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Abstract

Relationships with leaders do not happen in isolation from the relationships one has with one's peers. Therefore, we examine the influence of leader–member exchange on follower job performance in light of the larger social networks in which followers are embedded. Testing multilevel models with data that were gathered using questionnaires from a sample of 240 nurses and 20 supervisors working at four Dutch hospitals revealed that a positive relationship exists between leader–member exchange and follower job performance when follower workflow network centrality and/or follower friendship network centrality are high but not when they are both low. The results of this study show how the different follower relationships with the supervisor and colleagues intertwine in explaining follower job performance and suggest that the larger network in which followers are embedded within their work teams is important for explaining variations in the results regarding the relationship between leader–member exchange and follower job performance. Our study indicates that leaders should have an eye for the network position of their followers when developing high quality leader–

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member exchange relationships. For followers, a good relationship with their leader is important, but its value depends on their relationships with colleagues.

Keywords

job performance, leader–member exchange, LMX, social exchange, social networks

Based on social exchange theory, leader–member exchange (LMX) theory originally focused solely on the dyadic exchange relationship between a leader and a follower (i.e. the vertical dyad linkage; Dansereau et al., 1975). The central premise of LMX theory is that leaders form relationships of varying quality with their various followers (e.g. Graen and Uhl-Bien, 1995), consequently impacting follower outcomes, such as follower job performance. Most previous research has shown that LMX and follower job performance are positively related (e.g. Janssen and Van Yperen, 2004; Wang et al., 2005); however, heterogeneous effect sizes have been found for this relationship (e.g. Gerstner and Day, 1997; Ozer, 2008). Moreover, a few studies find evidence for a non-significant relationship between LMX quality and job performance (Liden et al., 1993). Therefore, there have been calls in the literature to adequately examine the contextual factors to better understand the mechanisms that cause these variations in the results (e.g. Tangirala et al., 2007).

Recent studies have conducted contingency-based examinations of the relationship between LMX and performance and suggest that there are several relevant moderating variables that influence this relationship (e.g. Cogliser et al., 2009; Martin et al., 2016). In previous research, the moderators of the LMX–job performance relationship refer to the characteristics of the supervisor–follower relationship, such as communication frequency (e.g. Kacmar et al., 2003), the characteristics of the supervisor or the follower (e.g. span of supervision and perceived job security; Harris et al., 2009; Hill et al., 2014; Loi et al., 2011; Schriesheim et al., 2000; Takeuchi et al., 2011), the characteristics of the task (e.g. Dunegan et al., 1992, 2002), such as task variety, and higher level unit or group characteristics, such as LMX differentiation (e.g. Ma and Qu, 2010). What seems clearly underexposed in the relationship between the LMX relationship and follower performance is the follower’s relationships with other relevant people in the work environment. It is likely that exchanges that take place in one kind of relationship seriously affect the effect of exchanges that take place in another type of relationship (Buch, 2015).

In the current study, we investigate the potentially moderating influence of followers’ social networks at work on the relationship between LMX and follower performance for two reasons. First, we respond to several calls in the literature to consider the importance of context in leadership research (e.g. Liden and Antonakis, 2009) by paying more attention to moderators (e.g. Graen and Uhl-Bien, 1995; Liden et al., 1997; Uhl-Bien et al., 2000) and more specifically, by examining LMX and its outcomes in the perspective of the social networks in which followers are embedded (Carter et al., 2015; Graen and Scandura, 1987). In earlier research, exchange relationships have been investigated in

isolation (Buch, 2015), largely disregarding the fact that employees are involved in several relationships at work, such as employee-organization relationships, employee-supervisor relationships, employee-team relationships and employee-customer relationships (Bordia et al., 2010). Recently, it has been advocated that to advance social exchange theory, the interconnections between various relationships should be incorporated into these analyses (Bordia et al., 2017), and recent research has indicated that new avenues have opened up for incorporating the ‘social’ context in which social exchange relationships are embedded (Takeuchi et al., 2011). Therefore, we acknowledge that the leader–member dyad simultaneously exists with other formal and informal organizational relationships in which followers are involved and that LMX should not be studied in isolation (Carter et al., 2015; Liden et al., 1997; Venkataramani et al., 2010).

Second, according to Graen (1976), the relationships that employees have with their supervisors and coworkers are two key social relationships at work. There is evidence that employees exchange different types of resources with supervisors and coworkers (Farh et al., 2017; Jokisaari, 2013; Morrison, 1993). However, there are some untested ideas in the literature regarding whether exchange relationships with supervisors and peers are interconnected (see, e.g., Cole et al., 2002; Settoon et al., 1996), suggesting there is a need to study the interaction between exchange relationships with supervisors and those with peers, as this may improve our ability to predict focal follower outcomes (Buch, 2015; Sherony and Green, 2002). Specifically, we aim to expand the framework of Goodwin et al. (2009), and respond to their call for future research to provide an understanding of how follower network centrality modifies the relationship between LMX quality and follower job performance.

