28 FASEB Member Societies already had some form of early-career membership category, with all nine having reduced dues compared to the full or regular membership category.

An early-career membership category with reduced dues may help retain members during pivotal times of career transition. In 2020, life sciences PhD recipients graduated with $11,692 in graduate education related debt (NSF SED Table 39), and $24,039 in cumulative debt on average (NSF SED Table 38). Even more troubling are debt disparities by gender and race (*see Figures 27, 28, and 29*). Additionally, the National Science Board notes in its "Not Going for Broke" factsheet that financial barriers represent a significant burden to building a diverse research and development workforce.

FIGURE 27
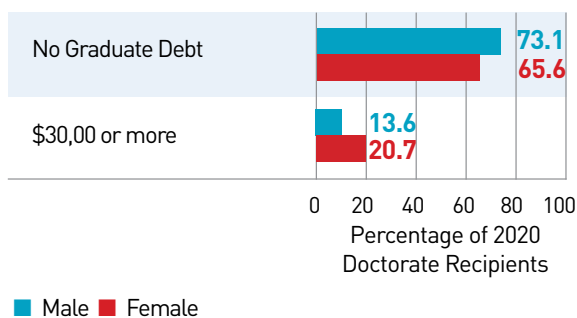
Figure 27. Data from NSF SED Table 40 showing the percentage of male and female 2020 doctorate recipients with no graduate debt and graduate debt greater than $30,000 U.S. dollars.

FIGURE 28
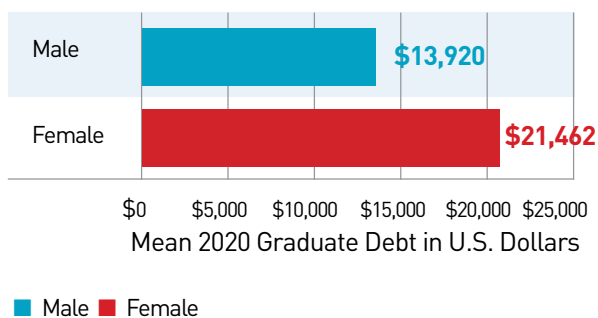
Figure 28. Data from NSF SED Table 40 showing the mean graduate debt of 2020 doctorate recipients for males and females.

FIGURE 29: Mean Debt of 2020 Doctorate Recipients in U.S. Dollars
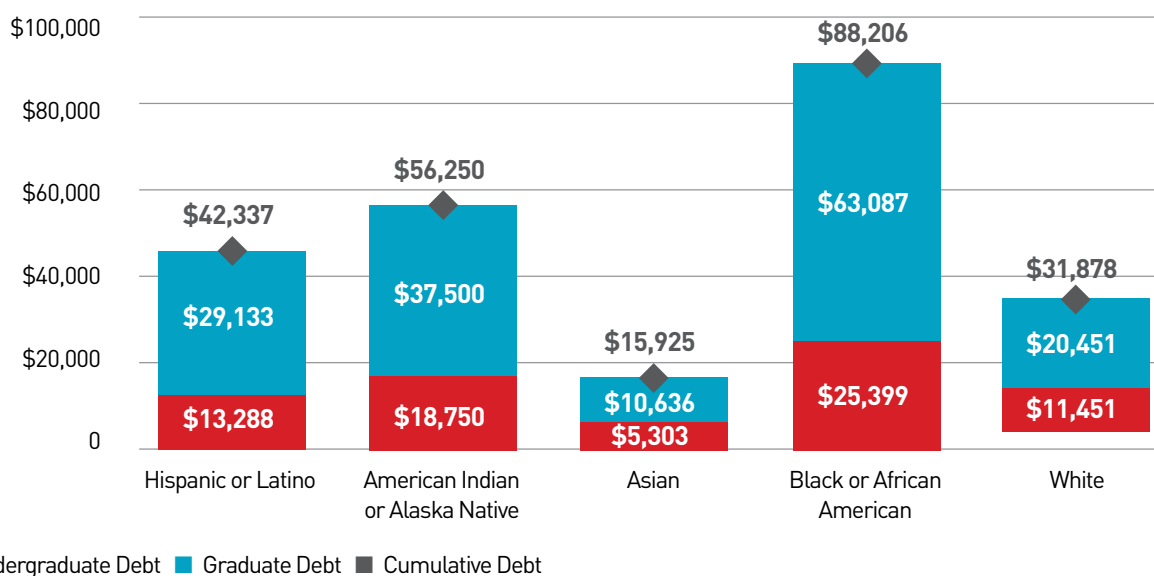
Figure 29. Data from NSF SED Table 40 of debt levels—broken down by undergraduate debt, graduate debt, and cumulative debt—for 2020 PhD degree recipients stratified by race and ethnicity. Note: more than one race and other race not reported values not displayed.

Regardless of current work sector, early-career scientists' savings may be lacking due to cumulative debt from pursuing higher education. For those who pursue occupations where the employer will not pay for society membership fees, the individual then faces the decision of maintaining membership or not—including potentially choosing to be a member of only one society instead of multiple.

While there is no robust data on reasons early-career scientists let their society memberships lapse, the cost of full or regular membership dues in instances where an early-career category does not exist may be a financial barrier. This may also be true for early-career scientists that do not hold a graduate degree. Some societies have a substantial portion of membership coming from undergraduates; maintaining their membership in an early-career member category with reduced dues may prove beneficial for both the society and the individuals.

As societies evaluate the ways with which they do and do not serve their early-career members, the Task Force encourages societies to maintain a consistent definition of "early career" throughout. For example, if both an early-career membership category and ECR positions on the highest body of governance exist, the early-career eligibility should be consistent to avoid confusion.

Recommendation 5.4: Retain membership for individuals in a variety of career pathways, not only in research.

Many scientific societies make a concerted effort to involve trainee members, undergraduate through postdoc. However, retaining members that choose nonacademic careers, or more broadly careers with primary job functions other than research, can be challenging.

