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SOCIAL NETWORKS AND THE PERFORMANCE
OF INDIVIDUALS AND GROUPS

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A field study involving 190 employees in 38 work groups representing five diverse organizations provided evidence that social networks, as defined in terms of both positive and negative relations, are related to both individual and group performance. As hypothesized, individual job performance was positively related to centrality in advice networks and negatively related to centrality in hindrance networks composed of relationships tending to thwart task behaviors. Hindrance network density was significantly and negatively related to group performance.

A growing body of management theory and research takes as its central premise the embeddedness (Granovetter, 1985) of individuals in social networks. The distinctive characteristic of this stream of research lies in how it draws on the structural properties of social networks in explaining outcomes. From this perspective, individuals' positions within social networks confer advantages, such as organizational assimilation (Sparrowe & Liden, 1997) and promotions (Burt, 1992), or lead to disadvantages, such as organizational exit (Krackhardt & Porter, 1986). *Centrality,* the extent to which a given individual is connected to others in a network, is the structural property most often associated with instrumental outcomes, including power (Brass, 1984), influence in decision making (Friedkin, 1993), and innovation (Ibarra, 1993).

Although previous research has demonstrated a relationship between network structure and instrumental outcomes, relatively few studies have explicitly examined the link between network centrality and job performance. Baldwin, Bedell, and Johnson (1997) found a positive relationship between the network centrality of master of business administration (M.B.A.) team members and their

grades. Brass (1981) found that the centrality of employees' positions in a network representing the flow of work was indirectly related to job performance via job characteristics. Thus, one purpose of the current study was to replicate and extend previous research on the relationship between an individual's network position within a work group and his or her job performance by examining the role of informal network position in actual work settings.

A related issue is whether group performance is a function of the structure of informal relationships within groups. Although the relationship between group interaction and performance has been the subject of considerable previous research, structure has largely been viewed in terms of formal relationships rather than informal interaction patterns (Guzzo & Shea, 1992). An important exception is group research conducted during the 1950s that examined the relationship between group communication structure and performance (for a review, see Shaw [1964]). More recently, Baldwin and colleagues' (1997) M.B.A. team study found that team interaction patterns consistent with cohesive work groups were positively related to teams' final grades. Thus, the second purpose of this study was to extend this early and more recent group research by examining group network structure and performance in work settings.

A third contribution of our study is its examination of the structure of informal relationships that potentially hinder individual and group performance. Although most research on informal net-

works has focused on positive or neutral relations, negative relations are a recognized possibility. Drawing from research on "negative asymmetry" (see Taylor [1991] for a review), Labianca, Brass, and Gray (1998) argued that negative relations in social networks are more important than positive relations for understanding attitudes and behaviors because negative relations are more salient. Recent empirical research supports these authors' contention that negative relationships may have a negative effect on attitudes and behaviors. Baldwin and colleagues (1997) found that an individual M.B.A. team member's centrality in an "adversarial" network was negatively related to his or her satisfaction. At the group level, the number of adversarial relations within a team was negatively related to perceptions of team effectiveness but positively related to the team grade. Similarly, Labianca and colleagues (1998) found that the number of negative (avoidance) relationships individuals had with out-group members was positively related to perceptions of intergroup conflict, whereas the number of friendship relations was not related to perceptions of intergroup conflict. Taken together, these studies demonstrate the importance of negative relationships in relation to attitudes and behaviors.

CONCEPTUAL BACKGROUND AND HYPOTHESES

Among the fundamental explanatory tenets of the social network perspective is the idea that the structure of social interactions enhances or constrains access to valued resources (Brass, 1984; Ibarra, 1993). Resources exchanged through informal networks include work-related resources, such as task advice and strategic information, but informal networks also transmit social identity (norms) and social support (Podolny & Baron, 1997). We focus on the exchange of task advice and information, because these resources are likely to be positively related to job performance, and on hindrance relations, because of their potentially negative effects on job performance.

