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Mentoring the Next Generation of Faculty: Supporting Academic Career Aspirations Among Doctoral Students

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Abstract We know little about the role of faculty mentoring in the development of interest in pursuing an academic career among doctoral students. Drawing on Social Cognitive Career Theory, this study examined the relationships between different kinds of mentoring (instrumental, psychosocial, and sponsorship) and academic career self-efficacy, interests, and goals. Analyses controlled for race, gender, field, and candidacy status. Psychosocial and instrumental mentoring predicted feelings of self-efficacy in one's ability to pursue an academic career, and exerted significant indirect effects through that self-efficacy, on students' interest in such a career. Race-gender comparisons indicated that sponsorship was not an important predictor for non-URM men, in contrast to the other groups.

Keywords Mentoring · Sponsorship · Career choice · Self-efficacy · Academic success

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Introduction

Academic careers are increasingly recognized as unfolding according to a developmental logic, with different career stages requiring different forms of institutional recognition and support (Buller 2010; Neumann 2009). We focus on the earliest stage in faculty careers: doctoral education. This stage is a preparatory one, during which individuals make the decision about whether an academic career as a tenure track faculty member is right for them. At research-intensive institutions, there is often an assumption that this preparatory stage will lead automatically to a faculty position, and an academic career (Nerad and Cerny 2002; Sadowski et al. 2008). This assumption persists despite the fact that in some fields many doctoral students pursue careers in non-academic settings, or pursue non-faculty careers in universities (Russo 2011). Moreover, in all fields, some students decide that a faculty career is not for them or give up the search for a faculty position in the face of an unfavorable job market (Auriol et al. 2013; Nerad 2004). However, because the push for students to pursue an academic career is so strong, and because at many institutions it may still be a primary career goal (such as at the institution in this study, see below), it is the focus of our current investigation.

Central to doctoral students' success are their PhD advisors and other mentors (Gelso 2006; Russo 2011). Mentorship, as we will discuss below, provides students with important feedback as to their performance, encouragement when they need it, and pragmatic information on how to acquire the skills necessary to succeed in a given field. Mentorship comes in several different forms, and the main goal of this paper is to examine the role that different types of advisor mentoring play in supporting students' desire to pursue an academic career, using a socio-cognitive model of career success.

We draw on the Social Cognitive Career Theory (Lent et al. 1994) in order to examine the relationships between three different types of mentorship and self-efficacy and career interest. In this early stage of career commitment, guidance from trusted senior members is central to students' commitment to that field (de Tormes Eby et al. 2013; Johnson 2007). Consistent with the increased recognition of the importance of mentoring throughout at least early stages of faculty careers, we focus on students' reports of the quality of the different kinds of mentoring they receive from a primary mentor. Here, we focus on PhD advisors (the individual faculty member who directly supervises a student's doctoral research). This decision is consistent with the operationalization of mentor used in other research (e.g., Lev et al. 2010), as well as arguments that PhD advisors are central to doctoral student success (Russo 2011). Thus, we use the term mentor and advisor interchangeably. In these mentoring relationships (as in many), the assumption is often made that the goal is both the transfer of complex knowledge and socialization to professional norms and standards, as well as guidance through a series of early career decisions and choices (Chemers et al. 2011; Weidman et al. 2001).

After presenting the theoretical perspective on which this project draws, we will review the literature on mentoring during doctoral study, with a specific focus on three separate types of mentoring (based on Kram 1985 and Ibarra et al. 2010), and then focus on the importance of mentoring for career goals and outcomes. We also discuss (and later, examine) the ways in which important demographic factors (such as gender, race, and science, technology, engineering and math or STEM (Science, Technology, Engineering and Math) vs. non-STEM fields relate to mentoring. We then test our hypothesized relationships, and pursue some exploratory analyses on the effects of demographic factors. Finally, we end the paper with a discussion of the future research implications, as well as

potential institutional applications of our findings. We contribute to the existing literature on mentoring by focusing on three difference types of mentoring (instrumental, psychosocial and sponsorship) and their impact on the self-efficacy and academic research career interests of doctoral students across a broad range of disciplines.

A Theoretical Framework for Understanding the Relationships between Mentoring, Career Self-Efficacy and Interest in Pursuit of an Academic Career

Drawing on Bandura's (1976; 2001) Socio-cognitive Theory, Lent and colleagues' (Lent et al. 1994; Lent et al. 2000; Lent and Brown 2013) Social Cognitive Career Theory (SCTC) models the development of career self-efficacy, expectations, and interests, as well as the pursuit of career goals. Career goals and interests are predicted by both self-efficacy beliefs and outcome expectations. These beliefs and expectations are, in turn, the result of different contextual factors, such as family background, feedback from important figures in one's life, educational experiences, etc. (see Lent and Brown 2013, p. 562). Consistent with this theoretical model and other empirical work (see Chemers et al. 2011) we argue that relationships with mentors are one means by which individuals develop feelings of competence and efficacy. These feelings, in turn, affect interest in a particular career goal. The model further states that interest in a career goal then predicts goal-setting, as well as behavioral commitment to specific goals and, finally, goal fulfillment. For our purposes, we draw only on the first part of this model, which outlines the precondition for doctoral students pursuing academic careers: examining how different types of mentorship predict the development of career efficacy, and then academic career interest (see Fig. 1).

The Role of Mentors in Graduate Training

Doctoral training is characterized by a strong emphasis on the apprentice relationship of the emerging scholar with her or his more senior faculty advisor. Advisors help link graduate students to their departments (Lovitts 2001), orient them to their fields (Green 1991), and are sources of both explicit (Bieber and Worley 2006) and tacit (Gerholm 1990) knowledge about their fields. Importantly, advisors' relationships with their advisees help encourage students to finish their programs and stay in the field (Golde 2005; Lovitts 2001). Affirmative relationships with mentors have been implicated in positive student outcomes, including their sense of belonging (in the field), confidence about their capacity

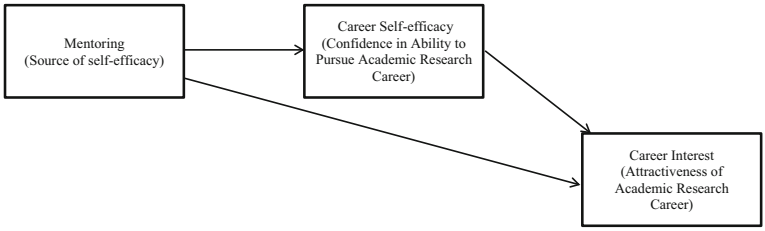

Fig. 1 Proposed paths between mentoring, academic research career self-efficacy, and academic career interest

to make a contribution (Bieber and Worley 2006; Curtin et al. 2013), and their productivity (Cronan-Hillix et al. 1986). Further, consistent with Lent et al.'s (1994) model, mentorship is predictive of students' successful attainment of academic jobs (Rybarczyk et al. 2011; see de Tormes Eby, et al. 2013, for a meta-analysis), or their eventual goal attainment and performance. While some research has shown relatively small effects of mentoring and raised concerns that additional empirical support for its efficacy is needed (Sambunjak et al. 2006), other analyses (Eby et al. 2008) have shown small, but significant differences between mentored and non-mentored individuals.

