A comparison of face-to-face and electronic peer-mentoring: Interactions with mentor gender

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Received 1 April 2007
Available online 4 March 2008

Abstract

The present study compared the relative impact of peer-mentoring that took place either face-to-face or through electronic chat. Protegés were 106 college freshmen randomly assigned to a senior college student mentor and to one of the two communication modes. Fifty-one mentors interacted with one of these protegés face-to-face and one solely through electronic chat. Electronic chat resulted in less psychosocial support, career support, and post-mentoring protege self-efficacy for those with male but not female mentors. Analyses of coded transcripts revealed that males condensed their language to a greater extent than did females in the electronic chat condition relative to the face-to-face condition. Dyads in the electronic chat condition had more interactive dialogue than did those in the face-to-face condition. Finally, dialogue interactivity predicted post-mentoring self-efficacy but only for those who communicated through electronic chat.

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Keywords: Peer-mentoring; Formal mentoring; Electronic communication; Self-efficacy; Gender effects

1. Introduction

1.1. Formal peer-mentoring

The term “mentor” is generally used to refer to an individual of advanced experience who is committed to supporting the development of another less experienced individual, namely the protégé (Levinson, Darrow, Klein, Levinson, & McKee, 1978). Mentoring relationships perform two primary functions: psychosocial and career support (e.g., Kram, 1985). Psychosocial support includes activities such as acceptance, role-
modeling, confirmation, friendship, and counseling. In contrast, career support includes activities such as protecting a protégé from organizational harm, helping a protégé to network with others, advocating on his/her behalf, helping to enhance the protégé’s visibility, offering advice, coaching the protégé, and providing performance feedback (Kram). Although, traditionally, mentors were thought to be hierarchically-senior (2–3 levels) to the protégé, more recently it has been recognized that mentoring can and does take place among junior and senior peers (e.g., Allen, McManus, & Russell, 1999; Allen, Russell, & Maetzke, 1997; de Janaschz, Sullivan, & Whiting, 2003). In fact, one recent study found that protégés actually felt they received greater role-modeling from mentors who were closer to them in organizational rank (Allen, Eby, & Lentz, 2006).

Formal peer-mentors—those selected, assigned, and sanctioned by an organization—are often used as formal role-models to bolster protégés’ confidence in their ability to perform new roles. Academic peer-mentoring, for instance, has been linked to a number of variables important for college student success, such as socialization (Allen et al., 1999), satisfaction with one’s university, and intentions to graduate (Sanchez, Bauer, & Paronto, 2006). A growing number of these formal programs employ internet technologies to alleviate time and distance constraints that would otherwise prevent mentor-protégé communication. This trend has also been seen within organizations as the number of employees who telecommute continues to rise. In addition, e-mentoring has been used quite extensively to enable K-12 children to communicate with professionals in specialized fields (e.g., science and engineering) with the goal of motivating them to excel in related coursework (Single & Single, 2005). Despite the increasing use of e-mentoring programs, it has been noted that rigorous empirical research on the effectiveness of such programs is sparse (e.g., Ensher, Heun, & Blanchard, 2003).

Although the few quantitative studies of e-mentoring that have been conducted (e.g., Hixenbaugh, Dewart, Drees, & Williams, 2006) suggest positive effects relative to no mentoring control groups, we could find no published experiments that directly compared e-mentoring to face-to-face mentoring. Moreover, only a few recent studies have investigated participant characteristics that moderate the effectiveness of e-mentoring (e.g., Smith-Jentsch, Scielzo, & Weichert, 2007). Such information is necessary in order for work organizations to judge when and for whom e-mentoring is an adequate substitute for face-to-face mentoring.

The present study addresses a critical gap in our knowledge by directly comparing face-to-face and e-mentoring with respect to mentoring functions provided, communication patterns, and post-mentoring protégé self-efficacy. We used an experimental design whereby protégés were randomly assigned to condition and to mentors. The potential moderating effects of mentor gender on the impact of communication mode was examined using ratings of psychosocial and career support from protégés, mentors, and objective coders. Communication patterns with respect to dialogue interactivity and the average length of mentor statements were also examined. Finally, these variables were investigated as predictors of post-mentoring protégé self-efficacy using a longitudinal design.

1.2. Electronic mentoring

Simply put, electronic mentoring (e-mentoring) takes place when career and psychosocial support is provided by a mentor through computer-mediated technologies. It is important to note that it can take many different forms. For instance, communication can take place synchronously (e.g., electronic chat, instant messaging) or asynchronously (e.g., email, message boards). Moreover, many programs employ a mixture of different communication modes, including phone and face-to-face meetings as well. Ensher et al. (2003) posited that mentoring relationships are most affected when participants communicate solely through electronic means. Thus, as our understanding of the variables influencing e-mentoring is in its infancy, we chose to compare face-to-face mentoring to that which took place entirely through the computer. Moreover, because we desired to control the method, frequency, and duration of mentoring sessions, participants in the e-mentoring condition communicated with each other at scheduled times from an experimental setting (as did the face-to-face participants) using private chat rooms. Data on mentoring processes were collected after the first three (15-min) weekly sessions.