Our hypotheses regarding the relationship between network structure and performance are presented first at the individual level of analysis and then at the group level. At the individual level, we focused on network centrality because it captures the extent of an individual's access to resources, such as task-specific knowledge and confidential information about work-related issues. Central individuals, because of their more numerous connections to others, have more relationships to draw upon in obtaining resources and so are less dependent on any single individual (Cook & Emerson, 1978). Centrality also implies control over the resource acquisition of others because central individuals can choose from a greater number of alternative individuals when exchanging beneficial resources. Moreover, the study's focus on centrality allows its results to be interpreted in the context of previous research that has demonstrated relationships between centrality and power (Brass, 1984), influence in decision making (Friedkin, 1993), and innovation (Ibarra, 1993). However, an important difference between this study and recent research is that we focus on centrality within work groups rather than within an organization as a whole.

At the group level of analysis, we examined two structural properties of interaction patterns in relation to performance: network density and network centralization. *Density* describes the overall level of interaction of various kinds reported by network members. *Centralization* reflects the extent to which interactions are concentrated in a small number of individuals rather than distributed equally among all members. Density is analogous to the mean number of ties per group member. The more ties each group member enjoys with other group members, the greater the density of the network. Group centralization, in contrast, is analogous to the variance in network ties per group member. When the variance in the number of network ties per group member is low, no group member enjoys substantially more ties than any other group member, and therefore no group member is more central than any other. Conversely, when the variance in the number of network ties per group member is high, some members have proportionately more ties and therefore are more central than other group members. These attributes of network structure are closely related to research conducted in the 1950s (Shaw, 1964) relating communication patterns to group performance and so enable the results of our study to be interpreted in the context of previous work. As has previous small group research, this study examined density and centralization in relation to work groups rather than whole organizations.

Advice Network Centrality and Individual Performance

Advice networks are comprised of relations through which individuals share resources such as information, assistance, and guidance that are related to the completion of their work. When the work performed by individuals is enhanced by task information available from others, an advice network is a means for obtaining resources that are

instrumental in facilitating individual job performance. Centrality in the advice network reflects an individual's involvement in exchanging assistance with coworkers and engaging in mutual problem solving. An individual who is central in the advice network is, over time, able to accumulate knowledge about task-related problems and workable solutions (Baldwin et al., 1997). This expertise not only enables the central individual to solve problems readily, but also serves as a valued resource for future exchanges with coworkers. As others become dependent on a central individual for important advice, he or she gains an advantage that can be used in future exchanges for valued resources (Cook & Emerson, 1978). Conversely, those who are in peripheral positions in the advice network should find it much more difficult to develop expertise about task-related problems and solutions and are thus less likely to develop the competencies and expertise necessary for high levels of performance.

Hypothesis 1. Centrality in a work group's advice network will be positively related to an individual's job performance.

Hindrance Network Centrality and Individual Performance

Negative exchange relations have been described in terms of such behaviors as interference, threats, sabotage, and rejection (Sahlins, 1972) as well as in relation to affective responses to such behaviors, including annoyance, emotional upset, and anger (Pagel, Erdly, & Becker, 1987). Given the practical difficulties inherent in obtaining valid data about negative relationships in field studies, researchers have used proxies in identifying network relations characterized by negative exchanges such as avoidance (Labianca et al., 1998) or by adversarial relationships (Baldwin et al., 1997). Because we are interested in performance, we focused on relationships with coworkers who thwart task behaviors, termed a hindrance network. Centrality in a hindrance network reflects the extent to which coworkers describe a focal individual as a person who makes it difficult for them to complete their work by withholding valuable information, resources, and opportunities. To the extent that an individual's performance depends upon access to valuable resources from coworkers, hindrance relations will be detrimental to performing various aspects of the job.

Hypothesis 2. Centrality in a work group's hindrance network will be negatively related to individual job performance.

