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# The Role of Research Strategies and Professional Networks in Management Scholars' Productivity

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*We propose a model of knowledge creation, transfer, and adoption based on theories of creativity and social networks. We test our hypotheses using a sample of 119 full professors in management departments at U.S. universities. We examine the effects that two research strategies, coauthoring and working in multiple research fields, have on the number of publications in each of three journal quality tiers during an 8-year period. In addition, we examined the influence that having strong ties and a dense network of professional colleagues each has on the total number of citations garnered by those publications. Results showed a heterogeneous pattern of coauthoring (distributing coauthoring activity evenly across a greater number of coauthors) is positively related to the number of publications in the highest-quality journals for the focal researcher. The heterogeneity of research fields in which a researcher works is also positively related to greater productivity, albeit in second- and third-tier publication outlets. In addition, we found that the number of strong ties in the focal author's professional support network positively related to his or her total citation count, independent of the number and quality of publications. Implications for the social network theory of creativity, organizational knowledge theory, and models of management scholars' productivity are explored.*

**Keywords:** *creativity; knowledge transfer; social networks; sociology of science*

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Many scholars have sought to identify factors related to the productivity and career success of academics in the field of management (Bedeian, Cavazos, Hunt, & Jauch, 2010; Cable & Murray, 1999; Judge, Kammeyer-Mueller, & Bretz, 2004; R. Long, Bowers, Barnett, & White, 1998; Miller, Glick, & Cardinal, 2005; Podsakoff, MacKenzie, Podsakoff, & Bachrach, 2008; Williamson & Cable, 2003). The primary theoretical perspective animating this research is Merton's (1973) distinction regarding universalistic versus particularistic norms of science. The prescription of the *universalistic* view is that scientific work be evaluated solely on its merits, regardless of who it is that produces the work. In contrast, the *particularistic* or *social constructivist* perspective suggests that the evaluation of scientific work may be influenced by the personal characteristics of the scientist, such as the prestige of the institution or personal connections (Judge, Cable, Colbert, & Rynes, 2007). Empirical results favor an integration of these two perspectives in what Merton called the process of accumulating advantage: The prestige or productivity of a student's PhD-granting department or doctoral supervisor is associated with the student's early publication success; both prestige and early publications independently determine the prestige of the student's first academic appointment; the prestige of that first appointment is in turn related to the subsequent productivity of the young researcher; and productivity ultimately leads to extrinsic and intrinsic career success (Bedeian et al., 2010; Cable & Murray, 1999; Judge et al., 2004; Miller et al., 2005; Williamson & Cable, 2003).

These studies demonstrate that research productivity is a driver of academic career success. Yet there is much to be learned about the research process itself and the way specific research strategies enable individuals to produce high-quality academic research. This is an important oversight in the literature because the production of new knowledge is the primary purpose of scientific activity. The organizational knowledge literature offers a useful framework for examining knowledge creation in the academic context and links this work to issues of knowledge creation and use in organizations (Baer, 2010, 2012; Fleming, Mingo, & Chen, 2007; Hansen, 1999; Phelps, Heidl, & Wadhwa, 2012). According to Phelps et al. (2012), *knowledge creation* refers to the generation of new knowledge, *knowledge transfer* refers to the mechanisms used to share information between a sender and receiver, and *knowledge adoption* refers to the use or implementation of a discrete element of knowledge. In the context of academic publishing, journal articles can be considered discrete examples of knowledge creation. Citations to those journal articles can be viewed as evidence of knowledge transfer and adoption, since citations formally document the use of the ideas contained in the cited work. Although journal citation impact has frequently been combined with publication counts to create an index of productivity (e.g., Judge et al., 2004; Miller et al., 2005), the knowledge framework (Phelps et al., 2012) suggests that these outcomes should be examined separately, as we do in the current study, because social processes related to knowledge creation (i.e., publications) may be different from those related to knowledge adoption (i.e., citations).

The purpose of the current study is to develop a better theoretical understanding of the knowledge creation, transfer, and adoption process through an examination of academic publishing. We build upon and extend the social network theory of creativity (Perry-Smith & Shalley, 2003) and the organizational knowledge literature (e.g., Phelps et al., 2012) to explain how three research strategies, drawn from the sociology-of-science literature (e.g., Crane, 1972; Lee & Bozeman, 2005; Price, 1963/1986; Price & Beaver, 1966; Wuchty, Jones, & Uzzi, 2007), facilitate knowledge creation, transfer, and adoption. The research

strategies include individual researchers' patterns of coauthoring, patterns of authoring across multiple research fields, and the structure of researchers' professional colleague support networks. We consider the first two strategies related to authorship patterns to be important to knowledge creation, whereas we consider the professional support network important to knowledge transfer and adoption.

Theories of creativity underlie the literature on knowledge creation (Phelps et al., 2012) and the social network theory of creativity (Perry-Smith & Shalley, 2003). Creativity has been defined as the generation of a novel and useful idea, product, or process (Amabile, 1988). Following previous scholars (Judge et al., 2007; McFadyen & Cannella, 2004; Shalley & Gilson, 2004; Shin & Zhou, 2007), we view academic publications as creative products. Academic publications are creative in the sense that they represent an original piece of work that is designed to move a specific professional field forward in some meaningful way (Kaufman & Beghetto, 2009; Sternberg, 1999, 2006). In this paper, we bring together two classic approaches to creativity (Rhodes, 1961; Torrance, 1993) as we relate creative *processes*, captured by coauthoring patterns and research field breadth, to creative *products*, in the form of academic publications. Creative processes include social and cognitive strategies and activities related to creativity (Torrance, 1974). Coauthoring is a social process that allows the authors to share and discuss unique sources of information and knowledge to enhance the creative potential of the manuscript. Similarly, working in multiple research topic areas requires cognitive process involving the learning of new theories, problems, and findings. Because quantity and quality are two distinct metrics of creativity (Simonton, 1994; Torrance, 1974), we examine a scholar's creative productivity in terms of the number of his or her publications in each of three journal quality tiers. In this study, we examine whether these two creative processes positively impact the quantity and quality of an individual's creative productivity.

Specifically, consistent with Perry-Smith and Shalley's (2003) emphasis on the value of "open" network structures for creativity, we propose that coauthoring heterogeneity and research field heterogeneity are constructs that represent structural *openness* that will enhance the focal authors' creativity and thus the number and quality of research publications produced. *Coauthoring heterogeneity* reflects the extent to which the focal author's coauthoring activity is distributed evenly across a number of different coauthors rather than concentrated in only a few (Baer, 2010; Perry-Smith, 2006). We do not examine any specific characteristics of the coauthors but focus on the number of different coauthors because each coauthor is likely to bring a unique and nonredundant constellation of knowledge, skills, and resources to a given collaboration, regardless of his or her demographic characteristics. Likewise, *research field heterogeneity* reflects the extent to which the focal author's publishing is distributed evenly across a number of different research fields or concentrated in only a few.

In addition, we examine structural "closure" in the focal researcher's professional colleague support network and propose it will enhance adoption or use of the focal author's publications as reflected in citations. As a number of scholars have noted (Burt, 2005; Fleming et al., 2007), considerable tension exists regarding the value of "open" versus "closed" network structures. This tension is especially obvious in the literature on knowledge creation and adoption within organizations. As Phelps et al. (2012) observed, findings regarding the positive effects of structural openness on knowledge creation (Baer, 2010; Fleming et al., 2007; McFadyen & Cannella, 2004; Perry-Smith, 2006) are in conflict with findings

regarding the negative effects of openness on knowledge transfer and adoption (Baer, 2012; Fleming et al., 2007; Hansen, 1999; Obstfeld, 2005; Reagans & McEvily, 2003). Fleming et al. (2007) sought to resolve this tension by showing that certain characteristics related to the creativity of one's collaborators could mitigate somewhat the negative effects of structural closure on generative creativity. We take a different approach to this paradox by distinguishing between two different social structures: the social structure used to generate novel ideas and the social structure used to transfer those ideas to potential end users. We examine both the positive effects that structural openness in the knowledge generation network has on creative productivity and the positive effects that structural closure in the knowledge transfer network can have on adoption. We argue that the number of strong ties with professional colleagues and the density of ties among those colleagues are forms of structural *closure* that will increase the use of the focal author's publications after they are created due to increased awareness, understanding, and trust in the value of the focal author's work.

This paper makes important contributions to the social network theory of creativity, the organizational knowledge literature, and theories of management scholar productivity. First, we extend Perry-Smith and Shalley's (2003) social network theory of creativity. This theory primarily emphasizes knowledge creation but has paid little attention to knowledge adoption or use. Following Fleming and colleagues (2007), we place equal emphasis on the importance of creative productivity (publications) and the use of the ideas created (citations). Going beyond Fleming et al., we examine two distinct social networks—coauthors and professional colleagues—related to different outcomes of the creative process. By doing so, we link the social network theory of creativity to the literature on knowledge processes in organizations. Thus our theorizing can be generalized to other organizational settings where new knowledge is both generated and used, such as new product development engineering (Hansen, 1999; Obstfeld, 2005), commercial banking and finance (Gargiulo, Ertug, & Galunic, 2009), and professional service firms, such as law or consulting (Cross & Cummings, 2004).

Second, we contribute to the literature on organizational knowledge creation, transfer, and adoption by examining two forms of structural openness during knowledge generation, coauthoring heterogeneity and research field heterogeneity, and two forms of structural closure during the knowledge transfer and adoption process, the number of strong ties with professional colleagues and the density of ties among those professional colleagues. Because one's professional colleagues are not necessarily one's coauthors, these two sets of actors constitute distinct social networks. By distinguishing network composition and structure used for knowledge creation from that used for knowledge transfer and adoption and aligning structure with composition, we propose one way to resolve the closed- versus open-network paradox prevalent in the literature. In sum, our work connects previously unconnected literatures (social network theory of creativity and organizational knowledge) and, at the same time, advances the movement toward a contingent approach to social networks for knowledge creation and use in organizations (Burt, 2005; Phelps et al., 2012; Podolny & Baron, 1997).