1.2.1. Psychosocial and career support

Although prior research has demonstrated that e-mentoring can have benefits relative to no mentoring (Hixenbaugh et al., 2006), no published studies have yet empirically compared the relative benefits of face-
to-face and e-mentoring. A practical advantage of e-mentoring is that it provides access to a larger and more diverse network of prospective mentors. However, a number of factors may hinder the actual and perceived provision of psychosocial and career support within e-mentoring relationships. Because electronic communication carries with it a “paper trail,” mentors may feel less comfortable sharing stories about their own past failures, insecurities, and/or fears. In addition, a mentor may be concerned that his/her written compliments and words of encouragement will be misconstrued as inappropriate in nature by a third party at a later date. In this sense, mentors may make objectively fewer statements of psychosocial support in the context of an e-mentoring relationship than in the context of a face-to-face relationship. Moreover, the absence of non-verbal cues that would normally communicate interpersonal warmth in face-to-face conversations may lead both mentors and protégés to feel that statements of psychosocial support provided electronically do not convey the same level of emotion. Thus, given the identical amount of contact time, we expected:

Hypothesis 1. Mentors will make (a) fewer coded statements of psychosocial support, and both (b) protégés and (c) mentors will perceive that less psychosocial support has been provided in the electronic chat condition relative to the face-to-face condition.

Since the average person cannot type as fast as he/she can speak, it is logical that a lesser amount of information can be communicated to a protégé electronically than verbally, given the same amount of time. This alone should limit the objective amount of advice, information, and feedback that a mentor can provide in the context of a time-limited electronic chat session relative to a face-to-face session of the same length. Furthermore, lag time between messages and responses can make electronic conversations disjointed and potentially result in misunderstandings and frustration (Bonnett, Wildemuth, & Sonnenwald, 2006; Chen & Shaw, 2006). Thus, one might expect to find that the advice, feedback, and information provided to a protégé through electronic means may be less clear or actually misinterpreted. This should lead protégés and their mentors who communicate solely through electronic chat to feel that the statements of career support provided are less helpful. Thus, we expected that given the identical amount of contact time:

Hypothesis 2. Mentors will make (a) fewer coded statements of career support, and both (b) protégés and (c) mentors will perceive that less career support has been provided in the electronic chat condition relative to the face-to-face condition.

1.2.2. Mentor gender

It has been argued that certain types of individuals may be better able to effectively communicate psychosocial and career support to protégés electronically than others (Enscher et al., 2003). In this regard, we investigated whether mentor gender plays a role. Gender-related differences in communication have long been documented. For instance, females tend to use longer utterances, whereas males condense their communication (Mulac, 1998). Males are also more likely to use metaphor (Hussey & Katz, 2006), sarcasm and irony (e.g., Gibbs, 2000) than are females. Moreover, prior research suggests that females may be more likely to adjust their communication patterns in situations that carry a greater risk of misinterpretation. For instance, Hussey and Katz found that females reduced their use of metaphor when communicating with a stranger as compared to a friend, whereas males did not. Similarly, female mentors may be more conscious of, and concerned about, the increased risk of misinterpretation when mentoring electronically as compared to face-to-face. We investigated this notion with respect to the average length of mentor statements.

In the interest of expediency, language communicated electronically, particularly through synchronous methods such as electronic chat, instant messaging, and text messaging tends to be abbreviated as compared to language communicated face-to-face. Thus, one might expect to see shorter mentor statements per turns at speech in the e-mentoring condition than in the face-to-face condition overall. However, female mentors may be more cautious in this regard, exhibiting a lesser decrease in statement length than male mentors. As such we hypothesized:

Hypothesis 3. Mentor gender will moderate the effect of communication mode on statement length. Specifically, shorter mentor statements will be observed in the e-mentoring condition than in the face-to-face condition and this disparity will be greater for male mentors than for female mentors.
If, in fact, male mentors engage in “riskier” communication patterns (e.g., condensed language), this should leave them particularly vulnerable to misinterpretation by their protégés in the e-mentoring condition. For instance, a mentor’s use of a metaphor that is unfamiliar to a protégé may be understood when accompanied by a gesture. However, in an electronic conversation, the message may be lost on a protégé. Similarly, a sarcastic comment accompanied by a smile and a particular tone of voice may be viewed as humorous by a face-to-face protégé. Without these additional cues, the same comment might be misinterpreted by an e-protégé. As a result, he or she may perceive less empathy and acceptance from the mentor. Given that males are more prone to engage in these forms of communication, we expected that:

**Hypothesis 4.** Mentor gender will moderate the impact of communication mode on protégé perceptions of the (a) psychosocial support and (b) career support received. Specifically, the negative effects of being mentored solely through electronic chat relative to being mentored face-to-face will be greater for those with male mentors than for those with female mentors.

In sum, we did not expect male mentors to make fewer statements of psychosocial or career support than females electronically. Instead, we expected that the manner in which they communicated these statements would be perceived less positively by their protégés. Since it is unclear whether males consciously choose to risk misinterpretation or whether they simply do not recognize when an increased risk exists, no formal hypotheses were put forth with respect to mentor-perceived support provided as a function of communication mode and gender.