Many studies of doctoral students have focused on students in particular disciplines, so it is not always easy to identify findings that are consistent across many or most fields vs. those that may be field-specific (see, e.g., Dua 2008; Nolan et al. 2008; Webb et al. 2009). Many studies only assess overall mentoring support rather than differentiating types of support, as we do; and few focus specifically on the role of mentoring in fostering commitment to an academic career among doctoral students.

Types of Mentoring

The study of mentoring in academia has built on the path-breaking early work focused on mentoring in other kinds of organizational settings, which distinguished between instrumental and psychosocial mentoring (Kram 1985). The first is mentoring in which mentors and mentees focus on the skills and knowledge that are essential for successful work performance, while the second involves aspects of personal support, encouragement and advice that may focus on relationships at work and the place of work in a full and satisfying life. More recently, increasing attention has been paid to the role of mentors not so much as teachers or advisors, but as gatekeepers within the work setting and the profession (Ibarra et al. 2010). This form of mentoring has been labeled sponsorship, and includes active advocacy of the individual's opportunities within the institution and the profession, and open access to the mentor's own network of professional contacts (Crosby 1999; Ragins and Kram 2007). We consider all three of these forms of mentoring, which fit well within a social learning theoretical framework, and reflect research indicating that faculty are already mentoring students in this way (see Thiry and Laursen's 2011 interviews with undergraduate science students).

Career or instrumental mentoring in academia encompasses explicit training in research methods, information about content, ethics and procedures, and active efforts to ensure that the protégé has opportunities to learn what she or he needs to know (Blake-Beard et al. 2011). In terms of social learning theory, instrumental mentorship may provide students with concrete information about the types of goals and opportunities available to them, as well as the chance to develop a sense of efficacy as they learn technical mastery over the skills necessary for success in a given field. *Sponsorship* (which is certainly instrumental, but confined to advocacy and networking) includes active recommendation of the mentee to others, provision of access to one's professional network, and advocacy on the mentee's behalf (Ibarra et al. 2010). While this form of mentorship does not necessarily require direct communication between mentor and protégée, it indirectly communicates to the protégée that her/his mentor values their contribution to the field, again perhaps building a sense of efficacy. Finally, *expressive or psychosocial mentoring* includes encouragement and support as a protégé learns and survives periods of doubt and failure (Blake-Beard et al. 2011). Psychosocial mentoring may also generate self-efficacy, and provide support to individuals in pursing their

career goals through challenging circumstances. Research with undergraduates has shown that mentoring high in the kind of relational support that characterizes psychosocial mentoring may be particularly important for women (Liang et al. 2002).

All three forms of mentoring have been identified as critical to success in occupational settings; they have less often been differentiated in research on mentoring in academic settings. One exception is Tenenbaum et al. (2001), who found empirical support for a similar three-factor structure of advisor mentoring of students. It is important to assess whether all three of these kinds of mentoring matter in early academic career stages, as senior faculty do not all share a belief that their role includes all three of them (Webb et al. 2009).

In a study of undergraduate, graduate, and postdoctoral science students, Chemers et al. (2011) tested a model with some of the same factors we are interested in here, and found that, among graduate and postdoctoral science students, instrumental and socio-emotional mentoring indirectly predicted interest in science careers (instrumental mentoring predicted interest in a career via science self-efficacy, and socio-emotional mentoring via science identity). They also examined other factors, not of interest here (such as community involvement, research experience, science identity and leadership self-efficacy). These findings indicate that different types of mentorship exert effects on understanding students' career commitments. Moreover, these results are consistent with findings showing significant relationships between mentoring and self-efficacy among undergraduates (MacPhee et al. 2013; Liang et al. 2002) and doctoral students (Hollingsworth and Fassinger 2002), as well as research finding significant associations between self-efficacy and career outcomes for undergraduates (Restubog et al. 2010), medical students (Bierer et al. 2015) and professionals across different careers (Abele and Spurk 2009).

Mentoring and Academic Career Outcomes

Mentoring is related to doctoral student satisfaction and productivity, as well as long-term success as a faculty member. Cameron and Blackburn (1981) found that professors who received sponsorship support in training were engaged with a network of related researchers, had higher publication rates, and received more grants. Similarly, Tenenbaum et al. (2001) found that instrumental mentoring and networking support were related to positive professional outcomes, while psychosocial support predicted personal outcomes such as satisfaction. Previous research has shown that positive feelings about one's graduate advisor are also related to positive professional outcomes (Curtin et al. 2013), so psychosocial mentoring may well matter for these outcomes also.

In a study of academic career goals in a sample of doctoral students, Ostrove et al. (2011) found that confidence about one's capacity to achieve academic goals (self-efficacy, in other words) was a strong correlate of commitment to those goals. Therefore, we assessed whether self-efficacy played a crucial role in mediating the relationship between mentoring and academic career interest.

Gender, Race, and Field Differences in Mentoring

Although not our primary focus in this project, there is evidence that demographic factors may play a role in the type of mentorship that different people receive. Inclusion of these background factors in our analyses is consistent with our theoretical framework. Bakken

et al. (2006), Lent et al. (2000), and Lent and Brown (2013) argue that important background variables, such as gender and race, influence feelings of self-efficacy and career interests, because they provide a reciprocal context for both how the world responds to the individual (creating different educational opportunities, for example), and how the individual interprets feedback and experiences from the world around them. Therefore, we examine the roles that gender, race, and field play in mentoring and its associated outcomes.

The literature on gender and race differences in mentoring is mixed (see, e.g., Ragins and Kram 2007, for a review). Nolan et al. (2008) found that female graduates of top U.S. chemistry programs reported less mentoring at the undergraduate, graduate and postdoctoral levels. Some researchers have argued that women receive less instrumental and more psychosocial support, compared to men (see, for example, Noe 1988a; McKeen and Bujaki 2007). Preston (2004) found that one of the reasons women reported leaving academia was lack of mentoring. However, Tenenbaum et al. (2001) found no significant gender differences in the types of mentoring support students received, and de Tormes Eby et al. (2013) did not identify any consistent impact of gender in their meta-analysis of youth, academic and workplace mentoring. In an experimental test of gender-based bias amongst science faculty, Moss-Racusin et al. (2012) found that faculty offered female students less mentoring, compared to male students.

