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## MENTOR study: Matching expectations and needs to optimize relationships in cardiovascular fellowship training

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### ABSTRACT

**Study objective:** Mentorship is a key component of successful cardiology training. This study sought to understand the alignment of mentorship priorities for fellow-in-training (FIT) mentees and faculty mentors.

**Design:** Cross-sectional survey study.

**Setting:** Online.

**Participants:** Cardiology mentors and FIT mentees in the State of Connecticut.

**Interventions:** None.

**Main outcome measures:** Likert-scale graded valuations on the importance of and satisfaction with various categories of mentorship by both mentors and mentees. Results were analyzed using Mann-Whitney, Kruskal-Wallis and Wilcoxon signed-rank tests, where appropriate.

**Results:** Forty-eight percent of FITs (n = 34) and 16% of faculty mentors (n = 34) responded to the survey. Of those, 74% of FITs identified a mentor within the first year of fellowship either by directly contacting the mentor or meeting them through a clinical rotation. Mentors significantly undervalued the importance of FITs of providing research opportunities (4.5 vs 3.6, p < 0.05), helping them make contacts (4.5 vs 3.7, p < 0.05) and providing job-search support (4.3 vs 3.3, p < 0.05). In contrast, mentors overestimated the value of work-life balance and clinical mentorship to FITs.

**Conclusions:** FITs value support in research, job search support, and networking more than mentors realize, leading to an expectation-satisfaction gap in those areas of mentorship. Further studies to examine how mentors and mentees can best align their expectations may improve the efficacy of the mentorship process.

### 1. Introduction

In academic medicine, the mentorship relationship is considered a critical component for career development and advancement. However, formal study into the role and structure of mentorship within academic medicine was limited until the 1990s [1], with early descriptive studies focusing on specific subgroups within academics, such as women and under-represented minorities [2,3] and medical students [4–7]. At each stage of training, mentorship is an important determinative factor for trainees: access to faculty mentors can impact a medical student's choice of specialty [8], and, at the level of subspecialty fellowship choice,

availability of a suitable mentor in that field is a key factor in recruitment [9,10]. Beyond training, mentorship is critical to the choice of physician practice setting [11].

Moving beyond specific specialty and practice setting choices, mentorship is associated with overall higher career satisfaction during and after training [3,12,13], better publication record, early career academic success [3,14,15], and academic promotion to professorship [16]. Conversely, lack of mentorship is frequently identified as a major obstacle to a successful academic career [17], implicated as the most common reason for failure to publish [18]. Successful interventions to retain junior faculty in academic medicine have included improving

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mentorship and efforts specifically directed toward faculty development [19].

The importance of effective mentorship for progression from medical school through training to a successful and satisfying career has been explored, however specific research on the critical qualities of mentorship in the progression of cardiology fellows into successful postgraduate cardiovascular medicine practice is less well characterized. The purpose of this study was to identify the expectations and needs of cardiology fellows-in-training (FITs) and their faculty mentors, with the goal of identifying potential gaps that can be focused on to improve mentorship relationships.

## 2. Methods

Program directors from all five cardiology fellowship programs in Connecticut were asked to distribute the link to an anonymous online survey about mentorship to their general and subspecialty cardiology trainees as well as their faculty members. The initial e-mail with survey description and the anonymous link was followed by a reminder e-mail two weeks later. No incentives for completing the survey were provided. FIT responses were collected between March and July 2019 and faculty mentor responses between October 2019 and February 2020. The study coordination was led by the American College of Cardiology (ACC) Women in Cardiology (WIC) Connecticut chapter that was responsible for technical support with data collection. Ethical approval has been waived for survey tool of de-identified individuals by the Yale Human Research Protection Program Institutional Review Board on 02/12/2019, Reference number FWA00002571.

In total, 71 trainees and 216 faculty members were sent the survey by their program directors. We received a total of 68 complete responses (34 responses from each group), for a 48% and 16% response rate for FITs and faculty mentors respectively. Only complete surveys were used in this analysis. FIT and faculty mentor questionnaires are provided in the Supplemental Digital Appendix 1 and 2.

