

Science & Society

Addressing the Gender
Gap in Research:
Insights from a Women
in Neuroscience
ConferenceMarian E. Berryhill^{1,3,*} and
Theresa M. Desrochers^{2,3}

There has been growing interest in quantifying the proportion of women participating in scientific conferences, publications, and committees. Numbers reveal persistent disparities, but offer few cures to the root causes of the gender gaps in research. Toward remediation, we outline five lessons learned through organizing two conferences for Women in Neuroscience (WiN). These recommendations build on participants' comments, and aim to better support women in their scientific paths and help provide equal opportunity.

The ongoing Coronavirus 2019 (COVID-19) pandemic has highlighted the importance of mentoring and a sense of community to job satisfaction and productivity, including in scientific careers. One of the outcomes of the isolation experienced during the pandemic was a renewed appreciation for the centrality of connecting with others, on both intellectual and personal levels. The current challenges, we argue, also offer an opportunity to revisit the value of representation within the scientific community. Here, we draw on participant voices from women in neuroscience attending a conference we organized as part of a National Science Foundation (NSF)-funded collaborative research grant between Dartmouth College,

Brown University, Montana State University, and the University of Nevada, Reno.

The WiN conference included 20–30 participants and took place over 4 days during the summers of 2018 and 2019 (the 2020 conference was a COVID-19 victim). The attendees were women, predominantly graduate students, who participated in workshops (e.g., how to give a conference talk or elevator pitch), networking events, and a Keynote Woman in Neuroscience address. As organizers, we tapped our own experiences as participants in similar events to develop a meaningful program. In this article, we draw on insights gained through the WiN meeting and enriched by participant feedback. We revisit persistent challenges in balancing representation within the scientific community, and discuss several ways to address gender-related gaps. We also provide this as a reminder of the real-world impact of bringing together women in science, technology, engineering and mathematics (STEM) fields for this purpose, especially in light of the global COVID-19 pandemic and its disproportionate and detrimental effects on women in STEM fields [1].

Workforce development is an important component of training researchers, and it is recognized by the NSF as one of its institutional goals. Toward that end, we targeted the gender gap in the neuroscience professoriate. Despite significant advances in the proportion of women in graduate training and receiving PhDs (both of these were estimated to be >50% in the USA in 2019 in psychology and the life sciences) [2], there remains a persistent gender gap in tenured faculty positions (e.g., [3]), and these patterns are further exacerbated for women of underserved ethnic/racial groups [4]. Importantly, the personal support mechanisms sought by female faculty members value personal relationships more heavily than they do institutional ones [5]. These observations reveal the importance of providing training

opportunities that focus on networking skills and on mentoring for female trainees.

Lesson 1: Networking Opportunities

Women's networks predict women's future professional success. Those women with a female-dominated inner support network tend to obtain job placements [6]. The postconference feedback consistently highlighted the perceived value of interacting with women scientists from other institutions, and from listening to women who were more advanced in their careers. Importantly, attendees noted that this experience 'helps me to feel like I am not alone'. Other comments illuminated existing gaps in mentoring from senior women and the positive response when it was offered. Many women experience imposter syndrome, the feeling that they do not belong and/or are undeserving of their current position in the field. Women without female mentors or role models in their professional networks are more likely to leave the field [7]. Similar gaps exist when considering decisions surrounding work-life balance and parenting responsibilities, thereby highlighting the need for regular communication on these sensitive issues for female trainees.

Lesson 2: Mentoring and Environment

Attendee comments also converged on the issue of the training environment and mentoring. Gender inequalities persist in the areas of hiring [8], scientific citations [9], grant funding [10], and the extent and burden of assigned service [11]. The latter can be due to a well-intentioned attempt to balance committee membership but select from a smaller pool of available women.

Several opinion articles and research papers emphasize the role of mentorship in the experiences of women in STEM [12,13]. This emphasis was reflected in the feedback received, such as, 'Seeing such successful women is inspiring ... It's helped me learn and grow'. Among other strategies, we

support expanded use of co-advising to prevent ‘blurry boundaries’ and more egregious faculty misdeeds [14].

Women report actively looking for women as role models and struggle with feelings of isolation because of their gender. In their feedback, trainees noted, for instance: ‘It has given me tools to deal with often being the only woman in the room.’, ‘It reminded me that I do have support and am not alone. I tend to need this reminder every few months because I get down on myself as a researcher and a woman in science and wonder what’s the point and why I’m here’. Institutions are not wasting time supporting mentoring initiatives, they are building a bigger tent.

Other comments highlighted a further advantage of mentorship: a greater understanding of the challenges that lie ahead for trainees. Many graduate programs have similar numbers of male and female students, potentially obfuscating evidence of later challenges. Trainees valued gaining better understanding of the leaky pipeline for women and perspectives on what that gap comprises. Our view is that it is better to have information before you need it.

Lesson 3: Know Your Options

Female faculty members are regularly asked by trainees considering academic paths whether raising children is possible in parallel to pursuing a research career, and how to navigate career and family responsibilities. The issue was also a topic of discussion at WiN. Policies vary tremendously across universities and research institutions regarding maternity leave, childcare availability, tenure clock pauses, and so on. One of the most highly ranked suggestions for future conference discussions was a ‘Discussion of institutional policies which can affect women’. These policies serve as visible indicators of the values of the institution. The hope of one attendee, which is echoed by many women, was ‘... to learn more

about the current situation of my gender in the field and through this conference, set concrete, achievable objectives on how to minimize the gap’. We advocate for transparent and inclusive policies that account for the time, cost, and effort involved in raising children. Examples include paid family leave, facilities and time to express milk for those choosing to breastfeed, and on-campus childcare. Importantly, these policies should be clearly communicated and consistent across academic ranks (students, post-docs, and faculty). Knowing to use the faculty handbook to investigate such policies can mitigate some anxiety and help people make multifactorial decisions carefully.