Finally, our research extends existing models of management scholar productivity (Judge et al., 2004; Miller et al., 2005; Podsakoff et al., 2008; Williamson & Cable, 2003). To date, the main constructs examined by these theories have been the reputation or productivity of the researcher's PhD-granting department, PhD supervisor, or current employing department. Little is known about the way reputation is converted by the focal scholar into publications. Based on the sociological literature on scientific publishing (Leahey, 2007; Lee &

Bozeman, 2005; Wuchty et al., 2007), we introduce to these models constructs that capture research strategies scholars use to enhance their creativity and thus the quantity and quality of their scientific work. In addition, we examine the way social ties that the focal scholar has to other professional colleagues influence the scholar's scientific impact. Inclusion of professional ties, a particularistic attribute, allows our study to contribute directly to the debate within the management literature regarding the extent to which universalistic versus particularistic criteria influence the evaluation of academic research (Bedeian et al., 2010; Cable & Murray, 1999; Judge et al., 2004; Miller et al., 2005). We provide a theoretical explanation for the effectiveness of these research strategies using theories of creativity and knowledge creation. Taken together, our study offers important insights into behaviors that scholars and other knowledge workers can use to increase the quantity, quality, and adoption of their work.

## Theory and Hypotheses

Following creativity researchers (Simonton, 1994; Torrance, 1974), we evaluate management scholars' creative output in both qualitative and quantitative terms by examining the number of academic publications they produce in each of three journal quality tiers. Professional creativity can be judged by the extent to which specific works of the professional move a field forward in a substantive or meaningful way in the judgment of domain experts (Gardner, 1994; Gough & Woodworth, 1960; Rubenson & Runco, 1992; Shalley & Gilson, 2004; Ward, Smith, & Finke, 1999). According to Sternberg's (1999, 2006) propulsion theory of creative contributions, some contributions move an existing field forward in the direction it is already heading (*replication, forward incremental contribution*, or *advanced forward contribution*), some contributions seek to bring a field to an earlier or different starting point and move forward from there (*redirection, reconstruction*, and *re-initiation contributions*), and yet other contributions bring together two or more existing approaches to synthesize an entirely new paradigm for the field (*integration*). We argue that academic publications are creative products in precisely this sense—each article is a unique work that is designed to move a field or research program forward in some meaningful way. Although we recognize debate about the relationship of journal status and quality (Adler & Harzing, 2009; Starbuck, 2005), we consider the status of the journal in which an article is published to be an indicator of the level of creative contribution made by publications in that journal because higher-status journals demand higher levels of theoretical, empirical, methodological, and/or practical contribution from the papers they accept. We distinguish three journal quality tiers based on consensus judgments regarding journal reputation scores and average citation rates (Extejt & Smith, 1990; Gomez-Mejia & Balkin, 1992; Johnson & Podsakoff, 1994; Podsakoff et al., 2008).

Consistent with the emphasis on the value of "open" social structures in the social network theory of creativity (Perry-Smith & Shalley, 2003), we propose that the extent to which one distributes coauthoring activity evenly across a larger number of coauthors (coauthoring heterogeneity) and the extent to which one conducts research across a larger number of fields (research field heterogeneity) positively relates to number of publications produced, with coauthor heterogeneity making its greatest contribution to the number of first-tier journal publications in particular. The number and quality of journal publications will in turn be related to the number of citations a focal researcher receives. Finally, consistent with the

organizational knowledge transfer perspective (Fleming et al., 2007; Phelps et al., 2012), we expect the number of strong ties and the density of one's professional support network to each be positively related to the number of citations made to that researcher's work beyond what is accounted for by the number and quality of publications.

### *Coauthoring Heterogeneity and Publications*

One of the most robust findings from the sociology-of-science literature over the last 50 years is the increased prevalence of multiple authors on academic papers in all disciplines (Beaver, 2001; Price, 1963/1986; Price & Beaver, 1966; Wuchty et al., 2007). Whether this trend is due to the growing importance of capital-intensive technology in research (i.e., "big science"), the increased complexity and specialization of scientific knowledge, or increased national and international competition for status among scientists, empirical research suggests that collaboration with coauthors is increasingly common. Working with coauthors means that the focal author will have less work to do on any given paper, increasing the number of papers one can work on in a given time and increasing overall productivity (Beaver & Rosen, 1979; Lavie & Drori, 2012; Pravdic & Oluic-Vukovic, 1986; Price & Beaver, 1966). Although this effect is established in the sociology-of-science literature, previous research in the management field has not included this important factor as a predictor of research productivity as we do here. However, because our theoretical interest is in creativity, we include the number of coauthors as a control variable in the current model and focus on the heterogeneity of coauthoring.

Heterogeneity is a construct based on qualitative differences among individuals and reflects the degree of variety among a set of actors (Blau, 1977; Harrison & Klein, 2007). In this paper, we assume that each new coauthor is unique in the sense that he or she brings a distinct set of knowledge, skills, and resources to a research project. Coauthoring heterogeneity reflects the distribution of one's coauthoring activity across coauthors. Given the same number of coauthoring instances, low levels of heterogeneity reflect coauthoring with the same person repeatedly, and high levels reflect an even pattern of coauthoring with many different individuals.

According to the social network theory of creativity (Perry-Smith, 2006; Perry-Smith & Shalley, 2003), interaction with a greater range of other individuals facilitates creativity. This is because interaction with many others allows the researcher access to a broader range of perspectives and a greater total amount of domain-relevant knowledge (Perry-Smith & Shalley, 2003; Shalley & Gilson, 2004). Diversity of knowledge is associated with creativity-enhancing cognitive processes, such as flexible thinking, divergent thinking, and remote associations among concepts (Amabile, 1983). This "value-of-diversity" argument (Tjosvold, 1982) should be especially important among those conducting academic research due to the social structure in which scientific activity takes place. As first shown by Price (1963/1986), scientific knowledge is characterized by a number of tightly clustered research areas in various stages of growth or decline, each of which is only loosely linked by citations and personal relationships to a large number of other research clusters. Distributing one's collaborations across a large number of different coauthors is thus likely to provide a researcher access to a broad range of knowledge because it allows one to reach a greater number of relatively isolated research areas, each with its own unique perspectives, techniques, and findings.

We therefore expect coauthoring heterogeneity to be positively associated with publishing in the highest-quality tier of journals for the focal authors, reflecting the highest levels of creative contribution. Some previous empirical work focusing on research productivity supports our perspective. Using a sample of biomedical researchers from two universities, McFadyen and Cannella (2004) found both the number of coauthors and repeated publishing with the same coauthor were positively related to a publishing productivity index they constructed, but both research strategies showed a diminishing marginal rate of return. However, McFadyen and Cannella did not directly examine coauthor heterogeneity as we do in the current study. Perry-Smith (2006) used a sample of researchers working in two applied research institutes and found that background (i.e., tenure and function) heterogeneity among those with whom the focal researcher communicated fully mediated the effects of weak ties on rated creativity. We include the total number of coauthors as a control variable, which we expect to be related to the number of publications at all three quality tiers, in order to focus more specifically on the effects of coauthoring heterogeneity on quality of creative contributions.

*Hypothesis 1:* Controlling for the total number of coauthors, heterogeneity of coauthoring is positively related to number of papers published in first-tier journals by the focal author.

### *Research Field Heterogeneity and Publications*

As argued above, working with coauthors is common and an important way for scholars to enhance their creativity by accessing information from a broad range of knowledge domains. We view publishing in multiple fields within the management discipline (e.g., organizational behavior, strategy, human resource management, etc.) as a way to enhance the creative potential of the skills and knowledge one already has. Each time an author works in a new field, that author has the potential to introduce new ideas, perspectives, theories, or constructs to that field. This is due to the probability that the unique stock of previous knowledge and experience held by the author introduces perspectives, theories, methods, or analytical techniques that are novel to that area. New domain-relevant knowledge, divergent ways of thinking about issues and problems, and the opportunity to see remote associations and form novel combinations among concepts should all contribute to the enhanced creativity of the researcher spanning fields (Amabile, 1983, 1988; Shalley & Gilson, 2004; Woodman, Sawyer, & Griffin, 1993). Although this strategy does not necessarily involve interpersonal interaction, it does represent the kind of structural openness and intersection of different knowledge domains or "thought worlds" referred to by creativity (Perry-Smith & Shalley, 2003) and social network researchers (Granovetter, 1985). In a sense, the researcher, who moves into a different field, creates structural openness by acting as the bridge between different social worlds.

Although specialization in one field might confer benefits of efficiency since the author will not need to spend time learning the literature in a new area (Leahey, 2007), working in multiple fields may offer its own type of efficiency. In particular, knowledge that is no longer novel in one field may have the potential to make important new contributions to a different field with only minimal adaptation. For example, Moody (2004) surmised that many sociologists publish in multiple fields within the discipline of sociology due to the applicability of shared theoretical frameworks and quantitative methods across fields. Nevertheless, because

there is some loss of efficiency in learning new literatures, researchers who work in multiple fields may find this to not always be an effective strategy to produce publications of the highest quality. Overall, we expect the benefits of increased creativity that result from working across multiple fields to result in more publications of every quality level.

*Hypothesis 2:* Controlling for the total number of coauthors, heterogeneity of research fields is positively related to the number of papers published in all three journal tiers by the focal author.

## *Publications and Citations*

Academic authors cite previous research for a number of reasons: to substantiate specific theoretical or empirical points, to enable readers to locate the original source information, and to give credit to previous authors. Professional recognition is the principle reward for scientists (Merton, 1973), and scientific journals (as opposed to books and monographs) arose in the 19th century primarily as a place for scholars to quickly establish priority claims regarding the discovery of new knowledge (Price, 1963/1986). Since that time, article citation rates have been regarded as a measure of the scientific impact of an article or, when aggregated across articles, of a researcher (Garfield, 1983; Judge et al., 2007).

Citations to a focal researcher's work play an important role in our paper because they represent the extent to which a scholar's creative output is used, or adopted, by other researchers in their scholarly work. Aguinis, Suarez-Gonzalez, Lannelongue, and Joo (2012) found a correlation of .50 between number of articles published by an individual and the number of citations. However, we distinguish among journal status tiers and expect publications in higher-tier journals to result in more citations than publications in lower-tiered journals because journal status is in large part a function of the average number of citations to articles in that journal (Aguinis et al., 2012; Garfield, 1983). Although this relationship is obvious, it allows us to examine separately two important aspects of creativity (Amabile, 1988; Fleming et al., 2007): the quality of creativity (journal tier) from subsequent use of the creative product (citations).

*Hypothesis 3:* Controlling for the total number of coauthors, number of publications is positively related to citations, with publications in higher-tier journals related to more citations than publications in lower-tier journals.

