Disruptive Momentum: The Value of Implementing Best Practices in Health Research Postdoctoral Mentorship

Kelley Arredondo, PhD*
Hilary N. Touchett, PhD, RN
Nipa Kamdar PhD, RN, FNP-BC
Natalie Hundt, PhD
Jennifer L. Bryan, PhD

Abstract

COVID-19 called attention to the challenges postdoctoral fellows in health research face when they have times of prolonged disruption or changes in work conditions; this disruption revealed key insights on how mentors, fellows, and their institutions can work together to ensure training continuity. To prepare strong scientists, postdoctoral fellowships need mentoring, training, and networking opportunities to enhance fellows' professional and skill development. In this article we outline potential solutions to minimize the impact of disruptions while promoting adaptable postdoctoral fellowship experiences by addressing how mentors and fellows alike can intervene on three key aspects of fellowships in health research: mentorship, training, and networking.

*Corresponding author can be reached at: Kelley.Arredondo@bcm.edu

Introduction

During the COVID-19 pandemic postdoctoral fellows, already in complex academic settings, found themselves navigating a shifting environment as the pandemic pushed most research from labs and institutions to isolated home settings (Suart et al., 2021). The pandemic exacerbated many barriers for fellows during a critical period when emerging researchers need mentoring and training to develop scientific skills and independence (Committee to Review the State of Postdoctoral Experience in Scientists and Engineers et al., 2014). For example, with cancellations of (or inability to attend) key networking opportunities (e.g., professional meetings, conferences, and training opportunities), fellows lost valuable opportunities during a pivotal time to meet and connect with others while showcasing their work to the scientific community. Some organizations adapted and leveraged virtual spaces to offer innovative professional development opportunities, such as hosting fully virtual conferences (Falk & Hagsten, 2021). This transition is likely to improve access to these opportunities due to the reduced burden and cost of travel, particularly with regard to trainees with child and elder care responsibilities, or those with more modest training funds (Jain et al., 2022).

However, in closer examination of pandemic-related impacts on trainees, many programs struggled to adapt to fellows' needs during the pandemic, indicating a need to reinforce strategies that protect against unplanned disruptions. Approximately 80% of 7,287 fellows surveyed worldwide reported having difficulty performing experiments during the pandemic, and 57% had difficulty sharing their research findings (Woolston, 2020). Additionally, fellows rely on the experience and advice of mentors to achieve their goals during fellowship; but it can become difficult to establish cohesion

with mentors when fellows are not co-located with mentors. In fact, 59% of fellows struggled to discuss ideas with their principal investigator during the pandemic (Woolston, 2020). Furthermore, 29% of fellows were dissatisfied and believed their mentors had not done everything they could to support them during the pandemic, with women reporting higher levels of dissatisfaction than men (Woolston, 2020).

These issues are particularly salient, given the known barriers to entry and retention of diverse faculty members. For example, using mentorship teams and multi-institutional training is one tool to support career development among trainees from underrepresented groups (Culpepper et al., 2021; Shen et al., 2022); but supporting mentees can be more challenging remotely or in the context of those needing highly flexible schedules. Since minorities and women have more family obligations than white men (Cardel et al., 2020; Fuligni et al., 2003; Power, 2020), obligations, such as taking care of children, older family members, or family members with disabilities, can significantly impact career trajectory (Fuligni et al., 2003; Power, 2020). The pandemic exacerbated this trend, making it even more difficult for women and minorities to accomplish academic endeavors (Cardel et al., 2020), which may impact attempts to support those from underrepresented backgrounds (Andrade et al., 2022).

Using lessons learned from this global disruption emphasizes how implementing certain measures (e.g., interinstitutional mentorship teams, remote and flexible work schedules, and virtual conferences) can enhance postdoctoral fellowships to minimize the impact of prolonged disruption at the individual level (e.g., sickness, pregnancy, deployment, sabbatical) or change in work conditions (e.g., distance-based traineeships, telework, field work). This ultimately enhances accessibility of training opportunities for individuals from underrepresented communities while maximizing fellowship impact.