Scientists with advanced degrees pursue a variety of career pathways beyond research and development. For example, the 2019 SDR indicates that of the approximately 220,700 U.S. residing employed PhD recipients in the fields of biological, agricultural, and environmental life sciences, 102,300–not even half–have any type of research and development as their primary work activity (SDR Table 15-2 for 2019 and 2010, *see Figure 30*). There are just as many doctorate recipients from the same fields of study working in management, sales, administration, professional services, and teaching combined.

FIGURE 30: Primary Work Activity of U.S. Residing Employed PhD Recipients in Biological, Agricultural, and Environmental Life Sciences
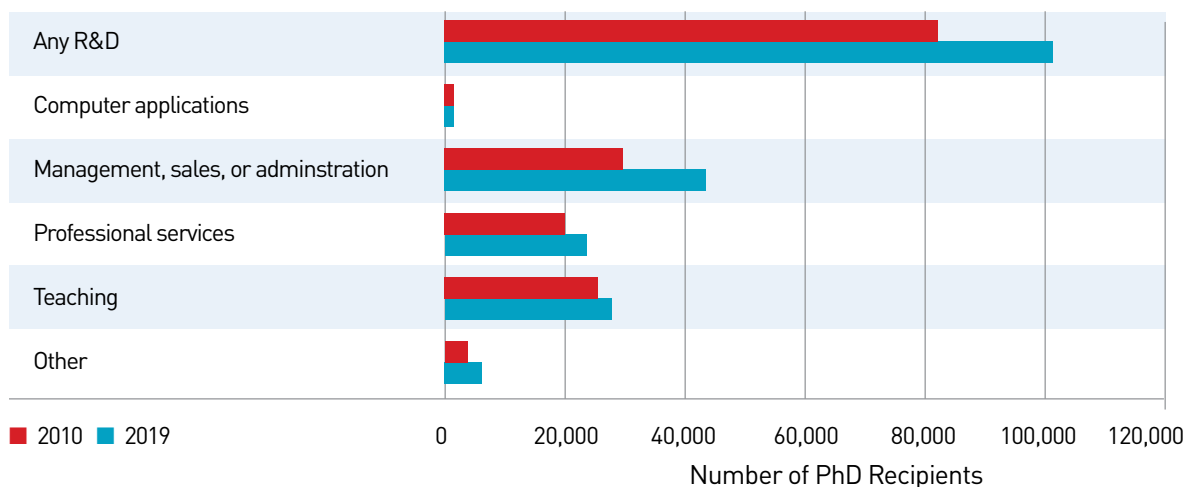

Figure 30. Data from Table 15-2 of the Survey of Doctorate Recipients showing primary work function in 2019 and 2010.

Academic jobs have more or less maintained pace, with the number of PhD recipients on the tenure track at a four-year educational institution being nearly identical between 2010 and 2019–approximately 12,400 and 12,700, respectively (SDR Table 20 for 2019 and 2010, *see Figure 31*). However, there's been a marked increase in PhDs employed not on the tenure track during the same time, from 11,300 in 2010 to 17,850 in 2019.

FIGURE 31: Tenure Status of PhD Recipients in Biological, Agricultural, and Environmental Life Sciences at 4-Year Educational Institutions
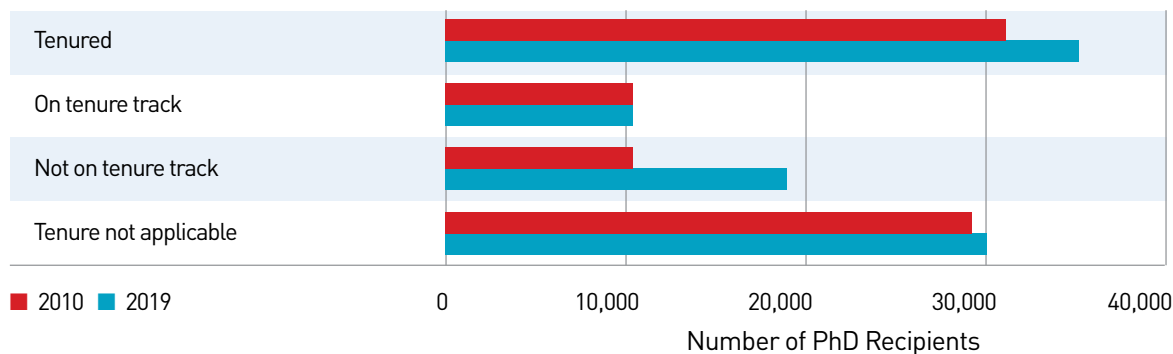

Figure 31. Data from Table 20 of the Survey of Doctorate Recipients showing the tenure status of U.S. residing PhD recipients employed at a 4-year educational institution in the fields of biological, agricultural, and environmental life sciences.

Between PhDs at academic institutions not on the tenure track or where tenure is not applicable, and the more than half of PhD recipients employed with job functions that are primarily not research and development, there lies a great opportunity for scientific societies to engage these individuals in a variety of careers.

Membership Categories. Some scientific societies limit the "regular" or "full" membership category only to those actively contributing to new knowledge in the field. Typically, this means academic scientists or scientists in government or industry producing publications, patents, and other novel findings.

Additionally, some scientific societies have a membership category such as "associate," "affiliate," "lay," or similar, intended for individuals who support the field and the mission of the society but may not be active contributors to creating knowledge. As of May 2022, 16 of the 28 FASEB Member Societies had some type of associate, or similar, membership. However, some of these membership categories expressly prohibit advanced degree earners from joining the category. Within the 16 FASEB Member Societies with some form of associate, or similar, membership category, six prohibit advanced degree earners.

Recalling that more than half of advanced degree recipients may no longer be deeply involved in research in their chosen profession, some society membership structures leave these scientists without an obvious way to engage. If typical "full" or "regular" membership categories are for active researchers, and the "associate," "affiliate," "lay," or similar categories ban advance degree holders, scientists who were once trainee members that have progressed in a non-research intensive career may simply not have a membership category to join. Societies should thoughtfully evaluate the current membership category structure and identify if there are ways to retain membership of those who pursue careers outside of research.