To better capture the nature of exchange relationships (Liden et al., 1997), we focus on two commonly distinguished types of employee social ties in the peer network: workflow ties and friendship ties (Mehra et al., 2001; Umphress et al., 2003). The workflow network encompasses formally specified interdependencies between employees who must interact to complete their tasks (Ibarra, 1993; Mehra et al., 2001), whereas the friendship network is derived ‘from mutual liking, similarity of attitudes, or personal choice’ (Mehra et al., 2001: 130).

Network research and LMX theory both consider the dyadic relationship to be the basic unit of analysis (Ferris et al., 2009; Venkataramani et al., 2010), and both are partly based on exchange- or resource-based theories (Sparrowe and Liden, 1997, 2005). Therefore, it follows that network research is an appropriate approach for studying how various types of exchange relationships may operate in concert. In addition, from a leadership or LMX perspective, a social network approach has been advocated (Carter et al., 2015). Carter et al. distinguish three areas of leadership research that use a network approach. The first area views leadership as an attribute of individuals and includes studies that address the relationship between the social network one is in and being seen or becoming a leader, the position of the leader in a network and the effectiveness of the leader, and the influence of the leader on the development of networks. One example from this area is the study conducted by Balkundi and Harrison (2006), who find that team performance is positively related to the centrality of the leader. The second area considers that leadership is relational (e.g. LMX) and focuses on the antecedents and consequences of leadership network structures (e.g. leadership is either concentrated in

one person or distributed among team members). An example is the study conducted by Erdogan et al. (2015), who find that, among other things, LMX quality is positively related to the advice network centrality of a follower if that follower is willing to help others. The third area that Carter et al. (2015) distinguish focuses on the antecedents and consequences of leadership and other social networks. One example in this area is the study conducted by Wang et al. (2017), who find, among other things, that the relationship between leader–member ties and leadership effectiveness is more positive if the member is more central in the advice and friendship network. Furthermore, Venkataramani et al. (2016) find that the positive relationship between employee workflow centrality and employee voice becomes more positive if those employees' leaders are central in the friendship network. Carter et al. (2015) conclude that there is a paucity of research in this area and, subsequently, a need for more research. Our study focuses on how the network position of the follower modifies the relationship between LMX and follower job performance and is positioned in this third area.

By investigating the moderating role of workflow network centrality and friendship network centrality on the relationship between LMX and job performance, this study contributes to the existing literature in at least four ways. First, studying the collective impact of the two types of follower exchange relationships, that is, LMX and exchanges within the peer network, enhances our understanding of the intertwinement of several different types of social exchanges and the seemingly different or overlapping resources that are exchanged in each type of exchange relationship. Second, this study adds to the small number of LMX studies investigating the impact of broader social networks in which followers are involved. Moreover, we focus on follower job performance as a consequence of leadership and social networks, which is different than the outcomes studied in earlier research. Third, by focusing on follower job performance as a consequence of LMX quality and considering potential moderating variables, we are able to shed more light on the causes of the variations in the results reported by earlier research on the association between LMX and follower job performance. Finally, the current study contributes to the literature on social networks by investigating the moderating impact of two distinct network ties and showing their combined impact on the association between LMX and follower job performance.

Theoretical model and hypotheses

LMX and job performance

High-quality LMX relationships can be characterized as those in which there is mutual trust, respect and obligation, and in which followers grow beyond the formal employment contract (Graen and Uhl-Bien, 1995), while low-quality LMX relationships are limited to role-defined relationships (Liden et al., 1993). The different exchanges that occur in high and low-quality LMX relationships can be explained by social exchange theory. This theory suggests that mutual exchanges in social exchange relationships take place between two parties and that providing benefits to the other party leads to the expectation of receiving a return of equivalent value in the future (Blau, 1964). Numerous studies show that in exchange for receiving tangible and intangible resources from

supervisors, followers appear to reciprocate through behaviors that may benefit the leader (Erdogan and Enders, 2007; Liden et al., 2000), such as higher levels of performance that maintain a balanced social exchange (Ilies et al., 2007; Masterson et al., 2000; Wang et al., 2005).

Although social exchange theory and the norm of reciprocity (Gouldner, 1960) can explain high LMX followers' motivation to exert extra effort (Walumbwa et al., 2011), such as high performance, it does not guarantee that high LMX followers actually have the resources to provide higher job performance. If followers are induced to reciprocate their high-quality LMX by performing better, they need the adequate resources to accomplish this. Initially, it seems likely that the supervisor is in a position to provide these resources. However, a closer look at the kind of resources mentioned in the literature that are primarily transferred from the supervisor to the follower indicates that these resources may not be sufficient to enhance performance. Most of the resources mentioned can be separated into three main categories of practices and policies distinguished in the HRM literature (see, e.g., Jiang et al., 2012).

