Published in final edited form as:
Acad Med. 2014 February ; 89(2): 301–311. doi:10.1097/ACM.0000000000000109.

Mentoring and the Career Satisfaction of Male and Female Academic Medical Faculty

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Abstract

Purpose—To explore aspects of mentoring that might influence medical faculty career satisfaction and to discover whether there are gender differences.

Method—In 2010–2011, the authors surveyed 1,708 clinician–researchers who received (in 2006–2009) National Institutes of Health K08 and K23 awards, which provided mentoring for career development. The authors compared, by gender, the development and nature of mentoring relationships, mentor characteristics, extent of mentoring in various mentor roles, and satisfaction with mentoring. They evaluated associations between mentoring and career satisfaction using multivariable linear regression analysis.

Results—The authors received 1,275 responses (75% response rate). Of these respondents, 1,227 (96%) were receiving K award support at the time and constituted the analytic sample. Many respondents had > 1 designated mentor (440/558 women, 79%; 410/668 men, 61%; $P < .001$). Few were dissatisfied with mentoring (122/1,220, 10.0%; no significant gender difference). Career dissatisfaction was generally low, but 289/553 women (52%) and 268/663 men (40%) were dissatisfied with work–life balance ($P < .001$). Time spent meeting or communicating with the mentor, mentor behaviors, mentor prestige, extent of mentoring in various roles, and collegiality of the mentoring relationship were significantly associated with career satisfaction. Mentor

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Other disclosures: None reported.

Ethical approval: This study was approved by the University of Michigan institutional review board.

gender, gender concordance of the mentoring pair, and number of mentors were not significantly associated with satisfaction.

Conclusions—This study of junior faculty holding mentored career development awards showed strong associations between several aspects of mentoring and career satisfaction, indicating that those concerned about faculty attrition from academic medicine should consider mentor training and development.

Growing evidence suggests attrition from the physician–scientist pipeline.[1,2] This trend appears particularly acute among female faculty; previous studies demonstrate that even promising female physician–researchers are less likely to advance in academic medical careers than their male peers.[3–7] Prior work suggests an association between inadequate mentoring, faculty discontent, and the ultimate abandonment of academic medicine by men and women alike.[8,9] Therefore, carefully characterizing what constitutes good mentoring in academic medicine—specifically, which aspects are associated with faculty satisfaction and whether there are differences by gender—is critically important.

The cohort of individuals receiving K08 and K23 career development awards from the National Institutes of Health (NIH)[10,11] is an ideal population among which to explore issues of mentoring, gender, and career satisfaction. Because K08 and K23 award recipients are highly promising clinician–investigators, they are provided with resources (including salary support for protected time) so that they can prepare to ultimately apply for subsequent grant support from the NIH as independent researchers. Of note, the K08 and K23 award programs specifically encourage careful development of a mentoring plan as part of the rigorous application process.[10,11] Surveying men and women about the mentoring they received during their K awards in order to explore differences in their experiences is particularly important because women may be less likely than men both to continue on in an independent research career and to transition from the K award to subsequent grants.[3,4,7]

Given growing interest in understanding the relationship between mentoring and career satisfaction in academic medicine,[12–16] we conducted a nationwide survey study of current recipients of K08 and K23 awards, all of whom were required to develop relationships with designated mentors. First, we sought to examine the development and nature of these mentoring relationships, mentor characteristics, and extent of mentoring in different mentoring roles. Next, we aimed to evaluate whether there were systematic differences in those aspects of the mentoring relationship that related to the gender of the K award recipient, the gender of the mentor, or in the gender concordance between mentor and mentee or protégé. Finally, we sought to assess the associations between various aspects of the mentoring relationship and career satisfaction in this promising population of junior academic medical faculty.

Method

Data collection

Using the NIH RePORTER database,[17] we identified 1,719 people who received new K08 and K23 awards in 2006 through 2009. After gaining ethical approval from the University of Michigan institutional review board (IRB), we conducted Internet searches and made

telephone calls to obtain background information and current U.S. mailing addresses for these recipients. We obtained 1,708 valid U.S. mailing addresses.

Between August 2010 and February 2011, we mailed a survey questionnaire along with a $50 incentive to 1,708 individuals who received K awards in the years 2006 to 2009. We included a cover letter stating that this was an IRB-approved research study designed to assess the experiences of researchers who received K08 and K23 awards from the NIH. The cover letter explained the voluntary nature of participation, the risks involved and efforts to ensure confidentiality, and the source(s) of funding; it also provided contact information for the principal investigator (R.J.) and IRB. We conducted our mail survey following a modified Dillman approach,[18] including targeted follow-up to nonrespondents, in order to reduce sources of error related to sampling and nonresponse.

On receipt of the completed questionnaires, we merged survey responses to data previously collected from RePORTER on K award type, award year, and characteristics of the recipient's institution.

Measures

We designed the questionnaire after reviewing the relevant literature and considering other instruments used to determine outcomes of academic careers.[12–16,19–29] We also engaged in detailed cognitive pretesting[30] to identify problems with the survey questions that could result in response error (e.g., complicated instructions, vague wording, inappropriate assumptions). We conducted cognitive interviews with a small number of faculty members similar to those in our target population, using a think-aloud approach and verbal probing techniques. We then modified the survey questions on the basis of our findings.

The ultimate questionnaire included 173 items that assessed demographics (20 items), job and education information (6 items), time allocation (43 items), mentoring experiences (33 items), family responsibilities (20 items), and career satisfaction and work environment (51 items).

Development of mentoring relationships—Two questions addressed the ease with which respondents identified role models and developed mentoring relationships: (1) "How easy has it been for you to identify someone whose career could serve as a model for your own?" and (2) "How easy has it been for you to develop a relationship with a mentor?" We dichotomized the four response categories ("very easy" or "easy" versus "difficult" or "very difficult") for descriptive analysis by gender.