Data are presented as mean  $\pm$  standard deviation for continuous variables. Categorical variables are presented as frequencies and percentages. For categorical variables, we calculated the percentage of answers in each category. The Likert scale in mentee questionnaire had values 1, 3 and 5, while the Likert scale in the mentor questionnaire had values 1, 2, 3, 4 and 5. Mann-Whitney *U* test was used to test the differences in expectations or satisfaction between FIT and faculty mentor respondents. Kruskal-Wallis test was used to assess demographic differences contributing to expectations or satisfaction. To identify the expectation-satisfaction gap in the same population (FITs or mentors) we used related-samples Wilcoxon signed-rank test. A *p* value of  $<0.05$  was considered statistically significant across all performed tests. All analyses were conducted using SPSS version 20.0 (IBM, Armonk, NY).

## 3. Results

Demographic characteristics of both faculty members and FITs are shown in Table 1. Of the 34 FIT survey respondents, 26 FITs (74%) reported having a mentor. FITs with mentors most commonly self-identified mentors (42%, *n* = 11) or met them on a clinical rotation (35%, *n* = 9), with a smaller percentage matched to a mentor by a program director (15%, *n* = 4). Most mentees established contact with their mentor before beginning fellowship (31%, *n* = 8) or in the first year of fellowship (54%, *n* = 14), with a minority identifying mentors at a later stage in training (15%, *n* = 4). According to FITs, most mentors were men (88%, *n* = 23), middle (54%, *n* = 14) or late career (42%, *n* = 11) stage and practiced in the same institution as the FIT (92%, *n* = 24). Most FITs had contact with their mentors at least monthly (58%, *n* = 15) and some had contact with their mentors every 2 to 4 months (38%, *n* = 10).

The remaining 8 out of 34 of FITs without a mentor (26%) noted experiencing lack of research opportunities (*n* = 5), lack of support in

**Table 1**  
Demographic characteristics of mentees and mentors.

	FITs (n, %)	Faculty members (n, %)
Response rate	34/71 (48%)	34/214 (16%)
Report having a mentor/mentee	26 (76%)	25 (73%)
Age		
25–35 years	25 (74%)	0 (0%)
35–45 years	9 (26%)	16 (47%)
45–55 years	0 (0%)	5 (15%)
55–65 years	0 (0%)	5 (15%)
65–75 years	0 (0%)	4 (12%)
>75 years	0 (0%)	1 (3%)
No answer	0 (0%)	3 (9%)
Gender		
Female	16 (47%)	7 (21%)
Marital status		
Single	6 (18%)	1 (3%)
Married/co-habiting	27 (79%)	32 (94%)
Divorced	1 (3%)	1 (3%)
Number of children		
0	25 (74%)	3 (9%)
1–3	9 (26%)	28 (82%)
>3	0 (0%)	2 (6%)
No answer	0 (0%)	1 (3%)
Visa/citizenship status		
US Citizen	16 (47%)	33 (97%)
Permanent resident	3 (9%)	0 (0%)
Visa holder	14 (41%)	1 (3%)
Other	1 (3%)	0 (0%)
Medical education		
US medical school	11 (32%)	30 (88%)
Medical school outside the US	23 (68%)	3 (9%)
No answer	0 (0%)	1 (3%)
Training/practice site		
University hospital	29 (85%)	22 (65%)
University-affiliated community hospital	5 (15%)	5 (15%)
Community hospital	0 (0%)	2 (6%)
Government agency	0 (0%)	2 (6%)
Private practice	0 (0%)	2 (6%)
Other	0 (0%)	1 (3%)
Subspecialty		
General cardiology	27 (79%)	14 (41%)
Heart failure	1 (3%)	2 (6%)
Interventional cardiology	3 (9%)	8 (23%)
Electrophysiology	0 (0%)	0 (0%)
Advanced imaging	0 (0%)	8 (23%)
Primary research career/research year	3 (9%)	2 (6%)