The first category includes the knowledge, skills and abilities (KSAs) domain. According to the HRM literature, the resources from this domain that leaders can provide are, for example, training opportunities for followers and the transfer of information, knowledge and expertise (e.g. Liden et al., 2006). The second category encompasses HR practices that primarily have motivating potential. Examples of relevant resources from this category mentioned in the LMX literature are rewards, incentives and feedback (e.g. Erdogan and Enders, 2007; Harris et al., 2009; Ilies et al., 2007). The third category refers to HR policies that provide followers with opportunities to enhance their performance. Resources mentioned in the LMX literature that can be placed in this class are empowerment, giving special responsibilities or challenging tasks, giving latitude or job autonomy, giving voice or influence or enhancing participation in decision-making (e.g. Banks et al., 2014; Liden and Maslyn, 1998). In addition to these three main resource categories, leaders may show their approval of followers through social support, attention, nurturing, loyalty or respect (e.g. Dunegan et al., 1992; Liden and Maslyn, 1998). Further, leaders may support the careers and promotions of followers (e.g. Boyd and Taylor, 1998; Erdogan and Enders, 2007) and finally, they may provide tangible resources such as equipment, materials or budgets (e.g. Liden and Maslyn, 1998; Walumbwa et al., 2011).

Some of the resources mentioned above may directly help followers enhance their performance through the acquisition of information, knowledge and some of the tangible resources. However, most of the mentioned resources are more indirect ways of helping followers enhance their performance by creating optimal conditions for them to provide good performance (e.g. resources in the 'opportunity' category), primarily have a motivating effect (e.g. rewards and positive approval) or facilitate performance enhancement in an indirect way (e.g. training and careers). Moreover, at least in the organizational context of our study, supervisors (i.e. head nurses) do not directly contribute to the primary processes (i.e. patient care) and generally are not immediately available because they work in a different location from where nurses provide patient care; therefore, they do not conduct direct supervision (Molleman and Van Knippenberg, 1995). Besides, most head nurses have not directly provided direct patient care for several years and probably do not

possess the adequate expertise anymore about the newest advanced nursing practices and techniques that are important for good follower performance. In addition, if, for example, a nurse has to prepare a patient for radical surgery or comfort a highly emotional patient, the head nurse will not be there to support that nurse. Therefore, it is reasonable to assume that supervisors do not have sufficient resources to help followers actually enhance their performance for many of their core tasks. In the following, we argue that these additional resources may come from the followers themselves, and if they do not possess them, they may be obtained from other colleagues on the ward. In addition, Jokisaari (2013), who conducted a study among the employees of municipalities, and Farh et al. (2017), who studied teams of MBA students, both indicate that the resources provided by supervisors differ from those that are exchanged between team members.

The role of the workflow network

A good indicator that a follower has extra resources him- or herself is his or her position in the workflow network. Workflow networks are seen as being instrumental for doing one's job properly (Lincoln and Miller, 1979; Mehra et al., 2001). The workflow network represents a highly restricted interaction network where the ties among employees are based on their formal role and in the course of performing appointed work roles (Brass and Burkhardt, 1992; Lincoln and Miller, 1979; Podolny and Baron, 1997). Via workflow ties, job-related resources, including information, material resources, expertise and knowledge, are exchanged (Balkundi and Harrison, 2006; Ibarra, 1993; Umphress et al., 2003). Workflow ties reflect task interdependence between followers because the workflow network involves formally established relationships between followers who must interact to complete their task (Mehra et al., 2001).

Referring to the possible asymmetry of workflow ties, two types of interdependence have been distinguished in the literature; that is, received task interdependence and initiated task interdependence. Received task interdependence refers to the dependence of a follower on coworkers in successfully performing a job (Kiggundu, 1983); it indicates that the follower needs instrumental resources from coworkers just to perform well and that these followers do not have a wealth of relevant resources themselves for reciprocating a high-quality LMX relationship by enhancing performance.

Initiated task interdependence represents coworkers' dependence on the follower and indicates that coworkers need resources from that particular follower such as expertise and help regarding work-related matters (Balkundi and Harrison, 2006; Bunderson, 2003; Goodwin et al., 2009; Kiggundu, 1983; Sparrowe et al., 2001). In a nursing context, for example, novices are highly dependent on more experienced nurses, among other things, for prioritizing tasks to be able to complete them during their shift, especially when the workload is high. Those who score high on initiated task interdependence are able to control relevant resources that coworkers need to do their work properly and so initiated task interdependence signals that they have many resources (Brass and Burkhardt, 1993; Settoon and Mossholder, 2002). Therefore, initiated task interdependence – and not received task interdependence – seems relevant if one wants to provide good performance to reciprocate a high-quality LMX relationship. Therefore, we focus on this kind of task interdependence.

As previously stated, initiated task interdependence means that resources flow from the follower to the coworkers; therefore, that follower will be more central in the team's workflow network. In the network literature, this refers to workflow network centrality and thus this resembles initiated task interdependence (Brass and Burkhardt, 1993; Bunderson, 2003). Since we primarily focus on the network perspective, we use the term workflow network centrality. The idea that those central in the workflow network actually possess a relatively large number of resources, such as skills, knowledge, expertise, information, professional advice and materials, has been generally supported by the literature (Ibarra, 1993; Settoon and Mossholder, 2002; Venkataramani et al., 2016; Wang et al., 2017). It seems reasonable to expect that high centrality in the workflow network indicates that the central follower can employ these job-related resources at his or her disposal to reciprocate a high-quality LMX relationship with higher job performance. We hypothesize the following:

Hypothesis 1: Workflow network centrality moderates the relationship between LMX and follower performance; the higher the workflow network centrality is, the more positive this relationship becomes.

