



One of us (D.T.K.) reviewed the titles and abstracts of identified articles. If in doubt, she retrieved the full-text article for review by a second author (P.V.). We excluded duplicate titles and articles that were clearly outside the scope of this study (Figure 1) and passed the remaining articles on for full-text review. We applied three inclusion criteria to the full-text versions of these papers:

1. The article described a mentoring model or program, defined as a formal activity or series of activities supporting development and personal growth of physicians. We excluded studies describing mentorship only for specific skills, such as surgical procedures.
2. The mentoring program was for physicians out of training. If both clinician and research mentees were included, then we included the study. If the study included trainees (residents and fellows) along with faculty as mentees, then we retained it. We excluded studies if only research mentees participated.
3. Mentors were described as medical professionals.

For each included study, we evaluated the program's stated objectives, components, and outcomes. We reviewed the full-text version of included articles and compiled the following data: (1) the author/s and year of the study, (2) the study's setting and program participants, including participants' backgrounds (if available), (3) the model of the program described, (4) program objectives, (5) program components (i.e., the structured, formal elements [e.g., curricula, activities, contracts] that involve mentors and mentees, not other aspects of the program, such as program development or evaluation), (6) program evaluation, including study design and data collection methods, and (7) evaluation results including participant satisfaction and mentees' achievements (Table 1).

## Results

The initial search yielded 382 citations. Review of titles and abstracts led to retrieval of 54 full-text articles. Sixteen articles, describing 18 programs, met inclusion criteria (some articles described more than one program, and some programs were described in more than one article).<sup>5–20</sup> All included articles were written in the English language.

Four articles were program descriptions; that is, they described program development or construction without describing evaluation methods or results.<sup>5,10–12</sup> One article reported participants' perceptions of the program but did not describe the data collection method.<sup>9</sup> All other reports conveyed research designs that were single-group studies performing pre–post,<sup>7,13–15</sup> post only,<sup>8,16–20</sup> or interim evaluation.<sup>6,10</sup> Only one program discussed plans for long-term data collection.<sup>15</sup>

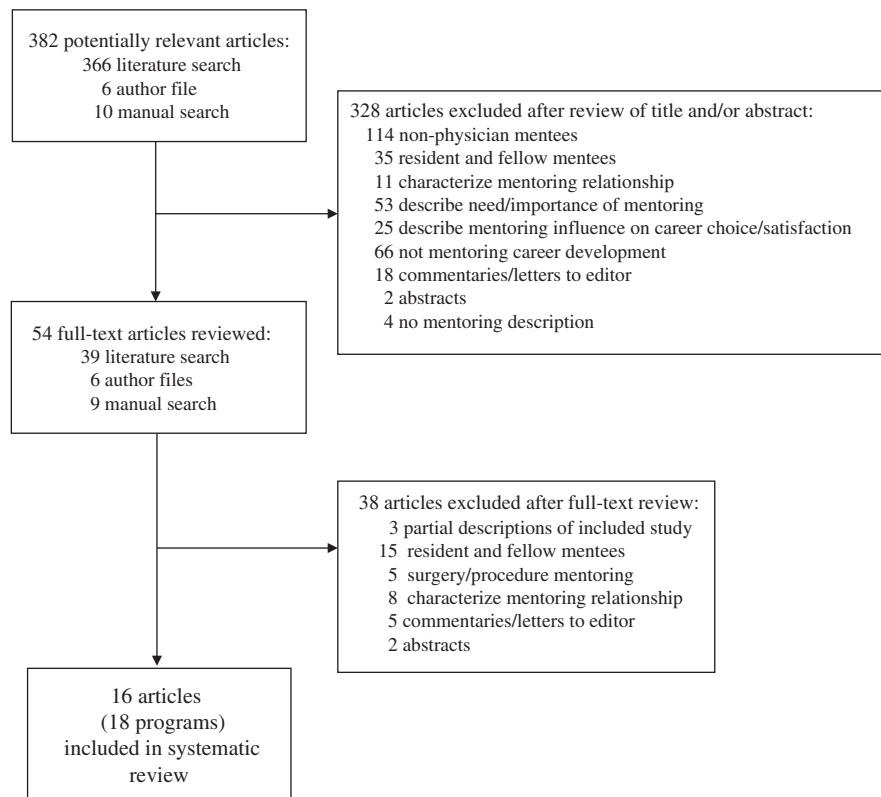
Below, we provide the results of our review of articles (see also Table 1). We explain the various models of mentoring programs covered in the articles, and we summarize some of the clearly stated program objectives that are relevant to a broad audience. We have used the articles' detailed descriptions of programs to discern and convey discrete program components. Next, we consider the programs' evaluation measures and the results of those measures, often mentees' achievements. Finally, we look at the barriers to implementing mentoring programs as described in the 16 articles we reviewed.

