

Diversity

Intentional Mentoring Networks for Minoritized Postdocs within a University System

Aumiller, J. G., Enekwe, B. O., Carter-Veale, W. Y., & Cresiski, R. H.

University of Maryland — Baltimore, University of Maryland — College Park, University of Maryland — Baltimore County

Abstract

Postdoctoral scholars have traditionally received mentoring from a single mentor (creating a “dyad”), limiting the psychosocial support they receive, which is particularly challenging for minoritized scholars (Deanna et al., 2022; Ransdell, et al., 2021). The AGEP Promise Academy Alliance (APAA) (Cresiski et al., 2022) provides multiple mentors for postdoctoral fellows to expand their academic, professional, and support networks. This mixed-method case study involves postdoctoral fellows in the APAA faculty conversion program to identify the extent to which these multiple mentoring opportunities occurred and benefited the APAA fellows. Surveys administered to participants and their non-research mentors elucidate the mentorship experience. The findings provide insights for implementing a multi-mentor network within a state university system. This study explores the broader ecosystem of mentorship and its influence on the advancement of minoritized postdocs in biomedical sciences, particularly those who may experience social isolation within their departments. It recognizes that mentorship extends beyond the formal research mentor-mentee relationship and encompasses a network of support that can positively impact the career trajectories and professional development of minoritized individuals. Scholars report benefits from having multiple mentoring opportunities within their institution, within the university system, and from external scholars through our mentors in residence program. “Just in time” mentoring on time-sensitive issues supplemented sustained mentoring. The inclusion of inter-institutional peers, administrators and faculty mentors enhanced this multiple mentor model. Minoritized postdoctoral scholars often have limited opportunities to receive mentorship (Yadav et al., 2020). Mentoring in dyads remains pervasive, though multiple mentors have been proposed (Deanna et al., 2022). We demonstrate that state university systems can be leveraged to provide a unique ecosystem of both short and sustained mentoring interactions that benefit minoritized postdocs without overburdening already over-worked faculty mentors.

Introduction & Literature Review

According to Berger and Schwetz (2023) a Postdoctoral Scholar is “an individual who has received a doctoral degree or equivalent working in a term-limited position of mentored research and professional development to prepare for an independent career usually in research and teaching” (Slide 19). For postdoctoral scholars in higher education, this period of mentored experience is considered essential to apply for tenure-track faculty positions. Postdoctoral mentoring has been shown to impact important areas of mentees’ development, such as self-efficacy (Chatterjee et al., 2023; Pfund et al., 2016), career and professional development (Lechuga, 2011; Pfund et al., 2012, 2016), and psychosocial development (National Academies of Science Engineering and Medicine, 2019). Additionally, if mentees are supported throughout their mentoring relationship, there is a higher likelihood the mentee will remain in academic research after their postdoctoral training concludes (Karalis Noel et al., 2022).

In recent years, there have been signs of strain in these postdoctoral mentoring relationships. Recently, the National Institutes of Health issued a request for information concerning the postdoctoral experience (National Institutes of Health, 2023). The need for more respectful and productive mentoring relationships was raised repeatedly in responses to this request (e.g., American Association of Medical Colleges, April 4, 2023; National Postdoctoral Association, April 7, 2023). For minoritized postdoctoral fellows in particular, defined as postdocs from racial groups that are marginalized due to systemic oppression (i.e., Black/African American, Hispanic/Latinx, Native American or Pacific Islander), studies have pointed to additional concerns in mentoring relationships (Deanna et al., 2022; Ransdell, et al. 2021; Yadav et al., 2020). Yadav et al., (2020) identified some of these concerns including: a lack of sense of belonging, tensions with their scientific identity and cultural identity, challenges within their intersectionality as minoritized female scientists, as well as stereotypes and other forms of bias.

Postdoctoral mentoring relationships, particularly in STEM fields, have traditionally been formal dyadic