The role of the friendship network

In work settings, social network theory often distinguishes friendship ties besides workflow ties (e.g. Balkundi and Harrison, 2006; Ibarra, 1992; Ibarra and Andrews, 1993; Lamertz and Aquino, 2004; Umphress et al., 2003). Friendship ties have also been labeled as informal or expressive ties (Lincoln and Miller, 1979; Mehra et al., 2001). In contrast with the workflow network, the friendship network is less restricted to formal structures and work roles because employees have more freedom in choosing their friends among their coworkers and consequently represents more individual choice and initiative, reflecting interpersonal liking (Ibarra, 1993; Mehra et al., 2001; Podolny and Baron, 1997). Relationships in this type of social network are rather stable and driven by mutual liking or similarities rather than workflow dependence (Zagenczyk et al., 2010). Another important difference between workflow and friendship ties is that friendship ties are, in general, reciprocal (see, e.g., Bowler and Brass, 2006; Kenny and La Voie, 1982; Kilduff, 1992), while this is often not the case for workflow ties (Ibarra and Andrews, 1993).

Friendship ties with coworkers serve not only social-emotional goals but also instrumental goals (Boyd and Taylor, 1998). Following from beliefs about mutual altruism, friendships with coworkers create a safe environment for sharing ideas and stability for exploring one's uncertainties and thoughts (Gibbons, 2004). In addition, friendship ties with coworkers may also be instrumental in obtaining other relevant resources, such as information or assistance (Brass, 1984), and, as such, friendship networks are also systems for supporting decision-making, mobilizing assistance and concealing or transmitting information (Lincoln and Miller, 1979). For example, because in complex decision-making the selection of alternatives is one of the most difficult steps, the friendship network may help simplify complex decision-making for employees because they

can select alternatives based on the information regarding the selections made by friends (Kilduff, 1992). In a nursing context, support from colleagues may be very important for managing complex care demands or coping with stressful events such as patients who are in severe pain, are very anxious or respond disorderly to the situation they are in. In this sense, the support of friends may be very instrumental in adequately responding to such situations.

Being central in the friendship network is therefore an advantageous position for acquiring additional resources from peers. Central followers in the friendship network can employ these additional affective and instrumental resources to reciprocate their LMX relationship with higher job performance if they do not have these resources themselves. Moreover, friendship network ties derive more from individual choices and initiative (Mehra et al., 2001), which restrain the central follower's freedom to a much lesser extent than workflow network ties. These arguments, which stress the availability of extra resources and the freedom to use them, lead us to predict that being central in the friendship network enables and motivates followers to translate high-quality LMX into higher job performance. Particularly in a situation of low workflow network centrality, we expect friendship network centrality to strengthen the positive relationship between LMX quality and job performance. When a follower has fewer job-related resources, centrality in the friendship network likely provides access to the extra resources needed to still be able to reciprocate the LMX relationship with higher job performance. Therefore, we hypothesize the following three-way interaction:

Hypothesis 2: A follower's friendship network centrality moderates the interactive effect of LMX quality and that follower's workflow network centrality on job performance in such a way that the relationship between LMX quality and job performance is positive and significant when friendship network centrality and/or workflow network centrality are high but not when they are both low.

Method

Sample and procedure

The research population consisted of 384 nurses and their supervisors working in 20 wards at four Dutch hospitals. Of this population, 240 nurses (response rate = 63%) and 20 supervisors (response rate = 100%) completed the entire questionnaire, and 15 nurses completed only part of the questionnaire. The average size of the wards, excluding supervisors, was 19 followers. The supervisors were mostly women (80%). The followers were also mostly women (93%) and were on average 40 years old; the minimum age was 20, and the maximum age was 62. The average organizational tenure was 14 years, and, on average, the nurses had been in their current position for 11 years.

An expert group including the hospitals' managers and policy advisors reviewed the questionnaires, and three nurses from the cardiology department of one of the hospitals pilot tested the questionnaires before they were administered at the hospitals. Considering the nurses' voluntary participation in this study and because nurses needed to rate their

coworkers and were rated themselves by their coworkers on several items, we guaranteed that the responses of the participants were strictly confidential. Pre-coding the questionnaires enabled us to match the responses of supervisors, followers and coworkers (see the next subsection).

Measures

To diminish concerns regarding common source, the data used in this study were provided by three sources (i.e. supervisors, coworkers and followers). Supervisors rated their followers' job performance. In addition, followers' workflow network centrality and followers' friendship network centrality were measured with a round-robin design in which each team member rated and was rated by every other team member (Marsden, 1990; Warner et al., 1979). Respondents were provided with a roster, which is a list containing the names of all the coworkers that work on the same ward. Coworkers' ratings were used to capture their workflow network centrality. In addition, we combined both the respondent's and the coworkers' ratings to capture friendship network centrality; that is, mutual liking. Specifically, we used the average connection of the follower with all the other coworkers in the work unit (Brass, 1984; Wasserman and Faust, 1994). We used single-item measures for the two types of network centrality, which is considered to be acceptable in network studies because asking several questions per measure about each other coworker in the workgroup would require great effort from the participants (e.g. Marsden, 1990; Venkataramani et al., 2010). Finally, respondents self-reported the LMX quality of the relationship with their supervisor.