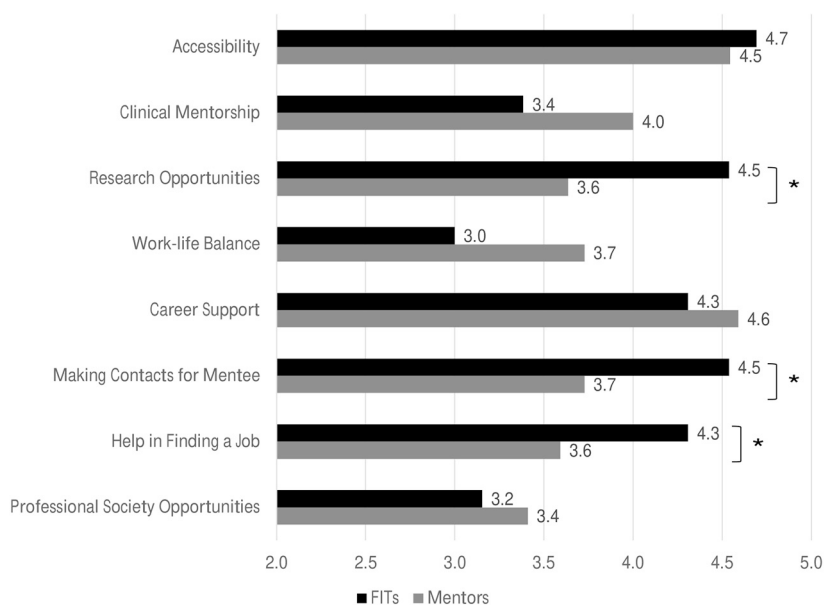
career decision making (*n* = 5), and inability to identify a mentor with shared interest (*n* = 5). They also noted barriers to accessibility of mentors (*n* = 3) and lack of knowledge on how to find a mentor (*n* = 3). We found no differences in gender distribution in the population of FITs without a mentor (4 female and 4 male) when compared to the overall FIT population (47% female, 53% male).

FIT needs and expectations across 8 categories were assessed to determine the perceived fulfillment of mentorship needs. The average importance ratings for different mentorship categories as rated by FITs and mentors are shown in Fig. 1. FITs thought the most important qualities in a mentor were providing research opportunities, making contacts for them, and help with finding a job, which mentors underappreciated (*p* < 0.05). Conversely, mentors trended toward thinking that FITs valued receiving advice on work-life balance and clinical mentorship more than FITs actually did. Both FITs and mentors gave the lowest importance ratings to professional society opportunities. When comparing FIT expectations and satisfaction in each of the mentorship categories, there was a significant expectation-satisfaction gap in the three areas of mentorship most valued by FITs: research opportunities, making contacts for the mentee, and help in finding a job (*p* < 0.05) (Fig. 2). Mentors showed a trend to surpass mentee expectations in the areas of work-life balance and clinical mentorship that were less

\*p<0.05

**Fig. 1.** Importance of different mentorship categories to FITs: FIT vs mentor responses  
FITs were asked “Please rate the importance of the below characteristics in your primary mentor” while mentors were asked “How important do you think each of the following is to your primary FIT mentees?”. Their averaged responses to each question are shown in the figure.

