

Mentoring Relationships in Graduate School

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This study asked graduate students at the University of California about their relationships with their advisors, satisfaction, and academic success. Both the women and men students worked primarily with male advisors, but not disproportionately to the availability of male and female professors. Instrumental help and networking help contributed positively to productivity (i.e., publications, posters, and conference talks). Psychosocial help contributed to students' satisfaction with their mentor and with their graduate school experience. The results are interpreted and implications are discussed in a framework of recent research on mentoring in organizations. © 2001 Academic Press

Over the past 2 decades, both scholarly and popular interest in mentoring has increased dramatically. Following the lead of Kram (1985), a growing number of researchers have examined the dynamics of developmental relationships within industrial and academic organizations. The large majority of methodologically rigorous studies have been done in business or industrial settings. In contrast, many of the publications that extol the benefits of mentoring in school settings lack compelling quantitative data (Crosby, 1999).

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Work Settings

Within the scientific studies of mentoring at work, several findings have been replicated with sufficient regularity to be considered reliable. First, researchers have discerned that mentoring or guidance involves distinct components. In the original in-depth interview study of mentoring pairs in a public utility organization, Kram (1985) differentiated between two types of help: instrumental and psychosocial. "Instrumental" help includes coaching, sponsorship, exposure, and opportunities for challenging assignments. "Psychosocial help" includes role modeling, empathizing, and counseling. While some scholars (e.g., Crosby, 1999; Ragins, 1999) propose terminological refinements and others (e.g., Eby, 1997) expand the typologies, a number of researchers (e.g., Scandura, 1992; Tepper, Shaffer, & Tepper, 1996) have provided firm support for the distinction between practical and emotional guidance.

A second reliable finding is that mentoring, especially instrumental mentoring, benefits the junior person (e.g., Allen, McManus, & Russell, 1999; Chao, 1997; Corzine, Buntzman, & Busch, 1994; Koberg, Boss, & Goodman, 1998; Scandura, 1992; Whitely, Dougherty, & Dreher, 1991), the senior person (e.g., Allen, Poteet, & Burroughs, 1997), and the organization (e.g., Koberg, Boss, & Goodman, 1998; Laband & Lentz, 1995; Seibert, 1999). The benefits of mentoring often, but not always, include increased satisfaction and commitment as well as elevated promotions and pay.

Nevertheless, not all mentoring experiences are positive (Seibert, 1999). For example, Collins (1983) reported that a quarter of women in her sample reported having had sexual relations with their mentor. More recently, Eby, McManus, Simon, and Russell (2000) have developed a taxonomy of negative experiences. Their work underlies the difficulties of diversified mentoring relationships, difficulties that can be especially evident when the mentor and the protégé have different values or attitudes. From a protégé's point of view, failed mentoring can produce a feeling of alienation (Ervin, 1995). From a mentor's point of view, difficulties can also arise when protégé's have unrealistic expectations about the mentor's power to affect outcomes within an organization (Murrell & Tangri, 1999). Mismatched expectations may be especially challenging when the mentor and the protégé come from different backgrounds (Ragins, 1997b; Thomas, 1990).

Some researchers express concern that the benefits of mentoring are less, and the costs of mentoring are more, for women than for men protégés. Kram (1985; also Clawson & Kram, 1984) worried that both men and women may assume stereotypical roles when a female protégé links with a male mentor. The mentoring relationship is often quite ambiguous, prompting people to resort to familiar roles in which women may become less autonomous while men may become protective. Recently, Thomas (1989, 1990, 1999) identified analogous problems in cross-race mentoring pairs.

Research (Burke, 1984; Cox & Nkomo, 1991; Dreher & Ash, 1990; Fagenson, 1989; Greenhaus, Parasuraman, & Wormley, 1990; Ragins, 1989, 1997a, 1999; Ragins & Cotton, 1991; Ragins & Sundstrom, 1990; Steinberg & Foley, 1999;

Whitely, Dougherty, & Dreher, 1992) has shown that women and men have equal access to mentors and receive the same amount of mentoring (O'Neill, Horton, & Crosby, 1999). Women are, however, much more likely than men to be associated with a mentor of the other gender (Burke & McKeen, 1997; O'Neill et al., 1999). There is also some evidence that women receive more psychosocial than instrumental help and men receive more instrumental than psychosocial help (McGuire, 1999).