Race, like gender, has been explored as a potentially important feature both of mentor and protégé characteristics, and as a predictor of successful mentoring, mostly in research on graduate students. Some research has focused on the process of mentoring itself. For example, Thomas and colleagues (Thomas 1990; 1993; Thomas and Gabarro 1999; Thomas and Higgins, 1996) found that ethnic and racial minorities often use multiple resources for mentoring, not just their immediate supervisor, or assigned mentor (see also Chesler and Chesler 2002). However, in the recent interdisciplinary meta-analysis by de Tormes Eby et al. (2013), the effects for race (like gender) on mentoring were all below Cohen's (1988) threshold for a small effect.

Some argue that identity congruence is important for successful mentor/protégée relationships (e.g., Gonzales-Figueroa and Young, 2005; Noe 1988b); others have argued that it is not necessary (see Sambunjak et al. 2010 for a brief discussion of this issue). Further, it may be the case that for groups who are traditionally underrepresented in a field, students may not expect or even idealize identity-congruent mentors (see Bakken 2005). Blake-Beard et al. (2011) found that, although women and students of Color expressed a desired to be matched with an identity-congruent mentor (similar to what Gonzales-Figueroa and Young 2005 found for Latinas), whether they made such a match did not affect academic outcomes. We were unable to examine mentee/protégée identity congruence in the current study, because we did not have this data, but we note that it may be the case that for underrepresented groups, having important identity-congruentmentors or role models is important. However, we also want to caution against assuming that identity-congruence is a panacea. For example, Moss-Racusin et al. (2012) found that *both* women and men faculty offered female students less mentoring (along with fewer other resources).

An intersectional perspective is critical in considerations of race and gender, so the focus on "main effects" in the literature may be misplaced (Cole 2009). Thus, while white (and in some fields, Asian/Asian American) men may benefit from holding two advantaged statuses (race and gender), underrepresented minority women may face particular difficulties since they hold two subordinate statues, while underrepresented minority men and non-underrepresented women hold one. In fact, women of color faculty are more likely to report having received no mentoring, compared to other women and men (Thomas and

Hollenshead 2001). These discrepancies seem to start in graduate school, where African Americans find it difficult to find a faculty advisor who can mentor them professionally, and provide appropriate socialization experiences (Davidson and Foster-Johnson 2001; Gasman et al. 2008). For this reason, we considered intersections of gender and race and not only their separate effects.

Less attention has been paid to differences by academic discipline in mentoring support (though see Blake-Beard et al. 2011 for an exception). Researchers have found differences between the physical sciences and the social sciences and humanities (Tenenbaum et al. 2001), and between the social sciences and the humanities (Cameron and Blackburn 1981) on career outcomes (publication rates), but did not report differences on levels or types of mentoring (it is not clear whether they had analyzed such differences). Disciplines vary in their norms about publishing alone versus with others, which also may influence the degree to which mentors and mentees are and expect to be coauthors on publications. These kinds of differences may also translate into differences in the types of mentoring in different fields. We therefore examine field differences in the types of mentoring received by students.

Current Study

In the current study, we separately measured the three types of mentoring, and assessed whether and how these three forms of mentoring were related to doctoral student's confidence that they could pursue an academic faculty career (career self-efficacy), as well as their desire to pursue such a career (career interest). Data were collected at a large, research-intensive, public research university located in the Midwestern U.S.

Study Hypotheses

We hypothesized that each of the three types of mentoring would be directly related to career self-efficacy and career interest. In addition, we assessed whether self-efficacy is a mediator of the relationship between the three types of mentoring and career interest (that is, whether there are indirect effects of mentoring on goals through self-efficacy), as the Social Cognitive Theory suggests. See Fig. 1 for this set of hypothesized relationships.

We did not have strong hypotheses about gender, race, or field differences, given the lack of consistent evidence in the literature. Therefore we conducted two-tailed tests of gender, race, gender-race group intersections, and field on our measures of mentoring, and of self-efficacy and academic career goals (Field 2009). We also examined whether gender-race intersections and field moderated the effects of mentoring on our outcomes of interest.

Method

Participants

Students enrolled in PhD programs at a research-intensive public university in the Midwest were recruited by e-mail to complete a web-based survey assessing the climates in different departments. Data for this study were drawn from a single public research institution. This

type of institution awards about two-thirds of all doctoral degrees nationally (Bell 2011). The primary goal of the data collection, carried out by the research staff associated with the ADVANCE Program, was to provide departments with climate information they could use to make positive changes. The first author was a research assistant at ADVANCE at the time of some of the data collection; the other two authors were members of the research staff. All data collection procedures were approved by the university's Institutional Review Board. Data were collected from 1173 students across 26 different departments; the overall response rate was 72 %. These analyses include 848 students for whom we had complete data.[1] Thirty-seven percent (315) of the participants were women, and 63 % (533) were men. Most of the sample (63 %) had achieved candidacy (that is, they had finished the qualifying exams for their department and were at the dissertation proposal or dissertation stages of their doctoral programs), 37 % were pre-candidacy, or still taking courses and preparing for exams. STEM students made up 63 % (n = 532) of the sample, and non-STEM students comprised the remaining 37 % (n = 316) of the sample. Students indicated whether they belonged to any domestic underrepresented ethnic or racial group (defined as domestic students who were African American, Latina/o, or Native American; compared to domestic and international students who are White, domestic and international students who are Asian or Asian American; or international students who are Black or of Hispanic descent). Eight percent (n = 105) of the sample indicated that they belonged to an underrepresented minority group. All items described here appear in the Appendix.

Outcome Variable: Interest in an Academic Career

Graduate students responded to items asking them about the attractiveness of particular career goals (adapted from Golde and Dore 2001). Students were asked to indicate how attractive each career goal was (1 = very unattractive; 4 = very attractive). One item from the scale was used in the current analyses (*Become a professor in a top research university*) to measure interest in an academic career. As noted earlier, this is the career goal that is most broadly emphasized at most research-intensive public research institutions like this one, even though 1/3–2/3 of doctoral students pursue careers outside of academia, depending on their field (Nerad and Cerny 2002). Further, although students may eventually pursue other career goals, in this sample, a career in academia was significantly more desirable than any other career goal. The mean score for interest in this goal was 3.14 (SD = .93). In this sample, not only was this goal rated as the most attractive one, students rated this goal as statistically significantly more attractive than the next two most popular career goals: "become a professor in a 4-year college" and "get a research job in industry or the private sector." In addition, the graduate school reported in 2014 that among doctoral graduates academic jobs were the most frequent 10-year post-degree outcomes (for graduates from 2002 to 2005), with 53 % of the 2 474 students obtaining academic jobs across all fields, ranging from a low of 48 % of physical scientists and engineers and a high of 75 % of graduates in the humanities and arts. Moreover, the next most frequent outcomes (business and government/national labs) were far lower in frequency (23 and 6 % overall, respectively). Finally, this pattern of preference held for all years post-Ph.D., even the first, where 62 % of graduates from cohorts 2010–2014 hold