relationships, which often operate in an apprenticeship model. This model may work in certain situations or at particular times in a mentees process, but often does not engage with the range of supports that mentees need as burgeoning scholars. The dyadic model is also limiting for individuals whose academic and personal paths and trajectories differ from their mentors, namely minoritized and marginalized scholars. However, supplemental forms of mentoring that take shape outside of this definition can be critical to the collective mentoring milieu for developing scholars (Bass et al, 2007; Carter-Veale et al., 2016). For example, micro-mentoring is a supplemental form of mentoring that emphasizes efficient sessions with trusted individuals who can provide rapid assistance to more pointed questions or contexts that arise in the life of an early career researcher (Walijee et al., 2020). These transient but focused interactions are sometimes akin to a “coach” style of mentoring (Chopra et al., 2018), but can still have a tremendous impact (Richardson et al., 2022), because they occur at moments of need. As medicine has improved with Just In Time Adaptive Interventions (Nahum-Shami et al., 2018), and teaching has improved with Just in Time pedagogy (Novak, 2011), academia can benefit from “just in time” micro-mentoring that provides the right amount of support at the right time depending on the mentee’s unique and evolving needs. While micro-mentoring may not supply the sustained interactions of trust building, or the long conversations that build deep relationships, it can fill an acute gap, providing resources in areas outside of the expertise of a scholar’s primary mentor circle.

Here we describe the collective mentoring provided to postdoctoral fellows from minoritized backgrounds in the AGEP PROMISE Academy Alliance (APAA), a National Science Foundation (NSF) funded program designed to increase faculty diversity through postdoctoral recruitment, development, and conversion into faculty positions within the University System of Maryland (Cresiski et al., 2022). The APAA is a collaboration of 6 universities within a state university system that recognizes the need for institutional *and* systemic change to diversify faculty. The combination of traditional research mentorship, staff support, and micro-mentoring from the APAA leverages the university system to support and retain outstanding scholars from minoritized backgrounds. The constellation of mentoring services provided by the APAA is similar to the “University as Mentor” where different units, individuals, and support systems contribute to the collective mentorship that enhances the success of young scholars (Bass et al., 2007).

Methods

Our research sought to answer: To what extent can an inter-institutional program’s network of mentorship, in conjunction with cross-institutional professional networks and multilevel mentoring, supplement traditional dyadic mentorship for minoritized postdocs in biomedical sciences? This study employs a mixed-methods approach to explore the effectiveness and experiences of inter and intra institutional mentoring within the APAA program, focusing on minoritized postdoctoral mentees. Data collection involved three distinct sources: an anonymous online pilot survey administered to APAA Fellows (n=10) and APAA Leadership Team (LT) campus representatives responsible for program coordination (n=6), along with two focus group interviews featuring the APAA LT (n=6) and the APAA Fellows (n=6). The survey, comprising closed-ended questions and Likert-scale items, comprehensively assessed mentoring aspects, such as mentor types, level of engagement, session content, and perceived helpfulness. Additionally, the interactive focus group format facilitated discussions on perspectives, challenges, and recommendations concerning both inter and intra institutional mentoring dynamics.

Participants received the online survey via email and were given a specific completion timeframe. Because demographic information was not collected via the online survey, anonymity and confidentiality of responses were assured. The focus group took place in a conducive environment, moderated by a trained third-party researcher, following a semi-structured interview guide. Fellows were asked about how mentors were assigned, level of engagement with their assigned mentors, the level of satisfaction with support their mentor provided, and about additional mentorship from people besides your assigned primary mentor. In addition, the APAA LT was asked about the mentoring process across the alliance. Sessions were audio-recorded and transcribed for analysis. Quantitative data from the survey were analyzed using descriptive statistics. Qualitative data from the open-ended survey questions and focus group underwent thematic analysis. Transcribed focus group data were coded and categorized into themes to capture key insights on mentoring experiences.

The study received ethical approval from the IRB at UMBC. Informed consent was obtained from all participants, ensuring their voluntary participation and the right to withdraw at any time. This study has limitations, including a small sample size that may limit generalizability. Self-report measures in the survey introduce potential social desirability bias. Despite these limitations, the study provides valuable insights into minoritized

postdoctoral mentees' experiences and contributes to the existing literature on benefits of multiple mentoring and ad hoc mentoring for minoritized scholars.

Findings

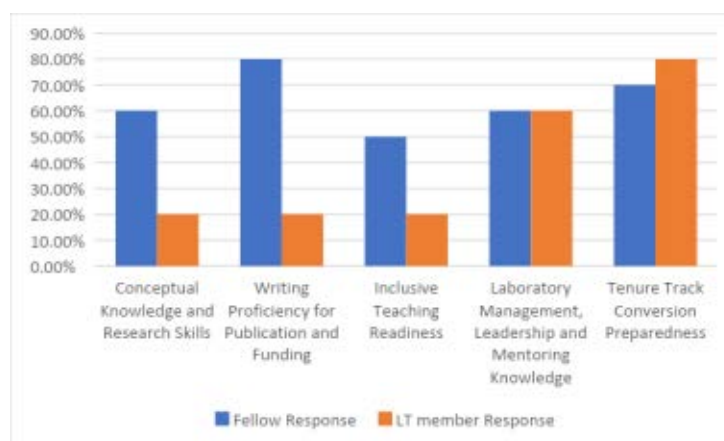
The analysis integrates both qualitative thematic results from the focus group discussions and quantitative data derived from the survey responses, providing a holistic understanding of the mentorship dynamics within the APAA program. Based on the survey and focus groups, several themes emerged.