## Setting and participants

All of the articles we reviewed describe mentoring programs at academic health centers in the United States. The participants of almost all of the programs were solely or primarily junior faculty.<sup>5–10,12–15,17,19,20</sup> Four programs targeted women mentees,<sup>10,13,16</sup> and three focused on minority physicians.<sup>10–12</sup> Seven programs were developed for a single discipline.<sup>13,14,16–20</sup>

## Mentoring models

Seven mentoring models were described in the reviewed articles: dyad, peer, facilitated peer, speed, functional, group, and distance mentoring. The traditional dyad, pairing a mentee with a more senior or more experienced mentor, was most common and was the only model in place for nine programs.<sup>5–7,9,10,17,18</sup> Variations of the dyad model, functional mentoring and speed mentoring, were also described. The functional mentor was paired with a mentee to provide guidance for a specific project.<sup>15</sup> This model's project was a tangible product amenable to outcome measurement (e.g., the development of a new course, or the planning and implementation of



**Figure 1** Trial flow for a systematic review of the literature in MEDLINE, EMBASE, and Scopus on mentoring for practicing physicians, published between January 2000 and May 2011.

**Table 1**  
**Description of Mentoring Programs in a Systematic Review of Physician Mentoring**

| Study (year)                      | Participants and setting                          | Mentoring model  | Objectives   | Program components  | Program evaluation   | Evaluation results   |
|-----------------------------------|---|------------------|--|---|--|--|
| Illes et al (2000) <sup>17</sup>  | 99 junior clinical and research radiology faculty | Dyad             | <ul style="list-style-type: none"> <li>Promote career development</li> <li>Improve communication in the department</li> </ul>  | <ul style="list-style-type: none"> <li>Mentees chose mentors</li> <li>Formal mentoring meetings every 6 months</li> <li>Retreats, seminars</li> </ul>   | <ul style="list-style-type: none"> <li>Survey</li> <li>Mentee performance assessed by peers</li> </ul>                               | <ul style="list-style-type: none"> <li>Value of mentoring meetings (1 = not important, 10 = extremely important) range of median ratings over 5 evaluation rounds: mentees 8–10; mentors 8–9</li> <li>Discussion of academic progress and research most important</li> <li>Mentees' research and patient care improved</li> <li>None reported</li> </ul>     |
| Mark et al (2001) <sup>5*</sup>   | Junior medical school faculty                     | Dyad             | <ul style="list-style-type: none"> <li>Foster gender equity</li> <li>Promote leadership</li> <li>Advance junior faculty</li> </ul>   | <ul style="list-style-type: none"> <li>Mentors assigned</li> <li>Contract signed</li> <li>Program of goal setting for career advancement, lunch meetings to address topics identified in needs assessment, workshops for mentors to improve mentoring skills</li> </ul>   | <ul style="list-style-type: none"> <li>Ongoing evaluation</li> <li>Data collection not described</li> </ul>                          | <ul style="list-style-type: none"> <li>Mentees' research and patient care improved</li> <li>None reported</li> </ul>   |
| Benson et al (2002) <sup>6</sup>  | 9 junior medical school faculty                   | Dyad             | <ul style="list-style-type: none"> <li>Increase academic success</li> <li>Increase collaboration and networking</li> <li>Promote continuity of organization's culture</li> </ul>   | <ul style="list-style-type: none"> <li>Tiered program with preceptor (for new faculty) and mentor (for junior faculty)</li> <li>Voluntary participation</li> <li>Mentees chose mentors; multiple mentors allowed</li> <li>Structured: packet with defined pathway for locating mentor, recommended activities, worksheet for developing partnership agreement</li> <li>Mentee-mentor pair determined meeting frequency</li> </ul> | <ul style="list-style-type: none"> <li>Interim focus groups and interviews</li> <li>Database of participation statistics</li> </ul>  | <ul style="list-style-type: none"> <li>Mentees: 80% felt program increased productivity</li> <li>Mentors: 75% felt time invested worth the effort</li> <li>Psychosocial functions rated higher than career functions (<math>P &lt; .0001</math>)</li> <li>38% junior faculty without mentors left; 15% with mentors stayed (<math>P = .12</math>)</li> </ul> |
| Pololi et al (2002) <sup>8</sup>  | 18 junior clinical and research faculty/2 years   | Facilitated peer | <ul style="list-style-type: none"> <li>Provide framework for professional development, emotional support, career planning</li> <li>Enhance personal awareness</li> <li>Build skills for success in academic medicine</li> </ul>  | <ul style="list-style-type: none"> <li>3-day intensive session + monthly daylong sessions over 8 months</li> <li>Academic development plan formulated</li> <li>Academic advancement skills developed</li> <li>Scholarly writing program developed</li> </ul>  | <ul style="list-style-type: none"> <li>Survey</li> <li>Interview</li> <li>Assessment of daily written learning objectives</li> </ul> | <ul style="list-style-type: none"> <li>Mentees felt they identified core values, formulated short- and long-term career goals based on those values</li> <li>Mentees felt they developed collaborative relationships and skills useful for academic medicine</li> <li>Improved faculty retention reported</li> <li>Program attendance: 89%</li> </ul>        |
| Wingard et al (2004) <sup>7</sup> | 67 junior clinical and research faculty           | Dyad             | <ul style="list-style-type: none"> <li>Provide formal mentoring and feedback about academic progress</li> <li>Increase connection to medical school and sense of community</li> <li>Develop skills for career path and personal academic strategic plan</li> <li>Expand network</li> </ul> | <ul style="list-style-type: none"> <li>Contract signed by mentees</li> <li>Weekly half-day workshops held</li> <li>Faculty leadership council, community networking, academic performance and career planning counsel, Web site, resource development,</li> </ul>   | <ul style="list-style-type: none"> <li>Survey</li> <li>Tracking mentees' careers</li> </ul>  | <ul style="list-style-type: none"> <li>After program, mentees rated themselves higher (<math>P &lt; .0001</math>) in professional development, research, education, and administration</li> <li>85% stayed at the medical center; 93% remained in academic medicine</li> <li>Cost benefit: ROI 49%</li> </ul>  |