Nature of mentoring relationships—The questionnaire asked respondents whether they had more than one designated K award mentor. It also asked how often they communicated in person, via telephone, or via e-mail with their primary K award mentor (dichotomized for analysis as at least once weekly versus less often) and how many hours in a typical month they spent meeting one-on-one with their primary K award mentor and other mentors (analyzed as a continuous variable). Another item asked, "Is your current relationship with your primary K award mentor closer to a student–teacher relationship or to a collegial relationship?" We dichotomized the five responses (ranging from mostly student–

teacher to mostly collegial) for analysis (at least somewhat more collegial versus neutral or more student–teacher).

Mentor characteristics—Respondents reported the gender and race of their primary K award mentor. For analysis, we grouped race as white, Asian, or underrepresented minority in medicine (black, Latino, Native American).

Using five response categories, respondents rated the extent to which their primary K award mentor was fault-finding or judgmental, committed to mentoring, exploitative, patient, overprotective, controlling, available and accessible, manipulative, an important contributor to research in the field, and well connected to others of importance in the field. The negative mentoring characteristics were scored from 0 (not at all) to −4 (a lot), and the positive mentoring characteristics were scored from 0 (not at all) to 4 (a lot). We dichotomized the responses to each of the items in this battery (some, quite a bit, or a lot versus a little or not at all) for descriptive analyses by gender. In addition, we constructed two scales (behavior and prestige; see also Results) from these items for use in modeling the relationship between mentoring and career satisfaction.

Extent to which mentees perceived their mentors to have performed potential roles—We measured the extent to which K award recipients received certain types of mentoring using the question stem “Thinking about all of your mentors, how much have your mentors…,” followed by a table listing the following behaviors: served as role models, promoted your career through networking, advised about preparation for advancement (e.g., promotion, leadership positions), advised about getting your work published, advised about department/division politics, advised about obtaining the resources you need, advocated for you, advised about balancing work and family, taught you knowledge and skills, and modeled professional and ethical behavior. We dichotomized the four-point response scale for descriptive analyses by gender (0 “not at all” or 1 “a little bit” versus 2 “quite a bit” or 3 “a lot”). In addition, we constructed a scale from these items to measure the relationship between career satisfaction and the extent of mentorship in various mentoring roles (see also Results).

Satisfaction—Survey respondents indicated their level of satisfaction with both their primary K award mentor and with the mentoring they had received from all sources. We measured satisfaction with mentoring with five-point responses (0 = very dissatisfied to 4 = very satisfied) and dichotomized these for descriptive analysis by gender (very or somewhat dissatisfied versus neutral, somewhat satisfied, or very satisfied).

Survey recipients also indicated their level of satisfaction in various career domains, including the opportunity to collaborate with other faculty, the amount of social interaction with other members of their department/division, the level of funding for their research, their current salary, their sense of being valued for their research, their sense of contributing to developments in their discipline, the balance between their competing professional responsibilities, and the balance between their professional and personal lives. We created a scaled measure of career satisfaction from these items (see also Results).

Mentee, K award, and institution characteristics—We recorded respondents' self-reported gender, race and ethnicity (which we then grouped as white, Asian, or underrepresented minority in medicine), degree (which we grouped as MD, MD/PhD, or non-MD), marital status (married/in a domestic partnership, single, or widowed/divorced), and parental status. We asked respondents to report their clinical specialty, which we then grouped into the following six categories, as we have described in detail elsewhere[4,5,31]: (1) medical specialties; (2) surgical specialties; (3) specialties caring for women, children, and families; (4) hospital-based specialties; (5) non- MD clinical specialties (which include pharmacists [PharmDs], veterinarians [DVMs], and many others); and (6) basic sciences. We also asked if the respondent's research was laboratory-based and whether he or she spoke English as a native language. We relied on data merged from the RePORTER database[17] for the respondent's K award grant type, year of K award, and institutional characteristics. We grouped institutions so that all hospitals affiliated with a single university were considered to be a single institution. We then grouped institutions into four tiers containing roughly equal numbers of K awardees, based on the amount of total NIH funding received (hereafter NIH funding tier).

Data analysis

We restricted the current analysis to those respondents who reported receiving support from their K awards during the year prior to the survey in order to eliminate the few who may have changed careers, shifted to nonmentored grant support, or ceased to receive K award funding prior to having completed a typical term of mentored career development. We performed all analyses using the SAS System version 9.3 (SAS Institute Inc., Cary, North Carolina). We first conducted descriptive analyses and comparisons by gender using either the chi-square or Fisher exact tests for categorical variables, and the *t* test for continuous variables. For all comparisons by gender, we reported the *P* values after adjusting for the following variables: K award type, year of K award, institutional NIH funding tier, recipient race, degree, marital status, and parental status, whether the recipient's research was laboratory based, and whether he or she spoke English as a native language.

We then sought to evaluate the associations between various aspects of mentoring and career satisfaction by developing a linear regression model of the satisfaction scale using the following covariates of interest: mentor gender, mentee–mentor gender concordance, multiple designated K award mentors, collegiality of the mentor–mentee relationship, frequency of communication between mentor and mentee, time spent meeting with mentor, the mentor behavior scale, the mentor prestige scale, and the extent of mentoring in various roles scale. The possible associations of these variables with the satisfaction scale were adjusted for the recipient characteristics of gender, race, degree, marital status, parental status, and specialty; for whether the recipient's work was laboratory based; for whether the recipient spoke English as a native language; and for the K award type, year of K award, and institutional NIH funding tier.

We then constructed a best multiple variable model to explain the satisfaction scale. First, we modeled all covariates (adjustment covariates and covariates of interest) simultaneously. Second, we reduced the model removing insignificant adjustment covariates iteratively, until

only significant covariates remained. Finally, we explored for statistically significant interactions between the respondent's gender and the remaining covariates in the model.