Moving forward, it is essential to consider whether traditional postdoctoral models in which administrative matters occur *ad hoc* serve the modern training environment (Davis, 2009; Fork et al., 2021). By applying evidence-based practices and integrating innovations used during the COVID-19 pandemic, academic health research has an opportunity to adapt traditional training and mentoring models. In a postpandemic setting, workforce demand for flexible schedules, remote work, and virtual collaboration means that close collaboration with mentors outside one's geographic region are becoming more commonplace (Fork et al., 2021). This expanding virtual reach for collaboration will likely drive global scientific advancement but also highlights the advantages of deft flexibility in training programs.

In this article, we present evidence-based practices for the professional development of fellows through mentoring, training, and networking opportunities that promote flexibility and inclusivity while improving overall postdoctoral training. Many of these suggestions are good training practices that become critical in times of disruption. Given the increasingly competitive and complex health research landscape, trainees, mentors, institutions, and professional societies should work together to support evolving norms.

Evidence-based Practices for Postdoctoral Fellowship Principles

The goal of fellowships is to provide newly trained doctoral graduates with independent research opportunities and protected time to establish collaborations, network with others in the field, and establish themselves in the intended area of expertise (Åkerlind, 2009). Mentoring is an essential component of postdoctoral training that

provides fellows (mentees) with guidance and development from an experienced mentor, to facilitate personal and professional development (Chandler et al., 2016; Eby et al., 2010). Disruptions in mentoring, training, and networking opportunities can negatively impact fellows' professional development and ability to secure gainful employment. However, fellows and mentors can implement solutions to mitigate the negative effects of disruptions by incorporating evidence-based practices and flexibility as needed throughout the traineeship.

Mentoring Teams Provide Comprehensive Support and Stability

Formal and informal mentoring differ in that formal mentoring is structured, with regularly scheduled meeting and planned topics, and includes consistent meetings with the fellow's entire mentor team (Joo et al., 2012). A mentor team provides fellows with access to different perspectives, knowledge, skills, and abilities to enhance their professional development (Chandler et al., 2016). Team mentorship provides stability when individual mentors experience disruptions and allows flexibility as mentees develop and explore career goals. Additionally, mentor teams allow fellows to have multiple developmental relationships, including primary mentor, sponsors, and coaches (Joo et al., 2012). *Primary mentors* interact frequently with mentees, providing career-related and psychosocial support (Baranik et al., 2010); primary mentors should embody many of the fellow's career goals, including work-life balance. *Sponsors* publicly support mentees by endorsing mentees for prestigious assignments, award nominations, and desirable career opportunities (Baranik et al., 2010). *Coaches* help mentees develop specific skills or behaviors to achieve objectives in line with

their career goals (Baranik et al., 2010). Mentorship teams should provide a balanced mix of developmental relationships to help with career-related and psychosocial elements (Higgins & Kram, 2001). To assess mentorship needs, fellows can make a list or use tools such as the Developmental Network Questionnaire to ensure their mentorship team covers essential roles (Higgins, 2004).

Open Communication Facilitates Co-operation

Structured plans for staying connected during disruption should allow flexibility while meeting the needs of all parties. Maintaining a scheduled communication routine or meeting to stay up to date on fellows' career developments and needs helps mentors and mentees have a clear understanding of the fellow's needs as well as the mentor's expectations (Chopra & Saint, 2017). To simulate the availability and collaboration that occur from being in the office, mentors can use informal communication platforms, such as Slack® or Microsoft® Teams.