## *Professional Support Networks and Citations*

The social network theory of creativity focuses on "open" and heterogeneous communication networks as key drivers of creativity (Baer, 2010; Perry-Smith, 2006; Perry-Smith & Shalley, 2003). With the exception of Fleming and colleagues (2007), little attention has been paid within this theory to the role of "closed" networks in the use or adoption of the new idea once it has been created. However, within the larger social network literature related to knowledge creation, transfer, and adoption, the benefits that strong ties and dense network structures confer have been the subject of considerable theoretical and empirical attention. Some researchers have found that strong ties facilitate knowledge transfer, knowledge worker performance, or new product development project performance (Baer, 2012; Hansen, 1999; Reagans & McEvily, 2003; Uzzi, 1997). For example, Hansen (1999) found the number of

strong ties positively related to project team performance when knowledge complexity was moderate or higher. Other scholars have emphasized the value of network density for knowledge transfer and use (Fleming et al., 2007; Gargiulo et al., 2009; Obstfeld, 2005; Reagans & McEvily, 2003). For example, Reagans and McEvily (2003) found the density of ties around employees in a contract research firm positively related to the reported ease of knowledge transfer, even with tie strength controlled. However, none of this research attempted to reconcile the positive and negative effects of structural openness and closure within the same model as we do here. Above, we hypothesized heterogeneity as the optimal structure within networks dedicated to knowledge creation (i.e., producing publications). Here, we specify tie strength and network density among professional colleagues as aspects of structural closure beneficial for the transfer and adoption of the new knowledge created (i.e., citations to those publications). Testing both strong ties and network density as forms of network closure will allow us greater insight into the mechanism responsible for knowledge transfer.

Specifically, strong ties between actors should facilitate knowledge transfer because they enhance shared cognition and tacit understandings that increase the ability of actors to communicate complex information to each other (Uzzi, 1997). Strong ties also should increase the motivation of actors to help and support each other due to the high degree of mutual emotional investment of the actors (Burt, 2005; Granovetter, 1985). Price (1963/1986) first called attention to the important role of informal networks among researchers or "invisible colleges" in the conduct of science. Scholars turn to the invisible college to help them make judgments about what research topics, theories, methodological approaches, and data are promising and important (Crane, 1972). Thus, strong ties should enable others to better understand and value the work of the focal author. Further, because strong ties reflect greater emotional investment, colleagues should be motivated to read, build upon, and cite the research work produced by the focal author.

*Hypothesis 4a:* The number of strong ties with professional colleagues is positively related to the number of citations to a scholar's work, after accounting for the total number of coauthors and the number and quality of publications.

A dense network of contacts around the focal author should also facilitate citations to that author's work but for somewhat different reasons. In densely connected networks, colleagues who are connected to other colleagues who make up the focal author's network provide these others with indirect information about the focal author. This information should increase knowledge of and trust in the focal author. Norms for cooperation also are likely to emerge among a densely connected set of actors. Violation of these norms may hurt the reputation of an actor and limit the willingness of other actors in the network to cooperate with him or her in the future (Burt, 2005; Coleman, 1990; Granovetter, 1985). As such, dense network structures provide the opportunity for reputation to emerge, and knowledge of the focal author's work should spread more quickly through a densely connected network of colleagues. Thus, a dense network of relations around the focal author should encourage colleagues to be aware of the focal author's work and should increase the likelihood that others cite that work in their own papers.

*Hypothesis 4b:* The density of ties within the scholar's professional support network is positively related to citations to that scholar's work, after accounting for the total number of coauthors and the number and quality of publications.

## Method

### *Sample and Procedures*

Our study design included a mix of archival and field survey data collections. Individual professor was the level of analysis. We first surveyed professors at PhD-granting institutions in the United States in early 2009. The survey included questions to obtain the professional support network and various control variables. For all survey respondents, we then obtained their published articles from 1995 to 2002 from archival sources in order to measure total coauthors, coauthor heterogeneity, research field heterogeneity, and publications in each tier. Citations to the focal professors' publications from 1995 to 2002 were obtained from archival sources in early 2010. We chose a 7-year publication window to include any peaks that might be induced by the timing of normal tenure and promotion processes. We set the end of the publication window back 7 years prior to our survey so that article citations would have enough time to accumulate but authors who were active then would still be active at the time of the survey. We also did not want the publication window to be much earlier than 1997 because this was the first year impact factor scores to measure journal quality are available.

To generate our population, we began by creating a list of all universities that granted a PhD or DBA in management in the United States from Peterson's (2007) *Graduate Schools in the U.S*. One of the authors then visited the websites of the 120 institutions identified. From these websites, the list was reduced to 112 PhD-granting institutions in the United States that actually had a PhD program in management and had full-time faculty. From the university websites, we culled a list of the names and e-mails of 833 full professors in the field of management. Our exclusive focus on the field of management is consistent with previous research in this area (Cable & Murray, 1999; Judge et al., 2004; Williams & Cable, 2003) and helps to eliminate a number of confounding factors, such as vastly different publication rates across broad scientific fields (Stephan & Levin, 1991). Our exclusive focus on full professors was necessary to ensure that all participants were active in the occupation from 1995 to 2002, the time period from which we collected coauthoring and publication data on the participants (i.e., to minimize left-censored data). We chose to limit our sample to U.S. universities because some of our control variables were not available for international universities (i.e., reputation rank) and to minimize unwanted variance in our sample due to differing publication norms or expectations.

In early 2009, we sent all 833 professors an invitation to participate in a study and an attached "clickable" survey. They were asked to complete the survey, which included the professional support network questions, and to return it via e-mail to one of the authors. We also included a request for the respondent's vita if it was not available on the professor's webpage. Of the 833 professors who were invited to participate, 49 indicated that they were ineligible (e.g., no longer in academics or not in the management discipline) and 45 e-mails were returned as invalid. After sending two reminder e-mails, we received 119 completed surveys (16% response rate).

Of the 119 professors, 89 (75%) were male and 30 (25%) were female. The average age in 2009 was 56.6 years, and the majority (92%) was Caucasian. They had been working in the academic profession for an average of 25.8 years and had been at the rank of full professor for an average of 12.9 years: 27% had been a full professor for less than 7 years, meaning they were at the rank of assistant or associate during the 1995-to-2002 time period, our window of data collection.

We compared respondents to nonrespondents to assess potential response bias in terms of gender, race, number of publications, and total citations. Gender and race were collected from the 119 respondents on the survey. We were able to obtain the gender and race of most of the nonrespondents from university website pictures (683 and 666 for gender and race, respectively). Results revealed that respondents did not significantly differ from nonrespondents on either gender ($\chi^2 = 1.53$; $df = 804, 1$; $p = .22$) or race ($\chi^2 = 4.83$; $df = 786, 2$; $p = .09$). For number of publications and citation counts, we compared the respondents to a randomly selected set of 125 nonrespondents. We used Web of Science to obtain the number of journal publications from 1995 to 2002 (our study period) and total citations to those publications, as of 2009, for both respondents and nonrespondents. Results from *t* tests indicated that respondents did not significantly differ from nonrespondents in terms of number of publications ($M = 8.39$ versus 8.19, $t = –.21$, $df = 245$, $p = .84$) or citation counts (387.73 versus 346.46, $t = –.64$, $df = 245$, $p = .52$). These results suggest that the study respondents' gender, race, and research productivity was representative of all full professors in our sampling frame.

### *Measures*

For each of the 119 professors who completed our survey, we also recorded the necessary information to compute coauthoring heterogeneity, the number of publications in each journal, article title, and abstract (for research field coding) and the control variables. In particular, we coded details about each individual's refereed publications from 1995 to 2002. In total, we recorded coauthor (including international coauthors) and research field data for 1,098 published articles across the final sample of professors.

*Citation counts*. We used Thomson Reuter's Institute for Scientific Information (ISI) Web of Science to obtain citation counts for the focal professors' (our subjects) publications from 1995 to 2002. Other methods for accumulating citations (e.g., Google Scholar) were not used because of the high level of spurious matches (Thelwall & Sud, 2011) and the inclusion of nonacademic citations sources (Aguinis et al., 2012). Citation counts were obtained in January 2010 by searching the individuals' names. To ensure accuracy, we confirmed that the publication list generated in ISI contained all ISI-listed publications from each person's vita. When we found vita publications not included in the initial ISI search by the individual's name, we searched ISI by article and added those citations to the total for each individual. Because we would not be able to obtain reliable citation counts for publications in journals not listed in the ISI database, we did not include publications or citations from such journals.

*Number of publications by journal quality*. We obtained the subjects' journal publications from 1995 to 2002 primarily from our ISI search. We also confirmed and supplemented these data by a manual examination of subjects' vitas. In order to evaluate both quantitative and qualitative aspects of each focal researcher's productivity (Torrance, 1993), we first had to rate the quality of the journals in our sample at the time in which the articles were published and then assign journals to distinct quality tiers. Although the status of journals can be based on a number of criteria, such as reputation in the eyes of deans, journal rejection rates, or journal citation rates, considerable convergence among these different criteria has been demonstrated in the field of management scholarship (Extejt & Smith, 1990; Gomez-Mejia & Balkin, 1992; Johnson & Podsakoff, 1994; Podsakoff et al., 2008). Thus, perhaps for reasons

of relative objectivity and availability, scientists and policy makers have increasingly come to rely on journal citation rates as the primary index of journal status or quality (Aguinis et al., 2012; Garfield, 1983). Two-year impact factor scores are available in ISI's Journal Citation Report and represent the average number of times articles from that journal published in the past 2 years have been cited in any ISI journal in that year. For each journal included in our sample's published articles, we calculated the average impact factor (AIF) as the average of the 2-year impact factor scores from 1997 (the first year these figures were available) through 2002.

We assigned journals to three quality tiers based on the journal AIF scores. Such a classification is highly meaningful to academic practitioners since many universities classify journals into quality tiers based on their relative impact scores for purposes of evaluation and ranking (Aguinis et al., 2012; Blackburn & Mitchell, 1981; Van Fleet, McWilliams, & Siegel, 2000). Although scholars have highlighted a number of problems associated with the use of ranking systems to evaluate universities or individual scholars (Adler & Harzing, 2009; Singh, Haddad, & Chow, 2007; Starbuck, 2005), much of this critique focuses on aggregation issues and the use of a narrow set of journals, often only 3 to 5 "top" journals. We avoid many of these problems by focusing on the individual and not the institution, assessing individual productivity across the full range of management related journals (197 journals in all), using a few broad ranking tiers to increase reliability, and focusing on only U.S.-based academics to minimize inconsistent norms and data coverage issues. Although no ranking system will be without flaws, the rankings we use are meaningful to practitioners and reflect a considerable degree of consensus in the field (Podsakoff et al., 2008).