Advice Network Structure and Group Performance

Just as one's position in social network structure is expected to be related to individual performance, the social network structure of a group should be associated with group performance. We expect that the density of an advice network will be positively related to group performance. Specifically, when group members exchange advice with a larger proportion of other group members, the group should benefit in terms of greater cooperation, greater information sharing, a stronger sense of accountability, greater agreement on expectations, and less tendency to engage in social loafing. A relatively larger number of group members exchanging advice indicates greater mutual interdependence between members. As Molm (1994) suggested, mutual interdependence fosters cooperation, which in turn enhances group performance. A dense advice network also benefits groups through the sharing of information. The more members involved in the exchange of advice, the more pieces of nonredundant information that are likely to be shared. Amount of information sharing is related to the quality of group decisions (Larson, Christensen, Franz, & Abbott, 1998). The exchange of advice among a large proportion of a group's members should also make each member more aware of other group members' roles in the group. By advising one another, members learn about the responsibilities of each group member. Knowledge of each group member's roles makes task behavior more visible and at the same time clarifies expectations and accountability. Increased visibility and accountability counteract social loafing and thus enhance group performance (Wagner, 1995).

Hypothesis 3a. The density of a work group's advice network will be positively related to group performance.

Although we expect a positive relationship between advice network density and group performance, we contend that the relationship between advice network centralization and group performance will be negative. Our hypothesis regarding centralization and group performance is consistent with the findings of the experimental research conducted in the 1950s in which groups with decentralized communication networks were more productive at complex tasks than were groups with centralized communication networks (Shaw, 1964). All of the organizations included in the current study had implemented empowerment, which had the effect of making respondents' tasks complex. Even in the manufacturing organization we

studied, employees operated complex computer-guided machinery that make their jobs relatively complex.

Our theoretical foundation for hypothesizing a negative relation between advice network centralization and group performance is drawn from Molm's (1994) distinctions among independence, dependence, and interdependence. These arguments suggest that decentralized networks foster interdependence, which in turn encourages cooperation. Cooperation is encouraged because, in interdependent relations, exchange partners share control over joint outcomes. And, unlike actors in dependent relations, who can gain at the expense of others, actors in interdependent relations cannot "receive benefits without contributing to their production" (Molm, 1994: 165). Because network centralization captures the extent to which exchange relations are concentrated among a few individuals, the greater the centralization in an advice network, the less interdependence, and the less cooperation. As cooperation in the task domain decreases, group performance will suffer.

Hypothesis 3b. Centralization in a work group's advice networks will be negatively related to group performance.

Hindrance Network Structure and Group Performance

Our rationale for the negative effects of hindrance networks on individual performance may be extended to the group level.[1] Although one relatively isolated hindering group member may not have much impact on a group, several such people can adversely affect group performance. Specifically, the more group members whose job-related behaviors are thwarted by a hindering member or members, the greater the harm to group performance. Our logic follows the general finding in group research that although the whole is more than the sum of the parts, the average of individual group member behaviors is consistently related to

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[1] We did not frame a hypothesis regarding hindrance centralization and group performance paralleling Hypothesis 3b. Molm's (1994) concept of interdependence in group exchange does not justify such a prediction. There is no comparable means of describing interdependence in the hindrance network. Negative exchanges do not have the same potential for interdependence as positive exchanges. That is, an interdependent network comprised of coordinated negative exchange relationships is difficult to conceptualize precisely because negative exchanges preclude the possibility of mutual coordination.

group behavior (Borman, Hanson, Oppler, Pulakos, & White, 1993). Thus, the greater the proportion of hindrance relations among a group's members (that is, the higher the density of the hindrance network), the lower the group's performance will be.

Hypothesis 4. The density of a work group's hindrance network will be negatively related to group performance.