[1] Note that we excluded participants with missing data, as AMOS is unable to calculate indirect effects with missing data. However, all of the analyses presented here (except the test for significance of indirect effects) were run on both the full sample (N = 1173) and the restricted sample (N = 848), and there were no differences in the overall pattern of significant hypothesized findings. Therefore, we report on the analyses run on the restricted sample here.

academic positions or postdocs (38 %), and that latter group declined over 10 years to 2 %, with most of the people in that category at the first year taking up academic positions between years 1 and 10 (from a document produced by the graduate school labeled "Placement Summary for Doctoral Students" conveyed by S. Connor, in a personal communication, July 27 2015). The high level of attractiveness of a career in a research institution for this sample of Ph.D. students, and the fact that the largest group of them takes up academic positions, led us to focus on this particular career goal.

Predictor Variables: Type of Mentor Support

Students responded to a series of 19 close-ended questions (adapted from Golde and Dore 2001), asking them about the degree to which they felt supported by their primary advisor. Questions were asked on a 1 (strongly disagree) to 5 (strongly agree) scale. Factor analysis of the 19 items produced two factors, one that we labeled instrumental and the other that we labeled psychosocial. The three items we identified as representing sponsorship loaded on both factors; a subsequent factor analysis forcing three factors also produced the instrumental and psychosocial factors as well as a third, far less robust, factor of sponsorship items that also double-loaded onto the instrumental factors. Given our empirical interest in advocacy as a specific kind of advisor support those items were removed from the other factors to create a separate scale, which hung together well.

Sponsorship

The degree to which graduate students agreed that their advisor proactively worked to advocate on their behalf, and recommended them to others was assessed using three items from the larger scale. Sample items included: *advocates for me with others when necessary* and *helps me develop professional relationships with others in the field.* These items showed good reliability among graduate students ($\alpha = .74$). The sample mean was 3.18 ($SD = .63$).

Instrumental Mentoring

The degree to which graduate students agreed that their advisor was available to support them in concrete ways with research and other professional issues was assessed using seven items from the larger scale. Sample items included: *teaches me the details of good research practice* and *advises about getting my work published.* These items showed strong reliability ($\alpha = .85$). The sample mean was 3.00 ($SD = .60$).

Psychosocial Mentoring

The degree to which graduate students agreed that their advisor provided psychosocial support was assessed using nine items from the larger scale. Sample items included: *builds my confidence* and *treats me as a whole person—not just a scholar.* These items showed excellent reliability ($\alpha = .92$). The sample mean was 3.17 ($SD = .61$).

Mediator Variable: Career Self-Efficacy

As noted above, both the SCCT and previous research with a different sample of doctoral students (Curtin et al. 2013) showed that a sense of self-efficacy in one's ability to pursue

an academic career predicted attractiveness of that career; therefore we examined it in the current analyses not only as an outcome of good mentoring, but as a possible mediator between mentoring and career goals. Graduate students were asked (items again adapted from Golde and Dore 2001) about the extent to which they were confident of their ability to achieve particular career goals (1 = not at all true; 4 = very true). Since our interest was in understanding mentoring in the context of pursuing a career in academic, we focused on the item related to that goal (*that I can become a professor in a top research university*) as an indicator of career self-efficacy in the current analyses. The mean score for this item was 2.47 ($SD = .98$).

Control Variables

Field (with non-STEM as the reference category), candidacy (candidate for the PhD versus pre-candidate doctoral student), race-gender group (with URM women as the reference category),[2] and perceived support from academic advisor were included as controls in all path analyses. Our interest in field, race, and gender are explained above. We controlled for candidacy status because it seemed possible that students who were in the later stages of their academic career (with a dissertation underway) may differ from those in the early pre-dissertation stages (see, for example, Russo 2011; Gibbs et al. 2014), in terms of how they felt about certain career goals. We did not have a measure of how long students had been in their program, so this was the closest proxy to controlling for stage of doctoral career.

Plan of Analyses

Gender and underrepresented racial group status (URM vs. non-URM) differences on each of the types of mentoring were tested using two-tailed independent t-tests. Field differences (STEM and non-STEM) were tested using one-way ANOVAs, with post hoc corrected Bonferroni tests. We also tested for differences within gender and underrepresented racial group, by comparing non-URM men, non-URM women, URM women, and URM men to each other; again using one-way ANOVAs, with post hoc corrected Bonferroni tests (Abdi 2007).

The hypothesized relationships among mentoring, career goal interest, and career goal self-efficacy were tested separately for each of the three types of mentoring support (sponsorship, instrument, and psychosocial support), since putting them into a model as a single latent variable would not allow us to examine the role of each of them individually. They also could not be included in a single model as separate variables, since they were highly correlated with each other. Given that they are considered to be behaviorally and theoretically distinct, we examine them separately here. The implications of this decision are discussed later in the paper. Path analysis models were estimated using Amos 20 (see Fig. 1 for the hypothesized paths). For each of the three mentoring variables, we first ran the saturated models. We then removed non-significant paths from control variables to the variables of interest, keeping the hypothesized paths in the model (referred to as the trimmed model hereafter). Although saturated models are expected to have good fit, more parsimonious models are preferred (Kline 2011). The significance of the indirect effect of

[2] Please note that although we chose to include race/gender intersections as controls, the main findings of the path analyses reported below do not change when race and gender are included as separate controls.

mentoring on career goal (via career goal self-efficacy) was also estimated in AMOS (following Shrout and Bolger 2002), using 5000 bootstrapped samples and calculating bias-corrected confidence intervals.

We also tested three alternative models for each type of mentoring, removing one of the hypothesized paths (first from mentoring to self-efficacy, then from mentoring to career goal, and then from self-efficacy to career goal), and comparing each of these to our trimmed model. Because none of these models fit the data significantly better than the trimmed model, they are not reported below.

Finally, in order to test whether race-gender or field moderated the effects of mentorship on career goals, the groups analysis function in AMOS was used. This allowed us to compare the paths between variables, by race-gender group and then by STEM vs. non-STEM, to see if any of the hypothesized paths were significant different either by gender-race group or field. The results of these analyses are summarized below.