LMX quality. To measure LMX quality, we used 11 items of the 12-item scale derived from Liden and Maslyn (1998). Sample items include 'I like my supervisor very much as a person,' 'My supervisor would come to my defense if I were "attacked" by others' and 'I do work for my supervisor that goes beyond what is specified.' Responses were provided on a seven-point scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). Based on the feedback provided by the expert group, we excluded the item 'My supervisor is the kind of person one would like to have as a friend' because the experts indicated that nurses in general do not regard or think of their supervisor as a (potential) friend and would thus see this item as irrelevant. Cronbach's alpha for the 11 items was .91.

Workflow network centrality. Instrumental relationships among employees are likely to be asymmetrical ties (Ibarra and Andrews, 1993). Therefore, to measure workflow network centrality, we followed the common practice of calculating a network centrality measure that is based on the incoming nominations of coworkers (Venkataramani and Tangirala, 2010). Specifically, we used the workflow network measure proposed by De Jong et al. (2007), asking participants to rate each of his or her direct coworkers on the item: 'How dependent are you *on X* for materials, means and information in order to carry out your work adequately?' The scale for this item ranged from 1 (*totally not dependent*) to 7 (*totally dependent*).

We used UCINET 6 (Borgatti et al., 2002) to create workflow centrality scores for each respondent. Respondents rated each direct coworker in their ward. These ratings were used to create a directed adjacency matrix in which respondents working in the same ward were connected with an outgoing and incoming score that ranged between 1 and 7. On average, respondents gave their direct coworkers a score of 3.60, indicating moderate interdependence between direct coworkers. The standard deviation of this measure, however, was relatively large ($SD = 1.41$), which indicates that some respondents were more dependent on their coworkers than others.

Workflow centrality was computed by averaging all the incoming scores that a respondent received from his or her direct coworkers. Given the relatively small size of the networks here, using respondents' direct connections (rather than indirect connections, which are used in more complex network centrality measures; see Marsden, 1990) provided the most meaningful indicator of the respondents' workflow network centrality (see Wasserman and Faust, 1994; see also Bunderson, 2003). Furthermore, we averaged all the incoming ties, rather than summing the incoming ties that were above an arbitrary threshold,¹ to make optimal use of the richness of our data (Opsahl and Panzarasa, 2009). Hence, the workflow network centrality measure captures the extent that a respondent's direct coworkers were, on average, dependent on the respondent's workflow to carry out their work.

Friendship network centrality. Expressive relationships tend to be reciprocated ties (Ibarra and Andrews, 1993). Specifically, friendship networks involve mutual liking among employees (Mehra et al., 2001). We therefore measured friendship network centrality with a social network question about the degree that coworkers liked each other. The respondents rated each of their coworkers by the item 'How do you generally feel about this coworker?', which is based on the measure of expressive ties proposed in Umphress et al. (2003). The responses were provided on a seven-point scale ranging from 1 (*dislike a lot*) to 7 (*like a lot*).

We used the same procedure in UCINET as before to compute a network centrality score for each respondent (Borgatti et al., 2002). On average, the respondents attributed a score of 5.54 ($SD = .71$) to their direct coworkers, indicating moderate to strong friendship relationships between respondents that worked in the same ward. As noted above, we accounted for reciprocated friendship ties by symmetrizing each relationship. In doing so, we created an undirected adjacency matrix in which a respondent's incoming and outgoing ties were averaged (Knoke and Yang, 2008). Subsequently, we computed a respondent's friendship centrality by taking the average of all the friendship ties between a respondent and his or her direct coworkers. Hence, a lower score indicates that a respondent was less liked among his or her direct coworkers, whereas a respondent with a higher score occupied a more central position in his or her friendship network.²

Job performance. To measure nurses' overall performance, Molleman and Van der Vegt (2007) developed a scale that contains six criteria that define high-standard nurse performance, including 'dedication,' 'communication,' 'self-reliance,' 'demonstrating accountability,' 'administrative work' and 'planning of work.' Based on these six criteria and in close cooperation with the expert group, 10 items were carefully chosen to measure job

performance. These items are provided in Appendix A. Before we asked the supervisors to rate their followers on job performance, we informed them that the ratings would be confidential and would only be used for research purposes. Subsequently, for every follower, supervisors were asked to indicate how satisfied they were with the follower's performance regarding these 10 items. The responses were provided on a five-point scale ranging from 1 (*very dissatisfied*) to 5 (*very satisfied*). Cronbach's alpha for the 10 items was .87.