Table continues

**Table 1**  
(Continued)

| Study (year)                                 | Participants and setting  | Mentoring model  | Objectives   | Program components   | Program evaluation results   |
|--|---|--|--|--|--|
| Tracy et al (2004) <sup>18</sup>             | 18 ob-gyn faculty   | Dyad   | <ul style="list-style-type: none"> <li>Determine if junior faculty mentoring beneficial for ob-gyn department</li> </ul>   | <ul style="list-style-type: none"> <li>Mentors and mentees matched</li> <li>Mentors and mentees received guides</li> </ul>   | <ul style="list-style-type: none"> <li>Mentees noted success in having a role model (83.3%), increased visibility (82.3%), feeling supported (94.1%), and having someone to turn to (93.8%)</li> <li>Mentees more than mentors believed program assisted in academic promotion (<math>P = .027</math>), grant writing (<math>P = .019</math>), and research (<math>P = .001</math>)</li> <li>Mentors more than mentees believed mentoring increased self-confidence (<math>P = .037</math>)</li> </ul> |
| Pololi and Knight (2005) <sup>9†</sup>       | Junior research and clinical faculty  | Dyad   | <ul style="list-style-type: none"> <li>Advance careers of junior faculty</li> <li>gender equity in academic medicine</li> </ul>  | <ul style="list-style-type: none"> <li>Mentees chose mentors</li> <li>Met 1 hour/month × 2 years</li> <li>Mentors participated in mentoring skills program</li> </ul>  | <ul style="list-style-type: none"> <li>Data collection not described</li> <li>Some mentors perceived to inspire, support and invest in mentee</li> </ul>   |
| Lewellen-Williams et al (2006) <sup>12</sup> | 22 underrepresented minority junior faculty   | Multilevel: Peer On-site (Dyad) Distance (experts in health care, business, academia, government/policy) | <ul style="list-style-type: none"> <li>Promote retention</li> <li>Advance careers of junior faculty</li> </ul>   | <ul style="list-style-type: none"> <li>Coaching, feedback, instruction from peer and on-site mentors; yearly lecture in their area of expertise from distance mentors</li> <li>Mentor training</li> </ul>  | <ul style="list-style-type: none"> <li>Data collection not described</li> <li>None reported</li> </ul>   |
| Bussey-Jones et al (2006) <sup>11</sup>      | 7 minority midlevel faculty   | Peer   | <ul style="list-style-type: none"> <li>Foster collaboration</li> <li>Gain experience in research, teaching, and professional development</li> </ul>  | <ul style="list-style-type: none"> <li>Mission statement</li> <li>Core curriculum</li> <li>Peer support</li> <li>Group projects</li> <li>Weekly meetings</li> </ul>  | <ul style="list-style-type: none"> <li>Data collection not described</li> <li>None reported</li> </ul>   |
| Kosoko-Lasaki et al (2006) <sup>10</sup>     | Female and minority faculty: 3 programs at 2 academic health centers<br>(1) 28 underrepresented minority faculty<br>(2) female junior faculty<br>(3) 49 female junior faculty | (1) Dyad<br>(2) Dyad<br>(3) Dyad   | <ul style="list-style-type: none"> <li>Assist in learning local rules, provide tools, connections, support system needed to succeed</li> <li>Increase number of women senior faculty, leaders, foster retention of women</li> <li>Link women junior faculty with women and men senior faculty, increase number of women promoted to senior faculty and leadership, foster retention</li> </ul> | <ul style="list-style-type: none"> <li>Mentors either chosen for or by mentee; signed agreement; faculty development program, financial support for national conference, met with mentor ≥2 times/year</li> <li>Mentors chosen for mentees; no formal structure—left to discretion of mentor and mentee</li> <li>Signed agreement, manual for mentor and mentees, resource section developed in library, lunch discussions, book discussions, outside speakers, social events</li> </ul> | <ul style="list-style-type: none"> <li>Yearly evaluation of objective outcomes</li> <li>Data collection not described</li> <li>Interim survey</li> </ul> <p>(1) 5-year retention rate: 58% (versus 20% prior to program); 1 tenured, 3 promoted mentees<br/>(2) None reported<br/>(3) Mentors and mentees satisfied and felt positively about the relationship; mentors believed mentees benefited and did not feel mentoring took too much time</p>   |