For statistical inference, we considered test statistics with *P* values at or below 5% to be significant.

Results

We received 1,275 completed questionnaires from the 1,708 individuals we contacted for a response rate of 75%. Our respondent sample did not differ significantly from the entire surveyed population of K award recipients by gender or K award year. However, a significantly higher proportion of non-MDs (81%, n = 220/272) responded to our survey than either MDs (74%, n = 754/1,024) or MD/PhDs (72%, n = 301/420; *P* = .02). A higher proportion of K23 recipients (78%, n = 645/831) responded than did K08 recipients (71%, n = 630/888; *P* = .002). Individuals at institutions with lower overall NIH funding were more likely to respond (80% [n = 322/401] from the lowest tier; 74% [n = 349/474] from the third tier; 73% [n = 353/486] from the second tier; and 69% [n = 236/340] from the top tier; *P* = .001). Of the 1,275 respondents, 1,227 (96%) reported actively receiving funding support from their K awards at the time of the survey and constituted the analytic sample.

The characteristics of the 559 female and 668 male K award recipients in the sample are detailed in Table 1. The majority of respondents held an MD degree, and the sample (n = 1,227) comprised the following specialties: 43% (n = 524) medical; 20% (n = 244) women, children, and families; 12% (n = 147) hospital based; 6% (n = 70) surgical; 3% (n = 32) basic science; and 17% (n = 210) non-MD clinicians. Of note, male respondents were more likely to hold MD/PhD degrees (28% of men [n = 190/668] versus 15% of women [n = 82/559]; *P* < .001). Women were more likely to hold non-MD clinical doctorates (25% of women [n = 138/559] versus 11% of men [n = 72/668]; *P* < .001). Men were more likely to have received K08 awards (60% of men [n = 399/668] versus 36% of women [n = 200/559]; *P* < .001). Men in this cohort were more likely than women to be married (92% of men [n = 616/667] versus 87% of women [n = 486/558]; *P* = .002) and to have children (82% of men [n = 545/667] versus 76% of women [n = 427/559]; *P* = .02). The majority of both men and women reported having a male primary designated K award mentor, although women were more likely than men to have a female mentor (29% of women [n = 159/550] versus 16% of men [n = 108/665]; *P* < .001).

Development of mentoring relationships

When asked how easy it was to develop a relationship with a mentor, relatively few respondents indicated difficulty, although women were slightly more likely to do so (21% of women [n = 117/552] versus 18% of men [n = 119/664]; *P* < .01). However, when asked how easy it was to identify someone whose career could serve as a model for their own, a substantial proportion of the respondents indicated difficulty, and women again were more likely than men to report difficulty (55% of women [n = 305/553] versus 40% of men [n = 269/667]; *P* < .0001).

Nature of mentoring relationships

Many respondents reported having more than one designated K award mentor, and women were more likely to do so (79% of women [n = 440/558] versus 61% of men [n = 410/668]; $P < .001$). Most respondents reported having a collegial relationship with their primary K award mentor. Overall, 68% of men (n = 455/668) and 62% of women (n = 348/559) reported a mostly collegial relationship with their mentors ($P = .33$). When asked how frequently they communicated with their primary K award mentor in person, via telephone, or via e-mail, the majority did so at least once a week (72% of men [n = 481/668] and 75% of women [n = 419/559]; $P = .56$). The mean number of hours that respondents spent in a typical month meeting one-on-one with a primary K award mentor was 3.2 for men and 3.0 for women ($P = .35$).

Primary K award mentor characteristics

Respondents generally reported that their primary K award mentors had positive characteristics, although a nontrivial minority did describe their mentors to be at least somewhat fault-finding (20%, n = 242/1,217), exploitative (17%, n = 200/1,212), overprotective (15%, n = 182/1,219), controlling (19%, n = 227/1,219), or manipulative (11%. n = 139/1,219). The vast majority indicated that their mentors were not only committed (89%, n = 1,086/1,221), patient (87%, n = 1,066/1,220), and available/accessible (88%, n = 1,078/1,221) but also important contributors to research (84%, n = 1,026/1,219) and well connected to others of importance in their field (89%, n = 1,085/1,220). Table 2 summarizes the perceived characteristics of primary K award mentors by gender of protégé, gender of primary K award mentor, and mentor–protégé gender concordance. Few gender differences were observed; however, protégés perceived female mentors to be more controlling (23% of female mentors [n = 62/267] versus 17% of male mentors [n = 164/942]; $P = .014$), whereas they perceived male mentors to be more available and accessible (89% of male mentors [n = 842/944] versus 85% [n = 226/267]; $P = .035$).

When all mentor characteristics (the items in Table 2) were considered together as a scale, the Cronbach alpha value was 0.73. However, when we iteratively removed items and recalculated the alpha value, a summary scale that excluded the final two items (i.e., an important contributor to research and well connected to others in the field) appeared more internally consistent. Therefore, two scales—following two latent constructs—resulted from the set of mentor characteristics that we examined. The first construct was mentor behavior and was measured by the first eight items listed in Table 2 (e.g., fault-finding/judgmental, patient, exploitative, available/accessible); the scale including these eight items had a Cronbach alpha of 0.78. This scale comprised three positive and five negative mentoring characteristics that were, as mentioned previously, scored from 0 (not at all) to 4 (a lot) for positive mentoring characteristics and 0 (not at all) to −4 (a lot) for negative mentoring characteristics; thus, in theory, the scale could vary between −20 and 12. In our study, the empirical distribution was skewed toward positive values. The second construct was mentor prestige and was measured by the last two items listed in Table 2; the scale for these two items had a Cronbach alpha of 0.87. Both of the component question scores ranged from 0 (not at all) to 4 (a lot), and the composite scale varied from 0 to 8 both in theory and in its empirical distribution.