Control variables. To determine whether demographics, (i.e. 'age, sex' and organizational tenure) should be controlled for, we followed Becker's (2005) recommendations, which include being beware of control variables that are uncorrelated with the dependent variable because including controls that are uncorrelated with the dependent variable in analyses reduces statistical power. Further, Becker recommends conducting the analyses both with and without the controls and if the results do not differ, reporting only the analyses without the controls. Initially, we included age (in years), sex (male = 0; female = 1) and organizational tenure (in years) as control variables in our analyses, but the results did not differ with and without these controls. Furthermore, the controls were uncorrelated to the dependent variable (see Table 1); thus, following the recommendations of Becker, we excluded these control variables from further analyses. We also ran the analyses with several unit-level and hospital-level controls: the percentage of men, average organizational tenure, average workflow network centrality, average out-degree centrality' and average task interdependence (i.e. 'the average of in-degree and out-degree workflow network centrality) at the unit-level and at the hospital-level, but the results did not differ with and without these controls.

The individual-level data are nested within the wards. We performed random effects maximum likelihood regression analyses to estimate the variance components for our models. We fitted an empty model for job performance to calculate the intraclass correlation (ICC1). The ICC1 for performance (ICC1 = .08, $p < .01$) indicates that multilevel models are needed. We therefore applied multilevel analyses when testing all the models. However, we did not include random effects in the multilevel analyses for the hospitals because the number of hospitals (four) is so low that it would be rather pointless (Raudenbush and Bryk, 2002; Snijders and Bosker, 1999). Therefore, we created three dummy variables to capture the hospitals ('Dummy 1,' 'Dummy 2' and 'Dummy 3'), but including these dummy variables in the analyses as control variables did not influence the results. Therefore, again based on Becker's recommendations, we do not include these control variables in our analyses.

Results

Descriptive statistics

The means and standard deviations for the variables and Pearson correlations between the variables are presented in Table 1. The correlation between LMX and job performance ($r = .25$, $p < .001$) is positive and significant. Furthermore, the correlation between LMX and workflow network centrality (i.e. 'coworkers' dependence on the

Table 1. Descriptive statistics and Pearson zero-order correlations among the study variables.

Variable	Mean	Standard deviation	1	2	3	4	5	6
1 Age	40.23	10.72						
2 Sex (male = 0; female = 1)	0.93	0.26	-.08					
3 Organizational tenure	13.62	10.32	.66***	-.07				
4 Leader-member exchange	4.65	1.01	-.14*	-.04	-.11			
5 Workflow network centrality	3.54	0.56	.08	-.18**	.14*	-.04		
6 Friendship network centrality	5.57	0.53	-.02	.09	-.02	.26***	.10	
7 Job performance	3.73	0.47	.05	-.03	.01	.25***	.20**	.26***

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

follower) is not significant ($r = -.04$), while the correlation between LMX and friendship network centrality is significant and positive ($r = .26, p < .001$). In addition, workflow network centrality is significantly correlated with job performance ($r = .20, p < .01$), and friendship network centrality is also significantly and positively correlated with job performance ($r = .26, p < .001$). Finally, network centrality measures are often positively skewed and thus violate normality assumptions (e.g. 'Erdogan et al., 2015). We note, however, that our workflow centrality and friendship centrality measures were approximately normally distributed, and both had acceptable skewness indices (-.25 and -.50, respectively; Mardia, 1970).

Hypotheses testing

We regressed job performance on the independent variables in three steps. In the first step, we included the main effects of LMX quality, workflow network centrality and friendship network centrality (see Table 2, model 1). In the second model, we added the two-way interactions of LMX quality by workflow network centrality, LMX quality by friendship network centrality, and workflow network centrality by friendship network centrality. In the third model, we added the three-way interaction between LMX quality, workflow network centrality' and friendship network centrality. To test our hypotheses, we conducted moderated regression analyses following the procedures recommended by Aiken and West (1991): (1) standardize the predictors to reduce multicollinearity between the variables and their interaction term; (2) multiply the standardized predictor variables to calculate their interaction term; (3) include the 'main' effects in the model to prevent a biased estimate of the interaction; (4) report unstandardized weights; and (5) to depict a significant interaction effect, compute regression equations using values of the predictors that lie ± 1 SD from their means.

In Hypothesis 1, we predicted that workflow network centrality would moderate the relationship between LMX and follower performance and that this relationship would be more positive if workflow network centrality is high. Table 2 indicates that although the sign of the weight of the two-way interaction between LMX and workflow network

Table 2. Results of multilevel regression analyses for job performance.^a

Step and variables	Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE
Intercept	3.72***	(0.07)	3.71***	(0.07)	3.72***	(0.07)
Leader–member exchange (LMX)	0.10**	(0.03)	0.11***	(0.03)	0.12***	(0.03)
Workflow network centrality (WNC)	0.17***	(0.03)	0.16***	(0.03)	0.19***	(0.03)
Friendship network centrality (FNC)	0.04	(0.03)	0.05	(0.03)	0.04	(0.03)
LMX × WNC			0.03	(0.03)	0.01	(0.03)
LMX × FNC			0.05*	(0.02)	0.04	(0.02)
WNC × FNC			−0.03	(0.02)	−0.04	(0.02)
LMX × WNC × FNC					−0.06**	(0.02)
Deviance statistic (−2 log likelihood)	215.11		207.08		196.33	
Change in deviance statistic			8.03*	d.f. = 3	10.75**	d.f. = 1

^a*n* = 240 followers. Non-standardized regression coefficients are reported. SE = standard error; LMX = leader–member exchange; WNC = workflow network centrality; FNC = friendship network centrality.

p* < .05; *p* < .01; ****p* < .001.

centrality is in the predicted direction, it is not significant (Model 2, LMX × WNC, *B* = 0.03, *ns*). So our first hypothesis is not supported. However, this model (Model 2) shows that a significant interaction exists between leader–member exchange and friendship network centrality (Model 2, LMX × FNC, *B* = 0.05, *p* < .05). This significant weight indicates that the positive relationship between LMX and job performance is more positive if friendship network centrality is high (see Figure 1).