Benefits to the Society. Retaining trainee members throughout their careers has many benefits to the scientific society. The first, and most obvious, is this would likely result in increased membership numbers. Although quantitative data was not identified by the Task Force, anecdotally Task Force members who are staff at scientific societies resoundingly concluded that trainee membership is difficult to maintain over time. Trainee members often join, or renew, only when they will present at the annual conference, which is typically not every year. Then after graduation or the postdoc training period, retaining members through career transition when shifting outside of research proves challenging.

Second, having a body of membership with diverse career paths will enhance the society's ability to connect trainee members to more established members as mentors and sponsors outside of academic sciences. These members in STEM-related occupations can be called upon for informational interviews, webinars, networking sessions, and panels at the annual meeting. Additionally, if these members are dedicated to the mission of the society, they could provide valuable insights on career paths as members of committees, task forces, and leadership. Not having to reach outside of society membership may make the task of helping trainee members with career exploration and preparation more feasible (see Theme 2: Career Exploration and Career Transition Readiness), as well promote perspectives from different careers in the society.

Benefits to STEM-Related Occupation Members. While the benefits to the society of retaining members that pursue varied career paths after training are fairly straightforward, the benefits to these members themselves of maintaining membership may be less obvious. Primary benefits of society membership often cited are access and discount to the annual meeting as well as to the scholarly journal(s). These advantages of membership may not hold much weight with scientists in non-research intensive fields such as consulting, management, policy, and more. Societies should assess their inventory of offerings to realistically determine if the benefits are valuable to those in STEM-related occupations outside of research.

If offerings that add value to membership for scientists in non-research intensive careers are lacking, societies should consider increasing this type of programming as feasible. Otherwise, it may be worth engaging in discussion on if society dues should be reduced for such members. Additionally, if possible, societies may consider engaging with current members, and prior members that did not renew, in STEM-related occupations to understand what they value in society membership, and why they choose to or not to renew.

Recommendation 5.5: Utilize inclusive language in membership category nomenclature as to not diminish other member categories.

"Full" or "regular" membership categories appear commonplace in scientific societies, and when assessed in a silo are harmless. However, if other membership categories already exist, such as associate, affiliate, lay, or similar, and/or if a membership category to include scientists in STEM-related occupations outside of research is created, the comparison of "full" or "regular" members to other categories may imply those members are less valuable to the society. Instead, consider terminology that identifies the characteristics of the group (for example, "independent research scientists") or utilize a more general term such as "members."

Conclusion

Scientific and professional societies play a critical role in upholding the standards of the field, promoting best practices, and connecting members beyond local geographies. An important aspect of cultivating the next generation of highly-skilled scientists is supporting early-career researchers. Societies can engage early-career scientists with thoughtful intention through programming and awards aimed to elevate scientists on a national level, and promote career growth through networking, mentoring, and meaningful service opportunities.

Through external and internal input, the Task Force identified five areas of focus for societies to bolster awards, programming, and engagement of early-career scientists: 1) networks and mentors; 2) career exploration and career transition readiness; 3) safe and inclusive environments; 4) support for international scientists in the U.S.; and 5) society structure and governance. Societies should ensure there is an established mechanism for needs of early-career scientists to be heard and acted upon. Accounting for needs of early-career scientists can help keep early-career scientists involved in the mission of the society as lifelong champions.

Acronyms and Abbreviations

Acronym/Abbreviation	Term
ECR(s)	Early-career Representative(s)
GSS	Survey of Graduate Students and Postdoctorates in Science and Engineering, issued by NSF
FASEB	Federation of American Societies for Experimental Biology
NASEM	National Academies of Sciences, Engineering, and Medicine
NIH	National Institutes of Health
NPA	National Postdoctoral Association
NRSA	Ruth L. Kirschstein National Research Service Award, a fellowship offered by NIH
NSF	National Science Foundation
Postdoc(s)	Postdoctoral scholar(s)
PI	Principal Investigator; typically, the research lead in an academic laboratory
SED	Survey of Earned Doctorates, issued by NSF
SDR	Survey of Doctorate Recipients, issued by NSF
STEM	Science, technology, engineering, and mathematics
STEMM	Science, technology, engineering, mathematics, and medicine