Table continues

**Table 1**  
(Continued)

| Study (year)                         | Participants and setting   | Mentoring model  | Objectives   | Program components   | Program evaluation results   |
|--------------------------------------|--|------------------|--|--|--|
| Seritan et al (2007) <sup>16</sup>   | 14 female faculty: psychiatrists, psychologists, licensed clinical social worker                               | Peer<br>Distance | <ul style="list-style-type: none"> <li>Promote faculty development, peer support, and mentoring</li> <li>Enhance women's mental health knowledge</li> <li>Develop liaisons with departmental, local, and national organizations</li> </ul>   | <ul style="list-style-type: none"> <li>Mission statement</li> <li>Monthly/every other month meetings</li> <li>Web site to increase visibility and transparency, guest speakers, collaborative interdisciplinary activities, faculty development activities</li> </ul>  | <ul style="list-style-type: none"> <li>Post and interim survey</li> <li>Perceived sense of community, belonging, empowerment, and relationship with other female faculty</li> </ul>  |
| Moss et al (2008) <sup>19</sup>      | 10 junior psychiatry faculty   | Peer             | <ul style="list-style-type: none"> <li>Identify and discuss key issues affecting junior faculty</li> <li>Implement clinical and academic practice improvements</li> <li>Develop support and collegiality</li> </ul>  | <ul style="list-style-type: none"> <li>Meetings every other month covering topics decided upon by group</li> </ul>   | <ul style="list-style-type: none"> <li>Focus group themes: knowledge, interpersonal, psychological, and emotional gains; development, process, and future directions of program</li> <li>Cost: \$117/meeting, \$14.58/participant/meeting</li> </ul>   |
| Thorndyke et al (2008) <sup>15</sup> | 97 junior faculty (physicians and basic scientists)  | Functional dyad  | <ul style="list-style-type: none"> <li>Provide guidance for a defined project over 9 months</li> </ul>   | <ul style="list-style-type: none"> <li>Paralleled yearlong career development/ research/ clinical practice/education curriculum</li> <li>Mentees and mentors matched</li> <li>Structured, defined roles for work on project</li> </ul>   | <ul style="list-style-type: none"> <li>Mentees agreed or strongly agreed: mentor respected them as person (91.1%), that they benefited from mentoring (91.1%), believed mentoring would help advance career (91.9%), believed the project would impact career (92.3%), appreciated the value of developing a mentor-mentee relationship (92.4%)</li> <li>Mentors agreed or strongly agreed: mentoring was a good idea (100%), comfortable with the choice of mentee (100%), mentee respected them (93.5%)</li> </ul> |
| Files et al (2008) <sup>13</sup>     | 4 female faculty (3 junior, 1 midcareer) involved in women's health  | Facilitated peer | <ul style="list-style-type: none"> <li>Develop skills to start writing group, produce academic publications</li> <li>Establish curriculum</li> <li>Develop, maintain, and maximize peer mentoring relationships</li> <li>Develop sustainable education program for women physicians</li> </ul> | <ul style="list-style-type: none"> <li>Weekly peer meetings, monthly facilitator meetings; facilitator only meetings every other week</li> <li>Curriculum for skills acquisition, enhancement, application</li> <li>Group research protocol developed</li> <li>Participants sign 1-year contracts</li> </ul> | <ul style="list-style-type: none"> <li>Survey</li> <li>3 key indicators showed 30% improvement: satisfaction with academic accomplishments, achievement of skills for academic advancement, belief that necessary writing skills were obtained</li> </ul>  |
| Aleyne et al (2009) <sup>20</sup>    | 182 medical students, residents, fellows, junior faculty attending child and adolescent psychiatry conferences | Group            | <ul style="list-style-type: none"> <li>Increase connectivity of trainees to specialty, establish child and adolescent psychiatrists as mentors, provide networking opportunities</li> </ul>  | <ul style="list-style-type: none"> <li>3 daily meetings during which mentors facilitated discussion with small group of mentees; one closing meeting</li> </ul>  | <ul style="list-style-type: none"> <li>95% mentors endorsed having established meaningful connection with mentee</li> <li>74% mentors reported positive experience</li> </ul>  |

Table continues

**Table 1**  
(Continued)

| Study (year)                    | Participants and setting           | Mentoring model | Objectives  | Program components  | Program evaluation results  |
|---------------------------------|------------------------------------|-----------------|---|---|---|
| Cook et al (2010) <sup>14</sup> | 7 junior internal medicine faculty | Speed           | <ul style="list-style-type: none"> <li>• Answer specific questions relevant to mentees' academic activities</li> <li>• Identify resources to support activities</li> <li>• Expand academic network</li> <li>• Initiate ongoing mentoring relationships</li> </ul> | <ul style="list-style-type: none"> <li>• Junior faculty spent 10 minutes with each of 6 senior faculty</li> </ul> | <ul style="list-style-type: none"> <li>• Survey</li> <li>• Little change in satisfaction with mentoring (7-point scale, 7 = highest): mean 4.7 (SD 1.4) pre versus 4.6 (SD 1.8) post</li> <li>• Mentees felt time was well spent: mean 6.3 (SD 0.8)</li> <li>• Establishing and maintaining mentoring relationship was most frequent topic of discussion</li> </ul> |

\*Meharry University program described here; other programs described in Benson et al<sup>6</sup> (2002), Pololi et al<sup>8</sup> (2002), and Wingard et al<sup>7</sup> (2004).