The results show a significant three-way interaction between LMX quality, workflow network centrality and friendship network centrality on follower job performance (Model 3, *B* = −0.06, *p* < .01). To test whether the form of this three-way interaction corresponds with the hypothesized pattern, we plotted the interaction in Figure 2. We hypothesized that friendship network centrality would moderate the interactive effect of LMX quality and workflow network centrality on followers' job performance in such a way that the relationship between LMX quality and job performance is positive and significant when friendship network centrality and/or workflow network centrality are high but not when they are both low.

There is a significant positive relationship between LMX quality and job performance for followers with low workflow network centrality and who are central in the friendship network (simple slope = 0.21, *p* < .001; Figure 2a). However, there was no significant relationship between LMX quality and job performance for followers with low workflow network centrality and who are less central in the friendship network (simple slope = 0.02, *ns*; Figure 2a). Furthermore, Figure 2b shows that a significant positive relationship exists between LMX quality and job performance for followers with high workflow network centrality. This is true for those followers who are central in the friendship

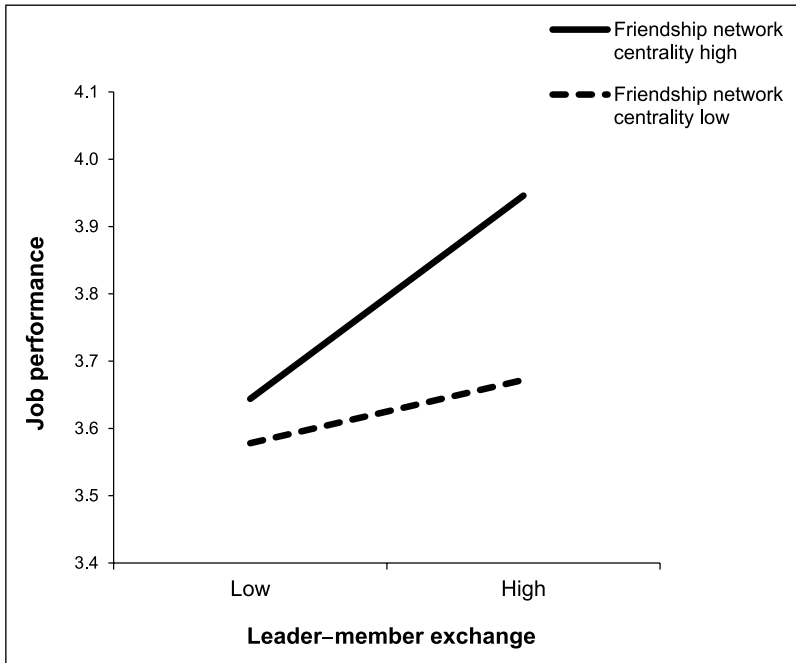


Figure 1. Interaction between leader-member exchange and follower friendship network centrality on follower job performance.

network (simple slope = .11, $p < .05$) as well as for followers who are less central in the friendship network (simple slope = .15, $p < .01$). A slope difference test (Dawson and Richter, 2006) indicates that for followers with high workflow network centrality, the slopes of high versus low friendship network centrality do not differ significantly ($t = -0.844$, $p = ns$, Figure 2b), while they differ significantly for followers with low workflow network centrality ($t = 3.89$, $p < .001$, Figure 2a). These findings are in line with our second Hypothesis.

Discussion

In this study, we tested the moderating influence of followers' peer network on the relationship between LMX quality and follower job performance. We examined the interconnections among the different types of employee relationships. Additionally, we intended to enhance our understanding of the variations in the results regarding the relationship between LMX quality and follower job performance. Therefore, to develop our understanding of social contextual factors that influence this association, we incorporated both followers' centrality in the workflow network and followers' centrality in the friendship network into our conceptual model as potential moderators.

We did not find support for the hypothesized interaction between LMX and workflow network centrality (Hypothesis 1). We argued that the motivation to provide high