Exploring Developmental Opportunities Promotes Growth

Training is another fundamental part of fellowships. The National Academies of Sciences recommends that postdoctoral fellowships provide fellows with learning and training opportunities (2018). For example, virtual training has been shown to be a successful way to deliver continuing education for geographically dispersed health professionals (Bryan et al., 2018). While mentors and fellows may have limited access to advance projects during disruptions, they can use this time to seek out formal and informal training opportunities to learn new skills. Conducting systematic reviews, working with public data sets, such as the

European Data Portal, Datos Abiertos, ATUSERVICIO, and National Health and Nutrition Examination Survey, allows ongoing research productivity and skill development when clinical research is not feasible. Mentors can facilitate developmental opportunities by curating workshops and trainings within specific interest areas to enrich fellows' professional development. Additionally, mentors can assist fellows by sharing grant opportunities and resources specific to those early in their careers.

Institutional Support Can Promote Success

Institutions that host postdoctoral traineeships can support successful programs in a myriad of ways. Incorporating mentorship satisfaction into faculty performance evaluations and allocating financial resources, dedicated personnel, and protected mentorship time for faculty provide incentivization (Maisel et al., 2017). Implementing structured elements into postdoctoral programs can help mentors and fellows overcome barriers by having clear program objectives, policies, guidelines, and activities (Culpepper et al., 2021; Hezlett & Gibson, 2005; Joo et al., 2012). Additionally, institutional coordination can facilitate cross-team, department, and interdisciplinary collaborations. Interdisciplinary research is an effective model for studying complex problems (Aboelela et al., 2007) and is more impactful (Larivière et al., 2015), more productive in publications and grants (Levitt & Thelwall, 2009), and more highly cited (Chen et al., 2015). Institutions can facilitate inter-disciplinary connections by providing formal networking opportunities by hosting research incubator events such as hackathons, datathons, and virtual showcases, and by creating interinstitutional

social events (Aboab et al., 2016; Komssi et al., 2014).

Networking Cultivates Innovation

Having opportunities to network and develop a large interdisciplinary professional network helps individuals with career-related outcomes, such as finding a job or getting promoted. However, presenting oneself professionally, solidifying skills, and networking are challenging tasks for newly minted independent scientists. These skills are especially important for women (Shen et al., 2022) and trainees from underserved social backgrounds including low-income and/or working-class, first-generation college graduates, racial/ethnic minorities, or immigrant families (Zacher et al., 2019). Professional acculturation can seem especially daunting for those with limited access to formal career mentors and professional models, which is why thoughtful socialization and support are key to helping fellows establish strong networks (Bäker et al., 2018). Compounding this challenge, many fellows move to new institutions, often far from prior support networks, creating significant pressure to quickly establish supportive academic networks (Burgio et al., 2020).

Organizations and professional societies can use free virtual platforms to promote wider networking and collaboration. For example, some platforms allow the customization of different access rights for different communication channels and live broadcast for synchronous learning and collaboration and provide simultaneous video and text communications across large numbers of users and groups (Kruglyk et al., 2020). When selecting virtual platforms, consider platforms that are accessible to a variety of users. Platforms such as Discord® use lower bandwidth than other virtual

platforms, meaning that they are accessible to those with lower Internet speeds and slower devices (Kruglyk et al., 2020). Using these approaches, many previously in-person professional opportunities were converted to virtual modes, presenting an opportunity to normalize virtual networking and collaborative experiences globally (Black et al., 2020; Blackman et al., 2020; Falk & Hagsten, 2021).

With creative networking, fellows can deepen their integration in the field. Though formal presentation opportunities might be reduced, active social media involvement on platforms like Twitter®, ResearchGate®, and/or blogs, and even brief posts about work or visual abstracts increases name recognition (Izquierdo-Iranzo et al., 2020; Jordan & Weller, 2018). If applicable, fellows can engage with community organizations to develop new relationships and provide additional platforms to promote work. Fellows and mentors can extend mentorship and collaborative networks by intentionally seeking out new connections through existing contacts (Goel & Grimpe, 2013). Fellows may also benefit from passive networking through professional affiliations, alumni networks, and social media to celebrate important achievements, commiserate on shared struggles, and collaborate in problem solving (Goel & Grimpe, 2013).