METHODS

Sample and Procedures

Respondents were drawn from five organizations whose employees participated in a larger research project on work group processes: a large public university, a small manufacturing firm in the construction industry, a large distributor of industrial products, and two geographically separate plants of a consumer products company. Forty-seven work groups voluntarily participated in the research; the response rate as a percentage of all groups we invited to participate was 96 percent. Network and general work attitudes surveys were administered on site in work groups to 269 individuals during work hours. Group leaders (formal supervisors or individuals designated as team leaders) completed questionnaires to assess individual and group-level performance.

Because network analysis requires a high response rate (Wasserman & Faust, 1994), groups with less than 80 percent participation were excluded. Analyses were based on the remaining 38 groups: 9 from the university, 5 from the manufacturing firm, 8 from the distributor of industrial products, and 16 from the consumer products manufacturer. Because group leaders provided performance data, they were not included in the network data. The total sample for testing hypotheses at the individual level of analysis was 190. The average group size, excluding leaders, was 5.0 members. The average length of time since group formation was 20.2 months. Within each group, we replaced missing data with the median value for the network to preserve the maximum amount of information. (For instance, if four of five members of a group had responded, we used median values for the network for the fifth individual.) Median substitutions represented 11.4 percent of the network data.

The average age of the respondents was 36.4 years. Men comprised 37.8 percent of the sample's members. In terms of race, 63.6 percent were Caucasian, 20.9 percent were African American, 10.7 percent were Hispanic, 2.7 percent were Asian, and the remainder were classified as "other." As for educational attainment, 11.1 percent had not com-

pleted high school, 41.6 percent held a high school diploma, 9.3 percent had received technical training following high school graduation, 13.3 percent held an associate's degree, 21.2 percent held a bachelor's degree, and 3.5 percent held a graduate degree. The respondents' average organizational tenure was 7.6 years. They performed a variety of jobs, including clerical and production jobs and managerial jobs in marketing and customer support.

Measures

Networks and network centrality. The network surveys listed the names of each individual in a respondent's work group. Following the work of Burt (1992) and Ibarra (1993), we assessed advice relations by asking the respondents two questions: "Do you go to [name] for help or advice on work-related matters?" and "Do you talk to [name] about confidential work-related matters?" A hindrance relation was elicited by asking, "Does [name] make it difficult for you to carry out your job responsibilities?" Because we were interested in the *strength* of the relationships among individuals who knew each other, we elicited valued responses to each network question using a seven-point scale, anchored by "not at all"(1), "some"(4), and "very much"(7).

We computed normed in-degree centrality scores for each individual (Borgatti, Everett, & Freeman, 1992) to allow for comparisons across groups of different sizes. In-degree centrality is a form of degree centrality that counts only those relations with a focal individual reported by other group members, and it thus does not suffer from the limitations of self-reports, as does out-degree centrality.

We conducted a factor analysis using centrality scores for our three network measures. Two factors explaining 89 percent of the variance in the network measures had eigenvalues greater than 1.0. The two advice network centrality items showed high (greater than .90) loadings on the first factor, with hindrance centrality loading on the second factor, thus demonstrating convergent and discriminant validity.

Network density. In binary network data, density is the proportion of actual nominations among the total possible number of nominations (Wasserman & Faust, 1994). Because the relations in our data were valued (measured on a scale from 1 to 7), we computed density as the sum of the actual responses divided by the total possible sum of responses.

Network centralization. Network centralization was computed following Freeman's (1979) defini-

tion in the UCINET IV software package (Borgatti et al., 1992). First, the sum of the differences between the largest individual centrality score and the scores of all the other individuals in the network was computed. This sum of the observed differences in individual centrality scores was then divided by the maximum possible sum of differences (Wasserman & Faust, 1994).

Individual job performance. We examined two aspects of job performance: in-role (performance on required duties and responsibilities) and extra-role (performance on discretionary behaviors that go beyond the formal job description). Group leaders rated each member's in-role and extra-role performance using 14 items scaled "strongly disagree"(1) to "strongly agree"(7). We used the 7-item scale developed by Williams and Anderson (1991) to measure in-role performance. Extra-role performance was measured with the 6-item altruism scale developed by Smith, Organ, and Near (1983) and 1 item ("This employee willingly gives his/her time to help others who have been absent") from the Podsakoff, MacKenzie, Moorman, and Fetter (1990) scale.