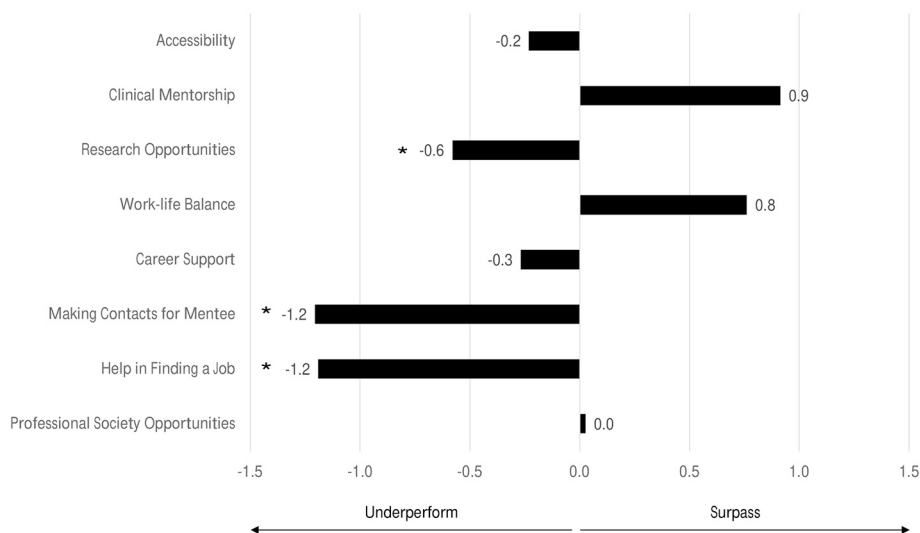
\* p < 0.05.



\*p<0.05

**Fig. 2.** FIT expectation-satisfaction gap  
FITs were asked “Please rate the importance of the below characteristics in your primary mentor”, followed by “Please rate your level of fulfillment of your expectations of these characteristics in your primary mentor”. Their averaged responses to each question are shown in the figure.

\* p < 0.05.



important to mentees. Importantly, there were no significant differences in expectations and satisfaction with mentorship among FITs or mentors based on their gender, marital status or academic affiliation.

When mentors rated how successfully they thought they provided mentorship in each of the eight previously defined categories, mentor self-ratings and mentee ratings of their satisfaction with mentorship in each category correlated well in all categories, except in research mentorship where mentees rated higher satisfaction than mentors' own self-assessment of performance (p < 0.05) (Fig. 3).

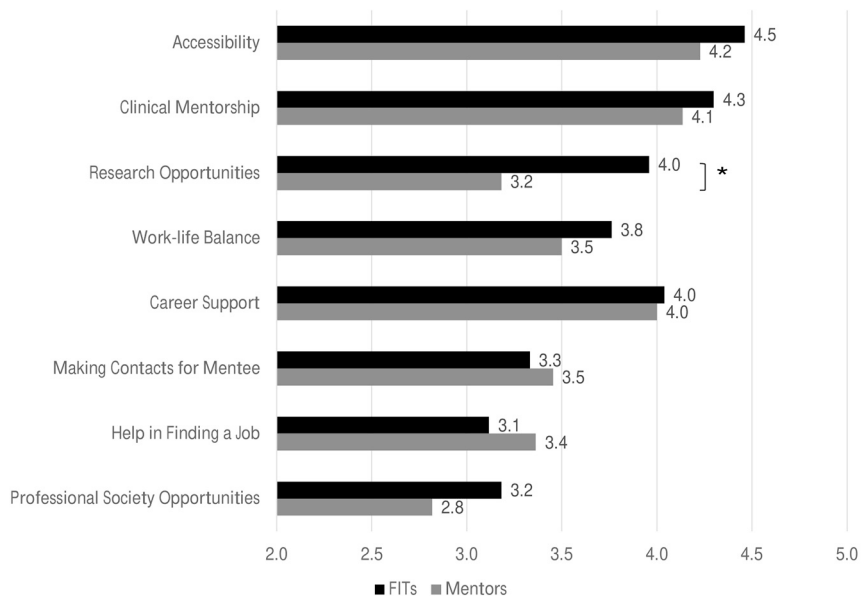
Of the 34 faculty respondents, 70% (n = 24) noted they had a mentor in their early career, and more than half were current mentors (n = 14). Significant findings were that mentors believed that career support (4.6 vs 3.9, p < 0.05) and work-life balance (3.7 vs 2.9, p < 0.05) were more important to their mentees than they perceived it had been for themselves in their early career. Additionally, they felt they provided better

mentorship in work-life balance compared to their own mentors (3.5 vs 2.7, p < 0.05) but were less able to provide research opportunities to mentees compared to what their mentors provided them (3.2 vs 4.1, p < 0.05).