### 1.2.3. Dialogue interactivity

Although the success of mentoring relationships is often attributed to a unique “chemistry” between mentor and protégé, few researchers have attempted to go beyond the measurement of mentor behavior in evaluating the mentoring process. Notably, Bonnett et al. (2006) found that the e-mentoring relationships described as more successful by protégés were characterized by greater coded dialogue interactivity. Henri (1992) defined interactivity as a three-step process involving the communication of information, a response to this information, and a reply to this response. Burgoon et al. (2002) noted that when communication is interactive, each participant’s comments and queries are contingent on the others’. Interactivity is a concept that has frequently been employed to evaluate the quality of educational and training systems (Chen, Wong, & Hsu, 2003). Classroom-based training and computer-based training, for example, are considered to be most effective when they actively engage trainees in the learning process (Wiedner, 1999), incorporate assessment and feedback loops (Kluger & DeNisi, 1996), and tailor their content to the unique needs of the trainee (Goldstein, 1991). Similarly, in an interactive mentoring relationship, the protégé is not simply a passive recipient of knowledge but a partner in the learning process. This should enable the mentor to tailor his/her advice, encouragement, and reinforcement to the unique needs of the protégé. However, inhibitions due to disparities in status may hinder the interactivity of mentor-protégé discussions. Similar inhibitions have been discussed with respect to lower-status teammates’ willingness to state their opinions, express concerns, and ask questions (Smith-Jentsch, Salas, & Baker, 1996).

The Cues Filtered Out theory (Culnan & Markus, 1987) posits that the absence of visual and vocal cues in text-based computer-mediated communication alleviates social inhibitions. This has been offered as a potential advantage of e-mentoring previously (e.g., Ensher et al., 2003). However, no prior experiment has compared face-to-face and e-mentoring in this regard. Consistent with the notion that electronic communication is more democratic we expected that:

**Hypothesis 5.** Mentor-protégé dyads that communicate through electronic chat will have more interactive dialogue than will mentor-protégé dyads that communicate face-to-face.

Moreover, we expected that the relative benefits of e-mentoring with respect to dialogue interactivity should be greater for those with male mentors than for those with female mentors. Again, support for this notion comes from the literature on assertive communication and teams which has demonstrated that lower ranking teammates (regardless of their own gender) are less likely to ask questions, express concerns, and state their opinions when speaking to a male team leader than to a female team leader (Smith-Jentsch et al., 1996). Sim-
ilarly, male mentors are likely to be more intimidating to protégés and, as such, they should be less likely to have interactive dialogue with their protégés than female mentors when communicating face-to-face. Electronic communication, however, should make both status and gender cues less salient. Thus, we expected that:

**Hypothesis 6.** Mentor gender will moderate the impact of communication mode on dialogue interactivity. Specifically, the increase in dialogue interactivity seen for dyads in the e-mentoring condition relative to those in the face-to-face condition will be greater when the mentor is male than when the mentor is female.

### 1.3. Protégé self-efficacy

A primary goal of many formal peer-mentoring programs is to increase task-related self-efficacy. Self-efficacy refers to an individual’s belief that he or she can successfully perform a specific task or activity (Bandura, 1977). Those higher in self-efficacy have been shown to outperform those lower in self-efficacy in a variety of academic and job-related outcomes. Self-efficacy is expected to be derived from four general sources: successful past experiences, vicarious experiences, social persuasion, and emotional/psychological states (Bandura). The empathy, encouragement, and reinforcement that define psychosocial support are likely to increase protégé self-efficacy through the positive emotions it is intended to induce. Furthermore, when a mentor provides career support by sharing his/her personal history including successes, failures, and lessons learned, these vicarious experiences should have a positive impact on protégés’ self-efficacy as well. Consistent with these notions, Day and Allen (2004) found that mentoring functions received by face-to-face mentors were positively associated with protégé self-efficacy. Thus, we expected that:

**Hypothesis 7.** After accounting for pre-mentoring levels of self-efficacy, protégé-reported (a) psychosocial and (b) career support will be positively associated with post-mentoring self-efficacy.

We have argued that protégés would report receiving less support if they were e-mentored than if they were mentored face-to-face and that this detrimental effect would be most pronounced for those with male mentors. Furthermore, in the previous hypothesis, it was argued that protégé-reported support would be positively associated with post-mentoring self-efficacy. Thus, it follows that:

**Hypothesis 8.** (a) Mentor gender will moderate the impact of communication mode on post-program self-efficacy and (b) this effect will be mediated by protégé-reported support received.

Finally, we expected that dialogue interactivity would contribute positively to post-mentoring self-efficacy. Interactive mentoring sessions suggest a level of reciprocity and partnership that should allow a protégé to feel respected and accepted by his or her mentor. This, in turn, should make it easier for the protégé to view his/her mentor as a later version of him/herself. As a result, the protégé should be better able to vicariously benefit from the mentor’s triumphs over adversity, increasing the likelihood that they will believe they too can be successful one day. Moreover, interactive mentor-protégé dialogue should enable mentors to tailor the advice they give to address the unique needs and desires of their protégés. Thus, we expected that:

**Hypothesis 9.** After accounting for pre-mentoring levels of self-efficacy, dialogue interactivity will be positively related to post-mentoring protégé self-efficacy.