Theme 1: Leadership Team Recognition of Fellows' Mentoring Needs

Participants acknowledged the importance of mentoring support for postdoctoral fellows, particularly those from minoritized backgrounds, within the faculty conversion program. One member of the LT stated, "the fellows are encouraged ...to take advantage of asking other people, including the people on the LT, for advice on different things, whether it's negotiating their salary when they're converting and different things like that. So there are opportunities to not just be the research mentor, there is a role for that, but there are other people that serve in that role for mentoring opportunities and places that the fellows can go to find some resources or find information."

Of the LT surveyed, 80% reported their engagement in mentoring activities with an APAA Fellow who is outside their institution, indicating a significant level of cross-institutional mentoring, and 80% reported engaging with an APAA Fellow within their institution. The content of the mentoring conversations was broad across the five learning outcomes associated with the program. Fellows perceived that Writing Proficiency for Publication and Funding was the most common topic discussed with LT members, and Inclusive Teaching Readiness being the least common (see Figure 1). LT members perceived that most conversations were about Tenure Track Conversion Preparedness (see Figure 1).

Figure 1.
Content of Mentorship Conversations between LT Members and Fellows



Theme 2: Fellows' Receipt of Informal Mentoring

Fellows actively sought out informal mentoring relationships with members of the LT, demonstrating their proactive engagement. One Fellow mentioned, "I get some feedback from [the project director] about the documents [to] submit for applications. For example, my research statement... and the teaching philosophy, how to adjust it, what to increase, what you need to add. All of that has been excellent mentorship and guidance." Moreover, another fellow expressed gratitude for the mentorship she received from APAA staff at Towson, who provided mentorship regarding her teaching. Fellows participating in the focus group confirmed that there have been opportunities to receive guidance and mentorship from varying sources. For example, several fellows received guidance on contract negotiations before converting to a tenure-track position.

The cross-institutional mentoring survey revealed notable patterns in sources of advice and support sought by Fellows. The data indicated that Fellows turned to various individuals for guidance, with their research mentor being sought out at least once by 60% of participants. Table 1 highlighted that the APAA director was the most used ad hoc mentoring resource, with 90% of fellows seeking advice and support from this individual. Following closely behind were members of the LT from off-campus institutions, who were engaged

by 60% of fellows, and 70% of Fellows received mentoring from LT members on their own campus. These findings suggest that while research mentors play a significant role, the APAA director and LT members are key figures sought after for guidance and support by the Fellows within the program.

Table 1 also demonstrates the helpfulness of informal mentoring from the APAA program for Fellows, revealing important insights about the impact of different mentoring relationships on Fellows' experiences. On-campus Staff/LT members and secondary mentors provided through the APAA were found helpful by 100% of Fellows who accessed this resource, and 86% of participants considered off-campus Staff/LT member mentorship helpful. While only half of Fellows acknowledged receipt of mentorship from peer Fellows, 75% of them found this helpful. We believe that the informal nature of the mentoring relationships created a comfortable space for open communication and mentorship sessions. In contrast, a mentor in residence pilot that brought national faculty to a single virtual meeting with the Fellows was not perceived as providing mentorship or being helpful. In conclusion, cultivating a robust and diverse informal mentoring network within the APAA program is crucial for enhancing the professional development and support of postdoctoral scholars.

Table 1.

APAA Fellow's Perceived Sources of Mentorship and Helpfulness of Those Sources

Source of Mentoring	Percent of Fellows that Received Mentoring, even once, from this Source	Percent of Fellows that Found this Source Helpful (Somewhat +Very Helpful)
The APAA Director	90%	100%
An APAA LT member ON my campus	70%	100%
An APAA LT member who was NOT ON my campus	60%	86%
My primary research mentor	60%	78%
My department chair	60%	75%
A secondary mentor facilitated through the APAA	20%	100%
A current/past APAA Fellow	50%	75%
A faculty member from an APAA institution outside of my fellowship institution	10%	100%
A faculty/staff member met through or at an APAA professional development event	20%	100%
Mentor in Residence	0%	0%
Other mentor not listed but facilitated through the PROMISE Academy Alliance	20%	100%

Theme 3: The Role of Traditional Mentoring

Fellows in the focus group largely reported that primary mentors helped them navigate their respective institutions, make connections, and move toward their research and career goals. One Fellow commented "My mentor has been excellent also here in the institution, and she actually has tried to help me connect with local institutions too, people she knows.... She's also connected me with institutions outside Maryland."