Online Focus Groups
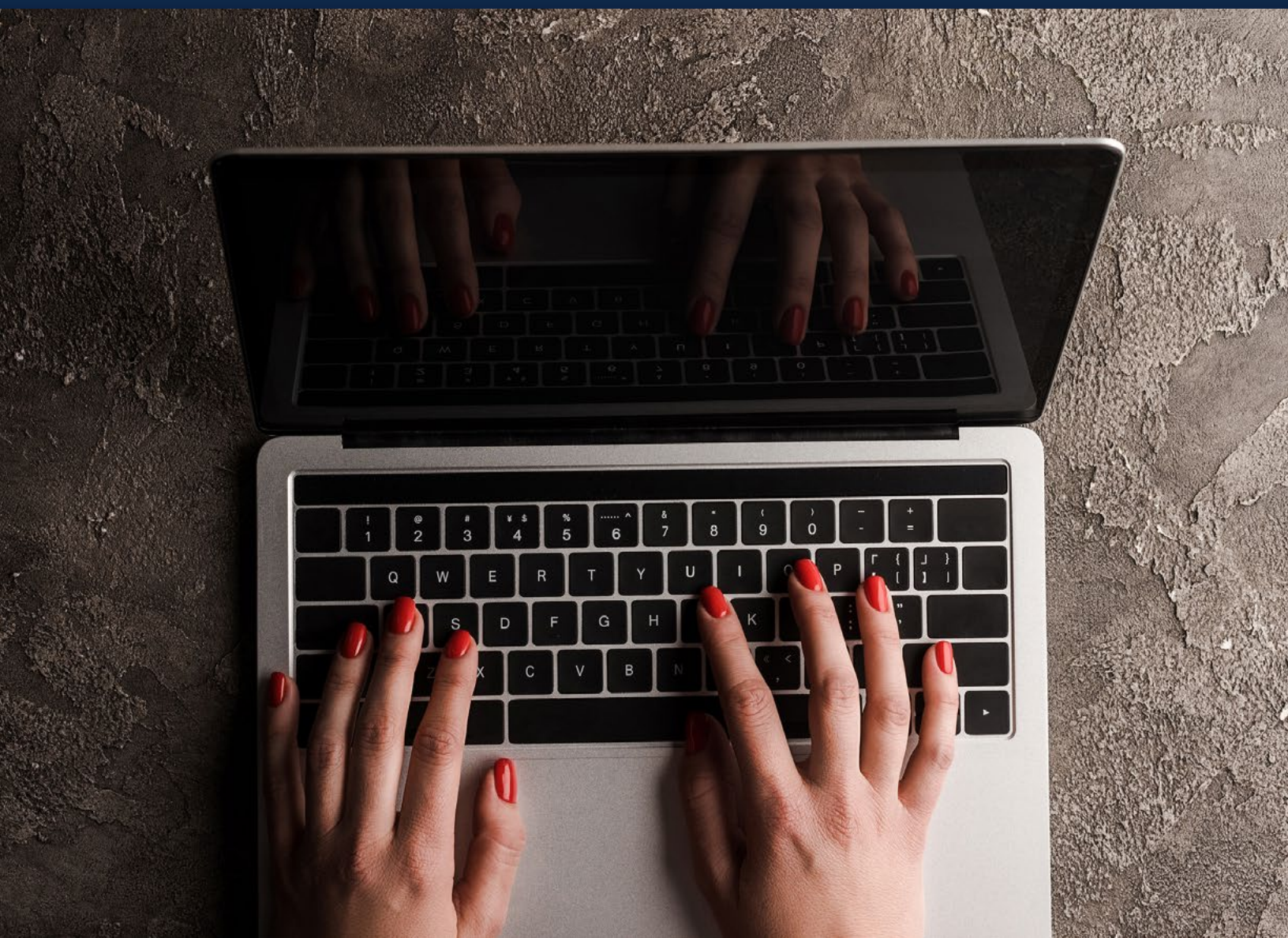
In addition to the online survey, the Task Force conducted small focus groups sessions. Conduct of the focus groups, questions to be asked during the focus groups, and storage/use of data from the focus groups was deemed exempt from IRB approval by FASEB's Protection of Human Subjects Committee.

Focus Group Topics

1. How do you interact with your scientific/professional society? Why do you, or do you not, take advantage of volunteer and professional development opportunities offered? Why or why not are you interested in having a seat on a committee, task force, board, etc.? What can scientific societies do to be valuable to you to be worth the time you put into being involved?
2. What policies, programs, or resources at societies, academic institutions, nonprofits, or other organizations have been truly helpful as an early-career scientist?
3. We know funding is a primary concern; aside from having more money and increasing pay lines, what are creative solutions you think could help mitigate the stress of funding?
4. How has your work environment (current or past) been supportive, inclusive, and healthy? What do you think helps foster an environment you want to stay in? What policies or programs are you aware of that have made environments more collegial, welcoming, and encouraging?
5. In looking forward to your next career transition, what helps you feel prepared? Or reflecting on your most recent career transition, what helped you feel prepared? What supports were lacking? What helped you feel ready?

Focus Group Participants

Task Force members suggested their colleagues to FASEB staff for focus group participation. Four focus groups were organized with two to four participants each; all participants were early-career scientists. A total of 14 early-career scientists participated in one of four focus groups held in September 2022. Self-disclosures during focus groups allowed FASEB to determine the following participant characteristics:

- **Gender:** 8 women, 6 men
- **Geographical location in the U.S.:** 6 in eastern time zone; 5 in central time zone; 1 in mountain time zone; 2 in pacific time zone
- **Career stage:** 1 graduate student; 8 postdocs; 4 assistant professors at academic institutions; 1 early-career researcher outside of academia
- **Race** (note: not all participants self-disclosed information about race): 5 Black or of African descent; 3 Asian
- **Citizenship** (note: not all participants self-disclosed information about citizenship): 6 participants indicated they were either born outside of the U.S., or are currently dealing with or in the past have dealt with barriers related to being a visa holder while in the U.S.
- **Sexual orientation** (note: not all participants self-disclosed information about sexual orientation): 1 participant indicated they are part of the LGBTQI+ community

FASEB intentionally tried to host diverse focus groups to ensure a variety of perspectives were reflected. FASEB did not explicitly collect demographic information from focus group participants to protect their anonymity.

Summary of Topic 1: Interactions with Scientific and Professional Societies

A small number of participants noted that during senior stages of graduate school they did not engage with their scientific and/or professional societies much, simply due to time constraints. Additionally, more individuals noted that even if active in the society, many societies could prioritize enhancing their communications with members. Lack of information about upcoming events and resources, outside of the annual conference, was a relatively common complaint. One participant stated that society members cannot be expected to navigate through the society's website to get information about what is happening with the society; instead, outreach must be more targeted to members.

For those more engaged with their society, many mentioned attending or helping to organize webinars, participating in leadership development activities, joining online discussions (via Slack or society chat forums) that were on narrow topics of interest (sometimes scientific, other times about resources for specific career stages, etc.), and volunteering with small tasks that do not take too much time such as being a judge for poster review.

One participant noted that their society, recognizing the time burden of volunteers, tries to ensure that there are enough volunteers to spread out the work, that way each volunteer only contributes a few hours to the effort even if the larger event takes >15 hours of planning total. They suggested this was very useful for early-career members who have limited time. A different participant noted that societies being very clear and transparent about time required for volunteer opportunities was a crucial, and a big deciding factor for them to get involved or not.

Most focus group participants commented to some degree on their society being an easy way to network outside of their institution. Attendance to the annual conference was often cited, though interactions through other means, such as virtual events/forums and volunteering, also came up. A couple of participants took this one step further, from networking to identifying mentors. One postdoc participant noted that one of their scientific societies goes to great effort to welcome new society members and usher them in, partially by helping to identify potential mentors for the new members. A different participant stated that societies have been a helpful tool to find successful scientists to serve as mentors who share traits of their identity, as that is lacking in their department at their institution.