Research also indicates that gender plays another role in the mentoring dyad; women mentors may be especially prone to giving psychosocial help. McGuire (1999) surveyed workers at a large financial services company, asking them to identify someone at work who has helped them with work-related and personal problems. Both male and female protégés received more work-related help from their male mentors than their female mentors and more psychosocial help from their female mentors than male mentors. Furthermore, female mentors gave more psychosocial help to female protégés than to male protégés. Looking at data from 200 mentoring pairs across a number of firms, Sosik and Godshalk (2000) reported that male mentors provided instrumental help but not psychosocial help, even to male protégés, while female mentors provided psychosocial help but not instrumental help. Scandura and Viator (1994) sampled certified public accountants and concluded that female protégés received more psychosocial help from female mentors than from male mentors. A probable reason for the difference in kinds of help given by male and female mentors is that female mentors tend to work at lower levels in organizations than do male mentors (Scandura & Viator, 1994). Indeed, with rank held constant, gender differences may become insignificant (Struthers, 1995).

Meanwhile, other research has shown that protégés benefit most, in a financial sense, from having a White male mentor. In one influential study, Dreher and Cox (1996) demonstrated that protégés of White male mentors earned significantly more money than anyone else, including protégés of other types of mentors. Similarly, a survey of graduates of Howard University's School of Business showed that only those men and women who reported relationships with White male mentors had a salary advantage; protégés of women and of men of color did not differ in terms of their compensation over nonprotégés (Dreher & Chargois, 1998).

Academic Settings

Given the robust findings about the benefits of mentoring in the workplace, it may seem logical to assume that mentoring also benefits students in graduate school. Certainly, the assumption has been made in professional magazines. "One of the most rewarding and important relationships a researcher can have is with his or her mentor," reads the first line of the lead article in the October 1999 *APS Observer* (American Psychological Society, 1999, p. 1). The article goes on to note that "scientists are in need of mentors at many stages of their career but particularly in undergraduate and graduate study" (p. 18).

The data to support this assumption are scarce. Some scholars have concluded that mentoring is important for graduate students on the basis of anecdotes (Collins,

1993; Hill, Castillo, Ngu, & Pepion, 1999) or small qualitative studies (Betz, 1997; Heinrich, 1995; Kahn & Scott, 1997; Lark & Croteau, 1998; Lark & Paul, 1998). One much-cited quantitative study of publishing rates reported that male graduate students published more if their advisors were male and female graduate students published more if their advisors were female (Goldstein, 1979). Somewhat different results were obtained 2 decades later by Kelly and Schweitzer (1997), who concluded that the gender of the graduate student and of the professor did not matter in graduate school but that graduate students who had either a faculty member or an advanced student as a mentor obtained better grades than those with no mentor or with too many mentors (Kelly & Schweitzer, 1997). Another study reported that education professors valued mentoring, served often as mentors, and sometimes reported having had a mentor (Busch, 1985). In a fourth study, graduate students in psychology at one state university were asked if they had a mentor and about the traits that make someone a good mentor (Cronan-Hillix, Gensheimer, Cronan-Hillix, & Davidson, 1986). Approximately half of the students did have a mentor. The characteristics that were most sought in a mentor concerned personal supportiveness rather than professional competence. Turning to MBA students, Allen, McManus, and Russell (1999) reported that business school students who had an older student guide experienced less stress than other students. Finally, Green and Bauer (1995), in a longitudinal study of graduate students in the sciences at one large midwestern university, concluded that students who were highly competent and highly committed to science at the time of starting graduate school reported, 1 year later, that they had received good mentoring. Green and Bauer also reported that the students' productivity after 1 or 2 years of graduate work was predicted by their entering competence and that mentoring experiences did not explain any additional variance.