Extent to which mentees perceived mentors to have played various roles

Respondents described a number of roles played by their mentors. The vast majority reported that their mentors had served as role models (76%, n = 933/1,225) or had modeled professional and ethical behavior (82%, n = 1,007/1,225). Most also reported that their mentors had taught them knowledge and skills (77%, n = 945/1,223), advised them about publication (75%, n = 912/1,224), or advocated for them (73%, n = 891/1,224). Respondents frequently reported that their mentors had promoted their careers through networking (62%, n = 757/1,225) or had advised them in areas such as obtaining resources (62%, n = 757/1,225), department politics (48%, n = 594/1,225), or preparation for advancement (58%, n = 710/1,223). Fewer respondents reported that their mentors had advised them about balancing work and family (22%, n = 273/1,224). Table 3 summarizes the perceived roles of primary K award mentors and the amount of mentoring given in each role by gender of protégé, gender of primary K award mentor, and mentor–protégé gender concordance. Those with female mentors were more likely to report receiving advice on work–life balance than those with male mentors (28% of protégés with female mentors [n = 74/266] versus 20% of protégés with male mentors [n = 192/946]; $P = .008$). Women with male mentors were most likely to report being taught skills and knowledge by mentors (83%, n = 322/389), followed by women with female mentors (77%, n = 121/158), men with male mentors (75%, n = 415/556), and men with female mentors (70%, n = 76/108). Overall, male K award recipients were slightly more likely to report that their mentors had served as role models (78% of male recipients [n = 517/667] versus 75% of female recipients [n = 416/558]; $P = .02$). Moreover, gender concordance was associated with the extent to which the mentor was perceived to serve as a role model (79% for female–female pairs [n = 125/158]; 78% for male–male pairs [n = 434/556]; 75% for male mentees with female mentors [n = 81/108]; and 73% for female mentees with male mentors [n = 285/391]; $P = .05$).

When considered as part of a scaled measure, all of these items seemed to measure the same latent construct—extent of mentorship in various mentoring roles—as reflected in excellent internal consistency (Cronbach alpha 0.91). When we removed individual items iteratively and recalculated the alpha value, the value varied between 0.89 and 0.90, further indicating that all items belong in the same scale. The items were scored 0 (not at all) to 3 (a lot), with the combined scale varying between 0 and 30 in theory. The empirical distribution did vary as expected and was approximately normally distributed.

Satisfaction

Overall, few respondents were dissatisfied with the mentoring received from their primary K award mentor (10%, n = 122/1,220) or with the mentoring received from all other sources (10%, n = 128/1,221). We detected no significant difference in satisfaction with primary K award mentor by gender of mentor ($P = .78$), gender of mentee ($P = .54$), or gender concordance ($P = .90$). Women were slightly more likely to be dissatisfied with the mentoring they received from all sources (12% of women [n = 66/555] versus 9% of men [n = 62/666]; $P = .04$).

Figure 1 details the level of dissatisfaction expressed by respondents regarding a number of career domains. Dissatisfaction was most notable regarding the balance between professional and personal lives, about which nearly half of respondents expressed concern. Women were more likely than men to express their dissatisfaction with work–life balance (52% of women [n = 289/553] versus 40% of men [n = 268/663]; $P < .001$), the balance between their professional responsibilities (44% of women [n = 240/551] versus 32% of men [n = 211/659]; $P < .001$), their sense of being valued (31% of women [n = 169/554] versus 26% of men [n = 174/661]; $P < .03$), and the opportunity to collaborate with other faculty (14% of women [n = 77/555] versus 9% of men [n = 57/664]; $P < .008$).

When all eight career satisfaction variables (those that appear in Figure 1) were considered together as a scaled measure of career satisfaction, internal consistency was good (Cronbach alpha 0.79). If we removed one variable iteratively from the scale, the Cronbach alpha varied from 0.75 to 0.78, indicating that each of the questions appear to be part of the same latent construct and can be scaled together. In theory, the scale would be distributed between −16 and 16, following a normal distribution. The empirical distribution varied between −12 and 16 and approximated a normal distribution, thus confirming its suitability as an outcome variable for estimation using linear models.

In multivariable models, we found that several aspects of mentoring were significantly associated with satisfaction after adjusting for personal and institutional characteristics of the K awardee, as depicted in Table 4. These included the nature of the mentoring relationship (e.g., the collegiality of the mentoring relationship, time spent meeting with or communicating with the mentor), mentor characteristics (e.g., mentor behavior, mentor prestige), and the extent of mentoring in different mentoring roles. Mentor gender and gender concordance of the mentoring pair were not significant, nor was the number of K award mentors.

In the multivariable model presented in Table 5, in which backwards selection eliminated characteristics (as described in Method, above), the mentoring aspects that remained significantly associated with career satisfaction were the collegiality of the mentor–mentee relationship, mentor behavior, and extent of mentorship in various mentoring roles. Also independently associated with career satisfaction were mentee gender, specialty, and whether the mentee’s research was laboratory based. We evaluated for potential significant interactions between gender and other variables in the model, including the mentoring variables, and found none.

Discussion and Conclusions

In this study of junior faculty holding NIH K series career development awards, we found that a number of aspects of mentoring were associated with overall career satisfaction—including the nature of the mentoring relationship (e.g., collegiality), positive mentor behaviors, and the extent of mentoring in various mentoring roles. We found generally high satisfaction and positive mentoring experiences in this population with relatively few gender differences. However, our findings did indicate low levels of satisfaction and inadequate

mentoring within the work–life balance domain, along with significant gender differences in this area.