#### 4. Discussion

This mentorship study of FIT and faculty mentors from all five cardiovascular disease fellowship programs in the state of Connecticut highlights several important findings, including that the majority of trainees established a connection to a mentor by the end of their first year of training, and that while trainees were overall satisfied with the mentorship they received, there were important areas of both overlap and mismatch of expectations. FITs highly valued mentors who were accessible, provided research opportunities, and made contacts for

\*p<0.05



**Fig. 3.** Fulfillment of FIT expectations: FIT vs mentor ratings  
 FITs were asked “Please rate your level of fulfillment of your expectations of these characteristics in your primary mentor” while mentors were asked “How successful do you think you are at providing each of the following to your primary FIT mentees?”. Their averaged responses to each question are shown in the figure.

\* p < 0.05.

mentees, while access to professional society opportunities and mentorship around achieving work-life balance was less highly valued. Additionally, the expectation-satisfaction gap for FITs was greatest in those most valued three categories. Taken together, this study suggests a FIT view of mentorship that is potentially more transactional where research opportunities and publications are exchanged for making contacts and help finding a job toward establishing an academic career, which has been suggested previously [20].

With over 1000 incoming fellows in the United States every year, cardiology represents the largest subspecialty fellowship in all of internal medicine [21]. Despite these large numbers, in a large systematic review of 39 studies evaluating the role of mentorship throughout various stages of medical training, none focused on cardiology fellows and faculty [22]. This study is the first to specifically focus on the mentorship gaps between cardiology trainees and mentors. The prevalence of mentorship reported in this study was high, but within previously reported ranges of 30–80% [12,13,23–26]. The finding that the majority of cardiology fellows identified mentors by the end of their first year of training is similar to prior studies of obstetrics and gynecology residents showing that few trainees find mentors past the second year, underscoring the importance of connecting FIT to mentor early in fellowship [23,24].

There are several limitations of this study. First, the sample size of this study was small, owing to our smaller state population and was underpowered to detect gender differences in the ability to find a mentor. Second, this study overrepresented women and international medical graduates. There was a higher proportion of female respondents than national average both in cardiology fellowship and among practicing cardiologists [27,28]. This may reflect the fact that the study coordination was led by the ACC WIC chapter, encouraging a higher response rate among women. Alternatively, it might indicate that women place a higher importance on mentorship than men. Third, the study design did not allow to examine directly mentor-mentee pairs which would be a more reliable way to determine the expectation-satisfaction gap. This flaw could have led to an over or underestimation of the gap, or failure to detect gaps in other categories of mentorship. Finally, although there were options for free-text responses, the multiple-choice nature of questions asked may have biased the responses received.

While finding a mentor more comes down to “having the right chemistry” [17], this study highlights important components toward improving successful mentorship relationships. FITs in academic medical centers value mentor accessibility, opportunities for research, and finding potential post-graduate employment. This transactional relationship is less important for the mentors who feel their most important roles are as clinical mentors who can guide FITs toward optimal work-life balance. Additionally, neither mentors nor mentees in this sample prioritized promotion within professional societies, despite the importance of continued education and networking through these organizations [29,30].

The mismatch between needs and expectations may ultimately lead to mentorships that are less productive if expectations go unfulfilled. Alternatively, mentees may not fully understand what categories of mentorship they should prioritize in their early careers in order to achieve their goals, and perhaps with longitudinal progression of their careers their impressions will change to become more in line with their mentors'. The hypothesis-generating findings of this pilot study suggest that many expectations may be going unfulfilled under current mentorship paradigms, and improved communication between mentee and mentor may help to bridge this divide.

**CRedit authorship contribution statement**

Natalija Odanovic: methodology, formal analysis, investigation, writing-original draft, visualization.