On the basis of the results of a factor analysis using varimax rotation, one of the in-role performance items ("engaged in activities that will directly affect his/her performance evaluation") and one of the extra-role performance items ("helps others who have been absent") were deleted because of low or mixed loadings. After omission of these items, a second analysis resulted in two clean factors. The remaining 12 items comprised the in-role ($\alpha = .94$) and extra-role ($\alpha = .90$) performance scales, each consisting of 6 items each.

Group performance. Group performance was assessed by leaders using seven items developed for this study on a scale ranging from "very poor"(1) to "outstanding"(7) ($\alpha = .99$). Items addressed the quality and quantity of work and the initiative, cooperation, timeliness, and overall performance of groups.

RESULTS

Descriptive statistics and correlations among study variables are reported in Table 1 (individual-level variables) and Table 2 (group-level variables).

Table 3 presents the results of the regression analyses testing the hypothesized relationships between network centrality and individual performance. We controlled for organizational differences by entering the organization dummy variables in step 1, followed by the centrality measures in step 2. In support of Hypothesis 1, centrality in the advice network was positively related to

TABLE 1
Descriptive Statistics and Correlations for Individual-Level Variables[a]

Variable	Mean	s.d.	1	2	3	4	5	6	7	8
1. Organization 1	0.20	0.40								
2. Organization 2	0.17	0.38	−.23**							
3. Organization 3	0.09	0.29	−.16*	−.11*						
4. Organization 4	0.34	0.48	−.36**	−.33**	−.23**					
5. Organization 5	0.19	0.40	−.25**	−.23**	−.15*	−.36**				
6. In-role performance	5.83	0.79	.17*	−.10	.24**	−.17*	−.04			
7. Extra-role performance	5.53	1.27	.31**	−.21**	.37**	−.19**	−.14*	.65**		
8. Advice centrality	3.52	1.04	.10	.19**	.00	−.27**	.03	.26**	.22**	
9. Hindrance centrality	1.49	0.66	.02	.13*	−.06	−.01	−.09	−.30**	−.27**	−.09

[a] n = 190.
* p < .05
** P < .01

TABLE 2
Descriptive Statistics and Correlations for Group-Level Variables[a]

Variable	Mean	s.d.	1	2	3	4	5	6	7	8
1. Organization 1	0.24	0.42								
2. Organization 2	0.16	0.42	−.24							
3. Organization 3	0.13	0.33	−.22	−.17						
4. Organization 4	0.21	0.30	−.29*	−.22	−.20					
5. Organization 5	0.26	0.43	−.33*	−.26	−.23	−.31*				
6. Group performance	4.66	0.90	.26	−.21	.45**	−.09	−.34*			
7. Advice network density	1.87	0.09	.12	.48**	.16	−.32*	−.09	−.05		
8. Advice network centralization	218.17	101.69	.32*	.10	.05	−.11	−.25	−.15	.12	
9. Hindrance network density	0.21	0.06	.09	.32*	−.10	−.07	−.21	−.36*	.28*	.16

[a] n = 38.
* p < .05
** P < .01

individual in-role and extra-role performance. Centrality in the hindrance network was negatively related to individual in-role and extra-role performance, supporting Hypothesis 2. Taken together, network centrality variables explained 13 percent of the variance in in-role performance and 10 percent of the variance in extra-role performance.

Table 4 presents the results of regression analyses testing the hypothesized relationships between group network structure and group performance. The organization dummy variables were entered in step 1, followed by the network measures in step 2. Contrary to Hypothesis 3a, the parameter estimate for density in the advice network was not statistically significant. Although the parameter estimate for centralization in the advice network was in the hypothesized direction, its statistical significance was marginal (p = .06), and thus Hypothesis 3b found weak support. Supporting Hypothesis 4, the parameter estimate for hindrance network density was negative and statistically significant. Taken together, network density and centralization ex-

plained 20 percent of the variance in group performance.