Existing evidence supports the idea that mentoring relationships can affect career development and success in academic medicine.[15] Previous research has shown that mentors influence important career outcomes, such as personal development and research productivity.[23] They can assist their protégés in various areas of career development by serving as advocates; by providing opportunities for networking; by aiding in the development of important skills such as grant writing, data analysis, and manuscript preparation; and by offering personal advice and moral support.[24–26] In addition, studies have identified a number of characteristics and behaviors that are desirable for mentors, including compatibility with their protégé, patience, generosity, and trustworthiness.[21,24–26] Our study builds on this work by demonstrating that multiple aspects of the mentoring relationship are important correlates of career satisfaction. Because mentor behaviors—particularly the level of collegiality perceived by the mentee— do appear to be directly associated with mentees' career satisfaction, we believe that promotion of formal training programs that promote positive mentor behaviors may serve as a useful means to promote satisfaction and, in turn, retention in academic medical careers.

Prior research has suggested that women in academic medicine have unique needs and expectations that are not fully being met by current conceptualizations of mentoring[32,33]; therefore, investigators studying mentoring and satisfaction must give specific attention to the influence of gender. In this study, female respondents were less satisfied than men overall, and a substantial number of female respondents were specifically dissatisfied with the balance between their professional and personal lives.

Of note, our respondents perceived female mentors to be more likely to give advice on work–life balance, especially when paired with a female protégé; still, mentoring in this domain was generally infrequent, even when both members of the mentoring dyad were female. Moreover, female mentors were perceived as being less available, and female protégés had greater difficulty in identifying role models. These findings are troubling because previous research suggests that women's attrition from academic medicine may be partly due both to a dearth of positive role models who have successfully navigated the challenges of career and family and to a lack of sufficient advice in this important area.[8] Our findings are especially compelling in light of social cognitive career theory,[34] which focuses on how social cognitive mechanisms relevant to career development (e.g., self-efficacy beliefs, outcome expectations, goals related to balancing work and family) interrelate with other personal factors (e.g., gender), contextual factors (e.g., exposure to role models; cultural and gender role socialization), and learning/experiential factors (e.g., observing one's own success or failure; observing the success or failure of role models) to either promote or hinder a person's ability to progress in his or her career. Of note, not only women but also a substantial proportion of men in our study expressed dissatisfaction with work–life balance and received little mentoring in this domain. Thus, our findings add to the evidence suggesting a growing need for mentors and role models in academic medicine who are available and willing to share with their protégés—both male and female— their own personal experiences with managing the competing demands of work and home.[8,16]

Notably, our respondents perceived female mentors as less available and more controlling compared with male mentors. Such findings are worth considering in the context of prior research on unconscious gender bias.[35–39] It is possible that similar behaviors in men and women are judged differently because of stereotypical cultural expectations[35–37] and that gender bias may negatively affect the way successful female leaders are perceived.[38,39] It could be the case that female mentors behaved similarly to male mentors but were judged more harshly (e.g., were rated as more controlling) because their actions were perceived as masculine and gender incongruent (e.g., women are not expected to be assertive). Additional research is necessary to explore this issue further. Educating both protégés and mentors—both male and female—about stereotypes and gender bias may be a crucial step toward "fixing the environment" rather than "fixing the women" in such circumstances.[40,41]

This study has a number of strengths, including both a large number of responses and a high rate of response from a population with established mentoring relationships, among whom the importance of different aspects of mentoring could be explored. Nevertheless, this study does have certain limitations. First, it relies on self-report for most of its measures. Although the questions we used have high face validity and were developed with standard techniques of survey design (including cognitive pretesting[30]), recall bias and/or other biases may have influenced participant responses. Second, like all survey studies, selection bias is possible. Although we achieved an extremely high response rate for a medical faculty survey (75%), and differences between respondents and nonrespondents were not marked, those who responded may have differed systematically from the overall target population. Nevertheless, it is unlikely that such differences would underlie either the associations between specific aspects of the mentoring relationship and satisfaction that we observed or the gender differences that we observed. Finally, the K award population may differ systematically from the broader population of faculty in academic medicine, limiting the ability to generalize, particularly regarding the overall level of satisfaction observed, beyond the group of individuals holding career development awards.

In sum, this study found strong associations between several aspects of mentoring and career satisfaction of K award recipients, indicating that those who have concerns about dissatisfaction with and attrition from academic medical careers would be well advised to target the training and development of mentors. Positive mentoring behaviors are common but not universal. Because these behaviors are not necessarily innate, they should be taught, like any important skill in medicine. In particular, because the greatest area of dissatisfaction we observed was in the domain of work–life balance, and because this was one of the only domains in which gender differences existed, specific attention towards developing mentoring skills in this area may be particularly useful in improving overall satisfaction and retention in academic medical careers for all, and for women in particular.

Acknowledgments

The authors wish to thank the K award recipients who took the time to participate in this study.

Funding/Support: This work was supported by grant 5 R01 HL101997-04 from the National Institutes of Health to Dr. Jagsi. The funding body played no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; or preparation, review, or approval of the manuscript. Dr. Ubel is supported by a Health Policy Investigator Award from the Robert Wood Johnson Foundation.