We divided journals into three tiers based on salient cut points in the average impact factor. *First-tier* journals were those with average scores at or above 1.0, s*econd-tier* journals scored between .50 and .99, and *third-tier* journals scored below .50 (see Appendix A for examples). These AIF scores may appear low by current standards but reflect the growth of the management field since 2002. For example, the 2-year impact factor for *Journal of Management* was 6.70 in 2012 but was 1.74 in 2002. We divided the 119 focal authors in our database among the authors of this paper. Each of us assigned the appropriate journal quality rating (first-tier, second-tier, or third-tier) to the articles generated by our assigned authors based on the cut points we had established for the AIF score. After coding journal quality for the articles, we each counted the number of publications in the respective journal tiers during the study period. Thus, each of the professors in our sample received a score reflecting the number of his or her publications in each of the journal quality categories (i.e., first-tier, second-tier, and third-tier journals). One of us then cross-checked the accuracy of the journal ratings and publication counts for a sampling of 10% of the subjects and found no misclassifications.

We chose a small number of tiers to minimize the number of arbitrary cut points between tiers. Because any chosen cut points will be arbitrary to some extent, it is important to establish that results are not an artifact of arbitrary decisions but are robust across different possible alternative choices. We therefore examined our results using several different journal tier categorization schemes and found that our results are robust across schemes, providing strong evidence that they are not an artifact of any single arbitrary scheme (see Appendix B).

*Coauthoring*. *Total number of coauthors* was calculated by counting the total number of coauthors on all of the papers the focal subject had published during the 1995-to-2002

time period. Thus, coauthoring with the same person three times would be counted as three incidents of coauthoring. *Coauthoring heterogeneity* reflects both the number of different coauthors with whom the focal author had published during the 1995-to-2002 time period as well as the extent to which this coauthoring was spread evenly across the different coauthors. Consistent with other social network researchers (e.g., Baer, 2010; Perry-Smith, 2006), we calculated Blau's (1977) index of heterogeneity, which is defined as follows:

$$\text{Heterogeneity} = 1 - \Sigma p_i^2,$$

where $p$ is the proportion of authoring with a particular coauthor and $i$ represents each unique coauthor. Coauthor data were obtained from the published articles listed in ISI and verified on subjects' vitas.

*Research field heterogeneity*. Based on the title and abstract for each focal author's refereed journal articles from 1995 to 2002, we coded the number of fields in which each respondent had published. We developed the coding scheme by starting with the reviewers' area-of-expertise checklist used by *Academy of Management Journal*. We modified this checklist by dividing it into the division and interest groups associated with the Academy of Management and then adding or clarifying the fields listed to create 15 broad yet mutually exclusive categories. We sent our list to nine subject matter experts for their input and modified category names accordingly (see Appendix C in the online supplemental materials). We then pilot-tested the process by coding articles based on the titles and abstracts for five focal professors, a total of 49 articles. We each independently coded each article on up to two fields listed on the coding sheet. For example, an article on CEO compensation was coded as "strategy" and "human resources" (HR). In this pilot test, we achieved 78.6% agreement on the field codes. The disagreements were then discussed to reach consensus and to identify ways to improve our consistency (for example, coding on both the independent and dependent variables). The remaining 1,049 publications were divided so that each article was coded independently by at least two authors. Discrepancies were resolved by discussion among the assigned coders until consensus was achieved. Each focal professor was then assigned a count in each of the number of different fields in which he or she had published. We then calculated Blau's (1977) heterogeneity index as above. Given the relatively small average number of fields in which subjects had published ($M = 3.4$), the number of fields and the heterogeneity index were highly correlated ($r = .72$). We therefore chose to focus on heterogeneity as a single index of the extent to which the focal authors work was evenly distributed over a number of different research fields.

Based on the suggestion of a reviewer, we also developed a more fine-grained coding scheme using 111 article topic areas nested within the 15 research fields of management. Article topic area heterogeneity was unrelated to publishing in any journal tier and did not alter any of our substantive results, including those for research field heterogeneity. We therefore chose not to include this variable in our analyses.

*Professional support network*. On the survey, focal authors (referred to as "ego" in network analysis) were asked to list the initials of up to 12

> colleagues you trust to speak to about your own professional issues or career concerns. For example, you might seek them out at professional meetings or you might get in contact with them if you or one of your students were seeking an academic position.

Twelve contacts were allowed based on data regarding the size of core support networks (Marsden, 1990). Note that alters are not necessarily coauthors (although they could be), and these data were collected in 2009, well *after* the 1995-to-2002 publication window. This helps mitigate concerns with the direction of causation between structural properties of the coauthoring network and professional ties. Respondents were then asked to describe the strength of their relationship with each colleague (i.e., alter) on a 3-point scale (2 = *close*, 1 = *less close*, 0 = *distant*) and to indicate the strength of the relationships among their alters using the same 3-point scale. This ego-network approach to measuring social structure around an individual is common in social network analysis (e.g., Burt, 1992; Kilduff & Krackhardt, 2008; Seibert, Kraimer, & Liden, 2001). Number of strong ties represents the number of relationships the respondent described as close (score of 2). In our sample, the number of strong ties ranged from 0 to 12, with an average of 5.8. Network density indicates the extent to which colleagues in the focal respondent's ego network had relationships with each other and reflects the degree of closure around ego. Density is calculated as the number of ties among alters divided by the potential number of ties among alters. In our sample, professional support network density ranged from 0 to 1, with an average of 0.42.

Because the collection of network data is time intensive for respondents, one-item scales are typical in sociometric questionnaires (Marsden, 1990). However, previous research shows that recall of typical interaction patterns with psychologically important alters can be remarkably accurate (Freeman, Romney, & Freeman, 1987). The fact that we sampled network data from established full professors, who were on average 56 years old, also suggests that the network ties will be long-standing rather than transitory. Burt (2000) showed that the social networks of older people are likely to reflect long-term relationships (a) because of the diminishing rate at which ties end for relationships that have been long established and (b) because relationships formed by older people tend to last longer.

*Control variables*. A number of control variables were included in our models based on our review of the management publishing and career success literature. Gender (coded 1 for male and 0 for female) was included because some studies have shown gender to be related to the number of publications (Judge et al., 2004; Miller et al., 2005). Likewise, the reputation of the PhD-granting department (PhD university reputation) and the reputation of the department in which the author currently works (current university reputation) were included as controls because previous research has shown these variables to be related to publications (Judge et al., 2004; Miller et al., 2005; Podsakoff et al., 2008). Universities with stronger reputations may have more resources to support research and therefore expect high research productivity. PhD university reputation and current university reputation were gathered from Podsakoff et al.'s (2008) Table 4, which ranks 100 universities by the number of total citations to authors affiliated with that university from 1981 to 2004. We reverse-scored the rankings so that a high score represents a stronger reputation (i.e., more cited authors at the university); universities not included in the Top 100 were scored as zero (lowest score). Authors with more experience in the field have been shown to receive more citations

(Podsakoff et al., 2008). Therefore, years since PhD was calculated as the number of years since the individuals had completed their PhD, which was collected on the survey. In order to control for stable but unspecified individual differences in author ability and motivation, we controlled for the total number of publications prior to the 1995-to-2002 time frame. Number of publications prior to 1995 was collected from ISI Web of Science for each focal author. We also controlled for the number of editorial boards that the focal researcher served on since 2003 since this was a form of status that might influence publishing success or citation rates; this variable was self-reported on the survey. Different research areas may have different research productivity rates for a number of reasons (Certo, Sirmon, & Brymer, 2010; Podsakoff et al., 2008). We therefore developed dummy control variables to capture the primary area of research in which the focal subject published. Each subject was assigned a primary research domain category based on the modal content code from the number-of-fields variable described above. This was a categorical variable consisting of three categories: strategy/entrepreneurship area ($n = 29$), organizational behavior [OB]/HR area ($n = 66$), and all other fields (e.g., innovation, international business, organizational theory; $n = 24$). An ANOVA indicated that those publishing primarily in the *other* domains had lower citation counts than those publishing in OB/HR or strategy/entrepreneurship ($F = 4.79$, $p < .05$). We therefore include these dummy variables (using OB/HR as the excluded category) when testing our hypotheses. We included total number of coauthors as a control variable to account for the total number of coauthoring incidents distinct from the number of unique new coauthors. Finally, we included all of the control variables plus our main variables of interest, coauthoring heterogeneity and article field heterogeneity, when examining the relationship between professional network characteristics and citations. Total number of coauthors in particular controls for the possibility that citation rates will be higher because there are a greater number of coauthors who can cite their own work.

### *Analyses*

We used Poisson log-linear regression to test our hypotheses because the dependent variables, the number of articles published in each tier and the number of citations to those articles, are nonnegative counts. The Poisson distribution is appropriate for modeling count data (Gill, 2001). Because preliminary examination of our dependent variables showed evidence of overdispersion (variance greater than the mean), we used a semiparametric estimation procedure that provides corrected standard error estimates and robust estimates of statistical significance, as recommended by Dunteman and Ho (2006). All analyses were conducted using the generalized linear model module of SPSS.

Interpretation of a Poisson regression coefficient is difficult because the parameter is scaled in terms of the log of the dependent variable. However, the exponent of the regression coefficient, $e^{(\beta)}$, provides the expected multiplicative effect for a one-unit change in the independent variable scaled in terms of the original dependent variable, conditional on all independent variables being at their mean (J. Long, 1997). This interpretation parallels the unstandardized effect in ordinary least squares regression and is preferable when units of the independent variable are meaningful. Exponentiating the product of the coefficient and the standard deviation, $e^{(\beta * SD)}$, gives the conditional expected multiplicative change in the dependent variable associated with a one–standard deviation change in the independent variable

(Long, 1997). This calculation allows standardized comparisons across independent variables measured on different scales.

## Results

Table 1 provides the means, standard deviations, and correlations for the study variables, including all control variables. Table 2 reports the results for Hypotheses 1 and 2, and the results for Hypotheses 3 and 4 are shown in Table 3.