Conclusion

Fellowship is a transitional period for early career researchers who need foundations that can support them through periods of disruption and change. While the pandemic amplified barriers for those in health and behavioral research postdoctoral fellowships, it also presented an opportunity to reconceptualize academic training. Using successful strategies implemented during the pandemic not only supports adaptability but also yields diverse, well-prepared researchers.

Institutions should consider evolving and adapting to a changing workforce landscape, by supporting inclusive models that support researchers with diverse needs. Flexibility, frequent check-ins, and timely change can mitigate potential impacts of disruptive events and maximize the postdoctoral training experience. However, concerted efforts are needed on behalf of professional societies, institutions, mentors, and fellows to support this change. Careful consideration of formal mentorship relationships, training opportunities, and networks are needed to optimize fellows' professional development experience. With proper support, planning and adaptation, fellows can position themselves for continued career advancement.

Acknowledgments

References

Aboab, J., Celi, L. A., Charlton, P., Feng, M., Ghassemi, M., Marshall, D. C., Mayaud, L., Naumann, T., McCague, N., Paik, K. E., Pollard, T. J., Resche-Rigon, M. Salciccioli, J. D., & Stone, D. J. (2016). A "datathon" model to support cross-disciplinary collaboration. *Science Translational Medicine*, *8*(333). https://doi.org/10.1126/scitranslmed.aad9072

Aboelela, S. W., Larson, E., Bakken, S., Carrasquillo, O., Formicola, A., Glied, S. A., Haas, J., & Gebbie, K. M. (2007). Defining interdisciplinary research: Conclusions from a critical review of the

literature. *Health Services Research*, *42*(1p1), 329–346. https://doi.org/10.1111/j.1475-6773.2006.00621.x

Åkerlind, G. S. (2009). Postdoctoral research positions as preparation for an academic career. *International Journal for Researcher Development*, *1*(1), 84–96. https://doi.org/10.1108/1759751X201100006

Andrade, B., Medina-Munoz, H. C., Montaño, E. T., Roa, J. N., Sánchez, R. G., Tat, J., Hurst, S., Mouchka, M. E., Trejo, J., & Gonzalez Ramirez, M. L. (2022). COVID-19 threatens faculty diversity: Postdoctoral scholars call for action. *Molecular Biology of the Cell*, *33*(3). https://doi.org/10.1091/mbc.E21-10-0507

Bäker, A., Muschallik, J., & Pull, K. (2018). Successful mentors in academia: Are they teachers, sponsors, and/or collaborators? *Studies in Higher Education*, *45*(4), 1–13. https://doi.org/10.1080/03075079.2018.1544235

Baranik, L. E., Roling, E. A., & Eby, L. T. (2010). Why does mentoring work? The role of perceived organizational support. *Journal of Vocational Behavior*, *76*(3), 366–373. https://doi.org/10.1016/j.jvb.2009.07.004

Black, A. L., Crimmins, G., Dwyer, R., & Lister, V. (2020). Engendering belonging: Thoughtful gatherings with/in online and virtual spaces. *Gender and Education*, *32*(1), 115–129. https://doi.org/10.1080/09540253.2019.1680808

Blackman, R. C., Bruder, A., Burdon, F. J., Convey, P., Funk, W. C., Jähnig, S. C., Kishe, M. A., Moretti, M. S., Natugonza, V., Pawlowski, J., Stubbington, R., Zhang, X., Seehausen, O., & Altermatt, F. (2020). A meeting framework for inclusive and sustainable science. *Nature Ecology & Evolution*, *4*(5), 668–671. https://doi.org/10.1038/s41559-020-1190-x

Bryan, J. L., Stewart, D. E., Uriarte, J., Hernandez, A., Naik, A. D., & Godwin, K. M. (2018). Eleven principles for teaching quality improvement virtually: Engaging with geographically distributed learners. *Journal of Continuing Education in the Health Professions*, *38*(4), 276–281. https://doi.org/10.1097/CEH.0000000000000227