The present study collected empirical data on the issue of mentoring and the advisor–advisee relationship. We view graduate school as a crucial step in the production of researchers. We also assume that advisors are generally of importance to graduate students, both for the official roles they play and for the way in which they socialize graduate students into professional life. Probably most graduate students think of their advisors as playing some of the roles—albeit perhaps not perfectly—that fall within the province of traditional mentoring. By surveying students across a number of disciplines, we aimed to see if the associations reported in the sciences (Green & Bauer, 1995) generalize to the social sciences and the humanities.

To gain insight into the place of mentoring in the professional development of graduate students, we investigated three questions. First, do graduate students work disproportionately with advisors of their own gender? We predicted, based on previous literature in work organizations (e.g., Gibson & Cordova, 1999), that male students would work primarily with male advisors; but no prediction was made about female students. Assuming that female role models are important to female students, it seems likely that female students may seek out female advisors, disproportionately to the scarce number of female professors (Gilbert, 1985); but it is also likely that female graduate students seek out the most powerful people as

their advisors and that they view males as more powerful than females. Second, we asked about the types of help male and female advisors give to male and female students. Based on McGuire's (1999) findings, we expected female advisors to give more psychosocial help than male advisors and to do so especially for female students. Third, we examined whether the different types of help lead to different outcomes. Extrapolating from the research in industry (Whitely, Dougherty, & Dreher, 1991) we expected a positive relation between instrumental mentoring and work outcomes. Yet, considering that our sample of graduate students is younger than most samples of workers, it is possible that psychosocial or emotional help is as important to the graduate students as it is to younger students. Perhaps instrumental help produces some types of positive outcomes, while psychosocial produces other types. We predicted that instrumental help influences the rate of publications while psychosocial help influences satisfaction.

METHODS

Participants

One hundred eighty-nine graduate students in nine departments enrolled at the University of California—Santa Cruz participated in this study. The departments included psychology, economics, anthropology, history of consciousness, linguistics, chemistry, biology, earth sciences, and physics. These departments were selected because they all grant doctorate degrees and represent a cross section of humanities, social sciences, and natural sciences. Four hundred thirty-one graduate students in nine departments received a consent form, a letter asking them to participate in the study, and a copy of the questionnaire in their campus mailbox. The letter briefly explained the study and informed students that completion of the questionnaire entered participants into a drawing with two \$50 cash prizes. Students were instructed to return the consent form to one of the authors and the questionnaire to another author by campus mail. Students who did not complete the questionnaire within 2 weeks were sent a reminder by e-mail. After 2 months, another questionnaire was sent to the students who had not returned their surveys. The response rate for women was 45%, and the response rate for men was 43%. The overall response rate was 44%. The response rate was 48% in the natural sciences, the response rate was 28% in the social sciences, and the response rate was 47% in the humanities. A chi-square goodness-of-fit test indicated differential participation across the divisions, $\chi^2 (df = 2, n = 179) = 9.00, p < .05$; social science students were less likely to participate than students from the other two divisions.

Participants ranged in age from 22 to 61 years ($M = 28.92, SD = 5.34$). Ninety-three students were women, 92 were men, and 6 students declined to report their gender. To determine whether students were selecting male and female advisors proportionately to their availability, we calculated from the University catalog the percentage of faculty by gender in the three divisions. In the humanities, 50% of the faculty were men, and 50% were women. In the social sciences, 43% of the faculty were women, and 57% were men. Finally, in the natural sciences, 17% of the faculty were women, and 83% were men. Overall, 27% of the faculty in the departments selected for study were women and 73% were men.