One Fellow who did not feel adequately supported by their primary research mentor said that the APAA project director "would ask me these questions about, 'Have you set up a strategy for what your goals are?', and then, 'Have you relayed those messages to your mentor?' But my mentor was not a person that was coming in and setting up these meetings or the person who would say, 'Hey, welcome to the department, these are the things that you should know. Here's a map of all of our resources within the all core facilities, and these are all the things that's going to help you get moving forward.'" While 78% of Fellows met with their primary mentor 5 or more times (Figure 2), only 60% of Fellows felt they *received* mentoring from their primary research mentors (Table 1). One Fellow met with their mentor just once during their two-year Fellowship. Moreover, multiple Fellows felt that mentorship from their primary mentor was not helpful (Table 1). The results indicate that to ensure effective mentoring, it is essential to address concerns regarding primary research mentors' skills in mentorship. Efforts should focus on improving support from primary mentors and ensuring more structured conversations take place with department leadership to best prepare Fellows for tenure-track positions.

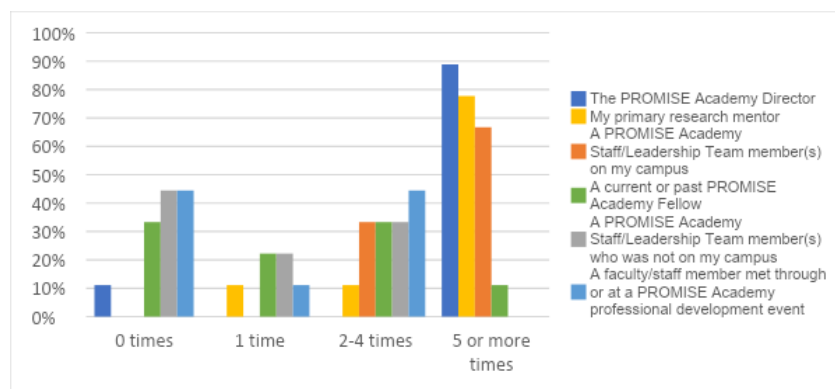
Theme 4: Personalized Guidance and Support from the Leadership Team

The LT provided supplemental mentoring in a variety of contexts (see Figure 2), providing tailored guidance and support to Fellows, considering their individual needs, goals, and aspirations. This personalized ap-

proach enhanced the effectiveness of the mentoring relationships. One fellow discussing within-institution mentoring support shared, “I had a mentor here from a different department, and it was really great. I mean, she was really dedicated to talk[ing] to me [about] how the institution works.... Then she really took the time to help me to understand... how to succeed, how to be successful, I mean, share her experience.”

Figure 2.

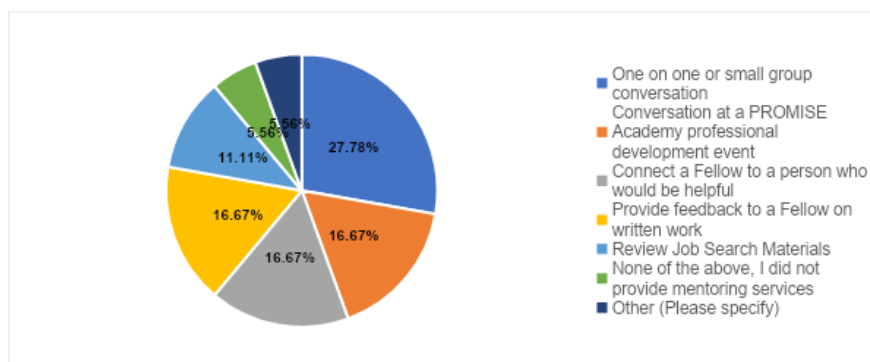
Quantity of Mentorship Provided by the APAA Community (Times met during Fellowship)



Fellows reported meeting a significant number of times with members of the APAA LT over the course of their fellowship, with 88.89% of Fellows meeting with the Director 5 or more times, 66.67% meeting with an APAA LT member from their own campus 5 or more times, and a third of Fellows meeting with current/past Fellows or LT members from outside their own institution 2-4 times. This reflects a significant involvement of the APAA LT in the monitoring and support of Fellows during their fellowship period.