Lesson 4: (Constructive) Feedback Matters

Both the 2018 and the 2019 WiN conferences required trainees to present their work to scientists from different subfields and receive feedback. In 2018, there was also a workshop guided by a public-speaking expert. Participants identified practicing presentations and receiving supportive feedback as one of the most useful and confidence-building aspects of the conference. One participant noted that, ‘seeing the features that made a presentation really smooth and common pitfalls people make were so helpful’. Several noted that working on presenting improved confidence and comfort with communicating their science in front of large groups of people. Given the centrality of scientific presentations in research careers, and gender-related differences in the dynamics around them, we encourage particular emphasis on continuous, kind, and constructive feedback during lab meetings or department presentations. For example, feedback forms could be distributed with a few short questions to generate constructive feedback for trainee presentations. We emphasize the value of regular feedback for trainees, because it costs little time or effort and has the

potential to improve confidence and quality of presentations [15].

Lesson 5: Self-Advocacy

The intended theme for the cancelled 2020 WiN conference was self-advocacy. One reason why women may sometimes refrain from submitting applications or asking for resources is because they believe themselves to be less qualified than their male counterparts. Participant comments from previous conferences indicated that they want strategies to approach challenging conversations and to get what they need without being perceived as difficult. This propagates through many aspects of science, such as applying for grants, fellowships, awards, symposia, and jobs. Drafting or soliciting letters of recommendation and personal statements may also be difficult for trainees who do not have experience in accurately characterizing their own accomplishments. We advocate for hands-on workshopping of writing skills and even support the requirement to submit some application [e.g., National Research Service Award (NRSA) or Graduate Research Fellowship Program (GRFP)]. These and other measures will help build the self-advocacy and negotiation skills necessary in science.

Concluding Remarks

Gender equity in science must surpass simply balancing the numbers of women and men in the department. We have summarized five lessons derived from feedback provided by WiN participants. These lessons apply generally to women in STEM fields. We also highlighted the importance of work-related network and sense of community; constructive feedback and strengthening presentation skills; mentoring and career advice; and building competency in self-advocacy. Undoubtedly, the post-COVID-19 world will be altered. Our hope is that starting anew provides us all with an opportunity to optimize research environments and share the joy of discovery with the whole of our community.

Acknowledgments

We thank Peter Tse, PI of the NSF Track II EPSCOR OIA 1632738, which supported this work, and our collaborators within the Attention Consortium (Kelsey Clark, Jeremy Manning, Patrick Cavanagh, Alireza Soltani, Barbara Jobst, David Sheinberg, Barry Connors, Charles Gray, James Mazer, and Gideon Caplovitz), administrative assistance from Natalie Stephenson and Cody Plante, Participants of WIN 2018 & 2019, and Sage Fox Consulting.

Declarations of Interests

The authors declare no competing interests in relation to this work.

¹University of Nevada, Reno, NV 89557, USA

²Brown University, Providence, RI 02912, USA

³These authors have contributed equally

*Correspondence:

mberryhill@unr.edu (M.E. Berryhill).

<https://doi.org/10.1016/j.tins.2021.03.004>

© 2021 Elsevier Ltd. All rights reserved.

References

- Kramer, J. (2020) Women in science may suffer lasting career damage from COVID-19. *Sci. Am.* August 20
- National Center for Science and Engineering Statistics (2019) *Doctorate Recipients from U.S. Universities: 2019*, NSF
- Machlovi, S. et al. (2021) Women in neuroscience: where are we in 2019? *J. Neurosci. Res.* 99, 9–12
- Lambert, W.M. et al. (2020) Career choices of underrepresented and female postdocs in the biomedical sciences. *Elife* 9, e48774
- Kelly, B.T. (2019) *Though more Women Are on College Campuses, Climbing the Professor Ladder Remains a Challenge*, Brookings
- Yang, Y. et al. (2019) A network's gender composition and communication pattern predict women's leadership success. *Proc. Natl. Acad. Sci. U. S. A.* 116, 2033–2038
- Blackburn, H. (2017) The status of women in STEM in higher education: a review of the literature 2007–2017. *Sci. Technol. Libr.* 3, 235–273
- Sheltzer, J.M. and Smith, J.C. (2014) Elite male faculty in the life sciences employ fewer women. *Proc. Natl. Acad. Sci. U. S. A.* 111, 10107–10112
- Dworkin, J.D. et al. (2020) The extent and drivers of gender imbalance in neuroscience reference lists. *Nat. Neurosci.* 23, 918–926
- Wittman, H.O. et al. (2019) Are gender gaps due to evaluations of the applicant or the science? A natural experiment at a national funding agency. *Lancet* 393, 531–540
- Casad, B.J. et al. (2021) Gender inequality in academia: problems and solutions for women faculty in STEM. *J. Neurosci. Res.* 99, 13–23
- Singleton, K.S. et al. (2021) An open letter to past, current and future mentors of Black neuroscientists. *Nat. Rev. Neurosci.* 22, 71–72
- Stout, J.G. et al. (2011) STEMing the tide: using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM). *J. Pers. Soc. Psychol.* 100, 255–270
- Somerville, L. (2018) What can we learn from Dartmouth? Science Published online November 20, 2018. <https://doi.org/10.1126/science.caredit.aaw1370>
- Hattie, J. and Timperley, H. (2007) The power of feedback. *Rev. Educ. Res.* 77, 81–112