Materials and Measures

The survey distributed to participants contained five parts. The first section was a 19-item scale designed to measure both psychosocial (e.g., “conveyed feelings of respect for you as an individual”) and instrumental (e.g., “helped you improve your writing skills”) functions of a primary adviser. We included all but 2 items from the Dreher and Ash (1990) survey, which had been used to measure business school graduates’ mentoring experiences and had a coefficient α of .95. The two omitted items were irrelevant to graduate students: “to what extent has a mentor given or recommended you for assignments that increased your contact with higher level managers?” and “to what extent has a mentor kept you informed about what is going on at higher levels in the company or how external conditions are influencing the company?” Four items were added to the survey, as shown in Table 1.

TABLE 1
Socioemotional (SE), Instrumental (I), and Networking (N) Help Items

| Factor loadings | | | Item |
|-----------------|------------|------------|---|
| SE | I | N | |
| .56 | .46 | .36 | Gone out of his/her way to promote your academic interests? |
| .81 | .15 | .11 | Conveyed feelings of respect for you as an individual? |
| .80 | .28 | .00 | Conveyed empathy for the concerns and feelings you have discussed with him/her? |
| .75 | .39 | .00 | Encouraged you to talk openly about anxiety and fears that detract from your work? |
| .66 | .21 | .00 | Shared personal experiences as an alternative perspective to your problems? |
| .70 | .28 | .13 | Discussed your questions or concerns regarding feelings of competence, commitment to advancement, relationships with peers and supervisors or work/family conflicts? |
| .57 | .24 | .35 | Shared history of his/her career with you? |
| .62 | .41 | .28 | Encouraged you to prepare for the next steps? |
| .80 | .26 | .31 | Served as a role model? |
| .75 | .00 | .22 | Displayed attitudes and values similar to your own? |
| .49 | .51 | .21 | Helped you finish assignments/tasks or meet deadlines that otherwise would have been difficult to complete? |
| .23 | .55 | .00 | Protected you from working with other faculty, lecturers, or staff before you knew about their likes/dislikes, opinions on controversial topics, and the nature of the political environment? |
| .00 | .50 | .49 | Given you authorship on publications?* |
| .21 | .77 | .21 | Helped you improve your writing skills?* |
| .22 | .79 | .29 | Helped you with a presentation (either within your department, or at a conference)?* |
| .36 | .67 | .34 | Explored career options with you?* |
| .20 | .19 | .74 | Given you challenging assignments that present opportunities to learn new skills? |
| .19 | .21 | .80 | Helped you meet other people in your field at the University? |
| .15 | .19 | .82 | Helped you meet other people in your field elsewhere? |

Note. Items marked with an asterisk were added to Dreher and Ash (1990).

The second section of the questionnaire asked students to rate globally their satisfaction with their advisors (e.g., "I am satisfied with my relationship with my advisor") and with their graduate experience (e.g., "I am satisfied with my overall graduate experience"). Single items were used to measure each of these two types of satisfaction.

The third section consisted of four items that measured working relationships with the advisor. The questions asked whether the students could get their advisors to meet with them, help them with projects, and give them feedback on papers and if students could resolve disagreements with their advisors. The scale had a Cronbach α of .88.

The final section asked about scholarly productivity (e.g., total number of journal publications, poster presentations, and conference talks). All reported productivity of the different types were totaled so that each student received a score for scholarly productivity. For example, if a student reported two poster presentations and one journal publication, they received a score of three products. We then divided the score into products with advisors and products that did not include students' advisors. We had, thus, two scores: products with advisor and products without advisor. Finally, students completed demographic information about themselves and their advisers.

RESULTS

Before analysis, number of products, student gender, advisor gender, years in graduate school, score on the instrumental and psychosocial scales were screened for missing values and outliers. For the instrumental and psychosocial scales, missing values were imputed from the mean for the item (Tabachnik & Fidell, 1996). Transformations of the number of students' products with their advisors and without their advisors were conducted to reduce the skew and improve the normality of these variables. A square-root transformation was applied to these variables.