Hypothesis 1 predicts a positive association between the heterogeneity of coauthoring and first-tier publications, controlling for the total amount of coauthoring and the other control variables. In support of this hypothesis, coauthoring heterogeneity is positively and significantly related to the number of first-tier publications ($\beta = 2.74$, $p < .001$) and is not significantly related to second-tier or third-tier publications (see Table 2). Transformation of the regression parameter shows that a one–standard deviation increase in coauthoring heterogeneity is associated with a 73% increase in the number of first-tier publications.

Hypothesis 2 predicts that the diversity of research fields in which a focal researcher publishes will be associated with more publications of every publication tier for the focal author. Providing partial support for this hypothesis, field heterogeneity is positively and significantly related to the number of second-tier publications ($\beta = 1.12$, $p < .05$) and third-tier publications ($\beta = 2.06$, $p < .05$) but is not related to the number of first-tier publications ($\beta = –.25$, *ns*) (see Table 2). A one–standard deviation increase in field heterogeneity is associated with a 27% increase in second-tier and a 54% increase in third-tier publications.

Hypothesis 3 predicts that number of publications will be positively associated with citation counts in order of journal tier. As Model 2 in Table 3 shows, the number of first-tier publications ($\beta = .17$, $p < .001$) and second-tier publications ($\beta = .06$, $p < .05$) in the 1995-to-2002 publication window are each positively and significantly related to the total number of citations to a researcher's work accumulated by the end of 2009. A one–standard deviation increase in the number of first-tier publications is associated with a 24.6% increase in total citations, while a one–standard deviation increase in the number of second-tier publications is associated with an 18.9% increase in total citations. However, the number of third-tier publications is *negatively* associated with citations ($\beta = –.09$, $p < .05$). A one–standard deviation increase in third-tier publications is associated with an 11.8% *decrease* in the total number of citations. These results change only slightly in Step 3 of the hierarchical regression (see Table 3, Model 3).

Hypothesis 4a, which predicts a positive relationship between the number of strong or close professional support relationships and citations, is supported. As Model 3 in Table 3 shows, the number of strong ties is positively and significantly related to citations ($\beta = .06$, $p < .001$). A one–standard deviation increase in the number of strong ties is associated with a 19% increase in total citations. Hypothesis 4b, however, which predicts a positive relationship between the density of relationships among alters in a researchers' professional support network and the total number of citations, is not supported ($\beta = .24$, *ns*).

Examination of the control variables reveals a number of additional results of interest. The total number of coauthors on the focal author's papers is positively related to the number of first-tier ($\beta = .01$, $p < .01$), second-tier ($\beta = .02$, $p < .001$), and third-tier ($\beta = .02$, $p < .001$) publications for the focal author, reflecting a 25% increase in first-tier publications, a 44%

**Table 1**
**Descriptive Statistics and Correlations**

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Total citations | 365.70 | 401.78 | | | | | | | | | | | | | | | | |
| 2. Number of first-tier publications | 5.38 | 4.79 | .83 | | | | | | | | | | | | | | | |
| 3. Number of second-tier publications | 2.40 | 2.84 | .28 | .28 | | | | | | | | | | | | | | |
| 4. Number of third-tier publications | 1.01 | 1.48 | .08 | .18 | .25 | | | | | | | | | | | | | |
| 5. Coauthoring hetereogeneity | 0.79 | 0.20 | .32 | .42 | .27 | .19 | | | | | | | | | | | | |
| 6. Article field hetereogeneity | 0.47 | 0.21 | .01 | .07 | .28 | .24 | .39 | | | | | | | | | | | |
| 7. Professional support strong ties | 5.75 | 2.95 | .16 | .01 | −.19 | −.10 | −.02 | .03 | | | | | | | | | | |
| 8. Professional support network density | 0.42 | 0.22 | .13 | .07 | −.03 | −.03 | .21 | .02 | .14 | | | | | | | | | |
| 9. Gender (1 = male; 0 = female) | 0.75 | 0.44 | .12 | .13 | .09 | .21 | .12 | .03 | −.09 | −.04 | | | | | | | | |
| 10. PhD university reputation | 64.68 | 31.82 | −.06 | −.04 | −.26 | −.27 | −.14 | −.14 | .08 | −.11 | .09 | | | | | | | |
| 11. Current university reputation | 46.03 | 34.88 | .23 | .23 | .05 | −.06 | −.03 | −.04 | .04 | −.01 | −.01 | .14 | | | | | | |
| 12. Years since PhD | 25.83 | 8.02 | −.10 | −.13 | .01 | −.02 | −.11 | .04 | −.01 | −.03 | .14 | .28 | .14 | | | | | |
| 13. Number of publications prior to 1995 | 14.50 | 16.36 | .25 | .34 | .33 | .16 | .15 | .13 | −.06 | −.01 | .14 | .01 | .15 | .52 | | | | |
| 14. Number of editorial boards | 3.65 | 2.29 | .34 | .28 | .33 | .10 | .28 | .06 | .17 | .17 | .00 | −.03 | .01 | −.19 | .11 | | | |
| 15. Strategy/entrepreneurship area | 0.24 | 0.43 | .12 | .03 | −.01 | −.12 | .04 | .09 | −.07 | .02 | .06 | .01 | .06 | −.15 | −.18 | .05 | | |
| 16. Other areas | 0.20 | 0.40 | −.30 | −.34 | −.06 | −.09 | −.32 | .10 | .00 | −.01 | −.09 | .08 | −.15 | −.02 | −.15 | −.07 | −.29 | |
| 17. Total number of coauthors | 19.14 | 17.22 | .59 | .74 | .62 | .44 | .47 | .26 | −.16 | .10 | .15 | −.15 | .07 | −.09 | .37 | .24 | −.04 | −.19 |

*Note:* $N = 119$. Correlations equal to or greater than .24 are significant at $p < .01$; correlations greater than .18 are significant at $p < .05$.

**Table 2**
**Poisson Log-Linear Regression Predicting Number of First-Tier, Second-Tier, and Third-Tier Publications, 1995 to 2002**

| | Number of First-Tier Publications | | Number of Second-Tier Publications | | Number of Third-Tier Publications | |
|---|---|---|---|---|---|---|
| Variable | β (*SE*) | Exp(β) | β (*SE*) | Exp(β) | β (*SE*) | Exp(β) |
| Intercept | −0.53 (0.62) | 0.59 | −0.53 (0.84) | 0.59 | −0.88 (0.77) | 0.42 |
| Gender (0 = female, 1 = male) | 0.05 (0.11) | 1.06 | 0.03 (0.22) | 1.03 | 0.88* (0.36) | 2.40 |
| PhD university reputation | 0.00 (0.00) | 1.00 | −0.01** (0.00) | 0.99 | −0.01** (0.00) | 0.99 |
| Current university reputation | 0.00* (0.00) | 1.00 | 0.00 (0.00) | 1.00 | −0.00 (0.00) | 1.00 |
| Years since PhD | −0.03** (0.00) | 0.98 | 0.01 (0.01) | 1.01 | 0.01 (0.02) | 1.01 |
| Number of publications prior to 1995 | 0.01 (0.00) | 1.01 | 0.00 (0.01) | 1.00 | −0.01 (0.01) | 0.99 |
| Strategy/entrepreneurship area | −0.01 (0.13) | 0.99 | 0.04 (0.18) | 1.04 | −0.65* (0.30) | 0.52 |
| Other research areas | −0.57** (0.20) | 0.57 | 0.18 (0.28) | 1.14 | −0.47 (0.39) | 0.62 |
| Total number of coauthors | 0.01** (0.00) | 1.01 | 0.02*** (0.01) | 1.02 | 0.02*** (0.00) | 1.02 |
| Coauthoring heterogeneity | 2.74*** (0.72) | 15.42 | 0.54 (1.02) | 1.72 | −0.77 (0.86) | 0.46 |
| Article field heterogeneity | −0.25 (0.28) | 0.78 | 1.12* (0.49) | 3.06 | 2.06* (0.85) | 7.85 |
| Deviance | 203.41 | | 200.07 | | 156.23 | |
| *df* | 108 | | 108 | | 108 | |

*Note:* $N = 119$. Significance tests are two-tailed.
*$p < .05$.
**$p < .01$.
***$p < .001$.

increase in second-tier publications, and a 46% increase in third-tier publications for a one–standard deviation change in total coauthors. Our results also show that males produced 2.4 times more third-tier publications than females (β = .88, $p < .05$). The reputation of the researcher's current university is positively associated with slightly more first-tier publications (β = .004, $p < .05$), while the reputation of the PhD-granting institution is negatively associated with the number of second-tier (β = .008, $p < .01$) and third-tier (β = .010, $p < .01$) publications. The number of editorial boards upon which a focal researcher served after the publishing window is also positively related to citations (β = .06, $p < .05$). A one–standard deviation increase in editorial board memberships is associated with a 14% increase in citations.

## Discussion

Understanding the factors that influence research productivity and quality within the field of management is an important theoretical pursuit because high-quality research has the potential to benefit organizations, employees, and society. Based upon the social network theory of creativity (Perry-Smith & Shalley, 2003) and theories of organizational knowledge (Phelps et al., 2012), we developed a set of hypotheses that describe several strategies academic researchers might use to facilitate the production of high-quality publications with

**Table 3**
**Poisson Log-Linear Regression Results Predicting Number of Citations Accumulated by 2009 to Publications, 1995 to 2002**