Figure 3.

Format of Supplemental Mentoring Provided by APAA Leadership Team



The LT respondents reported engaging in various forms of mentoring activities with the APAA Fellows. The most common form was one-on-one or small group conversations, accounting for 27.78% of the responses. Additionally, 16.67% of the respondents mentioned engaging in conversations during APAA professional development events. Another 16.67% of the participants indicated that they connected a Fellow with another person who would be helpful for their professional development. Providing feedback on written work was reported by 16.67% of the respondents, while 11.11% mentioned reviewing job search materials. On the other hand, 5.56% of the respondents stated that they did not provide any mentoring services. A small percentage (5.56%) mentioned engaging in other forms of mentoring activities, although specific details were not provided in the survey.

In addition to these themes, the findings also revealed recommendations for improving the mentorship program, including appreciation for mentorship efforts, having standardized mentorship procedures across institutions, and consistent use of Individual Development Plans. These findings and recommendations provide valuable insights for enhancing the mentorship program for minoritized postdoctoral fellows in biomedical sciences, and promoting their professional development and success within the APAA faculty conversion program.

Conclusions

Drawing from the rich data obtained through two focus groups and an online survey conducted with minoritized postdoctoral fellows and the LT, this study holds significant implications for the implementation of a new organic model of mentoring within a state-wide university system's postdoctoral faculty conversion program for minoritized postdocs in biomedical sciences. The findings shed light on the experiences and perspectives of these Fellows, revealing insights into the effectiveness of this innovative approach. By exploring emergent themes such as adhoc (Just in time) mentoring, personalized support, role modeling, and trust-building, the study underscores the transformative potential of this model in supplementing traditional dyadic mentorship and advancing the professional development of minoritized postdoctoral fellows. As the Alliance develops the model for scaling up to additional departments, institutions, and university systems through the recently launched project, Re-Imagining STEM Equity Utilizing Postdoc Pathways (RISE UPP, funded by the NSF Eddie Bernice Johnson INCLUDES program), there is a clear focus on enhancing the mentoring component and providing more structure and support to these supplemental mentor streams as well as traditional mentor relationships between primary mentor and department chair. In conclusion, while the APAA program has received appreciation for its mentorship efforts and positive feedback from Fellows, there are areas that require further development. The study highlights the importance of standardizing mentorship procedures, addressing concerns about mentor assignments, and ensuring strong mentorship support throughout the program to effectively prepare fellows for conversion and long-term success in academia.

Acknowledgements

The AGEP PROMISE Academy Alliance is supported by the National Science Foundation (NSF), Directorate for Education and Human Resources (EHR), Division of Human Resource Development (HRD), Alliances for Graduate Education and the Professoriate (AGEP) Awards: University of Maryland Baltimore County (UMBC; 1820984), University of Maryland College Park (UMCP; 1820975), University of Maryland at Baltimore (UMB; 1820983), and Salisbury University (SU; 1820971), and Towson University (TU; 1820974).