A principal component analysis using orthogonal rotation was performed through SPSS on the 19 items of the questionnaire for the 129 students who answered every question. We required that each factor have an eigenvalue greater than 1 (Tabachnick & Fidell, 1996). Three factors were extracted, which accounted for 63% of the variance. Using an inclusion criterion of .4, all the items loaded exclusively on one factor. The three factors were named networking, instrumental, and psychosocial help. Networking items asked about how often advisors helped students make connections within the field (e.g., "helped you meet other people in your field"). This factor accounted for 6% of the variance and had an eigenvalue of 1.13. Psychosocial help items asked about the social-emotional support that advisors provided for their advisees (e.g., "conveyed empathy for the concerns and feelings you have discussed with him/her and encouraged you to talk about anxiety and fears that detract from your work"). This factor accounted for 47% of the variance and had an eigenvalue of 9.03. Finally, instrumental items asked about how often advisors provided academic or job-related support (e.g.,

“helped you improve your writing skills and encouraged you to prepare for the next steps”). This factor accounted for 10% of the variance and had an eigenvalue of 1.96. There were 3 networking items, 6 instrumental items, and 10 psychosocial items (see Table 1 for individual factor loadings). Networking was found to have an α of .80, psychosocial help had an α of .93, and instrumental had an α of .83. Correlations were computed to examine relations between networking, instrumental, and psychosocial help. As can be seen in Table 2, networking related significantly to instrumental help, $r(187) = .65, p < .01$, and to psychosocial help, $r(187) = .51, p < .05$. In addition, instrumental and psychosocial help also related significantly, $r(187) = .69, p < .01$.

The four items that measured positive working relationships with students' advisers (e.g., “can you get your advisor to meet with you?”) had an α of .88.

A significant chi-square analysis indicated that both women and men students were more likely to have men than women advisers. Students chose to work with 134 men advisers and 53 women advisers, $\chi^2(df = 1, n = 187) = 7.16, p < .01$. Thus, students were more likely to have men advisers than expected by chance. However, men students were even more likely than women students to have men rather than women advisers, $\chi^2(df = 1, n = 183) = 13.04, p < .0001$. Nevertheless, students did not disproportionately select male advisers, $\chi^2(df = 1, n = 183) = .34, ns$.

Table 2 presents the means and standard deviations for the variables. Table 3 presents correlations between the variables. Inspection of the correlations indicates that the more products that students had with their advisers, the fewer products that they had without their advisers. The more products students had with their advisers, the more satisfied they were with school. Not surprisingly, students' satisfaction with their advisers, their positive working relationship with their advisor, and their satisfaction with school related strongly to each other. Students were more likely to pick an advisor of the same gender. Additionally, advisers were more likely men in the natural sciences than in the humanities.

A 2 (advisor gender) \times 2 (student gender) between-subjects MANOVA was performed on three dependent variables: networking, instrumental, and psychosocial help. With the use of Wilks's criterion, the combined DVs were related to the gender of the advisor, $F(3, 177) = 2.63, p = .05$, but not to the student gender, $F(3, 177) = .91, ns$, or their interaction, $F(3, 177) = 1.60, ns$. A follow-up ANOVA on advisor gender indicated that women advisers provided more social-emotional support ($M = 3.72, SD = .97$) than did men advisers ($M = 3.24, SD = .94$), $F(1, 182) = 7.68, p = .006$.

Five hierarchical multiple-regression analyses determined whether networking, instrumental, and psychosocial help predicted publications with advisers, students' publications without their advisor, students' satisfaction with advisers, satisfaction with graduate school career, and positive working relationship with advisor. For each regression, in the first block we entered background characteristics including the number of years in graduate school, the students' gender, the advisers' gender, and academic discipline. Academic discipline was coded into a continuum with