### 2. Methods

#### 2.1. Participants

One-hundred-six undergraduate freshmen (mean age 18.21 years) recruited from undergraduate biology classes participated as protégés in a formal program designed to ease the transition from high school to university life at a large Southeastern University. The protégés were randomly assigned to communicate with a peer-mentor either face-to-face (17 male and 37 female protégés, mean age of 18.22 years) or solely through
electronic chat (19 male and 33 female protégés, mean age of 18.20 years). Twenty-four male and 31 female juniors and seniors with at least a 3.0 GPA were recruited from upper-level biology classes to serve as mentors (mean age of 21.5 years). Each mentor was assigned one face-to-face and one e-protégé. Participants were paid by the hour ($10 for mentors and $8 for protégés) for completing measures.

2.2. Measures

2.2.1. Protégé self-efficacy

Fifteen items from the College Self-Efficacy Inventory (CSEI; Solberg, O’Brien, Villareal, Kennell, & Davis, 1993) were used to examine pre- and post-mentoring self-efficacy. Participants were asked to report the extent to which they felt confident that they could perform 15 different course- and social-related tasks. Some example tasks from this scale include “make new friends when you want to” and “research a term paper.” Participants responded using a 6-point Likert scale (1—‘strongly disagree’ to 6—’strongly agree’). Coefficient α for this scale was .87. Pre-mentoring and post-mentoring self-efficacy scores ranged from 2.53 to 6.00 (pre) and 2.87 to 6.00 (post), respectively.

2.2.2. Protégé- and mentor-perceived support

Mentors and their protégés were each asked to report the extent to which they felt psychosocial support and career support was provided to them/by them during their first three formal mentoring sessions using a 24-item scale adapted specifically for academic populations by Allen et al. (1999). Responses were made on a 6-point Likert scale, anchored 1—‘strongly disagree’ to 6—’strongly agree.’ Coefficient α for protégé reports of psychosocial support and career support were .89 and .90, respectively. For mentors, coefficient α were .80 for psychosocial and .87 for career support. Average scores for protégé ratings ranged from 2.11 to 6.0 for psychosocial support and 1.0 to 5.36 for career support. Mentor ratings ranged from 1.56 to 5.78 for psychosocial support and 1.0 to 5.09 for career support.

2.2.3. Coded variables

Audio recordings were made of face-to-face sessions and these recordings were later transcribed. Transcripts of chat logs were also saved. One session transcript was missing from 15 of the 106 mentor-protégé dyads. Thus, data on the following coded variables were obtained for the remaining 91 dyads: dialogue interactivity, average statement length, frequency of psychosocial support statements, frequency of career support statements.

Dialogue interactivity was computed by counting the number of speaker changes (from mentor to protégé or vice versa) within each session transcript. Two raters agreed on 100% of the 100 session transcripts that they both coded for interactivity. Dialogue interactivity was found to be highly consistent across the three sessions as estimated by coefficient α (.97). Thus, we averaged these three values to arrive at an overall score. The mean number of dialogue changes per session ranged from 16.33 to 417.33.

Average statement length for mentors was calculated by summing the number of mentor words per transcript and dividing this number by the number of mentor turns at speech per transcript. Average statement length for dyads across the three sessions was found to be quite consistent as estimated using coefficient α (.84). Thus, the three values were averaged to arrive at an overall measure. Scores on this variable ranged from 3.31 to 48.14.

Coded psychosocial and career support were assessed by two coders who used operational definitions consistent with the self-report scales completed by mentors and protégés. For example, if a mentor were to say “You should calculate your points earned in the class every week to monitor your progress,” this was coded as one statement of career support. Coders summed all statements of psychosocial support and career support separately for each session transcript. Inter-rater reliability, based on a set of 100 session transcripts that were coded by both raters, was .77 for coded psychosocial support and .94 for career support. Coefficient α for frequency counts of the coded variables across the three sessions was .41 for statements of psychosocial support, and .72 for statements of career support. These counts were then averaged across the three e-mentoring sessions to arrive at overall scores for the two mentoring functions. Ranges were 0–5.67 for coded psychosocial support and 0–24.33 for career support.
2.3. Procedure

Protégés provided demographic data, and completed the pre-mentoring self-efficacy measure prior to being randomly matched to a mentor during the first week of September. Mentors and protégés received separate 30-minute orientations detailing rules of conduct (e.g., no racially or sexually-offensive comments, no discussion of illegal activity), and providing suggestions as to general topic areas for discussion (e.g., scheduling classes, study strategies, roommate issues, joining clubs, selecting a major). At this time, both mentors and protégés were instructed that their first three sessions would take place at an experimental laboratory on campus and would be recorded for research purposes. These sessions began the following week. Mentors were randomly assigned one protégé with whom they would communicate face-to-face, and another with whom they would communicate solely through electronic chat for the first three sessions. In order to control communication mode, mentors and protégés were asked not to communicate outside of their scheduled sessions or to exchange personal contact information until after the third week. Immediately following their third session, mentors and protégés rated the degree to which psychosocial and career support had been provided to that point. Additionally, protégés completed the identical self-efficacy measure that was completed at the start of the program. Mentors and protégés were then debriefed and given the opportunity to exchange their personal contact information so they could continue to meet whenever, wherever, and however they wished. Fifty-two percent of protégés did so. This percentage was greater in the e-mentoring condition (65%) than in the face-to-face condition (39%).