A few participants noted serving in leadership roles at various levels in their society, with each participant offering different primary reasons for doing so. One noted that they feel the society has given them a lot – particularly with respect to organizing the annual conference and making it a great space to network, and volunteering with the society is their way to give back to the community. Another participant noted that becoming prominently involved in the society was a straightforward way to grow their network; to get their name out there and be able to easily make new connections. A third participant emphasized involvement in the society was an easy way to find a community of support outside their immediate environment. Finally, a participant stated that being involved in society volunteer leadership was a way for them to effect the change in the society they wanted to see.

All focus group participants with leadership roles in the society did also mention that this time volunteering was valuable service to list on their CVs/resumes. Additionally, they all noted, in varying degrees, that society service was a way to gain or demonstrate leadership skills and other "soft skills" not often appreciable from laboratory work.

Summary of Topic 2: Helpful Policies, Programs, and Resources

Nearly all participants stated that the ability to apply for awards through society membership or at the institution was massively helpful. The monetary award supports the work, and the award itself is a strong addition to the CV or resume.

Majority of the focus group participants noted that either society or institution run workshops on writing have been helpful. Writing pods for accountability can also be beneficial. The perceived usefulness of a writing workshop seemed to vary dramatically depending on if the topic presented and career stage of the participant was a good match (for example, learning to write a scientific paper vs a grant, for an early graduate student vs postdoc), and the webinar/workshop/course instructors' clearness and communication made an impact. Several participants also noted that even if they felt comfortable with the writing topic being presented, they may attend anyway because writing styles can be so different, and hearing different perspectives and tips is helpful.

Most participants felt that organized sessions for networking, typically around a scientific topic, were very useful. Society annual conferences are a clear place this occurs. A couple of participants also mentioned smaller, regional conferences from their society were a more comfortable setting to network as the event is less overwhelming, and travel/lodging costs are typically less than the national conference. Some institutions also put on smaller conferences for the department, or for all postdocs in the biological sciences. These come with no travel/lodging costs and are a useful way to promote interactions aimed at expanding networks.

Participants across career stages, but primarily those who identified women, praised organized, mentor match programs launched by societies. Having a structured program with intentional matches that seek to fulfill the mentoring needs of the junior scientist was commended. Those who had participated in such a program noted this was useful to find mentors outside of your institution who may be able to help open doors for you later in your career. Another stated that this was the easiest way for them to find someone outside of academic sciences to act as their mentor, which fit their career aspirations.

Postdocs in particular noted the usefulness of communities—be that through a society, Future PI Slack, or their department/ university–openness in sharing documents. Most notably, this was K99/R00 applications and faculty job search materials. Grant applications, start up package offers, templates for industry CVs, and guidance on lab policies were also stated as being helpful resources.

Of the focus group participants, those in earlier stages of their careers also noted the utility of job resources, either through their society or at the institution. Job boards and listings of job opportunities were most frequently cited as helpful. Many participants noted the potential usefulness of committees to help guide their scientific career. One participant's department approaches mentoring committees for junior faculty in a unique way. Rather than having a standing committee, the committee evolves based on the mentees career stage and needs. Committee members can, and are expected to, rotate off the mentoring committee if the mentee needs more focused advice in an area outside of their expertise. This dynamic mentoring committee helps ensure that assistant professors have access to the right person at the right time.

Specific programs/resources that were mentioned include:
- FLARE (Future Leaders Advancing Research in Endocrinology) at the Endocrine Society
- Early-career Leadership Program at the Genetics Society of America
- Multilingual Seminar Series at the Genetics Society of America
- NSFs INCLUDES Hub
- New PI Slack
- Future PI Slack
- Preparing Future Faculty program at their institution
- Using #AcademicChatter, #AcademicTwitter, and #BlackIn (field) hashtags on Twitter to find community and opportunities of interest

- PALM (Promoting Active Learning & Mentoring) Fellowship at the American Society for Cell Biology
- FRED (Faculty Research and Education Development) grant writing training at the American Society for Cell Biology
- ACT (Accomplishing Career Transitions) program at the American Society for Cell Biology
- Peer reviewer at the American Heart Association
- Career development award at the American Heart Association
- United Negro College Fund Bristol-Myers Squibb E.E. Just Postgraduate Fellowship
- Burroughs Wellcome Fund Career Awards at the Scientific Interface

Summary of Topic 3: Mitigate the Stress of Funding

Focus group participants who are currently in the U.S. on a temporary visa, or have been in that position in the past, discussed the challenges of obtaining fellowship funding when you are not a U.S. citizen or green card holder. General advice from participants who have been through this process to those just beginning was to start the application for a green card as early as possible. Otherwise, once in an independent position, applying for grants (as opposed to fellowships) is more equitable.

A few participants felt strongly that caps on early-career funding mechanisms were harmful to those with non-traditional academic trajectories. Some funding is based on years since an accomplishment, such as years since the prior degree. If a scientist takes time away from their academic journey to work, gain other skills, or deal with life events, that limits their window to apply to these funding mechanisms. One participant noted that these policies did not feel very inclusive and may work against the overall goal of broadening participation of diverse people in science.

Postdoc focus group participants frequently stated that the lack of access to benefits and/or changing access to benefits when changing funding sources caused a lot of stress. While not directly tied to funding of their scientific endeavors, it does deeply affect overall wellbeing. Lack of parental leave and matched retirement account were the most often cited stressors in terms of benefits. No funds for relocation was also a stressor for some, that is compounded by the relatively low pay for postdocs. A few participants noted that after various fees and taxes are removed from their paychecks, they are making roughly the same amount each month as a postdoc as they did in graduate school. For participants that spoke in great detail about this matter, it seemed each home institution handled postdoc pay differently. For example, one institution set postdoc pay according to their own scale. A different institution followed the NIH Ruth L. Kirschstein National Research Service Award (NRSA) stipend scale for postdocs. A third institution followed the NRSA, but your pay is based on when you entered; i.e., if your postdoc Year 0 was in 2017, you're making the Year 5 scaled stipend in 2022 but based on the 2017 scale, not the 2022 scale. Regardless of exact circumstances that dictate the postdoc stipend/salary levels, all postdocs actively participating in this focus group discussion stated unequivocally that they live paycheck to paycheck. When being paid monthly, toward the end of the pay cycle, it can be incredibly difficult to make the stipend/salary stretch until the next pay day.