TABLE 2
Mean Scores and Intercorrelations between Variables

| Variable | M | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|------------------------------|------|------|---|-------|-----|-------|-------|--------|-------|-------|--------|--------|-------|-------|
| 1. Products with advisor | .88 | 1.08 | — | -.15* | .04 | .02 | .16* | .42** | .08 | .19** | .33** | .05 | .32** | .25** |
| 2. Products without advisor | 1.00 | 1.31 | | — | .03 | -.01 | -.08 | -.30** | .05 | .05 | .28** | -.05 | -.07 | -.01 |
| 3. Satisfaction with advisor | 3.71 | 1.26 | | | — | .68** | .61** | -.01 | -.08 | .10 | -.17* | .68** | .54** | .44** |
| 4. Working relationship | 4.20 | .87 | | | | — | .41** | -.02 | -.09 | .10 | -.19** | .71** | .60** | .46** |
| 5. School satisfaction | 3.57 | 1.12 | | | | | — | .11 | .06 | .11 | -.27** | .38** | .40** | .34** |
| 6. Area | n.a | n.a. | | | | | | — | .20** | -.02 | -.12 | -.06 | .21** | .19* |
| 7. Advisor gender | n.a. | n.a. | | | | | | | — | .27** | .09 | -.22** | .09 | -.05 |
| 8. Student gender | n.a. | n.a. | | | | | | | | — | .08 | .12 | .09 | .10 |
| 9. Year in Graduate School | 3.10 | 1.86 | | | | | | | | | — | -.12 | -.01 | -.10 |
| 10. Psychosocial support | 3.40 | .99 | | | | | | | | | | — | .69** | .51** |
| 11. Instrumental support | 2.97 | 1.10 | | | | | | | | | | | — | .65** |
| 12. Networking support | 3.40 | 1.05 | | | | | | | | | | | | — |

Note. n.a. = not applicable.

* $p < .05$.

** $p < .01$.

TABLE 3
Summary of Hierarchical Regression Analyses

| Variables | Publications with advisors ^a | | | Publications without advisors ^b | | | Satisfaction with advisor ^c | | | Satisfaction with graduate school ^d | | | Working relationship ^e | | |
|------------------|---|-----|---------|--|-----|---------|--|-----|---------|--|-----|---------|-----------------------------------|-----|---------|
| | B | SE | β | B | SE | β | B | SE | β | B | SE | β | B | SE | β |
| Step 1 | | | | | | | | | | | | | | | |
| Discipline | .71*** | .09 | .48 | -.52*** | .13 | -.30 | -.02 | .13 | -.01 | .13 | .11 | .09 | -.03 | .09 | -.02 |
| Advisor Gender | -.24 | .16 | -.10 | .18 | .22 | .06 | -.35 | .22 | -.13 | .03 | .19 | .01 | -.14 | .16 | -.39 |
| Student Gender | .40** | .14 | .18 | .04 | .19 | .02 | .32 | .19 | .13 | .24 | .17 | .11 | .22 | .14 | .12 |
| Years | .22*** | .04 | .38 | .17** | .05 | .24 | -.13** | .05 | -.20 | -.17*** | .04 | -.29 | -.09* | .04 | -.19 |
| Step 2 | | | | | | | | | | | | | | | |
| Networking | .12 | .08 | .12 | .17 | .12 | .14 | .12 | .08 | .10 | .10 | .09 | .09 | .02 | .06 | .03 |
| Instrumental | .28** | .10 | .29 | -.05 | .14 | -.04 | .02 | .10 | .02 | .18 | .11 | .18 | .18** | .07 | .23 |
| Soical-emotional | -.20* | .10 | -.18 | -.06 | .14 | -.04 | .81*** | .10 | .64 | .25* | .11 | .22 | .48*** | .07 | .54 |

^a $R^2 = .36$ for Step 1; $\Delta R^2 = .06$ ($ps < .01$).

^b $R^2 = .16$ ($p < .01$) for Step 1; $\Delta R^2 = .01$.

^c $R^2 = .05$ for Step 1; $\Delta R^2 = .50$ ($p < .01$).

^d $R^2 = .07$ for Step 1; $\Delta R^2 = .47$ ($ps < .05$).