<sup>†</sup>Facilitated peer model described in Pololi et al<sup>8</sup> (2002).

new clinical services). Speed mentoring was a one-time event with mentees and mentors paired for 10-minute periods to initiate mentoring relationships.<sup>14</sup> The event allowed for networking and resource identification, but only a minority of mentees pursued long-term mentoring after the event.

Two articles described the use of only the peer mentor model, through which groups of individuals similar in age, experience, and rank mentor one another.<sup>11,19</sup> Mentees in one of these studies favored that program development did not occur in a top-down fashion.<sup>19</sup> The other group felt that peer mentoring is especially beneficial in areas with fewer resources because peer support requires nothing more than time and commitment.<sup>11</sup>

One program overcame the scarcity of local mentors by collaborating with a senior mentor at another institution, a combination of peer and distance mentoring.<sup>16</sup> Another employed dyadic, peer, and distance mentoring with the mentees supported by a peer mentor (i.e., a colleague close in academic rank to the mentee), a local mentor (i.e., a medical faculty mentor from the same institution as the mentee), and a distance mentor (i.e., a mentor from outside the mentee's institution).<sup>12</sup> The distance mentors came from health care, business, academia, and government, and they shared expertise from their respective fields with mentees. Group mentoring described mentor-facilitated group discussion at a professional conference.<sup>20</sup>

Although, as mentioned, peer mentoring circumvents the hierarchy of a traditional mentor–mentee dyad, the members of one of the peer mentoring groups were hesitant to rely solely on their own abilities and valued senior faculty input.<sup>19</sup> Facilitated peer mentor models, with peer cohorts overseen by senior supervising mentors,<sup>8,13</sup> address this concern. Facilitated peer mentoring extends the time and skill of a few mentors who may have limited availability but can provide oversight for a larger number of mentees than they could within a traditional dyad model.

**Program objectives**

Program objectives varied widely. Some programs were designed to meet specific needs, and others were designed

to be more comprehensive. The most common global objectives of mentoring programs were (1) professional or career development,<sup>5,7–9,11,12,16,17</sup> (2) academic success,<sup>6,8,10,13</sup> (3) networking,<sup>6,7,10,14,16,19,20</sup> and (4) faculty retention.<sup>10,12</sup> Programs with more focused objectives cited project completion,<sup>15</sup> improved women's mental health knowledge,<sup>16</sup> developing liaisons with local and national organizations,<sup>16</sup> and improved communication within a department.<sup>17</sup> These objectives reflected local needs and interests. The stated goal of one program was to determine whether a department would benefit from a mentoring program at all.<sup>18</sup>

**Program components**

We undertook this review to determine the components that build successful, formal mentoring programs. The term “formal” in this context indicates that the articles described a recognized infrastructure for mentoring. Many of the articles even described the steps that program leaders took to develop the official mentor programs at their institutions, which included reviewing the mentoring literature,<sup>12,17,18</sup> assessing organizational readiness through open forum discussions,<sup>17</sup> and interviewing administrators to determine successful strategies and potential barriers to program development.<sup>12</sup> Although the 16 articles varied in the degree to which they described systematic components, we identified seven key components across multiple programs as detailed below.

**Mentor preparation.** As an element of organizational readiness, several programs addressed mentor preparation.<sup>5,9,10,12,18</sup> Llewellyn-Williams and colleagues<sup>12</sup> developed a Mentor Readiness Inventory and found that mentors desired both retraining to enhance their teaching skills and instruction on, specifically, how to mentor. Across the articles describing mentor preparation, programs facilitated mentor training in one of two ways: providing books and manuals on mentoring<sup>10,18</sup> or sponsoring training through workshops and seminars.<sup>5,9,10,12</sup> The articles about the programs that provided written materials did not explicitly mention any expectation for actually reading or being accountable for the content of the materials. Some programs used workshops to facilitate

mentoring skills development,<sup>5,9,10</sup> and another provided coaching to ensure effective advising, teaching, and leadership skills.<sup>12</sup> No article described mentor training in detail, and none included specific comments on how or if mentor training contributed to the mentoring program.

**Planning committee.** Several programs were overseen by a team or committee.<sup>10,15,17,18</sup> Committee members included faculty<sup>15,17</sup> and “senior department managers.”<sup>17</sup> Committee responsibilities included pairing mentees and mentors,<sup>15,18</sup> program oversight and design,<sup>17</sup> program monitoring and intervention as needed,<sup>15</sup> evaluation and data interpretation,<sup>17</sup> and assurance of program effectiveness.<sup>17</sup> As with mentor training, none of the articles included specific comments on the effectiveness of an oversight committee.