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| Variable | β (*SE*) | Exp(β) | β (*SE*) | Exp(β) | β (*SE*) | Exp(β) |
| Intercept | 3.84*** (0.71) | 46.55 | 3.39*** (0.54) | 29.80 | 2.74*** (0.64) | 15.54 |
| Gender | 0.16 (0.18) | 1.18 | 0.08 (0.15) | 1.08 | 0.14 (0.13) | 1.15 |
| PhD university reputation | 0.00 (0.00) | 1.00 | −0.00 (0.00) | 1.00 | −0.00 (0.00) | 1.00 |
| Current university reputation | 0.01* (0.00) | 1.01 | 0.00 (0.00) | 1.00 | 0.00 (0.00) | 1.00 |
| Years since PhD | –0.01 (0.01) | 0.99 | 0.01 (0.01) | 1.01 | 0.01 (0.01) | 1.01 |
| Number publications prior to 1995 | 0.00 (0.00) | 1.00 | −0.01 (0.00) | 1.01 | −0.01* (0.00) | 0.99 |
| Number editorial boards | 0.09* (0.03) | 1.09 | 0.09** (0.03) | 1.09 | 0.06* (0.03) | 1.06 |
| Strategy/entrepreneurship area | 0.17 (0.19) | 1.19 | 0.20 (0.13) | 1.10 | 0.17 (0.11) | 1.18 |
| Other areas | –0.59* (0.26) | 0.55 | −0.20 (0.21) | 0.82 | −0.16 (0.20) | 0.85 |
| Total number of coauthors | 0.01** (0.00) | 1.02 | −0.01* (0.01) | 0.99 | −0.01* (0.01) | 0.99 |
| Coauthoring heterogeneity | 1.92* (0.82) | 6.84 | 1.46* (0.60) | 4.31 | 1.67* (0.67) | 5.33 |
| Article field area heterogeneity | –0.65 (0.41) | 0.53 | −0.46 (0.34) | 0.63 | −0.42 (0.32) | .66 |
| Number of first-tier publications | | | 0.17*** (0.02) | 1.18 | 0.17*** (0.02) | 1.18 |
| Number of second-tier publications | | | 0.06* (0.03) | 1.06 | 0.08* (0.03) | 1.09 |
| Number of third-tier publications | | | −0.09* (0.04) | 0.92 | −0.08* (0.04) | 0.93 |
| Professional support strong ties | | | | | 0.06*** (0.01) | 1.06 |
| Professional support network density | | | | | 0.24 (0.25) | 1.27 |
| Deviance | 24108.9 | | 12773.7 | | 11342.2 | |
| *df* | 107 | | 104 | | 102 | |
| $\Delta\chi^2$ | | | 11335.2*** | | 1431.5*** | |
| *df* | | | 3 | | 2 | |

*Note:* $N = 119$. Significance tests are two-tailed.
*$p < .05$.
**$p < .01$.
***$p < .001$.

high scientific impact. Controlling for an extensive set of factors identified in previous models of management scholar productivity (e.g., Judge et al., 2004; Podsakoff et al., 2008), we found that coauthoring heterogeneity was associated with more publications of the highest-quality tier, whereas article field heterogeneity was positively related to publications in second- and third-tier journals. The number of first- and second-tier publications between 1995 and 2002 is positively related to the total citations to the focal author's articles accumulated by 2009, but the number of third-tier publications was not related to citations as expected. The number of strong professional support ties held by a focal author, but not the density of ties within the author's network, also positively related to total citations. Our findings contribute to theory and research on organizational knowledge, creativity, and models of scholarly productivity.

With regard to organizational knowledge, our results have theoretical implications for theory and research on the way social network structures influence the process of knowledge creation and knowledge transfer within organizations (e.g., Baer, 2010, 2012; Hansen, 1999; Obstfeld, 2005; Reagans & McEvily, 2003). Currently, there exists an unresolved dilemma regarding the value of open versus closed structures for knowledge creation and transfer rooted in the observation that open networks facilitate the production of creative ideas because they provide access to novel information but impair use of those ideas because they fail to engender trust and understanding among potential end users necessary to promote their use (Fleming et al., 2007; Janssen, van de Vliert, & West, 2004). For example, Hansen (1999) found weak ties beneficial for projects because they facilitate information acquisition but at the same time detrimental for project performance because they impair knowledge transfer. Likewise, Fleming et al. (2007) found that an open network structure among patent coauthors facilitates novel idea generation but at the same time impedes the adoption of those ideas by other patent authors. They found that the negative effects of dense ties among collaborators were offset somewhat by characteristics of the collaborators related to their own creativity but did not examine the moderated effects of density on idea use. Although Fleming et al. distinguished two distinct phases of the creative process, generation and use, they focused only on the properties of the idea generation network and its members. Our theoretical approach in this paper is to focus on two different networks composed for different purposes, suggesting that network purpose be aligned with network structure to achieve optimal outcomes. Our results suggest the structure and creativity paradox can be resolved through the use of open structures in knowledge acquisition networks (in our case, coauthoring networks) and closed structures in knowledge transfer and adoption networks (in our case, professional support networks). We suggest organizational knowledge theorists carefully specify the network structures—openness and closure—appropriate to different network content types—information acquisition or idea implementation—to optimize overall knowledge creation and adoption.

Our results also extend the research on social networks and creativity (Perry-Smith & Shalley, 2003) in two important ways. First, the fact that coauthoring heterogeneity was associated with more first-tier publications whereas field heterogeneity was associated with more publications in second- and third-tier journals suggests that these research strategies have different effects on the quality and quantity of one's creative contributions. That is, not all forms of structural openness have the same effects. Coauthoring with a variety of others appears to be a more effective strategy for producing creative contributions of the highest quality for the reasons specified by the social network theory of creativity, such as access to a greater range and variety of information. The unexpected finding that coauthoring heterogeneity is related to the number of citations even after accounting for publication tier suggests heterogeneity produces publications that are even more valued than the average publication in a given tier. On the other hand, working in multiple fields can increase the sheer number of one's creative contributions, although they may not be of the highest quality. The lower quality associated with this strategy may be due to the fact that the value one's new ideas and perspectives bring to a field is somewhat offset by the difficulties and inefficiencies associated with working in a new field. Still, these findings extend the key proposition that open networks in the knowledge creation process improves creative contribution (Fleming et al., 2007; Perry-Smith & Shalley, 2003) to the academic context and shows that different operationalizaions of structural openness have different effects.

Our second contribution to the social network theory of creativity (Perry-Smith & Shalley, 2003) is related to our examination of two forms of structural closure. We found the number of strong ties in the focal author's professional support network positively related to citations to that focal author's work, after controlling for the number of publications and other contextual and behavioral variables, but the density of ties among professional colleagues was not related to use, as it was in the Fleming et al. (2007) study. Our results, while not definitive, suggest that shared tacit understandings among colleagues and emotional investment with each other, associated as they are with strong ties, will facilitate knowledge adoption. However, it appears that dense ties that may provide information regarding reputation and norms promoting mutual cooperation are not as important in our context. This finding does not preclude the possibility that network density is important in other contexts for the spread of new ideas or practices as evidenced by Fleming et al. Academic colleagues, the subjects of our study, are likely to be working in different universities, while other types of knowledge workers may be working within a single organization with shared goals and incentives for information sharing. Thus, propositions regarding network closure as well as additional propositions regarding moderation by contextual factors could be added to the social network theory of creativity.

Finally, our finding regarding research strategies and the influence of strong ties on citation rates also adds a strategic behavioral element currently lacking in models of management research productivity and impact (e.g., Judge et al., 2004; Podsakoff et al., 2008). Current models of research productivity focus on contextual constructs, such as institutional affiliation, and early research success. Our work suggests that interpersonal behaviors, such as collaborations with a variety of different coauthors, seeking to publish in multiple fields, and forming strong relationships with colleagues, can also influence the quantity and quality of a scholar's research output. At the same time, our results provide evidence suggesting particularistic attributes (Merton, 1973) do play a role in determining scientific impact. In addition to the hypothesized effect of strong ties, our results showed that membership on editorial boards (after the publishing window of the study) had a positive effect on citation rates, even after controlling for publication number and quality. Our decision to regard publication quality, quantity, and impact as distinct constructs also moves theory in this area forward in terms of subtlety and insight. Overall, our study offers several new theoretical constructs representing behavioral strategies and interpersonal relationships that should be incorporated into models of scholarly research and suggests more refined ways to examine research productivity.

### *Practical Implications*

The results of this study have practical implications for academic researchers and knowledge workers in other institutional settings. For academic researchers, our results suggest that conducting research in multiple fields should be a way to increase one's research productivity because it allows leveraging one's existing knowledge to solve problems in new areas. However, working with a greater number of different coauthors is associated with the production of higher-quality research due to creativity advantages above and beyond the sheer efficiency of the division of labor associated with coauthoring. The 73% increase in first-tier publications associated with a one–standard deviation increase in coauthoring heterogeneity

found in this study is likely to be of considerable practical importance to practicing researchers in terms of reputation and ultimately salary. In addition, a one–standard deviation increase in coauthoring heterogeneity was associated with a 40% increase in citations even after accounting for the increased number of publications at the highest publishing tier. This suggests that researchers who are engaged in more heterogeneous coauthoring are producing papers that have more scientific impact than the average paper accepted by first-tier publications. This research strategy appears to be beneficial not only to the individual researcher but to progress in the scientific field because it is associated with more high-quality publications with higher scientific impact.

Our findings regarding strong ties suggest that researchers hoping to increase the scientific impact of their work should expend time and effort building more strong ties with other academic colleagues, perhaps through attending conferences, organizing conference activities, or taking advantage of other opportunities to engage with their fellow scholars. Membership on editorial boards also was associated with increased scientific impact in the form of citations. However, whether use of these particularistic strategies by the individual researcher is beneficial to the scientific field is debatable (Merton, 1973). Heavy reliance on particularistic criteria to evaluate research can undermine stakeholders' belief in the objectivity of the field. On the other hand, professional networks can have functional implications for a scientific field that might otherwise lack coherence or the ability to reach consensus on important questions, methods, or conclusions (Crane, 1972; Price, 1963/1986). Future research might examine the extent to which these professional networks are useful for more purely beneficial activities, such as identifying new coauthors and generating higher-quality research.

Although we found the expected positive influence of first- and second-tier publications on citation counts, third-tier publications were negatively related to total citations. Since citation counts are non-negative, it is not possible for third-tier publications to directly reduce citations. However, it may be the case that working on third-tier publications detracts from time spent on first- and second-tier publications, resulting in fewer citations overall. Given time constraints to work on research activities, academic scholars may find these results informative for making decisions on how to allocate their time across multiple research projects and papers.

Although this study was conducted using academic researchers, the theoretical model should generalize to other types of knowledge workers, who make up an increasingly large and important segment of the world economy (Phelps et al., 2012; Powell & Snellman, 2004). For example, our results can be directly translated into recommendations for corporate research scientists (e.g., Perry-Smith, 2006) and design engineers (Obstfeld, 2005; Reagans & Zuckerman, 2001), who also produce new knowledge in formal, written form and often document the use of their ideas with patents and patent citations. Like academic researchers, these knowledge workers should seek to distribute their collaboration activity over a larger number of fellow scientists and engineers rather than concentrating their collaboration with only a few if they wish to produce highly creative contributions. Applying their knowledge and skills in a greater number of fields is also likely to improve their productivity but is not likely to produce ideas of the highest creative quality. Maintaining strong ties with the "end users" of their ideas, whether they be within their organization or in the broader professional community, is likely to facilitate the smooth transfer and adoption of the new processes, products, or procedures they produce.