Results

Bivariate Analyses: Gender, Race, and Field Differences on Mentoring

Although our primary goal was testing the models described above, we performed bivariate analyses first, both to provide context for the multivariate analyses, and because gender (Noe 1988a; McKeen and Bujaki 2007), race (Thomas 1990), and even field (Blake-Beard et al. 2011) may matter for both mentoring and the career outcomes we examined above (confidence in one's ability to pursue a research career, as well as interest in such a career). Mean differences by gender, race, and field on each of the three types of mentoring are reported in Table 1.

Men reported receiving significantly more sponsorship and instrumental mentoring. Compared to non-URM students, underrepresented racial minority students reported receiving significantly less instrumental support. Compared to non-URM men, URM women reported receiving significantly less instrumental support (indicating that the overall difference on instrumental support between underrepresented minority students and non-underrepresented minority students, and between men and women, was explained by the lower scores among URM women). Students in non-STEM fields reported receiving significantly less instrumental support and sponsorship compared to students in STEM fields. However, non-STEM students also reported significantly more psychosocial support than STEM students.

We also examined gender, race, and field differences on the hypothesized mediator variable (self-efficacy) and on our outcome of interest (interest in a career in academia). Men were significantly higher in self-efficacy ($M = 2.53$; $SD = .96$) than women ($M = 3.36$; $SD = 1.00$; $t(846) = 2.45$, $p < .05$). There was no significant difference between men and women in their interest in a career at a top research university ($t(846) = 1.98$, *ns*). There were no significant differences between underrepresented racial groups and other racial groups on either outcome (t^{efficacy} (846) = .39, *ns* and t^{interest} (846) = .97, *ns*). Non-STEM students were significantly higher in career self-efficacy ($M = 2.57$; $SD = .98$), compared to STEM students ($M = 2.41$; $SD = .98$); $t(846) = 2.31$, $p < .05$). Non-STEM students were also significantly more likely to indicate interest in an academic career ($M = 3.34$; $SD = .86$), compared to STEM students ($M = 3.02$; $SD = .96$); $t(846) = 4.45$, $p < .001$.

Table 1 Means, standard deviations, and differences in mentoring by gender and field among graduate students

	Instrumental mentoring	Psychosocial mentoring	Sponsorship
Women	2.94 (.67)	3.15 (.62)	3.11 (.68)
Men	3.04 (.56)	3.19 (.60)	3.22 (.59)
t	2.21*	.91	2.37 *
df	567.90	652.73	584.11
URM	2.86 (.61)	3.12 (.63)	3.13 (.64)
Non-URM	3.02 (.60)	3.18 (.60)	3.18 (.63)
t	2.20*	.71	.74
df	846	846	846
STEM	3.09 (.55)	3.13 (.62)	3.22 (.60)
Non-STEM	2.86 (.65)	3.24 (.58)	3.11 (.67)
t	5.39**	−2.49*	2.34*
df	581.75	846	608.23
Non-URM Men	3.04 (.56)[a]	3.18 (.61)	3.21 (.59)
URM Men	2.97 (.47)	3.27 (.53)	3.24 (.52)
Non-URM Women	2.97 (.66)	3.17 (.59)	3.12 (.67)
URM Women	2.72 (.70)[a]	2.96 (.70)	3.00 (.74)

	Between groups	Within groups	Between groups	Within groups	Between groups	Within groups
df	3.00	844.00	3.00	844.00	3.00	844.00
SS	3.90	302.28	1.98	309.18	2.87	331.00
MS	1.30	.36	.66	.37	.96	.39
F	3.63*		1.80		2.44	

* $p < .05$; ** $p < .01$; *** $p < .001$. *URM* underrepresented racial group

[a] Indicates a significantly different mean value between two groups

To test the various race-gender intersections, we compared URM women (n = 37), URM men (n = 42), non-URM women (n = 278) and non-URM men (n = 491) to each other on the outcomes of interest. The overall test was significant, F (3 844) = 4.23, $p < .05$). Post hoc comparisons showed that underrepresented minority men were significantly higher in career self-efficacy ($M = 2.83$; $SD = .91$), compared to both URM women ($M = 2.14$; $SD = 1.08$), and non-URM women ($M = 2.39$; $SD = .99$). However, URM men were not significantly higher compared to non-URM men ($M = 2.50$; $SD = .97$). Underrepresented minority women had significantly less interest in an academic faculty career ($M = 2.59$; $SD = 1.07$), compared to URM men ($M = 3.43$; $SD = .63$), non-URM women ($M = 3.13$; $SD = .94$) and non-URM men ($M = 3.16$; $SD = .92$; F (3, 844) = 5.73, $p < .01$); none of the latter three groups was significantly different from the others.

Path Analysis Results with Instrumental Mentoring as a Predictor

The saturated model for instrumental mentoring included all possible recursive paths in the model ($\chi^2 = 0$, $df = 0$; CFI = 1.00; RMSEA = .28 [90 % CI of .27–.29],

PCLOSE = .00). All non-significant paths between control variables and our variables of interest were then trimmed from the model. The trimmed model showed excellent fit ($\chi^2 = 8.06$, $df = 5$, $p = .15$; CFI = .99; RMSEA = .03 [90 % CI of .00–.06, PCLOSE = .86]), and was not significantly different from the baseline, saturated, model; (χ^2Diff = 8.06, $df = 5$, *ns*). The trimmed model had better fit (per the RMSEA), compared to the saturated model, and was therefore retained. Instrumental mentorship predicted both career self-efficacy and interest in an academic research career; self-efficacy predicted career interest.

Indirect Effect Analyses for Instrumental Mentoring

Indirect analyses showed a significant indirect effect of instrumental mentoring on interest in an academic career ($\beta = .08$, $SE = .01$; 95 % CI = .06 – .11). This assessed the indirect (mediated) effect of instrumental mentoring on interest in an academic career. When instrumental mentoring increases by one standard deviation, interest increases by .08 standard deviations. This significant indirect effect is in addition to the significant direct effect of instrumental mentoring on interest in a faculty career.

Path Analysis Results with Psychosocial Mentoring as a Predictor

Here again, we first ran the saturated model for psychosocial mentoring ($\chi^2 = 0$, $df = 0$; CFI = 1.00; RMSEA = .28 [90 % CI of .27–.29], PCLOSE = .00). The trimmed model showed strong fit, and was significantly different from the baseline, saturated model ($\chi^2 = 6.15$, $df = 3$, $p = .11$; CFI = .99; RMSEA = .04 [90 % CI of .00–.08, PCLOSE = .67]); χ^2Diff = 6.15, $df = 3$, *ns*). The trimmed model had better fit (per the RMSEA) and was retained. Psychosocial support predicted both career self-efficacy and academic career interest. Self-efficacy also predicted interest in the career goal.