Katharine R. Clapham: conceptualization, methodology, investigation, writing- review and editing.

Burcu Gul: conceptualization, methodology, investigation, writing-review and editing.

Celina M. Yong: writing- review and editing.

Judith L. Meadows: conceptualization, methodology, writing- review and editing.

S. Elissa Altin: conceptualization, methodology, investigation, writing- original draft, supervision.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ahjo.2021.100019>.

## References

- [1] P.B. Buddeberg-Fischer, K.-D. Herta, Formal mentoring programmes for medical students and doctors – a review of the Medline literature, *Med. Teach.* 28 (3) (2006) 248–257, <https://doi.org/10.1080/01421590500313043>.
- [2] J.C. Johnson, R. Jayadevappa, L. Taylor, A. Askew, B. Williams, B. Johnson, Extending the pipeline for minority physicians: a comprehensive program for minority faculty development, *Acad. Med.* 73 (3) (1998) 237–244.
- [3] W. Levinson, K. Kaufman, B. Clark, S.W. Tolle, Mentors and role models for women in academic medicine, *West J. Med.* 154 (4) (1991) 423–426.
- [4] A. Kalet, S. Krackov, M. Rey, Mentoring for a new era, *Acad. Med.* 77 (11) (2002) 1171–1172.
- [5] C. Haq, M. Grosch, D. Carufel-Wert, Leadership opportunities with communities, the medically underserved, and special populations (LOCUS), *Acad. Med.* 77 (7) (2002) 740.
- [6] W.H. Frishman, Student research projects and theses: should they be a requirement for medical school graduation? *Heart Dis. Hagerstown Md.* 3 (3) (2001) 140–144, <https://doi.org/10.1097/00132580-200105000-00002>.
- [7] A.D. Abernethy, A mentoring program for underrepresented-minority students at the University of Rochester School of medicine, *Acad. Med.* 74 (4) (1999) 356–359.
- [8] E. Osborn, Factors influencing students' choices of primary care or other specialties, *Acad. Med.* 68 (7) (1993) 572–574.
- [9] E. Caiola, D. Litaker, Factors influencing the selection of general internal medicine fellowship programs, *J. Gen. Intern. Med.* 15 (9) (2000) 656–658, <https://doi.org/10.1046/j.1525-1497.2000.06389.x>.
- [10] A. Thakur, P. Fedorka, C. Ko, T.L. Buchmiller-Crair, J.B. Atkinson, E. W. Fonkalsrud, Impact of mentor guidance in surgical career selection, *J. Pediatr. Surg.* 36 (12) (2001) 1802–1804, <https://doi.org/10.1053/jpsu.2001.28842>.
- [11] R. Rubeck, M. Donnelly, R. Jarecky, A. Murphy-Spencer, P. Harrell, R. Schwartz, Demographic, educational, and psychosocial factors influencing the choices of primary care and academic medical careers, *Acad. Med.* 70 (4) (1995) 318–320.
- [12] A.C. Sciscione, G.H. Colmorgen, M.E. D'Alton, Factors affecting fellowship satisfaction, thesis completion, and career direction among maternal-fetal medicine fellows, *Obstet. Gynecol.* 91 (6) (1998) 1023–1026, [https://doi.org/10.1016/s0029-7844\(98\)00076-3](https://doi.org/10.1016/s0029-7844(98)00076-3).
- [13] S.A. Pearlman, K.H. Leef, A.C. Sciscione, Factors that affect satisfaction with neonatal-perinatal fellowship training, *Am. J. Perinatol.* 21 (7) (2004) 371–375, <https://doi.org/10.1055/s-2004-835308>.
- [14] J. Steiner, P. Curtis, B. Lanphear, K. Vu, D. Main, Assessing the role of influential mentors in the research development of primary care fellows, *Acad. Med.* 79 (9) (2004) 865–872.