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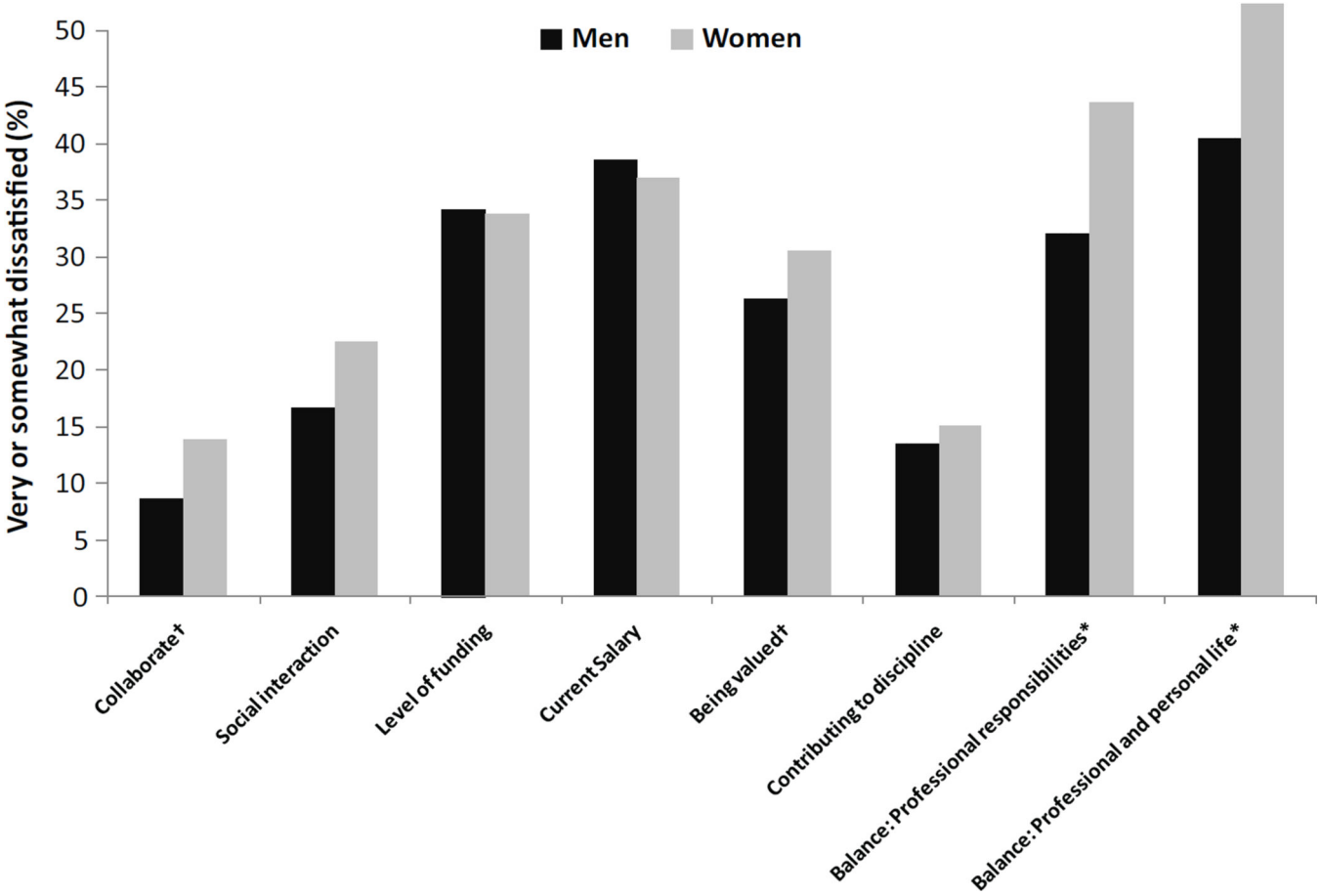

Figure 1.

Comparison of career satisfaction by gender. This figure shows the percentage of respondents to our survey of K award recipients (n = 1,227), by gender, who reported dissatisfaction across various domains. Significant differences by gender existed in dissatisfaction with work–life balance, the balance among professional responsibilities, the sense of being valued, and the opportunity to collaborate with other faculty. *$P < .0001$; †$P < .05$.

Table 1

Training, Demographic, and Other Characteristics of the 1,227 K08 and K23[*] Award Recipients Responding to a Survey, 010–2011

Characteristic	N (%)[†] Women (n = 559)	Men (n = 668)	*P* value[‡]
K award type			**<.001**
K08	200 (35.8)	399 (59.7)	
K23	359 (64.2)	269 (40.3)	
Year of K award			.21
2006	110 (19.7)	147 (22.0)	
2007	147 (26.3)	153 (22.9)	
2008	136 (24.3)	187 (28.0)	
2009	166 (29.7)	181 (27.1)	
K award institution tier[§]			.54
First	103 (18.6)	122 (18.5)	
Second	145 (26.2)	195 (29.6)	
Third	155 (28.0)	183 (27.7)	
Fourth	150 (27.1)	160 (24.2)	
Missing	6	8	
Degree			**<.001**
MD	339 (60.6)	406 (60.8)	
MD/PhD	82 (14.7)	190 (28.4)	
Non-MD	138 (24.7)	72 (10.8)	
Nature of research			**<.001**
Lab based	209 (37.4)	425 (63.6)	
Other	350 (62.6)	243 (36.4)	
Specialty[¶]			**<.001**
Women/children/family	129 (23.1)	115 (17.2)	
Hospital based	49 (8.8)	98 (14.7)	
Surgical	12 (2.2)	58 (8.7)	
Medical	219 (39.2)	305 (45.7)	
Basic sciences	12 (2.2)	20 (3.0)	
Non-MD	138 (24.7)	72 (10.8)	
Race			.63
White	391 (70.5)	463 (69.8)	
Asian	121 (21.8)	156 (23.5)	
Underrepresented in medicine, minority[**]	43 (7.8)	44 (6.6)	
Missing	4	5	

Characteristic	N (%)† Women (n = 559)	Men (n = 668)	*P* value‡
Marital status			**.002**
Married/in a domestic partnership	486 (87.1)	616 (92.4)	
Single	57 (10.2)	33 (5.0)	
Divorce/widowed	15 (2.7)	18 (2.7)	
Missing	1	1	
Parental status			**.02**
Yes	427 (76.4)	545 (81.7)	
No	132 (23.6)	122 (18.3)	
Missing	0	1	
English native language			**.05**
Yes	479 (85.7)	544 (81.6)	
No	80 (14.3)	123 (18.4)	
Missing	0	1	
Gender of primary designated K award mentor			**<.001**
Male	391 (71.1)	557 (83.8)	
Female	159 (28.9)	108 (16.2)	
Missing	9	3	

*K08 and K23 awards are National Institutes of Health career development awards that provide the recipient with salary support, structured mentoring, and protected research and training time.