Generally, participants seemed aware that their scientific society engages Congress to advocate for increased funding for biological and biomedical research. Beyond that, practical resources were suggested. Childcare at conferences and informational sessions about how to find NIH and NSF funding were mentioned.

Summary of Topic 4: Factors for a Supportive, Inclusive Environment

Most participants agreed on overarching themes of environments they would want to stay in: a place where you can be your true self, bringing all of your identities with you each day; a leader that recognizes you are a person before a worker, is empathetic, and gives you space to take care of yourself; an environment where all members are listened to and respected equally; conflicts are resolved in a fair and timely manner; team members are awarded and recognized appropriately; criticism is constructive and about the work not the person; and for academic environments, a lab with enough funding for everyone to feel stable. Most of these coalesced into key topics of clear communication and trust between colleagues, including coworkers and leaders demonstrating cultural competency.

For participants who self-identified as having one or more identities that have been historically excluded from science, being in an environment where they are not the "token" person representing their entire community was critical to their environment feeling safe and supportive. These participants also sometimes took on additional emotional labor of educating their colleagues about why certain words or phrases are offensive, and it was vital that their colleagues be open to learning and changing.

Accountability was also raised as a key component to a healthy work environment, which is sometimes lacking. Many noted that within their smaller workspace, typically an academic lab, the principal investigator sets this tone. However, the larger context of the department and institution is often privy to a Chair, Dean, Chancellor, or similar. If people in those positions of power do not hold those under their purview accountable for actions creating a hostile environment, it can be difficult for members of a well-functioning and inclusive lab to feel fully supported.

A couple of participants voluntarily flipped the question to discuss what makes environments unsafe, unsupportive, and exclusionary. Mandated, whether explicitly stated or understood expectation, long work hours were a common factor. Participants who experience this voiced that hours worked does not necessarily correlate to quality of the work. One participant did not necessarily mind working consistently long hours during that point of their career but did state it was extremely unsustainable and they knew their next career transition would need to consider expected work hours.

Participants who self-identified as graduate students and postdocs mentioned the vast power dynamics between trainees and the principal investigator in a lab. Unfair attention paid to different projects in the research portfolio, no clear policy or communication about authorship based on contributions to the project, and pressure to deliver results all contributed to toxic environments.

Summary of Topic 5: Career Transition Readiness

For those looking to transition to an independent academic position, having examples of application materials and time spent working on their research, teaching, and diversity statements helped them feel ready. Furthermore, having formal mentors and/or informal relationships with more senior people in their field to look over materials and provide feedback from the standpoint of what the search committee may be looking for was stated as being very helpful. Multiple early-career scientists from historically excluded communities also emphasized the importance of being able to identify successful people with shared identity/identities, and ideally having them be willing to become a mentor.

Regardless of goal for next career transition, there was strong consensus among focus group participants that mentors were key to career readiness. Next, access to resources such as how to negotiate, job opportunities, how to write a cover letter, and similar were mentioned. One participant noted that outside of the annual meeting, the societies they belong to lack opportunities to ask questions of experts. The societies may hold webinars, but members do not have a chance to engage with the speaker hosted by the society. This was in stark contrast to when experts were invited to the local institution, virtually or in person, as the department made a priority to have time for trainees to ask questions.

A couple of postdoc participants noted that they may have felt generally prepared to move on from their PhD to a postdoc, but upon arrival to the new institution information was lacking. Unlike grad school, where you typically arrive with a cohort, postdocs often arrive without any obvious support mechanisms—unless the principal investigator or lab colleagues go out of their way to ensure the new postdoc feels supported. Many orientations are generic and not tailored for postdocs or that department. On top of figuring out a new city, there are also routine items to learn such as how to connect to the network printer and its location. Overall, these participants wanted to point out that a transition from one place is not only readiness at the stage/organization you are moving on from, but also support in the new environment.

Online Survey Instrument

The Task Force drafted a survey to assess broad needs of early-career researchers, which was deemed exempt from IRB approval by FASEB's Protection of Human Subjects Committee. The survey was built in Survey Monkey and open from April 22 through May 22, 2022. FASEB and FASEB Member Society staff and volunteer leaders promoted the survey to their personal networks through a variety of means—listservs, personal emails, LinkedIn, Twitter, and similar. The goal was to get broad reach among the scientific community, particularly of early-career researchers.

A total of 790 participants opened the survey link. Responses were cleaned up to remove possible spam. Criteria for removal were:
• Those who opened the link, but did not respond
• Those who did not consent to the survey
• Highly incomplete surveys; answered only the first few questions
• Multiple respondents starting and ending the survey at nearly identical times (likely spam/bots)
• Respondents that consistently selected the first answer to questions
• Responses that included unintelligible text ("fdhfghsfdbfgfdsfsd") or do not make sense in the context of the question (e.g., "biological female" when asking what scientific/professional societies respondents belong to); if these were present, the entire survey submission was removed
• Answers not in English
• Answers that are copy/pasted from other questions on the same page of the survey
• Free text responses that clearly indicate the respondent is not in the target audience (e.g., participants who are working as humanists)
• Undergraduates

After cleaning, the usable sample was determined to be a maximum of 565 participants. The sample has some overrepresentation of historically excluded groups in the sciences; self-selected demographics cannot be verified.