DISCUSSION AND CONCLUSION

Social Networks and Individual Performance

The results of this study offer support for the hypothesized relationships between social network centrality and individual performance. Individuals who were central in their work groups' advice networks had higher levels of in-role and extra-role performance than did individuals who were not central players in such a network. Individuals who were central in a hindrance network had lower levels of both in-role and extra-role performance. These results are important because they demonstrate that group members who are central to group advice-sharing are rated more positively on individual performance. That this relationship was found with respect to both in-role and extra-role performance contributed to

TABLE 3
Results of Regression Analysis for Network Centrality and Individual Performance[a]

Variable	In-Role Performance				Extra-Role Performance			
	b	s.e.	*b*	s.e.	*b*	s.e.	*b*	s.e.
Step 1: Control variables								
Intercept	5.64	0.09	5.58	0.22	5.19	0.14	5.14	0.33
Organization 1	.80**	0.21	0.69**	0.19	1.12**	0.22	0.99**	0.22
Organization 2	0.45**	0.16	0.36*	0.15	−0.23	0.23	−0.33	0.23
Organization 3	0.01	0.16	−0.06	0.16	1.81**	0.30	1.67**	0.28
Organization 4	0.12	0.16	0.01	0.15	−0.02	0.23	−0.18	0.21
R^2	.10				.27			
F	5.33**				17.09**			
Step 2: Centrality								
Advice network			0.18**	0.05			0.23**	0.08
Hindrance network			−0.33**	0.08			−0.46**	0.11
ΔR^2			.13				.10	
ΔF			15.33**				13.84**	
Overall adjusted R^2			.23				.35	
Overall F			9.22**				17.60**	

[a] $n = 190$.
* $p < .05$
** $p < .01$

TABLE 4
Results of Regression Analysis for Group Network Structure and Performance[a]

Variable	Controls		Network Structure	
	b	s.e.	*b*	s.e.
Step 1: Control variables				
Intercept	4.20	0.22	5.22	0.63
Organization 1	0.85*	0.33	1.19*	0.31
Organization 2	0.06	0.37	0.45	0.38
Organization 3	1.40**	0.39	1.51**	0.34
Organization 4	0.32	0.34	0.46	0.30
R^2	.35			
F	4.48**			
Step 2: Network structure				
Advice network density			0.17	0.28
Hindrance network density			−4.97**	1.74
Advice network centralization			−0.02[†]	0.00
ΔR^2			.20	
ΔF			4.35*	
Overall adjusted R^2			.44	
Overall F			5.21**	

[a] $n = 38$.
† $p = .06$
* $p < .05$
** $p < .01$

the research on organizational citizenship. It appears that some of the advice provided by those who are central to the flow of information in work groups extends beyond what is expected as

per job descriptions. Additionally, individual job performance traditionally has been evaluated on the basis of behaviors that individuals engage in apart from coworkers. However, with the trend toward greater use of teams in organizations, the extent to which team members are involved in behaviors that assist coworkers has become a salient dimension of job performance. Indeed, our results showed that individuals who were identified by coworkers as being active in providing advice were rated more favorably by leaders than individuals who were not mentioned as often by coworkers as providing such information.

Given the sparseness of research on negative exchanges in work settings, we found it noteworthy that individuals who were identified by coworkers as hindering the work of others were rated by managers as relatively lower on in-role and extra-role performance. It appears that, just as there are networks of individuals engaged in providing useful advice and support, there are also networks of individuals who engage in behaviors that hinder others from completing their tasks. However, neither in the current study nor in the handful of other investigations examining negative exchange relationships have specific hindering behaviors been identified (Labianca et al., 1998). Future research should examine the causes of hindrance behavior and illuminate the ways in which individuals in central positions in hindrance networks slow the work progress of

their coworkers. For example, negative affectivity could induce some individuals to intentionally withhold effort or try to sabotage the work of coworkers (Robinson & Bennett, 1995).