**Contracts.** Several programs drew on written mission statements or contracts.<sup>5–7,10,11,13,16</sup> In peer mentor programs whose development was driven by mentees themselves,<sup>11,16</sup> each group drafted mission statements. In one program the mission statement helped provide accountability for the peer group and helped to prevent the loss of the group’s autonomy by articulating a specific role and expectation for their senior advisor.<sup>11</sup> Some programs required mentees to sign contracts for participation, and these contracts were viewed as signs of commitment,<sup>7</sup> reminding participants of the benefits of participation<sup>10</sup> and of the goals of the partnership.<sup>6</sup>

**Pairing mentors and mentees.** Of the 10 programs with paired mentee–mentor dyads, 4 allowed mentees to choose their mentors,<sup>6,9,10,17</sup> rather than the more traditional pairing of mentors and mentees by an external party. Most mentees chose mentors within their own academic section or department.<sup>17</sup> One program accommodated mentees’ diverse needs by allowing them to select multiple mentors.<sup>6</sup> In a program where mentees did not have the opportunity to choose mentors, mentees and mentors alike perceived the ability to pick mentors as an important consideration to form the ideal pair.<sup>18</sup> The practice of mentees choosing mentors allowed for equity in the pairing process, as it avoided mentors choosing “rising stars” as mentees.<sup>6</sup>

**Mentoring activities.** A minority of reviewed programs were structured around a single activity, such as speed mentoring<sup>14</sup> or group mentoring sessions during a national professional conference.<sup>20</sup> Most programs used a variety of mentoring activities, beyond didactic sessions and regular meetings between mentors and mentees, including guest speakers<sup>10,16</sup> and Web site development to share information and increase program visibility.<sup>7,16</sup> Regular meetings between mentors and mentees or among peer mentors were the most common mentoring activity. The expected frequency of meetings ranged from weekly<sup>7,11,13</sup> to twice yearly.<sup>17</sup> Program participants viewed biannual meetings as too infrequent.<sup>17</sup> In programs with more frequent meetings, even if participants’ time was compensated, scheduling challenges arose due to conflicting responsibilities.<sup>11</sup> Mentees in one program rated academic progress and research as the most important meeting topics.<sup>17</sup>

**Formal curricula for mentees.** A formal training element for mentees was described as part of three programs.<sup>11,13,15</sup> Curricula topics included career development,<sup>11,15</sup> research,<sup>11,13,15</sup> teaching,<sup>11,15</sup> and clinical practice.<sup>15</sup> For two programs, the curriculum typically comprised regular didactic sessions.<sup>11,13</sup> One group’s mentees completed surveys to help the program’s leaders determine how well mentees acquired the skills covered by the curriculum.<sup>13</sup> None of the articles provided comments regarding specific contributions that curricula added to mentoring programs.

**Program funding and participant compensation.** The funding for mentoring programs came from both external<sup>5–10</sup> and internal<sup>10–12,19</sup> sources. External sources included the National Center of Leadership in Academic Medicine<sup>5–9</sup> and the United States Department of Health and Human Services,<sup>10</sup> whereas internal support came from divisions,<sup>11</sup> departments,<sup>19</sup> and colleges of medicine.<sup>10,12</sup> Mentees who were granted protected time<sup>5,8,10,11,13</sup> valued the ability to devote uninterrupted, high-quality time to mentoring activities away from clinical duties.<sup>8</sup> Another set of authors cited protected time as a “major accomplishment” of their mentoring program.<sup>5</sup> Mentor support was less

common than mentee support, and two programs provided the mentor with, respectively, a stipend<sup>7</sup> and funded time.<sup>11</sup> Other forms of mentor compensation included CME credit and induction into the institution’s mentor academy.<sup>15</sup>

### Evaluation and outcomes

Of the programs that evaluated results, most gathered data from mentees<sup>6–8,13–19</sup>; fewer also collected data from mentors.<sup>6,10,14,15,17,18,20</sup> Data collection was predominantly by survey,<sup>7,8,10,13–18,20</sup> though program leaders also used participant interviews<sup>6,8</sup> and focus groups<sup>6,18,19</sup> as means of collecting data. Collected data were primarily subjective and reflected participants’ (both mentees and mentors’) satisfaction with the program, the psychosocial benefits mentees and mentors perceived, and the development of professional skills in mentees. Objective measures included retention rates,<sup>6–8,10</sup> meeting attendance,<sup>8</sup> number of successful professional society and committee nominations,<sup>10</sup> and promotions and rank.<sup>10,16</sup>

### Barriers to program development

The authors of the articles we reviewed seldom mentioned barriers to developing mentoring programs. In a mentoring program with no protected time, most mentees felt that mentors’ lack of time was detrimental to the program.<sup>18</sup> Lack of protected time was also identified as a barrier both to program organization<sup>6</sup> and to mentor recruitment.<sup>20</sup> Other reported barriers to mentoring included the burdensome logistics of group mentoring,<sup>20</sup> mentees’ perception of mentoring relationships as superficial and exploitative,<sup>9</sup> and mentees’ opinion that some models (facilitated peer) were less effective than others (dyad).<sup>8</sup> Some viewed physical distance as a barrier to mentoring,<sup>6</sup> although other groups were able to incorporate off-site mentors into their programs.<sup>12,16</sup>

### Discussion and Conclusions

Mentoring in medicine plays an important role in the personal growth and career development of mentees.<sup>2</sup> We undertook this review, in part, to determine the program components that build successful, formal mentoring programs. Some believe that mentoring programs should be structured to meet each faculty’s or institution’s specific needs,<sup>17</sup> and this belief is perhaps

reflected by our finding that 18 different mentoring programs used seven different models. Some general conclusions are possible based on reported results, which may help those designing or redesigning mentoring programs. Participants are typically highly satisfied with mentoring programs. They perceive that mentoring contributes to their career development, especially in the realms of research and education. Further, faculty retention appears to improve in systems with mentoring programs.