### *Strengths and Limitations*

There are a number of strengths of our study. First, the focus of the sample on professors at PhD-granting institutions across the United States eliminates numerous confounding effects, for example, eliminating individuals who chose to pursue a nonacademic career track. In addition, because our sample was working in the United States, major differences in publishing norms and expectations that might be found within an internationally diverse sample was restricted. Second, use of both survey and archival data minimizes common-method, common-source, and self-reporting biases. The time lag in the data collection also helps to strengthen confidence in the study's conclusions because the authoring and publication data are taken from an earlier time period than the professional support network and citation count data. Finally, we incorporated a range of control variables, including the number of previous publications and university reputation, to account for the effects of individual and institutional differences.

Our study is not without limitations. First, we have a relatively small sample size. However, we hasten to note that it is similar to other research conducted in this area (Cable & Murray, 1999; Judge et al., 2004; Williamson & Cable, 2003) and that there was no evidence of response bias in our sample in terms of gender, race, number of publications, or number of citations. A second limitation is that the narrow sampling frame of our study raises questions regarding generalizability in terms of rank and academic discipline. We note that many of the respondents in our sample were associate and sometimes even assistant professors during the publication window of our study, suggesting the effects should generalize across rank. The fact that the theoretical logic has been applied to both academic and nonacademic contexts implies that our results will generalize to other academic areas, but future research is needed with more varied samples to further test these ideas. Third, our time-lagged design does not completely eliminate concerns with direction of causality. For example, although data regarding strong ties were gathered 7 years after the publication window of this study and the zero-order correlation between coauthoring heterogeneity and the number of strong ties was nearly zero, it is possible that some coauthors were also members of the professional support network.

We did not code for coauthoring ties among the focal author's coauthors. Although these secondary ties might provide additional information regarding the creative potential of a given collaboration, we did not expect them to be a major factor because the knowledge, skills, and resources necessary to conduct research are likely to be "sticky" (e.g., Argote & Ingram, 2000; von Hippel, 1994) and therefore not easily transferred between coauthors. Thus, each new coauthor–focal author collaboration represents a unique combination of knowledge, skills, and resources not previously exploited, even if the coauthor had previously worked with others in the focal author's set of coauthors. Future research might test this assumption directly. Structural equivalence (Burt, 1987) in the pattern of collaborating between a new coauthor and previous coauthors may be an even better representation of the extent to which a new coauthor brings redundant knowledge, skills, and resources to collaboration with the focal author.

In this study, we viewed each new coauthor as unique and thus as contributing to coauthoring heterogeneity. Future research could instead, or in addition, examine characteristics of the coauthors to form a measure of coauthor diversity. Diversity could be examined in terms of demographic variables, such as gender or race, as well as

background training, career stage, or country of training. Diversity among coauthors along each of these dimensions also might contribute to the level of creative contribution of the focal author.

### *Conclusion*

How management research knowledge is generated has been and will continue to be of interest to management scholars. The results from the current study suggest ways for researchers to generate more and higher-quality publications as well as ways to use their professional network to enhance their scientific impact and, hopefully by extension, their impact on the practice of management.

## Appendix A

**Representative List of Journals by Tier**

| First Tier ($n$ = 45) | Second Tier ($n$ = 79) | Third Tier ($n$ = 73) |
|---|---|---|
| AIF > 1.0 | .50 < AIF < .99 | AIF < .50 |
| *Academy of Management Journal* | *Academy of Management Executive* | *Advanced Strategic Management* |
| *Academy of Management Review* | *Applied Psychology International Review* | *European Journal of Psychological Assessment* |
| *Administrative Science Quarterly* | *Basic and Applied Social Psychology* | *Group Decision and Negotiations* |
| *Harvard Business Review* | *Decision Sciences* | *International Journal of Manpower* |
| *Industrial and Labor Relations Review* | *Entrepreneurship Theory and Practice* | *International Journal of Selection and Assessment* |
| *Journal of Applied Psychology* | *Group and Organization Management* | *International Labour Review* |
| *Journal of International Business Studies* | *Human Relations* | *Journal of Business Ethics* |
| *Journal of Management* | *Human Resource Management* | *Journal of Business and Psychology* |
| *Journal of Organizational Behavior* | *Human Resource Management Review* | *Journal of Business Research* |
| *Journal of Personality and Social Psychology* | *International Journal of Human Resource Management* | *Journal of Labor Research* |
| *Journal of Vocational Behavior* | *Journal of Applied Social Psychology* | *Journal of Organizational Change Management* |
| *Leadership Quarterly* | *Journal of Business Venturing* | *Journal of Small Business Management* |
| *Management Science* | *Journal of Management Inquiry* | *Journal of Social Psychology* |
| *MIS Quarterly* | *Journal of Management Studies* | *Long Range Planning* |
| *Organizational Behavior and Human Decision Processes* | *J of Occupational & Organizational Psychology* | *Negotiations Journal* |
| *Organization Science* | *Journal of World Business* | *Public Personnel Management* |
| *Organizational Studies* | *Organizational Dynamics* | *Public Relations Review* |
| *Personnel Psychology* | *Organizational Research Methods* | *Sex Roles* |
| *Strategic Management Journal* | *Work & Stress* | *Total Quality Management* |

*Note*: This list provides only a sample of included journals to illustrate our coding scheme. AIF = average impact factor score based on the 2-year impact factor scores from 1997 to 2002.

# Appendix B

## *Analyses Using Alternative Journal Tier Cut Points*

To ensure robustness of our results, we tested our hypotheses based on the use of several different journal tier categorization schemes. One alternative is to divide journals into equal groups across three tiers based on the average impact factor (AIF) scores. In this case, the proportion of journals in each tier provides the salient cut point (i.e., 1/3), but specific AIF cut point scores are arbitrary. The results showed that coauthoring heterogeneity is again significantly and positively related to the number of first-tier publications but not publications in the other tiers. Article field heterogeneity is again related to the number of publications in lower-tier journals, but the effect is statistically significant for the bottom tier of journals only. A second alternative scheme is to divide journals in a skewed fashion, such that the first tier is made up of the top 10% of journals by AIF, the second tier is made up of the next 30% of journals, and the bottom tier is composed of the remaining 60% of journals. This scheme suggests that the highest levels of creative contribution are found primarily in a small group of only the highest AIF journals. Again, the results are consistent with our hypotheses, but in this analysis, coauthoring heterogeneity is positively and significantly associated with the number of publications in both the first and second tier of journals. This result is understandable because many of the journals that were previously categorized as first tier in the previous two analyses were recategorized into the second tier of journals for this analysis. In either case, again, coauthor heterogeneity is associated with the number of publications in higher-quality journals, and article field heterogeneity is significantly associated with the number of publications in the bottom tier of journals.

A third alternative analysis was suggested by the fact that many universities use a very restricted list of "A" publications for tenure and promotion decisions. We therefore present results based on using four journal tiers, with the top six journals, those with AIF scores greater than 2.5, separated out as the "premier" tier (*Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly, Journal of Personality and Social Psychology, Psychological Bulletin*, and *American Psychologist*). Again, our results are consistent. Coauthoring heterogeneity is significantly and positively associated with the number of publications in the premier and first tiers but not in the second or third tiers. Article field heterogeneity is associated with publications in the second and third tiers but is not associated with publication in either the premier or first-tier journals.

Finally, we calculated a weighted productivity index following Stephan and Levin (1991) to be used as our dependent variable. To form this weighted productivity index, we multiplied each publication by the AIF score of the journal in which it appears and summed across publications for each focal author. The results indicated that coauthoring heterogeneity is again positively and significantly related to the level of creative contribution reflected in the weighted productivity index. Article field heterogeneity, however, is not significantly related to weighted productivity. These results are easily reconciled with our previous results. Since top-tier publications are much more heavily weighted than lower-tier publications (by a multiple of 5 or more), the weighted productivity index chiefly reflects the relationship of our independent variables with the set of first-tier publications. All of these alternative analyses provide strong evidence that our results are robust and not simply an artifact of an arbitrary categorization scheme for journal tiers. Tables reporting these alternative analyses are available as an online supplement to Appendix B.

# References

Adler, N. J., & Harzing, A. W. 2009. When knowledge wins: Transcending the sense and nonsense of academic rankings. *Academy of Management Learning & Education*, 8: 72-95.

Aguinis, H., Suarez-Gonzalez, I., Lannelongue, G., & Joo, H. 2012. Scholarly impact revisited. *Academy of Management Perspectives*, 26: 105-132.

Amabile, T. M. 1983. The social psychology of creativity: A componential conceptualization. *Personality Processes and Individual Differences*, 45: 357-376.

Amabile, T. M. 1988. A model of creativity and innovation in organizations. In B. M. Staw & L. L. Cummings (Eds.), *Research in Organizational Behavior*, 10: 123-167. Greenwich, CT: JAI Press.

Argote, L., & Ingram, P. 2000. Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, 82: 150-169.

Baer, M. 2010. The strength-of-weak-ties perspective on creativity: A comprehensive examination and extension. *Journal of Applied Psychology*, 95: 592-601.

Baer, M. 2012. Putting creativity to work: The implementation of creative ideas in organizations. *Academy of Management Journal*, 55: 1102-1119.

Beaver, D. 2001. Reflections on scientific collaboration (and its study): Past, present, and future. *Scientometrics*, 52: 365-377.

Beaver, D., & Rosen, R. 1979. Studies in scientific collaboration. *Scientometrics*, 1: 133-149.

Bedeian, A. G., Cavazos, D. E., Hunt, J. G., & Jauch, L. R. 2010. Doctoral degree prestige and the academic marketplace: A study of career mobility within the management discipline. *Academy of Management Learning & Education*, 9: 11-25.

Blackburn, R. S., & Mitchell, M. 1981. Citation analysis in the organizational sciences. *Journal of Applied Psychology*, 66: 337-342.

Blau, P. M. 1977. *Inequality and heterogeneity: A primitive theory of social structure*. New York: Free Press.

Burt, R. S. 1987. Social contagion and innovation: Cohesion versus structural equivalence. *American Journal of Sociology*, 92: 1287-1335.

Burt, R. S. 1992. *Structural holes*. Cambridge, MA: Harvard University Press.

Burt, R. S. 2000. Decay functions. *Social Networks*, 22: 1-28.

Burt, R. S. 2005. *Brokerage and closure: An introduction to social capital*. New York: Oxford University Press.