3. Results

Means, standard deviations, and correlations among the study variables are presented in Table 1. Results from the multiple regression analyses used to test our hypotheses can be found in Table 2. The sample size for

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<td>3. Protégé gender</td>
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<td>6. Coded CS b</td>
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<td>8. Dialogue interactivity</td>
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<td>9. Protégé-reported PS d</td>
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<td>10. Protégé-reported CS d</td>
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<td>11. Mentor-reported PS d</td>
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<td>12. Mentor-reported CS d</td>
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<td>13. Post-mentoring school SE d</td>
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Note. *p < .05, **p < .01. Due to missing data, N = 91, for correlations involving all coded variables. For the remaining correlations, N = 106.

a Mentor and protégé gender (1 = male; 2 = female).
b Condition (0 = face-to-face; 1 = chat).
c Values on the diagonal represent internal consistency estimates. For coded variables internal consistency estimates are based on scores for the three sessions.
d PS, psychosocial support; CS, career support; SE, self-efficacy.
analyses involving coded variables was 91, whereas in the remaining analyses, the sample size was 106. Unless otherwise stated, an α level of .05 was used.

3.1. Communication mode and mentoring functions

First, in order to test the impact of communication mode on psychosocial and career support, one-tailed dependent t-tests were conducted. Four mentors had one protégé who did not complete the program. Therefore, this analysis was performed using data from the 51 mentors who had protégés in both conditions. In full support of Hypothesis 1, results indicated that mentors (a) made fewer statements of psychosocial support \( t(50) = 2.47, p < .05 \), and that both (b) protégés \( t(50) = 2.29, p < .05 \), and (c) mentors \( t(50) = 2.91, p < .05 \) perceived that less psychosocial support was provided in the electronic chat condition (1.04, 3.90, 3.84) than in the face-to-face condition (1.74, 4.27, 4.20). We conducted a supplementary analysis to examine whether the decrease in coded statements of psychosocial support was simply due to the slower nature of typing or whether inhibitions led mentors to offer disproportionately less psychosocial support. Specifically, we calculated the proportion of total mentor words that were included in the coded statements of psychosocial support and computed a dependent t-test on these. Contrary to our expectations, results indicated that words of psychosocial support made up a greater proportion of total mentor words in the e-mentoring (5%) condition than in the face-to-face (2%) condition \( t(50) = -2.87, p < .05 \).

Next, we examined the impact of condition on career support. Although mentors made fewer statements of career support \( t(50) = -6.10, p < .05 \) in the electronic chat condition than in the face-to-face condition (chat: 2.43, face: 7.37), no significant differences were reflected in protégé (chat: 2.58, face: 2.86) and mentor (chat: 3.15, face: 3.28) perceptions of career support provided (protégés: \( t(50) = 1.61, ns \); mentors: \( t(50) = 1.10, ns \)). Thus, Hypothesis 2a was supported, but Hypotheses 2b and c were not.

3.2. Interactions between condition and mentor gender

3.2.1. Message length

As shown in Table 2, the average length of mentor statements was regressed onto mentor gender, communication mode, and a product term reflecting the interaction of these two variables. The overall model was found to be significant \( F(3, 87) = 11.92, p < .05 \). As expected, there was a significant decrease in statement length overall in the electronic chat condition (10.86) relative to the face-to-face condition (19.12). Moreover, consistent with Hypothesis 3, mentor gender moderated this effect. Hypothesis 3 stated, specifically, that male

Table 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>SL</th>
<th>PPS</th>
<th>PCS</th>
<th>PS</th>
<th>MCS</th>
<th>CPS</th>
<th>CCS</th>
<th>DI</th>
<th>SE</th>
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<td>.76**</td>
<td>.76**</td>
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<tr>
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<td>-0.89**</td>
<td>-0.39</td>
<td>-0.00</td>
<td>-0.49</td>
<td>-0.88**</td>
<td>0.94**</td>
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<td>Mentor gender</td>
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<td>-0.18</td>
<td>.09</td>
<td>.07</td>
<td>.08</td>
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<td>0.21 *</td>
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<tr>
<td>Condition x mentor gender</td>
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<td>0.82 *</td>
<td>.20</td>
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<td>.43</td>
<td>-0.41†</td>
<td>- .14</td>
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<td>1.32**</td>
<td>.39†</td>
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<td></td>
<td></td>
<td></td>
<td>.25†</td>
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</table>

Note. Estimated regression coefficients are standardized. *p < .05 (two-tailed). **p < .01 (two-tailed). †p < .05 (one-tailed). Condition (0 = face-to-face; 1 = chat). Mentor gender (0 = male; 1 = female). SL, statement length; PPS, protégé-reported psychosocial support; PCS, protégé-reported career support; MPS, mentor-reported psychosocial support; MCS, mentor-reported career support; CPS, coded statements of psychosocial support; CCS, coded statements of career support; DI, dialogue interactivity; SE, self-efficacy. SE = Self-efficacy reported by protégés after three weeks of mentoring.
mentors would show a greater reduction in statement length from the face-to-face to the e-mentoring condition than would female mentors. Thus, we computed the effect sizes of experimental condition for those with male and with female mentors and tested the directional (one-tailed) confidence intervals (CIs) around the two effect size estimates for overlap. In accordance with Payton, Greenstone, and Schenker (2003), we did not use the boundaries of the 95-percent (one-tailed) CIs to check for overlap, because the latter are much too conservative. Instead, and following Payton et al.’s recommendation, we used the lower (male) and upper (female) boundaries of the 83-percent (one-tailed) confidence intervals, thus more closely approximating a 0.05 test.