### Limitations

We made every effort to search for all relevant articles published during the defined time period, yet the possibility that we missed pertinent studies remains, particularly given that a single reviewer performed the initial title and abstract review. Limiting our search to formal mentoring programs allowed detailed review of program infrastructure and components but also narrowed our review's scope. Comparing programs was challenging because outcome metrics were not standardized and quantitative synthesis was not possible. Further, although work on mentoring in other countries and nonacademic settings is present in the literature, articles that met our inclusion criteria were from only U.S. academic health centers, which limits the generalizability of our findings.

### Integration with previous research

Buddeberg-Fischer and Herta's<sup>3</sup> review of the mentoring literature between 1966 and 2002 included programs for physicians—both in practice and in training—as well as medical students. They found that mentoring for physicians emerged from faculty development programs; our review revealed that, although some mentoring programs remain embedded in faculty development programs, institutions now support and implement independent mentoring programs as such. Previous reviews have examined the prevalence<sup>2</sup> and types<sup>3</sup> of structured mentoring programs as detailed in the literature, describing the goals of these programs<sup>3</sup> and their effect on multiple dimensions of career development.<sup>2</sup> Our review complements these prior reviews by describing the programmatic components of the multiple mentoring models that now exist and, where possible, highlighting their perceived benefits.

In our review the dyad mentoring relationship remains, as it was in the last 35 years of the 20th century, the most frequently described model. Allowing mentees to choose mentors in the traditional dyad model is highly valued.<sup>15,21</sup> In the business world, this practice of “managing up” has encouraged mentees to take control of the mentoring relationship which helps ensure mentee success.<sup>21</sup> Variations of the dyad model, including functional mentoring and speed mentoring, have developed in the first decade of this century as have, in areas with limited mentors, peer and facilitated peer mentoring models. Our review indicates that mentors are now trained to perform their role in some programs; such training was completely absent according to the last review. A weakness noted previously<sup>2,3</sup> and persisting through the articles we reviewed is that reported results remain mostly descriptive, local, subjective, unvalidated, and without standardized evaluative metrics, such that no conclusions can be made regarding the effect of individual program components on mentoring outcomes.

### Implications for medical practice

Although empiric data to support the effectiveness of specific program elements (mentor preparation, mentor–mentee pairing, program funding, etc.) are lacking, the studies summarized in this review suggest that these components may be important. In settings with limited mentors, peer and facilitated models help extend available resources and benefit more mentees than would be possible with the traditional dyad model. Adequate support for the mentoring program is a key ingredient to success because sustaining mentoring activities without support is difficult.<sup>10</sup> Limited or unprotected time was often cited as a barrier to program development. Participants with protected time viewed this commitment from their institutions as a sign of acceptance for mentoring.<sup>15</sup> Lastly, although other reviews have noted that contracts may make the mentoring relationship inflexible,<sup>22</sup> the use of mission statements to set boundaries and of signed agreements to enforce accountability to mentoring relationships may be helpful.<sup>5–7,10,11,13,16</sup>

### Going forward

Since we conducted our literature search, two additional reports on,

respectively, one of the dyad mentor programs and the functional mentoring program reviewed herein have been published.<sup>23,24</sup> Functional mentoring projects are a measurable outcome, but the authors report the impact of the project, rather than mentoring itself, on mentees.<sup>23</sup> The other set of researchers found that the mentees who participated in the dyad mentoring program achieved higher success in leadership and professional activities and higher faculty retention than did their nonmentored peers.<sup>24</sup> These reports fill gaps in the current literature by providing longitudinal data and, in the case of the dyad mentor program, comparing mentored with nonmentored groups.

Program evaluation for the most part, however, remains largely subjective or focused on specific, local program aims and short-term results. Standardized metrics would facilitate cross-institution research and enhance generalizability. To this end, Berk and colleagues<sup>25</sup> developed two questionnaires to comprehensively assess the mentoring relationship by evaluating behavioral characteristics of the mentor as well as the characteristics and outcomes of the mentoring relationship. These questionnaires were developed in the absence of a mentoring program and warrant validation in a real-life setting.

Additionally, given the likely longitudinal effects of mentoring on individuals' careers, examining and reporting long-term outcomes is essential. Studying mentorship as physicians move along their career paths will also be important; for example, what are the mentoring needs of mid- and later-career faculty, and what models will best serve these needs? Finally, it would be helpful to evaluate the effectiveness of the mentoring models and of the specific program components identified in this review; doing so would help guide the evidence-based development of new programs.