- [15] J.F. Steiner, B.P. Lanphear, P. Curtis, K.O. Vu, Indicators of early research productivity among primary care fellows, *J. Gen. Intern. Med.* 17 (11) (2002) 854–860, <https://doi.org/10.1046/j.1525-1497.2002.10515.x>.
- [16] M.R. Wise, H. Shapiro, J. Bodley, et al., Factors affecting academic promotion in obstetrics and gynaecology in Canada, *J. Obstet. Gynaecol. Can.* 26 (2) (2004) 127–136, [https://doi.org/10.1016/S1701-2163\(16\)30488-1](https://doi.org/10.1016/S1701-2163(16)30488-1).
- [17] V. Jackson, A. Palepu, L. Szalacha, C. Caswell, P. Carr, T. Inui, "Having the right chemistry": a qualitative study of mentoring in academic medicine, *Acad. Med.* 78 (3) (2003) 328–334.
- [18] D.R. Scribner, J. Baldwin, R.S. Mannel, Gynecologic oncologists' perceptions of fellowship training, *J. Reprod. Med.* 50 (1) (2005) 29–34.
- [19] L.P. Fried, C.A. Francomano, S.M. MacDonald, et al., Career development for women in academic medicine: multiple interventions in a Department of Medicine, *JAMA* 276 (11) (1996) 898–905, <https://doi.org/10.1001/jama.1996.03540110052031>.
- [20] J.W. Newburger, Reflections on mentoring, *Congenit. Heart Dis.* 14 (2) (2019) 126–127, <https://doi.org/10.1111/chd.12773>.
- [21] Number of First-Year Fellows by Subspecialty | ABIM.org. Accessed July 27, 2020. <https://www.abim.org/about/statistics-data/resident-fellow-workforce-data/number-first-year-fellows-by-subspecialty.aspx>.
- [22] D. Sambunjak, S.E. Straus, A. Marušić, Mentoring in academic medicine: a systematic review, *JAMA* 296 (9) (2006) 1103–1115, <https://doi.org/10.1001/jama.296.9.1103>.
- [23] A.R. Galicia, R.R. Klima, E.S. Date, Mentorship in physical medicine and rehabilitation RESIDENCIES1, *Am. J. Phys. Med. Rehabil.* 76 (4) (1997) 268–275.
- [24] V. Coleman, M. Power, S. Williams, A. Carpentieri, J. Schulkin, Continuing professional development: racial and gender differences in obstetrics and gynecology residents' perceptions of mentoring, *J. Contin. Educ. Heal. Prof.* 25 (4) (2005) 268–277, <https://doi.org/10.1002/chp.40>.
- [25] L.M. Ramondetta, D.C. Bodurka, G. Tortolero-Luna, et al., Mentorship and productivity among gynecologic oncology fellows, *J. Cancer Educ.* 18 (1) (2003) 15–19, [https://doi.org/10.1207/S15430154JCE1801\\_9](https://doi.org/10.1207/S15430154JCE1801_9).
- [26] A. Palepu, R. Friedman, R. Barnett, et al., Junior faculty members' mentoring relationships and their professional development in U.S. medical schools, *Acad. Med.* 73 (3) (1998) 318–323.
- [27] ACGME, Residents and fellows by sex and specialty, 2017, AAMC, <https://www.aamc.org/data-reports/workforce/interactive-data/acgme-residents-and-fellows-sex-and-specialty-2017>. (Accessed 25 March 2020).
- [28] Active Physicians by Sex and Specialty, AAMC. <https://www.aamc.org/data-reports/workforce/interactive-data/active-physicians-sex-and-specialty-2017>. (Accessed 25 March 2020).
- [29] D.E. Beck, Role of professional societies in career development, *Clin. Colon Rectal Surg.* 24 (2) (2011) 106–108, <https://doi.org/10.1055/s-0031-1278406>.
- [30] S. Jacobovitz, Your professional home: the value of American College of Cardiology Membership, *J. Am. Coll. Cardiol.* 64 (20) (2014) 2172–2173, <https://doi.org/10.1016/j.jacc.2014.09.040>.