Indirect Effect Analyses for Psychosocial Mentoring

Indirect analyses revealed a significant indirect effect of psychosocial mentoring on interest in an academic career ($\beta = .08$, $SE = .01$; 95 % CI = .06–.11).

Path Analysis Results with Sponsorship as a Predictor

We first ran the saturated model for sponsorship ($\chi^2 = 0$, $df = 0$; CFI = 1.00; RMSEA = .28 [90 % CI of .27–.29], PCLOSE = .00). The trimmed model showed strong fit, and was significantly different from the baseline, saturated, model ($\chi^2 = 19.60$, $df = 7$, $p = .01$; CFI = .99; RMSEA = .05 [90 % CI of .02–.07, PCLOSE = .56]); (χ^{2-} Diff = 19.60, $df = 7$, $p < .05$). See Table 2 for the standardized coefficients for all relationships. The trimmed model was retained, as it had better fit, per the RMSEA. Sponsorship was significantly related to interest in an academic career, and predicted career self-efficacy. Career self-efficacy in turn predicted interest in that career goal.

Indirect Effect Analyses for Sponsorship

Indirect analyses showed a significant indirect effect of sponsorship on interest in an academic career ($\beta = .09$, $SE = .02$; 95 %CI = .07–.13).

Table 2 Standardized coefficients for trimmed path analyses models for the effects of three types of mentoring on graduate students' career self-efficacy and interest

Trimmed Model	
Paths predicting academic career interest	
Instrumental	.15***
Self-efficacy	.31***
URM Men	.16***
Non-URM Men	.30***
Non-URM Women	.24**
STEM	−.19***
Candidacy	−.05
Psychosocial	.15***
Self-efficacy	.31***
URM Men	.14***
Non-URM Men	.29***
Non-URM Women	.23***
STEM	−.15***
Candidacy	NS[d]
Sponsorship	.08
Self-efficacy	.32***
URM Men[a]	.16***
Non-URM Men[a]	.30***
Non-URM Women[a]	.25***
STEM[b]	−.17***
Candidacy[c]	NS
Paths predicting self-efficacy	
Instrumental	.26***
URM Men	.15***
Non-URM Men	.19*
Non-URM Women	.10
STEM	−.15***
Candidacy	−.07*
Psychosocial	.26***
URM Men	.10**
Non-URM Men	.09
Non-URM Women	NS
STEM	−.08*
Candidacy	−.08*
Sponsorship	.30***
URM Men	.10**
Non-URM Men	.09*
Non-URM Women	NS
STEM	−.12***
Candidacy	−.09***
Paths predicting instrumental mentoring	
URM Men	.06
Non-URM Men	.17

Table 2 continued

Trimmed Model	
Non-URM Women	.15
STEM	.18***
Candidacy	.00
Paths predicting psychosocial mentoring	
URM Men	.12*
Non-URM Men	.22**
Non-URM Women	.18*
STEM	−.11*
Candidacy	NS
Paths predicting sponsorship	
URM Men	NS
Non-URM Men	NS
Non-URM Women	NS
STEM	NS
Candidacy	NS

* $p < .05$. $p < .01$. $p < .001$

[a] URM women are reference category

[b] Non-STEM students are reference category

[c] Pre-candidate is the reference category

[d] NS signifies that paths from control variables that were non-significant in the saturated model were dropped in the trimmed models

Group Analyses

In order to test whether any of the hypothesized paths differed by race-gender group, or by field we used the groups analysis function in AMOS. This allows one to specify a model that compares each of the hypothesized relationships by race-gender group (allowing us to test whether there are any differences in the hypothesized paths between URM women, URM men, non-URM women and non-URM men, or between STEM and non-STEM students). The first step was to run the group model with no constraints, in order to establish a base-line model to which all subsequent models are compared. A Chi-square difference test was then run between this model and subsequent models with constrained pathways (i.e., forcing the model to estimate paths assuming there is no significant difference by group). The second model constrained the path of greatest interest to us, that between mentoring and interest in an academic career. We also ran a third groups model, constraining all hypothesized paths of interest; examining whether there were any gender-race or field differences anywhere in our hypothesized model.

Race-Gender Group Analyses for Instrumentality, Psychosocial, and Sponsorship

There were no significant race-gender group differences by either instrumental or psychosocial mentoring, indicating that there were no differences in any of the hypothesized paths by race-gender group for these two forms of mentorship.

However, there was a significant race-gender group difference in the relationship between sponsorship and career goal. The baseline groups model for sponsorship ($\chi^2 = 22.58$, $df = 12$), was significant for the model with the path between sponsorship and interest in an academic career constrained ($\chi^2 = 30.40$, $df = 15$; χ^2Diff $= 7.82$, $df = 3$; $p = .05$). Looking at the betas in the unconstrained model, the groups for whom the path between sponsorship and interest in an academic career was significant were non-URM women ($\beta = .16$, $p < .01$) and URM men ($\beta = .25$, $p = .05$). This path was not significant for non-URM men ($\beta =$ -.09, $p = .89$) or URM women ($\beta = .25$, $p < .12$).

Finally, we compared the baseline race-groups model for sponsorship to a model where all hypothesized paths were constrained ($\chi^2 = 42.21$, $df = 21$; $\chi^2\text{Diff} = 17.63$, $df = 9$; $p < .05$). Again, looking at the unconstrained groups model, we found that for non-URM women and non-URM men, the paths between career self-efficacy and interest in an academic career were significant ($\beta^{\text{non-URMwomen}} = .28$, $p < .001$; $\beta^{\text{non-URMmen}} = .39$, $p < .001$); as were the paths between and sponsorship and self-efficacy ($\beta = .31^{\text{non-URMwomen}}$, $p < .001$; $\beta^{\text{non-URMwomen}} = .34$, $p < .001$). For URM men and women, neither of these paths was significant.

Field Analyses for Instrumentality, Psychosocial and Sponsorship by Field

Comparing STEM and non-STEM students, we used the same approach. There were no significant differences in the hypothesized relationships, by field, for any of the three types of mentoring.

Discussion

Our primary goal was to assess the role of mentoring in supporting doctoral students' interest in a faculty career in a research university. Here, we will first summarize and discuss the results of the path analyses (our main focus), and then the correlational and group difference results, which we argue are noteworthy in several respects. Finally, we will discuss limitations, future directions and institutional implications.

Summary of Path Analyses

Our path analyses results provided evidence for the importance of mentoring relationships for this early career stage, and are consistent with SCCT (Lent et al. 1994). Our results supported the hypotheses that all three types of mentoring (instrumental, psychosocial, and sponsorship) would be associated with increased self-efficacy (or graduate students' felt confidence in their ability to pursue an academic career), as well as increased interest in such a career, controlling for gender-race group, field, and candidacy.