*Acknowledgments:* The authors wish to thank Ms. Maddie Ecklund for her assistance in manuscript preparation.

*Funding/Support:* None.

*Other disclosures:* None.

*Ethical approval:* Not applicable.



## References

- 1 Bhagia J, Tinsley JA. The mentoring partnership. *Mayo Clin Proc.* 2000;75:535–537.
- 2 Sambunjak D, Straus SE, Marusić A. Mentoring in academic medicine: A systematic review. *JAMA.* 2006;296:1103–1115.
- 3 Buddeberg-Fischer B, Herta KD. Formal mentoring programmes for medical students and doctors—A review of the Medline literature. *Med Teach.* 2006;28:248–257.
- 4 Jackson VA, Palepu A, Szalacha L, Caswell C, Carr PL, Inui T. “Having the right chemistry”: A qualitative study of mentoring in academic medicine. *Acad Med.* 2003;78:328–334.
- 5 Mark S, Link H, Morahan PS, Pololi L, Reznik V, Tropez-Sims S. Innovative mentoring programs to promote gender equity in academic medicine. *Acad Med.* 2001;76:39–42.
- 6 Benson CA, Morahan PS, Sachdeva AK, Richman RC. Effective faculty precepting and mentoring during reorganization of an academic medical center. *Med Teach.* 2002;24:550–557.
- 7 Wingard DL, Garman KA, Reznik V. Facilitating faculty success: Outcomes and cost benefit of the UCSD National Center of Leadership in Academic Medicine. *Acad Med.* 2004;79(10 suppl):S9–S11.
- 8 Pololi LH, Knight SM, Dennis K, Frankel RM. Helping medical school faculty realize their dreams: An innovative, collaborative mentoring program. *Acad Med.* 2002;77:377–384.
- 9 Pololi L, Knight S. Mentoring faculty in academic medicine. A new paradigm? *J Gen Intern Med.* 2005;20:866–870.
- 10 Kosoko-Lasaki O, Sonnino RE, Voytko ML. Mentoring for women and underrepresented minority faculty and students: Experience at two institutions of higher education. *J Natl Med Assoc.* 2006;98:1449–1459.
- 11 Bussey-Jones J, Bernstein L, Higgins S, et al. Repaving the road to academic success: The IMERGE approach to peer mentoring. *Acad Med.* 2006;81:674–679.
- 12 Lewellen-Williams C, Johnson VA, Deloney LA, Thomas BR, Goyol A, Henry-Tillman R. The POD: A new model for mentoring underrepresented minority faculty. *Acad Med.* 2006;81:275–279.
- 13 Files JA, Blair JE, Mayer AP, Ko MG. Facilitated peer mentorship: A pilot program for academic advancement of female medical faculty. *J Womens Health (Larchmt).* 2008;17:1009–1015.
- 14 Cook DA, Bahn RS, Menaker R. Speed mentoring: An innovative method to facilitate mentoring relationships. *Med Teach.* 2010;32:692–694.
- 15 Thorndyke LE, Gusic ME, Milner RJ. Functional mentoring: A practical approach with multilevel outcomes. *J Contin Educ Health Prof.* 2008;28:157–164.
- 16 Seritan AL, Bhangoo R, Garma S, Dubé J, Park JH, Hales R. Society for women in academic psychiatry: A peer mentoring approach. *Acad Psychiatry.* 2007;31:363–366.
- 17 Illes J, Glover GH, Wexler L, Leung AN, Glazer GM. A model for faculty mentoring in academic radiology. *Acad Radiol.* 2000;7:717–724.
- 18 Tracy EE, Jagsi R, Starr R, Tarbell NJ. Outcomes of a pilot faculty mentoring program. *Am J Obstet Gynecol.* 2004;191:1846–1850.
- 19 Moss J, Teshima J, Leszcz M. Peer group mentoring of junior faculty. *Acad Psychiatry.* 2008;32:230–235.
- 20 Alleyne SD, Horner MS, Walter G, Hall Fleisher S, Arzubi E, Martin A. Mentors’ perspectives on group mentorship: A descriptive study of two programs in child and adolescent psychiatry. *Acad Psychiatry.* 2009;33:377–382.
- 21 Zerzan JT, Hess R, Schur E, Phillips RS, Rigotti N. Making the most of mentors: A guide for mentees. *Acad Med.* 2009;84:140–144.
- 22 Huskins WC, Silet K, Weber-Main AM, et al. Identifying and aligning expectations in a mentoring relationship. *Clin Transl Sci.* 2011;4:439–447.
- 23 Gusic ME, Milner RJ, Tisdell EJ, Taylor EW, Quillen DA, Thorndyke LE. The essential value of projects in faculty development. *Acad Med.* 2010;85:1484–1491.
- 24 Ries A, Wingard D, Gamst A, Larsen C, Farrell E, Reznik V. Measuring faculty retention and success in academic medicine. *Acad Med.* 2012;87:1046–1051.
- 25 Berk RA, Berg J, Mortimer R, Walton-Moss B, Yeo TP. Measuring the effectiveness of faculty mentoring relationships. *Acad Med.* 2005;80:66–71.