^e $R^2 = .10$ for Step 1; $\Delta R^2 = .17$ ($ps < .01$).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

the humanities ranked with a 1, the social sciences ranked with a 2, and the natural sciences with a 3. In the second block, we entered networking, instrumental, and social-emotional help. Table 3 displays the unstandardized B , the standardized beta, standard error (SE), cumulative R^2 , and the incremented R^2 .

With a medium posited effect size and an α equal to .05, 120 participants are necessary to perform a regression with 80% power (Cohen, 1992). Because of students who omitted their gender or department, there were 175 participants in the regression equations. Thus, we had enough power to compute the regressions for the total sample. We did not, however, have enough power to compute the regressions for each discipline separately.

After step 1, with the number of years in graduate school, the students' gender, the advisers' gender, and academic discipline, the model significantly predicted the transformed number of publications on which students had authorship with their advisers, $R^2 = .36$, $F(4, 171) = 23.69$, $p < .001$. Within step 1, discipline, student gender, and years in graduate school significantly predicted the transformed number of students' publications with their advisers. Inspection of the correlations suggests that the longer students were in graduate school, the more that they published with their advisers. Second, men students published more than did women students with their advisers. Third, students in the natural sciences published more than students in the social sciences or humanities, $F(2, 178) = 18.92$, $p < .0001$. Addition of step 2, with networking, instrumental, and psychosocial help added to the model, improved prediction of students' publications with their advisers, $R_{inc}^2 = .06$, $F_{inc}(3, 168) = 6.69$, $p < .01$. Within step 2, instrumental help had a positive relation to publications with adviser while psychosocial help had a negative relation to publications with adviser.

After step 1, with the number of years in graduate school, the students' gender, the advisers' gender, and academic discipline, the model significantly predicted the transformed number of publications on which students had authorship without their advisers, $R^2 = .16$, $F(4, 171) = 8.15$, $p < .001$. Within step 1, discipline and years in graduate school significantly predicted the transformed number of students' publications without their advisers. Inspection of the correlations suggests that the more time students had been in graduate school, the more that they published without their advisers. Second, students in the humanities published more without their advisers than students in the natural sciences, $F(2, 178) = 8.94$, $p < .0001$. Step 2, with networking, instrumental, and psychosocial help added to the model, did not improve prediction of publications without advisers, $R_{inc}^2 = .01$, $F_{inc}(3, 168) = .77$, ns .

After step 1, with the number of years in graduate school, the students' gender, the advisers' gender, and academic discipline, students' satisfaction with their advisers was significantly predicted, $R^2 = .07$, $F(4, 170) = 2.95$, $p < .02$. Within step 1, years in graduate school significantly predicted students' satisfaction with their advisers. Inspection of the correlations suggests that the fewer years students were in graduate school, the less that they were satisfied with their advisers. Addition of step 2, with instrumental, networking, and psychosocial help added

to the model, improved prediction of students' satisfaction with their advisers, $R_{inc}^2 = .47$, $F_{inc}(3, 167) = 57.22$, $p < .0001$. Within step 2, psychosocial help had a significant positive relation to satisfaction with adviser.

After step 1, with the number of years in graduate school, the students' gender, the advisers' gender, and academic discipline, students' satisfaction with their advisers was significantly predicted, $R^2 = .05$, $F(4, 170) = 2.33$, $p = .05$. Within step 1, years in graduate school significantly predicted students' positive working relationships with their advisers. Inspection of the correlations suggests that the more years students were in graduate school, the less that they had positive working relationships with their advisers. Addition of step 2, with instrumental, networking, and psychosocial help added to the model, improved prediction of students' positive working relationships with their advisers, $R_{inc}^2 = .51$, $F_{inc}(3, 170) = 65.77$, $p < .0001$. Within step 2, psychosocial and instrumental help had significant positive relation to students' positive working relationships with their advisers.