In addition to the significant direct effects all three forms of mentoring had on interest in the career goal, all three types of mentoring also exerted significant indirect effects on interest in an academic career, via the degree to which students developed self-efficacy, or confidence in their ability to pursue such a goal. Alternative models did not fit the data as well as our hypothesized indirect model. Among doctoral students, all three types of mentoring directly predicted both academic career interest and self-efficacy, which exerted strong effects of its own on aspirations. Overall, these findings are consistent with Chemers et al. (2011) results with science students and postdocs, though our samples included science and non-science students (we also note some limitations to our study, in comparison to Chemers et al. (2011) below).

However, our gender-race group analyses indicate that the relationship between sponsorship and interest in an academic career was not significant for non-URM men, was significant for non-URM women and URM men, and approached a trend for URM women. The other two hypothesized paths (between sponsorship and career self-efficacy and between career self-efficacy and interest in an academic career) showed the same pattern. While we note that these group-based tests were not particularly powerful, given the very

small number of URM women (n = 37) and URM men (n = 42), they do indicate that sponsorship may matter least for non-URM men, and more for the other groups. These results should not be surprising. Groups that have traditionally been underrepresented in academia may rely more on being actively supported in making connections and developing career opportunities in academia (e.g., Davis 2008a, b).

We note that the groups path-analysis by field (STEM vs. non-STEM) revealed no significant difference in terms of the relationships of interest to this study; the hypothesized relationships between mentoring, self-efficacy and career goals did not differ as a function of field. Although, as we discuss below, some of the absolute mean values in variables of interest were different between the two fields, it seems that mentoring dynamics are similar. This is interesting, in that it suggests that mentoring interventions designed to foster academic career goals in both areas may not require major changes, depending on field.

Development of this model of direct and indirect effects (controlling for gender-race group, field, and candidacy status) allows us to establish one mechanism by which mentoring can support pursuit of a career goal, particularly among those least well-represented among the faculty (non-URM women and URM men and women). Mentoring helps develop confidence (self-efficacy) in one's capacity to achieve particular goals; this confidence is important as one begins to assess the degree to which different goals are attractive and may be worth pursuing. Therefore, as several meta-analyses have noted (Eby et al. 2008; de Tormes Eby et al. 2013), mentoring matters for multiple outcomes (in this case, self-efficacy and career interest), which may not always be independent. Thus, mentoring at this stage can have both direct and indirect influences on important professional outcomes.

A significant contribution that we make here is showing that these significant relationships exist for three different types of mentoring. To our knowledge, only two other studies (Chemers et al. 2011; Tenenbaum et al. 2001) have examined how different types of mentoring function to affect doctoral student outcomes. Our findings are somewhat different than both Tenenbaum et al. (2001), in that, in our sample, psychosocial mentoring predicted professional outcomes (they found it predicted personal outcomes). Our findings also diverged somewhat from Chemers et al. (2011) who found that, among science students, psychosocial mentoring affected career outcomes via social identity, and not self-efficacy. We did not have a measure of identity here (a limitation, as we acknowledge below). Future research should more thoroughly investigate the various different pathways and outcomes of these different types of mentoring. However, we note that a significant strength of our approach is our inclusion of doctoral students across both STEM and non-STEM fields, as well as our large sample size, which allowed us to explore questions related to differences between STEM and non-STEM students, as well as URM and non-URM students (even as we acknowledge the limited power of these latter analyses).

Summary of Group Differences

As context for our findings about the role of mentoring in supporting career interest among doctoral students, we also examined race-gender and field differences in career interest and in mentoring support.

Group Differences in Mentoring

Women doctoral students were less likely than their male counterparts to report that their primary advisor mentored them on the practical aspects of conducting successful research and professional development (instrumental support), and that their mentor advocated on their behalf and recommended them to others (sponsorship). This gender difference in mentoring support, at this critical stage of professional development, may help account for the "leaky pipeline" of women that has been observed in academia (e.g., Goulden et al. 2011). In addition, URM students reported less instrumental support; this finding seems to be driven by the fact that URM women received significantly less support compared to non-URM men. These latter findings serve to underscore the importance of intersectional comparisons, which allow us to see how the intersections of multiple marginalized statuses may impact students' academic experiences.

Non-STEM graduate students reported less instrumental mentoring and sponsorship, compared to STEM graduate students, though they received more psychosocial support. These results may reflect differences in the cultures and career demands in these different fields, with success in STEM fields more dependent than non-STEM fields on both training in specific research procedures and in collaboration, and therefore networking. Further, the current reality is that STEM students are generally better funded than non-STEM students (in particular students in the humanities), and so it may be that these graduate students may feel more instrumental support through their access to funding. However, non-STEM graduate students might benefit from more instrumental mentoring and sponsorship than they normally receive. Equally, STEM students might benefit from increased psychosocial support.

There were no gender or race differences in students' interest in a faculty career in a research university. This finding suggests that while it may be the case that women's underrepresentation in academic jobs is due to their ultimately making different choices as they enter the workforce (Ceci and Williams 2011), it seems that at the doctoral level they may be no less interested than men in pursuing academic careers. Findings such as this serve to counter arguments that women and URM students may be less interested in pursuing academic positions, and to highlight the possibility that these careers are either less possible or less desirable once people enter the job market (though note that we are not claiming that bias does not also play a role in these "decisions;" see Moss-Racusin et al. (2012)).

However, there were field differences in interest in an academic career, with non-STEM students more interested in academic careers. We note that one possible explanation is the reality that the job market in STEM fields for doctoral students is stronger than the national average (e.g., Selfa and Proudfoot 2014), meaning that they may have more options outside academia than their non-STEM counterparts. In addition, there were differences in doctoral students' feelings of efficacy that they could achieve these careers: men and non-STEM students were higher in career self-efficacy than women (this gender difference is consistent with other research, e.g., Bakken et al. 2003) and STEM students. The difference between STEM and non-STEM studies in self-efficacy is somewhat counter-intuitive, and counter an analysis of career outcomes of STEM vs. non-STEM graduates (Xu 2013), which found that STEM graduates are more likely to have a job closely related to their area of study and to earn more. Perhaps they are less confident in academic careers specifically, but this finding is of interest and, assuming it replicates, worth exploring further.

Finally, comparison of the four race-gender intersections revealed that URM men were higher in career self-efficacy than both URM and non-URM women (though not non-URM men). In addition, URM women rated their interest in a faculty career in a research university

significantly lower than any of the other three groups, which were equivalent, and they also report less sponsorship and instrumental mentoring support. This latter finding is interesting, as it is consistent with suggestions that interventions that aim to address gender-based self-efficacy beliefs target "learning experiences" such as mentoring (Williams and Subich 2006, as cited in Bakken et al. 2010). Moreover, underrepresented women received less instrumental support than majority men. We are also struck by the evidence for different norms about mentoring, and perhaps career preparation, among STEM and non-STEM students. It is, however, also important to note, as we discuss above, that mentoring had the same relationships across field with both career self-efficacy and academic career interest.