Burgio, K. R., MacKenzie, C. M., Borrelle, S. B., Morgan Ernest, S. K., Gill, J. L., Ingeman, K. E., Teffer, A., & White, E. P. (2020). Ten simple rules for a successful remote postdoc. *PLOS Computational Biology*, *16*(5), e1007809. https://doi.org/10.1371/journal.pcbi.1007809

Cardel, M. I., Dean, N., & Montoya-Williams, D. (2020). Preventing a secondary epidemic of lost early career scientists. Effects of COVID-19 pandemic on women with children. *Annals of the American Thoracic Society*, *17*(11), 1366–1370. https://doi.org/10.1513/AnnalsATS.202006-589IP

Chandler, D. E., Murphy, W. M., Kram, K. E., & Higgins, M. C. (2016). Bridging formal and informal mentoring: A developmental network perspective. In K. Peno, E. M. Silva Mangiante, & R. A. Kenahan (Eds.), *Mentoring in Formal and Informal Contexts* (pp. 1–20). Information Age Publishing.

Chen, S., Arsenault, C., & Larivière, V. (2015). Are top-cited papers more interdisciplinary? *Journal of Informetrics*, *9*(4), 1034–1046. https://doi.org/10.1016/j.joi.2015.09.003

Chopra, V., & Saint, S. (2017, March 29). 6 things every mentor should do. *Harvard Business Review*. Retrieved from https://hbr.org/2017/03/6-things-every-mentor-should-do

Committee to Review the State of Postdoctoral Experience in Scientists and Engineers; Committee on Science, Engineering, and Public Policy; Policy and Global Affairs; National Academy of Sciences; National Academy of Engineering; & Institute of Medicine. (2014). *The postdoctoral experience revisited*. https://doi.org/10.17226/18982

Culpepper, D., Reed, A. M., Enekwe, B., Carter-Veale, W., LaCourse, W. R., McDermott, P., & Cresiski, R. H. (2021). A new effort to diversify faculty: Postdoc-to-tenure track conversion models. *Frontiers in Psychology*, *12,* Article 733995. https://www.frontiersin.org/articles/10.3389/fpsyg.2021.733995

Davis, G. (2009). Improving the postdoctoral experience: An empirical approach. In R. B. Freeman & D. L. Goroff, *Science and engineering careers in the United States* (pp. 99–128). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c11619

Eby, L. T., Butts, M. M., Durley, J., & Ragins, B. R. (2010). Are bad experiences stronger than good ones in mentoring relationships? Evidence from the protégé and mentor perspective. *Journal of Vocational Behavior*, *77*(1), 81–92. https://doi.org/10.1016/j.jvb.2010.02.010

Falk, M. T., & Hagsten, E. (2021). When international academic conferences go virtual. *Scientometrics*, *126*(1), 707–724. https://doi.org/10.1007/s11192-020-03754-5

Fork, M. L., Anderson, E. C., Castellanos, A. A., Fischhoff, I. R., Matsler, A. M., Nieman, C. L., Oleksy, I. A., & Wong, M. Y. (2021). Creating community: A peer-led, adaptable postdoc program to build transferable career skills and overcome isolation. *Ecosphere*, *12*(10), Article e03767. https://doi.org/10.1002/ecs2.3767

Fuligni, A. J., Tseng, V., & Lam, M. (2003). Attitudes toward family obligations among American adolescents with Asian, Latin American, and European backgrounds. *Child Development*, *70*(4), 1030–1044. https://doi.org/10.1111/1467-8624.00075

Goel, R. K., & Grimpe, C. (2013). Active versus passive academic networking: Evidence from micro-level data. *The Journal of Technology Transfer*, *38*(2), 116–134. https://doi.org/10.1007/s10961-011-9236-5

Hezlett, S. A., & Gibson, S. K. (2005). Mentoring and human resource development: Where we are and where we need to go. *Advances in Developing Human Resources*, *7*(4), 446–469. https://doi.org/10.1177/1523422305279667

Higgins, M. C. (2004, February 17). *Developmental Network Questionnaire*. HBR Store. Retrieved from https://store.hbr.org/product/developmental-network-questionnaire/404105