After step 1, with the number of years in graduate school, the students' gender, the advisers' gender, and academic discipline, prediction of students' satisfaction with their graduate school experience was significantly predicted, $R^2 = .10$, $F(4, 171) = 4.93$, $p < .001$. Within step 1, years in graduate school significantly predicted students' satisfaction with their graduate school experience. Inspection of the correlations suggests that the fewer years students were in graduate school, the more that they were satisfied with their overall graduate experience. Addition of step 2, with instrumental, networking, and psychosocial help added to the model, improved prediction of students' satisfaction with their graduate school experience, $R_{inc}^2 = .17$, $F_{inc}(3, 168) = 13.28$, $p < .01$. Within step 2, psychosocial help had a significant positive relation to students' satisfaction with their graduate school experience.

DISCUSSION

Like other researchers, we found an empirical distinction between help that is practical and help that is socioemotional. Factor analysis of the mentoring scale we had adapted from Dreher and Ash (1990) produced three factors, which we labeled networking help, instrumental help, and psychosocial help. Previous studies had found two, not three factors. Because we modified Dreher and Ash's scale, deleting two of the original items and creating four additional ones, we cannot be certain that the new factor structure is not simply a result of methodological changes. It does seem probable, however, that specific contours of help may vary as a function of context. Perhaps it is possible for an advisor to give graduate students different types of practical help. In a business context, meeting "the right people" and being assigned to work on "the plum jobs" may not be as distinct as they are in graduate school. Meanwhile, for younger students, psychosocial help may include distinct components, while instrumental help may again not be analyzable into component units. Our findings suggest that it would be worthwhile to look at the structure of mentoring in a variety of different settings.

As expected, we found that practical help influenced students' productivity. Because the achievements of academic personnel are often evaluated in terms of publications and especially in terms of sole-authored publications, we distinguished between products with and without the academic advisor. We found that level of instrumental help statistically predicted the student's products with the advisor. These findings demonstrate that it is not only in a business setting that practical help from a senior person can help the junior person accomplish tangible career successes.

Also as expected, receipt of psychosocial help increased satisfaction. The more psychosocial help received, the more satisfaction students expressed with their advisors and with their graduate experience. Our findings were in line with previous research conducted in the setting of health care professionals (Koberg, Boss, & Goodman, 1998).

Satisfaction with advisor and satisfaction with the working relationship with the advisor had similar results. The bivariate correlation between the two was high ($r = .68$). Satisfaction with the relationship and with their advisors both decrease the longer that students are enrolled in graduate school. The more socioemotional help an advisor provides, the more satisfied the student is with both the advisor and their working relationship. The regression analyses indicated that students differentiate between the advisor and their relationships with their advisors; that is, more instrumental help increases the students' satisfaction with the student-advisor relationship, but not with the advisor.

Gender proved to be relatively unimportant in our study, as it has in so many studies in business (O'Neill et al., 1999). Women and men students were similar in most regards. The one noticeable difference concerned rate of publications. Men students published more with their advisors than did women students across the disciplines. Meanwhile, gender of the advisor was not very important. Men advisors gave less psychosocial help than women advisors, but were as likely as women to give practical help to their students. Women and men advisors were selected by students in proportion to their prevalence as faculty.

By extending to academic training the type of rigorous quantitative inquiry that has been prevalent in business settings, our study makes a contribution to the literature on mentoring. To carry the work further, one can envision a number of additional studies. At a minimum, it would be useful to repeat the survey at another graduate school to replicate the three factors of instrumental help, networking help, and psychosocial help replicate. More ambitiously, it would be very informative to conduct a longitudinal study, with data collected at the start of graduate school and at 1-year intervals thereafter. Increased sample sizes would also allow us to look at the impact of various types of mentoring help on students from ethnic minority groups in the sciences, humanities, and social sciences. Most ambitious of all would be a true experiment or a quasiexperiment in which students and advisors would be randomly assigned to conditions in which either socioemotional or practical help would be emphasized. Only with random assignment can we be sure that the observed effects are not due to self-selection.

Our study and existing studies probably provide enough data to warrant formulating the following advice to advisors: think about the type of outcome you desire and then match your help to produce the desired outcome. Socioemotional mentoring increases student satisfaction, whereas instrumental help increases student productivity.

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