Social Networks and Group Performance

The results did not support the hypothesis that advice network density is positively related to group performance. This hypothesis might have been supported had the measure focused specifically on advice in solving work-related problems and assistance with work assignments rather than general information about work, which may or may not have been relevant to group performance. We found marginal support ($p = .06$) for the hypothesized negative relation between advice network centralization and group performance. An interesting paradox emerges when one compares these results to those for individual performance. Specifically, centrality in the advice network was *positively* associated with *individual* performance, whereas at the group level, centralization was *negatively* associated with *group* performance. These results parallel those found in pioneering work on group structure and process (Shaw, 1964). Studies in which group structure was manipulated showed that central positions in groups related positively to individual performance. On the other hand, centralization at the group level was positively related to group performance only for simple tasks. On complex tasks, centralization was not associated with group performance. In the organizations included in our sample, tasks were complex, suggesting that our group-level results parallel those of the early experimental studies. This pattern of findings indicates that group performance is more than the sum of each member's individual performance (Molm, 1994).

We found support for the negative relationship between hindrance network density and group performance, suggesting that uncooperative behaviors among group members are just as important as cooperative behaviors in influencing group performance—perhaps even more so. Consistent with Brass and LaBianca's (1999: 324) argument in favor of examining both sides of the "social ledger," hindrance density was negatively associated with group performance, but the relationship between advice network density and performance was not statistically significant. Group performance suffers to the extent that coworkers withhold resources or avoid other group members. Future research in this area is warranted, especially research employing designs that permit differentiation among types of hindrance networks. A relevant question is, does a

hindrance network contain individuals who truly restrict the progress of the group toward completion of group tasks, or do these individuals present positions that conflict with those in the majority, resulting in their being perceived by others as hindering the group? A second area for future research is to examine what causes negative exchanges to develop. The results would have important implications for how to reduce negative exchanges within groups (that is, reduce hindrance network density), and thus increase group performance.

Limitations

This study has several potential limitations. The first concerns the validity of our performance measures. Although common method variance was not an issue because the social network and performance ratings data had different sources, aspects of the social context may have biased the subjective evaluation of performance. Similarly, there may have been a leniency bias in the group performance ratings, given that a group's effectiveness reflects its leader's own performance. Thus, an alternative interpretation of our findings is that informal network structure is related to supervisors' assessments of individual and group performance, rather than to actual performance.

Second, our theoretical perspective implies that network structure precedes individual performance. However, it is possible that the relationship between individual performance and network structure is reciprocal or that it is the reverse of what we have theorized. For example, it is possible that coworkers seek out high performers as sources of advice, thus enhancing high performers' central positions within informal networks.

Third, this study employed a single-item measure of hindrance networks. Although use of single-item measures of negative network relations is common in previous research involving large networks (e.g., Baldwin et al., 1997; LaBianca et al., 1998), small group research does not face the same practical limitations as large group research. Although sociometric techniques were used with small groups in experimental research conducted during the 1950s (Shaw, 1964), it should be noted that contemporary research typically studies networks larger in size than the groups studied here.

Conclusion

In summary, this study contributes to several streams of research. First, it adds to the social network and individual performance literatures by demonstrating a relationship between network

structure and both in-role and extra-role performance in a field setting. These results also suggest that the findings of laboratory experiments on group structure from the 1950s (Shaw, 1964) generalize to intact work groups in contemporary organizational settings. In addition, the findings enhance the social network literature by revealing that rarely studied hindrance networks are negatively related to individual in-role and extra-role performance as well as to group performance. Taken together, the results of the current investigation provide a strong rationale for the integration of modern social network analysis and the social psychology of groups.

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