For both males (face: 21.98, chat: 9.31) and females (face: 17.00, chat: 11.75), the effect of condition on statement length was significant. The effect size for dyads in which the mentor was male was $d = 1.75$, and the lower boundary of the confidence interval around it was $1.28$, with the upper boundary of the confidence interval equaling $0.72$, with the upper boundary of the confidence interval equaling $0.72$. The effect size of condition for those with female mentors was $d = 0.72$, with the upper boundary of the confidence interval equaling $0.99$. Since the two confidence intervals did not overlap, the hypothesis that the effect of condition on statement length would be greater for male mentors was supported.

### 3.2.2. Psychosocial and career support

Hypothesis 4a and b stated that mentor gender would moderate the effects of communication mode on protégé perceptions of psychosocial support and career support. As shown in Table 2, when protégé-reported psychosocial support was regressed onto mentor gender, communication mode, and their interaction, a significant model emerged, $F(3,102) = 4.02$, $p < .05$. The same was true when protégé-reported career support was regressed onto these three predictors $F(3,102) = 2.78$, $p < .05$. In both cases, the interaction term was significant.

The same procedure as described in our analyses of statement length was used to determine whether the effects of condition on protégé-reported psychosocial and career support were greater when the mentor was male than when the mentor was female. For those with male mentors, protégé-reported psychosocial support in the electronic chat condition (3.65) was significantly lower than in the face-to-face condition (4.51), but this was not true for those with female mentors (chat: 4.19, face: 4.23). The effect size of condition for those with male mentors was $d = 1.11$, and the lower boundary of the confidence interval around it was $1.75$, and the lower boundary of the confidence interval around it was $1.28$, with the upper boundary of the confidence interval equaling $1.11$, and the lower boundary of the confidence interval around it was $0.42$. Since the two confidence intervals did not overlap, Hypothesis 4a was supported.

Similarly, the mean level of protégé-reported career support for those with male mentors in the electronic chat condition (2.31) and in the face-to-face condition (3.08) was significantly different. However, for those with female mentors, this difference was not significant (chat: 2.87, face: 2.79). The effect size of condition for those with male mentors was $d = 1.11$, and the lower boundary of the confidence interval around it was $1.75$, and the lower boundary of the confidence interval around it was $1.28$, with the upper boundary of the confidence interval equaling $1.11$, and the lower boundary of the confidence interval around it was $0.42$. Since the two confidence intervals did not overlap, Hypothesis 4b was supported.

As shown in Table 2, although not hypothesized, we also investigated whether mentor gender interacted with condition to predict mentor-reported psychosocial and career support. Neither of these models was significant. Additionally, when coded psychosocial support was used as the dependent variable the model was not significant. Finally, although the model predicting career support was significant $F(3,87) = 10.30$, $p < .05$, the mentor-by-condition interaction term was not. Thus, no further comparisons were made.

### 3.2.3. Dialogue interactivity

In order to test Hypotheses 5 and 6, dialogue interactivity was regressed onto condition, total word count (to account for differences in transcript length), mentor gender, and the product term for the interaction of condition by mentor gender. As shown in Table 2, this model was significant $F(4,86) = 43.57$, $p < .05$. In support of Hypothesis 5, when transcript length (i.e., total word count) was controlled, dyads in the electronic chat condition (207.23) demonstrated a greater number of speaker changes than did dyads in the face-to-face condition (103.52). Additionally, mentor gender interacted with condition. However, the difference between the effect size of condition for those with male mentors, $d = -1.28$, and those with female mentors, $d = -0.71$, was not significant as evidenced by the slight overlap in the confidence intervals.
(male mentors: upper-bound CI \(0.83\) (one-tailed) = –0.93; female mentors: lower-bound CI \(0.83\) (one-tailed) = –0.98). Thus, Hypothesis 6 was not supported.

### 3.3. Predictors of post-mentoring self-efficacy

Our final set of analyses used post-mentoring protégé self-efficacy as the dependent variable. First, we tested the hypothesis that protégé-reported psychosocial and career support would be positively associated with post-mentoring self-efficacy. As shown in Table 2, a significant model was obtained when post-mentoring self-efficacy was regressed on pre-mentoring self-efficacy, protégé-reported psychosocial, and career support received \(F(3,102) = 52.19, p < .01\). However, neither protégé-reported psychosocial nor career support was a unique predictor. Thus, Hypotheses 7a and 7b were not supported. Next, post-mentoring self-efficacy was regressed on pre-mentoring self-efficacy, condition, mentor gender, and a product term reflecting the interaction of mentor gender and communication mode. The overall model was found to be significant, \(F(4,101) = 36.95, p < .05\). As shown in Table 2, those in the e-mentoring condition tended to have less post-mentoring self-efficacy (4.73) than those in the face-to-face condition (4.66). Additionally, there was a significant interaction between mentor gender and condition. The mean level of post-mentoring self-efficacy reported by protégés with male mentors was significantly greater in the face-to-face condition (4.94) than it was in the e-mentoring condition (4.66). However, the difference was not significant for those with female mentors (face: 4.58, chat: 4.65). The effect size of condition for those with male mentors was \(d = 0.77\), and the lower boundary of the confidence interval around it was lower-bound CI \(0.83\) (one-tailed) = 0.43. The effect size of condition for those with female mentors was \(d = 0.11\), with the upper boundary of the confidence interval equaling upper-bound CI \(0.83\) (one-tailed) = 0.15. Since the two confidence intervals did not overlap, Hypothesis 8a was supported.