Limitations and Future Research Directions

People may receive mentoring from important sources other than their immediate supervisors or primary advisors. While we maintain that advisor relationships are surely among the most important for those training to be academics, many students have multiple sources of support, which we did not account for here. Understanding the effects of mentorship from multiple sources is an important next step.

Additionally, although we examined differences by race/gender groupings, our sample sizes for underrepresented women and men were quite low. Therefore, these findings should be interpreted with caution. However, we felt that it was important to explore these important intersections as potential sites of difference in the kinds of mentoring that different students may receive. The differences suggest that it may be important to oversample from underrepresented groups in order to more fully understand the ways in which race and gender shape mentoring and associated career outcomes among doctoral students.

Further, people enter doctoral training with a variety of equally important goals, not all of which are related to the pursuit of an academic career. Mentoring is important for a number of other important goals (e.g., Eby et al. 2008; Tenenbaum et al. 2001). It may well be the case that for other kinds of goals, different types of mentoring do not assume the same level of importance as we found they did here. However, given that the focus of most large research universities is on the training of future academics, we see this particular goal, and therefore the findings we report here, of specific interest to individuals and institutions whose focus is on the development of future tenure-track faculty. Alongside this issue there are likely other important factors not examined here, which may be outcomes of mentoring, or moderators of its efficacy. For example, the development of a professional identity may be one important outcome of mentoring (Chemers et al. 2011), as well as a predictor of student success and persistence (Estrada et al. 2011), and mentor/mentee identity congruence (Li and Stewart, under review) may affect the success of a mentoring relationship. Further, there are a number of other factors that we know affect self-efficacy, such as the degree of affective importance one attaches to an area of study or work (e.g., Conklin et al. 2013).

Finally, it is important not to overstate the importance of mentoring in either development of career aspirations or career success. Mentoring can play an important role in helping support interest and goal development, but many other factors also play a role, including the perceived and real opportunities in the labor force (Lent et al. 2000). It may be the case that for other outcomes, or at different career stages, the different mentoring types would not be equally predictive of specific outcomes. We focused here on individuals who are making the very important decision as to whether they want to *join* academia, to pursue an academic future in their field. Therefore, the relationships we find here might look different (certainly the outcome of interest would be different) at other career stages, which should be studied.

Institutional Implications of Our Findings

Institutions of higher education can provide programmatic interventions for both mentors and protégés at the doctoral level. For example, Yang et al. (2013) found that mentor socialization is important, and so they need to be supported as they provide mentorship. This mentor support is built into some interventions. For example, the TEAM-Science approach (Byars-Winston et al. 2011), gives the student's research advisor specific training on being an effective mentor, and the Council of Graduate Schools recommends such programs, and provides information about how to develop them (http://www.cgsnet.org/cgs-occasional-paper-series/university-maryland-baltimore-county/lesson-4).

Providing opportunities for new faculty to learn about mentoring in formal, structured educational sessions is highly desirable, and all faculty—new and experienced—could benefit from exposure to particularly effective models, and routinized reminders about how to support students in meeting various milestones in their career development. In addition, no faculty member is likely to possess the skills to be effective with every kind of student; programs designed to address common mentoring difficulties between mentors and their protégés could support faculty at different career stages.

Our results suggest that the cultures of mentoring in STEM and non-STEM fields may be very different, with a strong emphasis on instrumental and sponsorship mentoring in the STEM fields and a strong emphasis on psychosocial mentoring in non-STEM fields. While these differences may well reflect important differences in the kind of work being fostered in these fields, it is also possible that both STEM and non-STEM faculty would benefit from more cross-conversation about the value of all three types of mentoring. We know that faculty are most often exposed to discussion of these kinds of issues within their own disciplines, but we suspect that this is an area where interdisciplinary communication might serve mentees in all the disciplines.

As we noted above, URM women graduate students reported particularly low levels of instrumental support, and women graduate students reported lower levels of sponsorship compared to their male counterparts. For women, and women of color in particular, mentoring may not be enough to overcome some of the structural, interpersonal, or psychological barriers that make them less likely to pursue academic careers (e.g., Ceci and Williams 2011, for a discussion of some of the challenges facing women in academia; and Davis 2008b). Mentoring is important to individuals' general success, but it is not a panacea for consistent underrepresentation of certain groups. It should be seen as only one of a series of interventions institutions should make in order to facilitate professional academic success. Institutions need to remain committed to providing broad-based support to doctoral students.

This point made, we want to end by underscoring that faculty mentoring of doctoral students is important. Further, mentoring takes different forms, and at least three of the important forms of mentoring from the literature are significant predictors of doctoral students' academic career goals. Advisors may not always see their role as providing emotional support and establishing important networking opportunities (Webb et al. 2009), but our evidence suggests that these forms of mentoring are as important as teaching protégés how to do research and be an academic professional. By making faculty aware of the importance of all of these forms of support, we can help them better develop the next generation of scholars in their respective fields.

Broader discussion of the importance of mentoring in supporting the early career development of future academics is an important part of institutional responsibility for the future of the academy. Higher education is increasingly expected to provide diverse,

engaged, and responsive faculty models and mentors for all students at all levels. In order to succeed in that mission, institutions must enrich and deepen the capacity of today's faculty to support the career aspirations of the faculty of tomorrow—and our data show that this requires faculty who are able to mentor on multiple fronts, or institutions who ensure that students are given multiple sources of support.

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Appendix

Variable name	Item	
Interest in academic aareer	How attractive is this goal to you:	Become a professor at a top research university
Mentoring—sponsorship	My primary advisor:	Helps me develop professional relationships with others in the field
		Advocates for me with others when necessary
		Encourages me to attend and present at professional meetings
Mentoring—instrumental		Helps me secure funding for my graduate studies
		Assists me in writing presentations or publications
		Advises about getting my work published
		Gives me regular and constructive feedback on my research
		Teaches me the details of good research practice
		Instructs me in teaching methods
		Teaches me to write grant/research proposals
Mentoring—psychosocial		Treats me ideas with respect
		Is easy to discuss ideas wth
		Treats me as a colleague
		Treats me as a whole person—not just a scholar
		Inspires me intellectually
		Builds my confidence
		Encourages me in my research interests and goals
		Provides emotional support when I need it
		Would support me in any career path I might choose
Career self efficacy	I feel confident:	That I can become a professor in a top research university

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