References

- American Association of Medical Colleges (2023, April 4). RE: Request for information (RFI) on re-envisioning U.S. Postdoctoral Research Training and Career Progression within the Biomedical Research Enterprise (NOT-OD-23-084). <https://www.aamc.org/advocacy-policy/washington-highlights/aamc-comments-nih-postdoctoral-research-training-and-career-progression-rfi>
- APAA Year 5 External evaluation report. (2023). Westat.
- Berger, S., & Schwetz, T. A. (2023, June 9). Re-envisioning NIH-supported postdoctoral training (Advisory Committee to the Director Postdoc Working Group). National Institutes of Health Advisory to the Committee Director Meeting.
- Bass, S. A., Rutledge, J. C., Douglass, E. B., & Carter, W. Y. (2007). Lessons learned: Shepherding doctoral students to degree completion. Council of Graduate Schools.
- Carter-Veale, W.Y., Tull, R.G., Rutledge, J.C., Joseph, L.N. (2016). The dissertation house model: Doctoral student experiences coping and writing in a shared knowledge community. *CBE Life Sciences Education*, 15(3). <https://doi.org/10.1187/cbe.16-01-0081>
- Chatterjee, D., Jacob, G. A., Varvayanis, S. S., Wefes, I., Chalkley, R., Nogueira, A. T., Fuhrmann, C. N., Varadarajan, J., Hubbard, N. M., Gaines, C. H., Layton, R. L., & Chaudhary, S. (2023). Career self-efficacy disparities in underrepresented biomedical scientist trainees. *PLOS ONE*, 18(3): e0280608. <https://doi.org/10.1371/journal.pone.0280608>
- Chopra, V., Arora, V. M., & Saint, S. (2018). Will you be my mentor? - Four archetypes to help mentees succeed in academic medicine. *JAMA Internal Medicine*, 178(2), 175-176.
- Cresiski, R. H., Ghent, C. A., Rutledge, J. C., Carter-Veale, W. Y., Aumiller, J., Bertot, J. C., Enekwe, B., Golembewski, E., Medina, Y., & Scott, M. S. (2022). Developing a state university system model to diversify faculty in the biomedical sciences. *Frontiers in Psychology*, 13, 514. doi: 10.3389/fpsyg.2022.734145.
- Deanna, R., Merkle, B. G., Chun, K. P., et al. (2022). Community voices: the importance of diverse networks in academic mentoring. *Nature Communications*, 13, 1681. <https://doi.org/10.1038/s41467-022-28667-0>
- Karalis Noel, T., Miles, M. L., & Rida, P. (2022). Using social exchange theory to examine minoritized STEM postdocs' experiences with faculty mentoring relationships. *Studies in Graduate and Postdoctoral Education*, 13(1), 90-108. <https://doi.org/10.1108/SGPE-12-2020-0080>
- Lechuga, V. M. (2011). Faculty-graduate student mentoring relationships: Mentors' perceived roles and responsibilities. *Higher Education*, 62(6), 757-771. <https://doi.org/10.1007/s10734-011-9416-0>
- National Academies of Sciences, Engineering, and Medicine. (2019). The science of effective mentorship in STEM. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25568>
- National Institutes of Health (2023). Request for Information (RFI): Re-envisioning U.S. postdoctoral research

- training and career progression within the biomedical research enterprise. Retrieved from <https://grants.nih.gov/grants/guide/notice-files/NOT-OD-23-084.html>
- National Postdoctoral Association (2023, April 7). RE: Request for information (RFI) on re-envisioning U.S. postdoctoral research training and career progression within the biomedical research enterprise (NOT-OD-23-084). <https://www.nationalpostdoc.org/news/news.asp?id=637764>
- Nahum-Shani, I., Smith, S. N., Spring, B. J., Collins, L. M., Witkiewitz, K., Tewari, A., & Murphy, S. A. (2018). Just-in-Time Adaptive Interventions (JITAs) in mobile health: Key components and design principles for ongoing health behavior support. *Annals of Behavioral Medicine*, 52(6), 446-462. <https://doi.org/10.1007/s12160-016-9830-8>
- Novak, G. M. (2011). Just-in-time teaching. *New Directions for Teaching and Learning*, 2011(128), 63-73. <https://doi.org/10.1002/tl.469>
- Pfund, C., Byars-Winston, A., Branchaw, J., Hurtado, S., & Eagan, K. (2016). Defining attributes and metrics of effective research mentoring relationships. *AIDS and Behavior*, 20(S2), 238-248. <https://doi.org/10.1007/s10461-016-1384-z>
- Pfund, C., House, S., Asquith, P., Spencer, K., Silet, K., & Sorkness, C. (2012). *Mentor training for clinical and translational researchers*. WH Freeman and Company.
- Ransdell, L. B., Lane, T. S., Schwartz, A. L., Wayment, H. A., & Baldwin, J. A. (2021). Mentoring new and early-stage investigators and underrepresented minority faculty for research success in health-related fields: An integrative literature review (2010-2020). *International Journal of Environmental Research and Public Health*, 18(2), 432. <https://doi.org/10.3390/ijerph18020432>
- Richardson, E. L., Oetjen, R., Oetjen, D., Gordon, J., Schroeder, L. H., Conklin, S., & Strawn, N. (2022). Micro-advising/mentoring: Small interactions can have broad career-altering impact on learner career progression. *The Journal of Health Administration Education*, 38(4), 1001.
- Waljee, J. F., Chopra, V., & Saint, S. (2020). Mentoring millennials. *JAMA*, 323(17), 1716-1717. <https://doi.org/10.1001/jama.2020.3085>
- Yadav, A., Seals, C. D., Sullivan, C. M. S., Lachney, M., Clark, Q., Dixon, K. G., & Smith, M. J. (2020). The forgotten scholar: underrepresented minority postdoc experiences in STEM fields. *Educational Studies*, 56(2), 160-185.