



# Reply to Hu: Postdoctoral consortia remove barriers to retention and effectively prepare participants for career advancement

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We agree with Hu's primary conclusion that long-term assessment of postdoctoral success, comparing among consortia and other training models, is needed (1). However, we disagree with Hu's assertion that postdoctoral consortia poorly prepare participants for future positions due to their unique, supportive culture. Consortia do exactly the opposite by equipping postdocs with the skills they need to succeed while simultaneously reducing barriers to retention for scientists from diverse backgrounds (2).

Postdoctoral consortia provide critical skills that aid members in overcoming difficulties in their next positions, regardless of career trajectory. Consortia train postdocs to balance competing interests, such as multiple interdisciplinary projects and individual lab projects, by providing peers as role models. Within a consortium, postdocs proactively improve their communication skills and work through varying issues like shifting project leadership. Consortia also train participants in interpersonal and collaborative skills that are highly valued and often are explicit requirements in both academic and nonacademic sectors (3, 4). Furthermore, consortia maximize postdocs' professional networks and relationships with colleagues across multiple institutions, thus providing increased access to opportunities for career advancement.

Postdoctoral consortia also aid in removing barriers to retention. Postdoctoral positions are a key, but short-term, career stage where the scientific community frequently loses talented professionals due to systematic barriers (5). These difficulties are especially pronounced for scientists from historically excluded groups, who face a "hostile obstacle course" consisting of barriers such as racism, harassment, and career isolation (6). Just as graduate students, faculty, and new industry hires are often trained as a group, the consortium model uses a cohort structure to build community and collegiality, while simultaneously allowing for flexible and remote work arrangements. This cohort structure creates a lasting community and a network of peers at varied career stages that can provide career guidance during the postdoc position and the transition into subsequent positions (7)—both of which occur during notably isolating career stages. This peer network, these career opportunities, and these mentor/mentee relationships can actively mitigate negative

mental health outcomes (8) and support high-quality research (9). There are unanticipated difficulties present in every job; consortia support members by establishing a collaborative culture that teaches the awareness and the resilience necessary to address those future difficulties.

Our goal is to highlight for the broader scientific community that training early career scientists in a collaborative environment will help to cultivate a new paradigm in research culture, one that is more just, inclusive, and supportive. After all, today's postdocs are the principal investigators, industry scientists, and policy leaders of tomorrow. The consortium model helps to normalize more transparent, equitable management practices that support the kind of talented, diverse, and creative scientific workforce that is required to address global challenges (10). We advocate for increased funding for, and creation of, consortia, in parallel with funding for long-term evaluation of postdoctoral consortium outcomes.

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1. X. Hu, The value of collaborative consortia postdoctoral training programs needs further long-term observation and research to acknowledge. *Proc. Natl. Acad. Sci. U.S.A.* **121**, e2418133121 (2024).
2. H. E. Lowman *et al.*, Collaborative consortia can boost postdoctoral workforce development. *Proc. Natl. Acad. Sci. U.S.A.* **121**, e2401812121 (2024), 10.1073/pnas.2401812121.
3. L. Gratton, T. J. Erickson, Eight ways to build collaborative teams. *Harvard Business Rev.* **85**, 100 (2007).
4. S. Acharya *et al.*, The science behind soft skills: Do's and Don'ts for early career researchers and beyond. *Open Res. Europe* **3**, 10 (2023), 10.12688/openreseurope.15746.2.
5. C. Woolston, Postdocs under pressure: "Can I even do this anymore?" *Nature* **587**, 689–692 (2020), 10.1038/d41586-020-03235-y.

6. A. A. Berhe *et al.*, Scientists from historically excluded groups face a hostile obstacle course. *Nat. Geosci.* **15**, 2–4 (2022), 10.1038/s41561-021-00868-0.
7. R. Deanna *et al.*, Community voices: The importance of diverse networks in academic mentoring. *Nat. Commun.* **13**, 1681 (2022), 10.1038/s41467-022-28667-0.
8. H. Nicholls *et al.*, The impact of working in academia on researchers' mental health and well-being: A systematic review and qualitative meta-synthesis. *PLoS One* **17**, e0268890 (2022), 10.1371/journal.pone.0268890.
9. R. Rahal *et al.*, Quality research needs good working conditions. *Nat. Hum. Behav.* **7**, 164–167 (2023), 10.1038/s41562-022-01508-2.
10. V. J. Owan *et al.*, Collaboration and institutional culture as mediators linking mentorship and institutional support to academics' research productivity. *Educ. Res. Policy Practice* **23**, 19–44 (2024), 10.1007/s10671-023-09354-3.