Survey Questions and Answer Options

1. **Which of the below best describes your current career stage? (mandatory, select only one)**
   - ❑ Master's student
   - ❑ PhD Student/Candidate
   - ❑ Clinician-scientist in training (e.g., students/residents/fellows from MD-PhD, DDS-PhD, DVM-PhD, PharmD-PhD, and/or DO-PhD programs or similar)
   - ❑ Postdoctoral researcher in academia
   - ❑ Postdoctoral researcher in industry
   - ❑ Postdoctoral researcher in government
   - ❑ Early-career basic science faculty at an academic institution, within 7 years of starting your first independent position
   - ❑ Early-career clinician-scientist faculty at an academic institution, within 7 years of starting your first independent position
   - ❑ Early-career scientist in government, industry, biotech, or similar, within 7 years of starting your first independent position
   - ❑ Other early-career STEM-related occupation, within 7 years of starting your first independent position (please specify) (free text response)
   - ❑ Not listed (please specify) (free text response)
   - ❑ Prefer not to answer

2. **Do you currently belong to or have you ever belonged to a FASEB Member Society and/or the National Postdoctoral Association?** (mandatory, select only one)
   - ❑ Yes (logic will take to question 3)
   - ❑ No (logic skips question 3)
   - ❑ Prefer not to answer (logic skips question 3)

3. *(if selected "yes" to question 2)* **Please indicate your membership by selecting all that apply:** (mandatory, select all that apply)
   - ❑ American Aging Association (AGE)
   - ❑ American Association for Anatomy (AAA)
   - ❑ The American Association of Immunologists (AAI)
   - ❑ American College of Sports Medicine (ACSM)
   - ❑ American Federation for Medical Researchers (AFMR)
   - ❑ American Physiological Society (APS)
   - ❑ American Society for Biochemistry and Molecular Biology (ASBMB)
   - ❑ American Society for Bone and Mineral Research (ASBMR)
   - ❑ The American Society for Clinical Investigation (ASCI)
   - ❑ American Society for Investigative Pathology (ASIP)
   - ❑ American Society for Nutrition (ASN)
   - ❑ American Society for Pharmacology and Experimental Therapeutics (ASPET)
   - ❑ The Association of Biomolecular Resource Facilities (ABRF)
   - ❑ Association for Molecular Pathology (AMP)
   - ❑ Endocrine Society (ES)
   - ❑ Environmental Mutagenesis and Genomics Society (EMGS)
   - ❑ Genetics Society of America (GSA)
   - ❑ The Histochemical Society (HCS)
   - ❑ Shock Society
   - ❑ Society for Developmental Biology (SDB)
   - ❑ Society for Glycobiology (SfG)
   - ❑ Society for Experimental Biology and Medicine (SEBM)
   - ❑ Society for Leukocyte Biology (SLB)
   - ❑ Society for Redox Biology and Medicine (SfRBM)

- ❏ Society for the Study for Reproduction (SSR)
- ❏ Society of Toxicology (SOT)
- ❏ The American Society of Human Genetics (ASHG)
- ❏ Society for Birth Defects Research & Prevention (formerly the Teratology Society)
- ❏ National Postdoctoral Association
- ❏ Prefer not to answer

4. Please list any professional societies and scientific societies you are a member of outside of FASEB Member Societies and the National Postdoctoral Association (for example, Women in Bio, Society for the Advancement of Chicanos/Hispanics and Native Americans in Science, and similar): (free text response)

5. Other than attendance to an annual conference/meeting for scientific activities and related awards, what offerings from scientific/professional societies do you take advantage of? (select all that apply)
- ❏ Mentoring opportunities
- ❏ Networking opportunities
- ❏ Access to journals and related publications
- ❏ Scientific webinars, short courses, and/or hands-on trainings
- ❏ Professional development webinars and/or short courses
- ❏ Service on committees, task forces, councils, Board, or similar
- ❏ Subscribe to newsletter, blog, or similar
- ❏ Write content for newsletter, blog, or similar
- ❏ Participate in organized outreach activities
- ❏ Participate in organized advocacy activities
- ❏ Job services (job board, resume workshop, chalk talk prep, or similar)
- ❏ Not listed (please specify) (free text response)

6. Please tell us about one or more positive examples you have of activities, programs, policies, resources, or similar from your scientific/professional societies and why you found this helpful as an early-career scientist. (free text response)

7. What opportunities do you wish your scientific/professional societies offered to help early-career scientists? (free text response)

8. What are some of your biggest professional development needs? (rank top 5)
- ❏ Early-stage career preparation (examples: career exploration, help with building CV or résumé, conducting informational interviews, shaping your online professional identity via website or LinkedIn or similar)
- ❏ Academic job search, application, interviewing, negotiation, and similar
- ❏ Non-academic job search, application, interviewing, negotiation, and similar
- ❏ Mentee/mentor and networking opportunities and relationships
- ❏ Communication skills and techniques (examples: technical writing, lay-term writing, oral presentations)
- ❏ Effective people skills (examples: teamwork, healthy conflict, emotional intelligence, management, resilience, mindfulness)
- ❏ Field specific skills (examples: grant writing, SAS, writing a business plan, creating pivot tables, understanding regulatory pathways, etc.) (please specify) (free text response)
- ❏ Not listed (please specify) (free text response)

9. Do you seek or have you sought professional advice and/or mentorship from people outside of your current and prior institutions/organizations? (select only one)
- ❏ Yes (logic will take to 10)
- ❏ No (logic will skip 10)

10. How did you build and establish this connection with people outside of your current and prior institutions? For example, did you meet at a conference and keep in touch, or are you research collaborators on a paper, or do you volunteer at the same organization outside your workplace, etc.? (free text response)

11. Have you largely experienced supportive, inclusive, and safe work environments as an early-career scientist?
(select only one)
❑ Yes (logic will take to 12)
❑ No (logic will skip 12)

12. What do you think has helped influence a positive, inclusive work culture (for example, policies, programs, resources, attitude of leadership and/or peers, etc.)? (free text response)

13. Do you feel confident that you will be prepared for your next career transition when the time arrives?
(select only one)
❑ Yes; please provide examples of what has helped you feel prepared for career transition (free text response)
❑ No; please provide skills areas you feel least confident in for your career transition (free text response)

14. Are there any other programs, policies, resources, experiences, or suggestions you would like to tell FASEB about?
(free text response)

Recognizing early-career scientists are not a homogenous group, FASEB is interested in assessing how career needs vary between different demographic groups. Collecting voluntary demographic information will enable FASEB to analyze answers by demographic categories. All questions are optional, but FASEB greatly appreciates your consideration to answer these demographic collection questions. Questions are modeled after data collection by the U.S. Census, National Institutes of Health, and/or National Science Foundation. There is no option of "prefer not to answer," as seen in many federal agency demographic collections, because all questions are optional; a non-answer is assumed as preferring not to answer. Additionally, FASEB recognizes language is evolving and some classifications may be outdated or simplified. FASEB hopes congruency with federal agencies may create respectability with a broad audience of stakeholders when aggregate data is presented. FASEB also respects your privacy and has consciously decided to keep demographic categories relatively broad, instead of narrowing down to be more disaggregated, to help maintain your anonymity.