Cable, D. M., & Murray, B. 1999. Tournaments versus sponsored mobility as determinants of job search success. *Academy of Management Journal*, 42: 439-449.

Certo, S. T., Sirmon, D. G., & Brymer, R. A. 2010. Competition and scholarly productivity in management: Investigating changes in scholarship from 1988 to 2008. *Academy of Management Learning & Education*, 9: 591-606.

Coleman, J. S. 1990. *Foundation of social theory*. Cambridge, MA: Harvard University Press.

Crane, D. 1972. *Invisible colleges: Diffusion of knowledge in scientific communities*. Chicago: University of Chicago Press.

Cross, R., & Cummings, J. N. 2004. Tie and network correlates of individual performance in knowledge-intensive work. *Academy of Management Journal*, 47: 928-937.

Dunteman, G. H., & Ho, M. R. 2006. *An introduction to generalized linear models*. Thousand Oaks, CA: Sage.

Extejt, M. M., & Smith, J. E. 1990. The behavioral sciences and management: An evaluation of relevant journals. *Journal of Management*, 16: 539-551.

Fleming, L., Mingo, S., & Chen, D. 2007. Collaborative brokerage, generative creativity, and creative success. *Administrative Science Quarterly*, 52: 443-475.

Freeman, L. C., Romney, A. K., & Freeman, S. C. 1987. Cognitive structure and informant accuracy. *American Anthropologist*, 89: 310-325.

Gardner, H. 1994. The creators' patterns. In M. A. Boden (Ed.), *Dimensions of creativity*: 143-158. Cambridge, MA: MIT Press.

Garfield, E. 1983. *Citation indexing: Its theory and application in science, technology, and humanities*. Philadelphia: ISI Press.

Gargiulo, M., Ertug, G., & Galunic, C. 2009. The two faces of control: Network closure and individual performance among knowledge workers. *Administrative Science Quarterly*, 54: 299-333.

Gill, J. 2001. *Generalized linear models: A unified approach*. Thousand Oaks, CA: Sage.

Gomez-Mejia, L. R., & Balkin, D. B. 1992. Determinants of faculty pay: An agency theory perspective. *Academy of Management Journal*, 35: 921-955.

Gough, H. G., & Woodworth, D. G. 1960. Stylistic variations among professional research scientists. *Journal of Psychology*, 49: 87-98.

Granovetter, M. S. 1985. Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91: 481-510.

Hansen, M. T. 1999. The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*, 44: 82-111.

Harrison, D. A., & Klein, K. J. 2007. What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review*, 32: 1199-1228.

Janssen, O., van de Vliert, E., & West, M. 2004. The bright and dark side of individual and group innovation: A special issue introduction. *Journal of Organizational Behavior*, 25: 129-145.

Johnson, J. L., & Podsakoff, P. M. 1994. Journals of influence in the field of management: An analysis using Salancik's index in a dependency network. *Academy of Management Journal*, 37: 1392-1407.

Judge, T. A., Cable, D. M., Colbert, A. E., & Rynes, S. L. 2007. What causes a management article to be cited—Article, author, or journal? *Academy of Management Journal*, 50: 491-506.

Judge, T. A., Kammeyer-Mueller, J., & Bretz, R. D. 2004. A longitudinal model of sponsorship and career success: A study of industrial-organizational psychologists. *Personnel Psychology*, 57: 271-303.

Kaufman, J. C., & Beghetto, R. A. 2009. Beyond big and little: The four c model of creativity. *Review of General Psychology*, 13: 1-12.

Kilduff, M., & Krackhardt, D. 2008. *Interpersonal network in organizations: Cognition, personality, dynamics, and culture*. New York: Cambridge University Press.

Lavie, D., & Drori, I. 2012. Collaborating for knowledge creation and application: The case of nanotechnology research programs. *Organization Science*, 23: 704-724.

Leahey, E. 2007. Not by productivity alone: How visibility and specialization contribute to academic earnings. *American Sociological Review*, 72: 533-561.

Lee, S., & Bozeman, B. 2005. The impact of research collaboration on scientific productivity. *Social Studies of Science*, 35: 673-702.

Long, J. S. 1997. *Regression models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage.

Long, R. G., Bowers, W. P., Barnett, T., & White, M. C. 1998. Research productivity of graduates in management: Effects of academic origin and academic affiliation. *Academy of Management Journal*, 41: 704-714.

Marsden, P. V. 1990. Network data and measurement. In W. R. Scott & J. Blake (Eds.), *Annual review of sociology*, vol. 16: 435-463. Palo Alto, CA: Annual Reviews.

McFadyen, M. A., & Cannella, A. A. 2004. Social capital and knowledge creation: Diminishing returns of the number and strength of exchange relationships. *Academy of Management Journal*, 47: 735-746.

Merton, R. K. 1973. *The sociology of science: Theoretical and empirical investigations*. Chicago: University of Chicago Press.

Miller, C. C., Glick, W. H., & Cardinal, L. B. 2005. The allocations of prestigious positions in organizational science: Accumulative advantage, sponsored mobility, and contest mobility. *Journal of Organizational Behavior*, 26: 489-516.

Moody, J. 2004. The structure of a social science collaboration network: Disciplinary cohesion from 1963 to 1999. *American Sociological Review*, 69: 213-238.

Obstfeld, D. 2005. Social networks, the *Tertius Iungens* orientation, and involvement in innovation. *Administrative Science Quarterly*, 50: 100-130.

Perry-Smith, J. E. 2006. Social yet creative: The role of social relationships in facilitating individual creativity. *Academy of Management Journal*, 49: 85-101.

Perry-Smith, J. E., & Shalley, C. E. 2003. The social side of creativity: A static and dynamic social network perspective. *Academy of Management Review*, 28: 89-106.

Peterson. 2007. *Graduate schools in the U.S*. Lawrenceville, NJ: Peterson's.

Phelps, C., Heidl, R., & Wadhwa, A. 2012. Knowledge, networks, and knowledge networks: A review and research agenda. *Journal of Management*, 38: 1115-1166.

Podolny, J. M., & Baron, J. N. 1997. Resources and relationships: Social networks and mobility in the workplace. *American Sociological Review*, 62: 673-693.

Podsakoff, P. M., MacKenzie, S. B., Podsakoff, N. P., & Bachrach, D. G. 2008. Scholarly influence in the field of management: A bibliometric analysis of the determinants of university and author impact in the management literature in the past quarter century. *Journal of Management*, 34: 641-720.

Powell, W. W., & Snellman, K. 2004. The knowledge economy. *Annual Review of Sociology*, 30: 199-220.

Pravdic, N., & Oluic-Vukovic, V. 1986. Dual approach to multiple authorship in the study of collaborator and scientific output relationship. *Scientometrics*, 10: 259-80.

Price, D. 1986. *Little science, big science . . . and beyond*. New York: Columbia University Press. (Original work published 1963)

Price, D., & Beaver, D. 1966. Collaboration in an invisible college. *American Psychologist*, 21: 1011-1018.

Reagans, R., & McEvily, B. 2003. Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly*, 48: 240-267.

Reagans, R., & Zuckerman, E. W. 2001. Networks, diversity, and productivity: The social capital of corporate R&D teams. *Organization Science*, 12: 502-517.

Rhodes, M. 1961. An analysis of creativity. *Phi Delta Kappan*, 42: 305-310.

Rubenson, D. L., & Runco, M. A. 1992. The psychoeconomic approach to creativity. *New Ideas in Psychology*, 10: 131-147.

Seibert, S. E., Kraimer, M. L., & Liden, R. C. 2001. A social capital theory of career success. *Academy of Management Journal*, 44: 219-237.

Shalley, C. E., & Gilson, L. L. 2004. What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *Leadership Quarterly*, 15: 33-53.

Shin, S. J., & Zhou, J. 2007. When is education specialization heterogeneity related to creativity in research and development teams? Transformational leadership as a moderator. *Journal of Applied Psychology*, 92: 1709-1721.

Simonton, D. K. 1994. *Greatness: Who makes history and why*. New York: Guilford Press.

Singh, G., Haddad, K. M., & Chow, C. W. 2007. Are articles in "top" management journals necessarily of higher quality? *Journal of Management Inquiry*, 16: 319-331.

Starbuck, W. H. 2005. How much better are the most-prestigious journals? The statistics of academic publication. *Organization Science*, 16: 180-200.

Stephan, P. E., & Levin, S. G. 1991. Inequality in scientific performance: Adjustment for attribution and journal impact. *Social Studies of Science*, 21: 351-368.

Sternberg, R. J. (Ed.). 1999. *Handbook of creativity*. Cambridge, UK: Cambridge University Press.

Sternberg, R. J. 2006. The nature of creativity. *Creativity Research Journal*, 18: 87-98.

Thelwall, M., & Sud, P. 2011. A comparison of methods for collecting web citation data for academic organizations. *Journal of the American Society for Information Science and Technology*, 62: 1488-1497.

Tjosvold, D. 1982. Effects of approach to controversy on superior's incorporation of subordinates' information in decision making. *Journal of Applied Psychology*, 67: 189-193.

Torrance, E. P. 1974. *The Torrance Test of Creative Thinking: Technical-norms manual*. Bensenville, IL: Scholastic Testing Service.

Torrance, E. P. 1993. Understanding creativity: Where to start? *Psychological Inquiry: An International Journal for the Advancement of Psychological Theory*, 4: 232-234.

Uzzi, B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42: 35-67.

Van Fleet, D. D., McWilliams, A., & Siegel, D. S. 2000. A theoretical and empirical analysis of journal rankings: The case of formal lists. *Journal of Management*, 26: 839-861.

von Hippel, E. 1994. "Sticky information" and the locus of problem solving: Implications for innovation. *Management Science*, 40: 429-439.

Ward, T. B., Smith, S. M., & Finke, R. A. 1999. Creative cognition. In R. J. Sternberg (Ed.), *Handbook of creativity*: 189-212. Cambridge, UK: Cambridge University Press.

Williamson, I. O., & Cable, D. M. 2003. Predicting early career research productivity: The case of management faculty. *Journal of Organizational Behavior*, 24: 25-44.

Woodman, R., Sawyer, J., & Griffin, R. 1993. Toward a theory of organizational creativity. *Academy of Management Review*, 18: 293-321.

Wuchty, S., Jones, B. F., & Uzzi, B. 2007. The increasing dominance of teams in production of knowledge. *Science*, 316: 1036-1039.