Hypothesis 8b stated that protégé-reported career and psychosocial support would mediate the impact of communication mode and mentor gender on post-mentoring self-efficacy. A necessary pre-condition for testing this hypothesis is that career and psychosocial support are significant predictors of post-mentoring self-efficacy (Baron & Kenny, 1986). However, as reported above, this was not the case. Thus, Hypothesis 8b was not supported.

Finally, we tested the hypothesis that dialogue interactivity would be positively associated with post-mentoring self-efficacy. To test this hypothesis, post-mentoring self-efficacy was regressed onto pre-mentoring self-efficacy, communication mode, mentor gender, and dialogue interactivity. Product terms representing the interaction of communication mode with mentor gender and communication mode with dialogue interactivity were also included as predictors. The overall model was found to be significant, \(F(6,99) = 25.61, p < .05\). Dialogue interactivity did not have a main effect on post-mentoring self-efficacy. Instead, it interacted with condition to predict post-mentoring self-efficacy. In particular, after accounting for pre-program protégé self-efficacy, the post-mentoring self-efficacy scores were slightly negatively related to dialogue interactivity for dyads in the face-to-face condition (\(B_{\text{Face}} = -1/1000\) changes; \(\beta_{\text{Face}} = -0.07\)). In contrast, in the chat condition, the protégés’ self-efficacy scores were strongly positively related to dialogue interactivity (\(B_{\text{Chat}} = +4/1000\) changes; \(\beta_{\text{Chat}} = +0.175\)). Thus, Hypothesis 9 was partially supported.

### 4. Discussion

The present study compared the processes and outcomes associated with peer-mentoring that took place face-to-face or solely through electronic chat. Results indicated that given the identical amount of contact time, those mentored through electronic chat received fewer statements of psychosocial and career support. Mentor gender did not moderate the effects of condition on the number of statements coded as psychosocial or career support. However, as expected, male mentors did condense their statements to a significantly greater degree in the electronic chat condition relative to the face-to-face condition when compared to female mentors. The effects of communication mode from the protégés’ perspective were also stronger when the mentor was male. In fact, only when the mentor was male did protégés perceive being given less psychosocial and career support and report lower post-mentoring self-efficacy in the chat condition. The mentors themselves, however, did not perceive a differential effect of communication mode based on their gender. As predicted,
mentor–protégé dialogue was significantly more interactive in the electronic chat condition than in the face-to-face condition. Finally, dialogue interactivity, but not protégé-reported psychosocial or career support, predicted post-mentoring self-efficacy; however only for those in the e-mentoring condition.

4.1. Theoretical implications

The findings reported here are both consistent with and extend prior research and theory on mentoring and on electronic communication from a number of disciplines. First, in addition to collecting mentor and protégé perceptions of psychosocial and career support as is common in studies of workplace mentoring, we examined session transcripts in a micro-analytic manner more consistent with communications research. Specifically, we investigated a language convention (i.e., statement length) that has been linked to gender in a number of previous studies outside of the mentoring literature. In this regard, our results were consistent with the notion that females communicate more effectively in situations that carry a greater risk of misinterpretation than do males. Hussey and Katz (2006) demonstrated this with respect to electronic communication directed at strangers versus friends. In our study, male mentors condensed their language to a greater degree when communicating electronically than did female mentors. They were also less effective at providing support in this condition from the perspective of their protégés. Interestingly, mentor gender did not interact with communication mode to predict mentor perceptions of the support they provided. Thus, rather than consciously choosing to accept the risk of communicating in an abbreviated fashion, it appears that our male mentors were simply unaware of their relative ineffectiveness in the chat condition.

Second, we borrowed from the educational literature, which takes more of a teacher-learner approach to the study of mentoring, by investigating the construct of dialogue interactivity. Bonnett et al. (2006) found that interactive electronic mentoring relationships were viewed more positively by participants. Our findings build on this prior research by demonstrating that more interactive mentor–protégé e-mentoring dialogue is also positively associated with the protégés’ personal growth. It is important to note that dialogue interactivity was a significant predictor of post-mentoring self-efficacy after accounting for pre-mentoring levels of self-efficacy. Thus, we can rule out the possibility that those with high efficacy to begin with were simply more willing to engage in interactive discussions with their mentors. Among the schemes that have been devised to assess dialogue interactivity, ours is comparatively simple. For instance, prior authors have content analyzed email traffic and categorized messages and responses into topic threads (Bonnet et al.). We simply calculated the average number of speaker changes per session. Although this metric predicted self-efficacy for those who were e-mentored, it did not for those in the face-to-face condition. We could find no other published studies in which dialogue interactivity was examined as a predictor of successful face-to-face mentoring relationships. This is not surprising given that it is uncommon to have transcripts of face-to-face mentoring sessions. However, we encourage future researchers to develop and incorporate alternative methods of measuring interactivity in future studies of face-to-face mentoring.