Higgins, M. C., & Kram, K. E. (2001). Reconceptualizing mentoring at work: A developmental network perspective. *Academy of Management Review*, *26*(2), 264–288. https://doi.org/10.5465/amr.2001.4378023

Izquierdo-Iranzo, P., Gallardo-Echenique, E., Izquierdo-Iranzo, P., & Gallardo-Echenique, E. E. (2020). Studygrammers: Learning influencers. *Comunicar. Media Education Research Journal*, *28*(1), 115-125. https://doi.org/10.3916/C62-2020-10

Jain, T., Currie, G., & Aston, L. (2022). COVID and working from home: Long-term impacts and psycho-social determinants. *Transportation Research Part A: Policy and Practice*, *156*, 52–68. https://doi.org/10.1016/j.tra.2021.12.007

Joo, B.-K., Sushko, J. S., & McLean, G. N. (2012). Multiple faces of coaching: Manager-as-coach, executive coaching, and formal mentoring. *Organization Development Journal*, *30*(1), 19–38.

Jordan, K., & Weller, M. (2018). Academics and social networking sites: Benefits, problems, and tensions in professional engagement with online networking. *Journal of Interactive Media in Education*, *2018*(1), 1. https://doi.org/10.5334/jime.448

Komssi, M., Pichlis, D., Raatikainen, M., Kindström, K., & Järvinen, J. (2014). What are hackathons for? *IEEE Software*, *32*(5), 60–67. https://doi.org/10.1109/MS.2014.78

Kruglyk, V., Bukreiev, D., Chornyi, P., Kupchak, E., & Sender, A. (2020). Discord platform as an online learning environment for emergencies. *Ukrainian Journal of Educational Studies and Information Technology*, *8*(2), 13–28. https://doi.org/10.32919/uesit.2020.02.02

Larivière, V., Haustein, S., & Börner, K. (2015). Long-distance interdisciplinarity leads to higher scientific impact. *Plos One*, *10*(3), Article e0122565. https://doi.org/10.1371/journal.pone.0122565

Maisel, N. C., Halvorson, M. A., Finney, J. W., Bi, X., Hayashi, K. P., Blonigen, D. M., Weitlauf, J. C., Timko, C., & Cronkite, R. C. (2017). Institutional incentives for mentoring at the U.S. Department of Veterans Affairs and universities: Associations with mentors' perceptions and time spent mentoring. *Academic Medicine*, *92*(4), 521–527. https://doi.org/10.1097/ACM.0000000000001507

National Academies of Sciences, Engineering, and Medicine. (2018). *The next generation of biomedical and behavioral sciences researchers: Breaking through*. The National Academies Press. https://doi.org/10.17226/25008

Power, K. (2020). The COVID-19 pandemic has increased the care burden of women and families. *Sustainability: Science, Practice and Policy*, *16*(1), 67–73. https://doi.org/10.1080/15487733.2020.1776561

Shen, M. R., Tzioumis, E., Andersen, E., Wouk, K., McCall, R., Li, W., Girdler, S., & Malloy, E. (2022). Impact of mentoring on academic career success for women in medicine: A systematic review. *Academic Medicine*, *97*(3), 444–458. https://doi.org/10.1097/ACM.0000000000004563

Suart, C., Nowlan Suart, T., Graham, K., & Truant, R. (2021). When the labs closed: Graduate students' and postdoctoral fellows' experiences of disrupted research during the COVID-19 pandemic. *FACETS*, *6*(1), 966–997. https://doi.org/10.1139/facets-2020-0077

Woolston, C. (2020). Pandemic darkens postdocs' work and career hopes. *Nature*, *585*(7824), 309–312. https://doi.org/10.1038/d41586-020-02548-2

Zacher, H., Rudolph, C. W., Todorovic, T., & Ammann, D. (2019). Academic career development: A review and research agenda. *Journal of Vocational Behavior*, *110(B)*, 357–373. https://doi.org/10.1016/j.jvb.2018.08.006