†Percentages may not total 100 because of rounding, and they are calculated omitting any missing data.

‡*P* values are calculated omitting any missing data, and statistically significant variables appear in bold.

§This refers to the K award recipient's institution; the authors divided these into four groups based on the amount of funding granted to each institution.

¶For a detailed explanation of this division, see Jagsi et al.[4,5,31]

**Black, Latino, Native American.

Table 2

Primary K Award* Mentor Characteristics by Gender of Protégé, Gender of Primary K Award Mentor, and Mentor–Protégé Concordance, 2010–2011

Mentor characteristic as reported by protégés responding "quite a bit" or " a lot" to the prompt, " My primary award mentor is…"	Gender of protégés			Gender of mentors			Protégé–mentor gender concordance				
	No. (%) of male protégés	No. (%) of female protégés	*P*† value	No. (%) of protégés with male mentors	No. (%) of protégés with female mentors	*P*† value	No. (%) of female protégés with female mentors	No. (%) of male protégés with male mentors	No. (%) of female protégés with male mentors	No. (%) of male protégés with female mentors	*P* † value
Fault-finding or judgmental	138/664 (20.8)	104/553 (18.8)	0.39	180/940 (19.1)	60/267 (22.5)	0.21	37/159 (23.3)	115/554 (20.8)	65/386 (16.8)	23/108 (21.3)	0.20
Committed to mentoring protégé	586/665 (88.1)	500/556 (89.9)	0.68	844/944 (89.4)	232/267 (86.9)	0.06	140/159 (88.1)	492/555 (88.6)	352/389 (90.5)	92/108 (85.2)	0.30
Exploitative	116/661 (17.6)	84/551 (15.2)	0.57	155/936 (16.6)	42/266 (15.8)	0.66	25/159 (15.7)	99/552 (17.9)	56/384 (14.6)	17/107 (15.9)	0.64
Patient	581/665 (87.4)	485/555 (87.4)	0.70	828/943 (87.8)	229/267 (85.8)	0.36	140/159 (88.1)	490/555 (88.3)	338/388 (87.1)	89/108 (82.4)	0.36
Overprotective	93/663 (14.0)	89/556 (16.0)	0.31	134/942 (14.2)	45/267 (16.9)	0.28	29/159 (18.2)	76/553 (13.7)	58/389 (14.9)	16/108 (14.8)	0.52
Controlling	123/665 (18.5)	104/554 (18.8)	0.88	164/942 (17.4)	62/267 (23.2)	**0.01**	36/159 (22.6)	97/555 (17.4)	67/387 (17.3)	26/108 (24.1)	0.11
Available and accessible	589/665 (88.6)	489/556 (88.0)	0.57	842/944 (89.2)	226/267 (84.6)	**0.04**	135/159 (84.9)	496/555 (89.4)	346/389 (89.0)	91/108 (84.3)	0.18
Manipulative	78/664 (11.8)	61/555 (11.0)	0.72	108/943 (11.5)	30/266 (11.3)	0.71	15/159 (9.4)	63/555 (11.4)	45/388 (11.6)	15/107 (14.0)	0.88
An important contributor to the research in protégé's field	556/663 (83.9)	470/556 (84.5)	0.81	794/943 (84.2)	224/266 (84.2)	0.57	138/159 (86.8)	468/554 (84.5)	326/389 (83.8)	86/107 (80.4)	0.45
Well connected to others of importance in protégé's field	585/664 (88.1)	500/556 (89.9)	0.36	838/943 (88.9)	238/267 (89.1)	0.75	143/159 (89.9)	488/554 (88.1)	350/389 (90.0)	95/108 (88.0)	0.81

*K08 and K23 awards are National Institutes of Health career development awards that provide the recipient with salary support, structured mentoring, and protected research and training time.

†Adjusted for K award type (K08 or K23), year of K award (2006, 2007, 2008, or 2009), K award institution tier (first, second, third, or fourth), degree (MD, MD/PhD, or Non-MD), nature of research (lab based or other), specialty (women/children/family specialties, hospital based, surgical, medical, non-MD, basic sciences), race (white, Asian, or underrepresented in medicine minority), marital status (married, single, or divorced/widowed), parental status (yes or no), and English as the respondent's native language (yes or no. Numbers in bold represent significant values.

Table 3

Extent to Which Protégés Reported Their Mentors Played Different Mentoring Roles by Gender of Protégé, Gender of Primary K Award* Mentor, and Mentor–Protégé Concordance, 2010–2011