Third, consistent with the Cues Filtered Out theory (Culnan & Markus, 1987) we found that mentor–protégé dialogue was more interactive when communication took place electronically than when it took place face-to-face. It has been argued previously that e-mentoring may reduce inhibitions associated with status cues (e.g., Ensher et al., 2003). However, to our knowledge, the present study is the first to provide empirical support for this potential advantage of e-mentoring. Although mean differences were in the hypothesized direction, the effects of condition on dialogue interactivity were not significantly greater when the mentor was male. One might expect these effects to be stronger, however, for mentoring relationships in which mentor gender corresponds more strongly with power (e.g., workplaces).

Finally, competing theories exist with respect to the impact of electronic communication on the development of socio-emotional bonds. On the one hand, interpersonal warmth may be lost with the absence of non-verbal cues. However, social information processing theory suggests that individuals find ways to compensate for this electronically and that relationships simply develop more slowly (Walther, 1996). Walther goes further arguing that electronic communication can make interactions hyper-personal through a feedback loop of idealized self-presentation and perception of message content. Moreover, he notes that individuals have more time to edit their responses and thoughtfully react to the messages they receive when communicating electronically. Our data are consistent with this point of view. Fewer statements of psychosocial support
were made in the electronic chat condition, however it appears that this was simply a function of the slower rate of information flow inherent when one types rather than speaks. When transcript length was taken into account, mentors actually wrote proportionately more words of psychosocial support in the electronic chat condition than in the face-to-face condition. Together with our findings regarding dialogue interactivity, this seems to suggest that when time is unconstrained e-mentoring may enable mentors and protégés who differ on a number of status-related and demographic variables to have more beneficial relationships.

4.2. Practical implications

The findings from this study suggest a number of practical implications for e-mentoring programs across a variety of disciplines. First, our results, together with those from prior research suggest that e-mentoring programs can positively affect psychosocial outcomes (i.e., self-efficacy, social integration) even in the short-term. However, the findings reported here also argue for preparatory training that stresses the importance of having interactive discussions and warns of the increased risk of miscommunication associated with this medium. Moreover, the fact that male mentors did not appear to recognize their relative ineffectiveness in the electronic chat condition suggests that they in particular need to be made aware that abbreviated language in online conversations can be problematic. This should be particularly important when mentors and their protégés are not familiar with the same slang or figures of speech (e.g., inter-generational, or inter-cultural mentoring relationships).

Second, it has been argued that e-mentoring should primarily be used when face-to-face mentoring is not possible (Single & Single, 2005). There are many populations for which this is the case. For some, e-mentoring is used to augment pre-existing face-to-face relationships (e.g., expatriates on assignment abroad, military personnel on deployment). For others, electronic media may be the primary or sole means by which mentors and protégés are acquainted. This would be true, for example, for protégés that are online college students, telecommuting employees, homebound persons with disabilities, or children from rural areas or low-income urban neighborhoods. In many such situations, protégés are also likely to be dissimilar from their mentors on a number of demographic variables (e.g., race, socio-economic class) that could inhibit an interactive face-to-face exchange of ideas. Thus, for some, e-mentoring might not simply be more practical than traditional mentoring it may also be more effective due to the absence of visual (e.g., physical disabilities) and/or vocal cues (e.g., rural or foreign accents) that make dissimilarities salient. We have seen this first-hand through our online mentoring programs designed to help unemployed individuals make the transition from welfare to work and to assist children aging out of the foster care system to find their first job. Protégés in both of these programs routinely tell us they would not have felt comfortable participating if they were required to meet with their mentors (working professionals) face-to-face.

A third practical implication of our findings pertains to the monitoring of e-mentoring relationships by program administrators. As we have found, this can quickly become an unwieldy task as the numbers of participants chatting concurrently grows. However, program administrators could collect data on dialogue changes per session relatively easy (an automated function). Based on this initial screening, administrators could then choose to follow up with a more detailed analysis of a smaller number of transcripts. Together with targeted requests for feedback from participants, administrators could more efficiently intervene in an appropriate manner (e.g., with feedback, training, re-matching).

4.3. Study limitations and future directions

The experimental control employed in the present study makes it unique in comparison to prior research on electronic communication in general, on mentoring in general, and on e-mentoring specifically. That said, a number of study limitations remain and must be noted when generalizing the results reported here. First, the disparity in benefits between traditional face-to-face and e-mentoring relationships is likely to be greater to the degree that electronic communication is relied upon. Thus, by studying mentor-protégé dyads that communicated solely through electronic chat our study likely represents a conservative test of the benefits e-mentoring can have. Second, in an effort to balance our needs for experimental control with the rights of the participants to develop productive and satisfying relationships our investigation of the impact that
communication mode had lasted only three weeks. Clearly, additional research is needed in order to investigate the longer-term impacts of communication mode. A third limitation is that the present study did not employ a control group. Thus, we can not estimate the effectiveness of e-mentoring relative to no mentoring at all. Finally, we examined one specific form of e-mentoring: electronic chat. Additional research is needed to compare various forms of synchronous and asynchronous e-mentoring.

In sum, the present study represents the most rigorous empirical test of e-mentoring to date. Given the increasing use of e-mentoring by universities, elementary schools, social welfare programs, and other organizations, we hope research on this topic will continue in a direction that enables practitioners to benefit from empirically-grounded guidelines regarding how, when, and for whom such programs are likely to be effective.

References