15. To which gender identity do you most identify (select only one)
❑ Genderqueer, gender non-conforming, gender fluid, agender, non-binary, or similar
❑ Man
❑ Woman
❑ Not listed (please specify) (free text response)

16. Are you of Hispanic, Latino, or Spanish origin? (select only one)
❑ No
❑ Yes

17. What is your race? (select all that apply)
❑ American Indian or Alaska Native
❑ Asian
❑ Black or African American
❑ Native Hawaiian or Other Pacific Islander
❑ White
❑ Not listed (please specify) (free text response)

18. Do you identify as a person with one or more disabilities? (select only one)
- ❏ No
- ❏ Yes

19. Are you a: (select only one)
- ❏ U.S. citizen
- ❏ Permanent U.S. resident (green card holder)
- ❏ Temporary U.S. resident on a visa for temporary work (H-1B, L-1A, etc.) or for study or training (J-1, F-1, etc.) or for another reason

20. Are you from a disadvantaged background, as defined by National Institutes of Health as meeting two or more of the following:
- • Were or currently are homeless, as defined by the McKinney-Vento Homeless Assistance Act (Definition: https://nche.ed.gov/mckinney-vento/);
- • Were or currently are in the foster care system, as defined by the Administration for Children and Families (Definition: https://www.acf.hhs.gov/cb/focus-areas/foster-care);
- • Were eligible for the Federal Free and Reduced Lunch Program for two or more years (Definition: https://www.fns.usda.gov/school-meals/income-eligibility-guidelines);
- • Have/had no parents or legal guardians who completed a bachelor's degree (see https://nces.ed.gov/pubs2018/2018009.pdf);
- • Were or currently are eligible for Federal Pell grants (Definition: https://www2.ed.gov/programs/fpg/eligibility.html);
- • Received support from the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) as a parent or child (Definition: https://www.fns.usda.gov/wic/wic-eligibility-requirements).
- • Grew up in one of the following areas: a) a U.S. rural area, as designated by the Health Resources and Services Administration (HRSA) Rural Health Grants Eligibility Analyzer (https://data.hrsa.gov/tools/rural-health), or b) a Centers for Medicare and Medicaid Services-designated Low-Income and Health Professional Shortage Areas (qualifying zipcodes are included in the file). Only one of the two possibilities in this criterion can be used as a criterion for the disadvantaged background definition.

(select only one)
- ❏ Yes
- ❏ No

21. Do you identify as a member of the lesbian, gay, bisexual, transgender, queer or questioning, intersex, asexual, and other sexual and gender minorities (LGBTQIA+) community? (select only one)
- ❏ Yes
- ❏ No

22. Do you provide regular unpaid assistance or care to a family member or friend?
- ❏ Yes, primary caregiver
- ❏ Yes, shared responsibilities caregiver
- ❏ No

23. What country has majority of your scientific training taken place in? (select only one)

❏ United States	❏ China	❏ India
❏ South Korea	❏ Taiwan	❏ Canada
❏ Nepal	❏ Brazil	❏ Colombia
❏ Turkey	❏ Thailand	❏ Other (please specify) (free text response)

Survey Respondent Demographics

Demographic data were optionally collected. Of the maximum 565 participants, the following demographic information was self-disclosed:

Career stage (N=565):
- 91 postdocs in academia
- 87 PhD students or candidates
- 75 early-career basic sciences faculty
- 68 master's students
- 56 early-career clinician-scientist faculty
- 55 clinician-scientists in training
- 45 early-career scientists in government, industry, biotech, or similar
- 32 postdocs in government
- 23 early-career scientists in STEM-related occupation
- 20 postdocs in industry
- 8 not listed
- 5 prefer not to answer

Gender identity (N=446):
- 0.2 percent not listed
- 9.2 percent genderqueer, gender non-conforming, gender fluid, agender, non-binary, or similar
- 41.3 percent women
- 49.3 percent men

Ethnicity (N=433):
- 34.4 percent Hispanic, Latino, or Spanish Origin
- 65.6 percent not Hispanic, Latino, or Spanish Origin

Race (N=434, participants were allowed to select multiple):
- 1.2 percent not listed
- 7.6 percent Native Hawaiian or Other Pacific Islander
- 13.8 percent American Indian or Alaska Native
- 18.0 percent Asian
- 21.7 percent Black or African American
- 46.8 percent White

Disability status (N=432):
- 24.3 percent disabled
- 75.7 percent non-disabled

Citizenship/residency (N=431):
- 9.0 percent temporary U.S. resident on a visa for temporary work (H-1B, L-1A, etc.) or for study or training (J-1, F-1, etc.) or for another reason
- 14.8 percent permanent U.S. resident (green card holder)
- 76.1 percent U.S. citizen

Disadvantaged background per the NIH definition (N=433):
- 27.0 percent not from a disadvantaged background
- 73.0 percent from a disadvantaged background

LGBTQIA+ identity (N=435):
- 45.5 percent not LGBTQIA+
- 54.5 percent LGBTQIA+

Caregiving status (N=434):
- 27.6 percent with no caregiving responsibilities
- 33.2 percent with shared caregiving responsibilities
- 39.2 percent with primary caregiving responsibilities

Country where majority of scientific training has taken/is taking place (N=437):
- 80.8 percent United States
- 5.3 percent all other countries
- 3.4 percent Canada
- 3.4 percent Taiwan
- 3.2 percent India
- 2.3 percent South Korea
- 1.6 percent China

Task Force Members

Voting Members
Vijay Kale, BVSc, MVSc, PhD, DABT, ERT - *Task Force Chair*
Lori Raetzman, PhD - *Task Force Vice Chair*
Kirsten F. Block, PhD
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