	Gender of protégés			Gender of mentors			Protégé–mentor gender concordance				
Role of mentors as reported by protégés responding "quite a bit" or "a lot" to the prompt, "Thinking about all of your mentors, how much have your mentors…	**No. (%) of male protégés reporting that …**	**No. (%) of female protégés reporting that …**	***P*† value**	**No. (%) of protégés with male mentors reporting that…**	**No. (%) of protégés with female mentors reporting that…**	***P*† value**	**No. (%) of female protégés with female mentors reporting that…**	**No. (%) of male protégés with male mentors reporting that…**	**No. (%) of female protégés with male mentors reporting that…**	**No. (%) of male protégés with female mentors reporting that…**	***P*† value**
Served as role model(s)	517/667 (77.5)	416/558 (74.6)	**0.02**	719/947 (75.9)	206/266 (77.4)	0.63	125/158 (79.1)	434/556 (78.1)	285/391 (72.9)	81/108 (75.0)	**0.05**
Promoted your career through networking	408/667 (61.2)	349/559 (62.5)	0.51	579/947 (61.1)	168/266 (63.2)	0.87	105/158 (66.5)	343/556 (61.7)	236/391 (60.4)	63/108 (58.3)	0.30
Advised about preparation for advancement (e.g., promotion, leadership positions)	380/666 (57.1)	330/557 (59.3)	0.47	542/946 (57.3)	158/265 (59.6)	0.79	94/157 (59.9)	314/555 (56.6)	228/391 (58.3)	64/108 (59.3)	0.83
Advised about getting work published	477/666 (71.6)	435/558 (78.0)	0.20	705/947 (74.4)	196/265 (74.0)	0.39	123/158 (77.8)	402/556 (72.3)	303/391 (77.5)	73/107 (68.2)	0.50
Advised about department/division politics	327/667 (49.0)	267/558 (47.8)	0.16	453/947 (47.8)	134/266 (50.4)	0.80	79/158 (50.0)	271/556 (48.7)	182/391 (46.5)	55/108 (50.9)	0.47
Advised about obtaining resources	410/667 (61.5)	347/558 (62.2)	0.32	580/947 (61.2)	168/266 (63.2)	0.92	102/158 (64.6)	342/556 (61.5)	238/391 (60.9)	66/108 (61.1)	0.70
Served as advocate(s)	496/666 (74.5)	395/558 (70.8)	0.13	701/947 (74.0)	180/265 (67.9)	0.13	106/158 (67.1)	420/556 (75.5)	281/391 (71.9)	74/107 (69.2)	0.15
Advised about balancing work and family	152/667 (22.8)	121/557 (21.7)	0.31	192/946 (20.3)	74/266 (27.8)	**0.01**	45/158 (28.5)	122/556 (21.9)	70/390 (18.0)	29/108 (26.9)	**0.03**
Taught knowledge and skills	493/667 (73.9)	452/556 (81.3)	0.07	737/945 (78.0)	197/266 (74.1)	**0.03**	121/158 (76.6)	415/556 (74.6)	322/389 (82.8)	76/108 (70.4)	**0.05**
Modeled professional and ethical behavior	536/664 (80.7)	471/558 (84.4)	0.37	775/944 (78.0)	221/266 (83.1)	0.92	135/158 (85.4)	448/553 (81.0)	327/391 (83.6)	86/108 (79.6)	0.85

*K08 and K23 awards are National Institutes of Health career development awards that provide the recipient with salary support, structured mentoring, and protected research and training time.

† Adjusted for K award type (K08 or K23), year of K award (2006, 2007, 2008, or 2009), K award institution tier (first, second, third, or fourth), degree (MD, MD/PhD, or non-MD), nature of research (lab based or other), specialty (women/children/family specialties, hospital based, surgical, medical, non-MD, basic sciences), race (white, Asian, or underrepresented in medicine minority), marital status (married, single, or divorced/widowed), parental status (yes or no), and English as the respondent's native language (yes or no). Numbers in bold represent significant values.

Table 4

Adjusted* Associations Between Mentoring Covariates and Career Satisfaction Among K08 and K23 Award† Recipients, 2010–2011

Covariate	Estimate	Adjusted *P* value
Mentor gender		0.73
Male	0.15	
Female	—	
Mentee–mentor gender match		0.53
Concordant	—	
Discordant	−0.26	
Number of designated K award mentors		0.90
1	—	
2+	−0.05	
Collegial mentor–mentee relationship		<.001
Mostly or somewhat more collegial	—	
Mostly and somewhat more student–teacher or neither	−1.72	
Frequency of communication between mentor–mentee		0.03
At least once a week	—	
Less than once a week	−0.85	
Monthly hours meeting one-on-one with mentors (1-unit increase in square-root of hour)‡	0.90	<.001
Mentor behavior scale (1-unit increase)	0.29	<.001
Mentor prestige scale (1-unit increase)	0.38	<.001
Extent of mentoring in various mentoring roles scale (1-unit increase)	0.37	<.001

*Adjusted for the recipient (mentee) characteristics of gender, race (white, Asian, or underrepresented in medicine minority), degree (MD, MD/PhD, or non-MD), marital status (single, married, or divorced/widowed), parental status (yes or no), and specialty(women/children/family specialties, hospital based, surgical, medical, non-MD, basic sciences); for whether the recipient's work was laboratory based (lab based or other); for whether the recipient spoke English as a native language (yes or no); and for the K award type (K08 or K23), year of K award (2006, 2007, 2008, 2009), and institutional NIH funding tier (first, second, third, or fourth).

†K08 and K23 awards are National Institutes of Health career development awards that provide the recipient with salary support, structured mentoring, and protected research and training time.

‡Total hours was highly skewed toward higher values, and the square-root transformation was applied to normalize the distribution.

Table 5

Final Multivariable Model of Career Satisfaction Among K08 and K23 Award* Recipients, 2010–2011

Covariate	Estimate	*P* value
Intercept	3.50	<.001
Gender of mentee		<.001
Male	—	
Female	−1.27	
Laboratory based		0.014
Yes	−0.820	
No	—	
Specialty†		0.004
Basic sciences	0.194	
Non-MD	1.579	
Clinical specialties for women, children, and families	0.932	
Hospital-based specialties	1.389	
Surgical specialties	1.114	
Medical specialties	—	
Collegial mentor–mentee relationship		0.015
Mostly or somewhat more collegial	0.816	
Mostly and somewhat student–teacher and neither	—	
Mentoring behavior scale‡ (1-unit increase)	0.113	0.001
Extent of mentoring in various mentoring roles scale§ (1-unit increase)	0.332	<.001

*K08 and K23 awards are National Institutes of Health career development awards that provide the recipient with salary support, structured mentoring, and protected research and training time.

†For a detailed explanation of this division, see Jagsi et al.4,5,31

‡Centered at the median value 7.

§Centered at the median value 19.