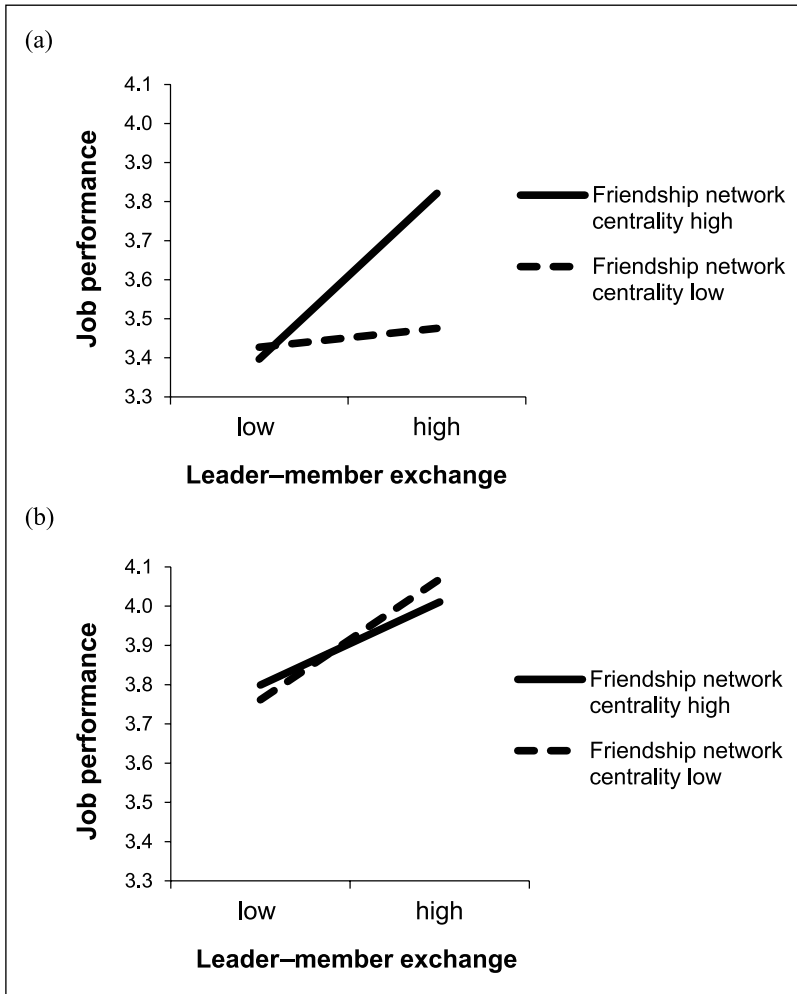


Figure 2. Three-way interaction between leader–member exchange, friendship network centrality and workflow network centrality on follower job performance.

Figure 2a. Workflow network centrality low.

Figure 2b. Workflow network centrality high.

performance comes from a high-quality LMX relationship and that a high level of workflow network centrality indicates that one possesses the resources for reciprocating a high-quality LMX relationship by providing a higher performance. Recent research has shown that a high level of workflow network centrality (referred to as asymmetric task dependence) leads to high levels of felt responsibility and that this is accompanied by increased motivation to perform well (Poile, 2017), which indicates that being central in the workflow network is motivating in itself to provide good performance and therefore may not strengthen the positive relationship between LMX and follower

performance. The main effect of workflow network centrality (see Table 2) underscores this post hoc explanation for not finding the hypothesized interaction effect.

We find a non-predicted significant interaction between LMX and friendship network centrality (Figure 1). The significant three-way interaction, however, clearly showed that this interaction between LMX and friendship network centrality only occurs if workflow network centrality is low (Figure 2a). In other words, our results show that when coworker dependence on a follower is high – indicating high workflow network centrality and control over valued job-related resources – friendship network centrality does not affect the relationship between LMX quality and job performance (Figure 2b). On the other hand, when coworker dependence on a follower is low – indicating low workflow network centrality and less control over valued job-related resources – there is only a positive relationship between LMX and job performance when friendship network centrality is high.

In particular, the three-way interaction effect shows that when a follower is central in the workflow network, the follower can reciprocate high LMX quality with higher job performance regardless of his or her friendship network centrality, whereas in a situation of low workflow centrality, a follower can only reciprocate high LMX quality with higher job performance when his or her friendship network centrality is high. Apparently, when followers have job-related resources at their disposal, as indicated by their centrality in the workflow network, being central in the friendship network and the benefits this brings along, does not additionally amplify the positive relationship between LMX quality and follower job performance. It seems that friends are willing to provide extra resources, but this follower does not need these resources because he or she already possesses these extra resources. On the other hand, when followers have fewer job-related resources at their disposal, as indicated by their less-central position in the workflow network, centrality in the friendship network still enables followers to translate high-quality LMX into higher job performance.

Theoretical contribution

Our findings make several important contributions, which relate to theory on LMX quality and social networks. First, in our study, we use a more integrated approach regarding the diverse relationships that exist within an organization. Research that includes employee relationships with both the supervisor and with peers in one empirical investigation is scarce, resulting in a lack of understanding regarding whether one type of relationship still matters in the presence of the other (Liao et al., 2010). The current study provides support for the suggestion made by Settoon et al. (1996) that employees need multiple exchange relationships. When both friendship network centrality and workflow network centrality are low, there is no significant relationship between LMX and follower job performance. Apparently, in addition to the resources and support that are obtained in a high-quality LMX relationship, followers need the resources and support that are exchanged in their relationships with coworkers to enhance their job performance.

Second, by including the moderating influence of followers' network centrality in the research model, we contribute to studies that examine moderators for the relationship

between LMX and follower consequences (see, e.g., Dunegan et al., 2002; Erdogan and Enders, 2007; Takeuchi et al., 2011; Tangirala et al., 2007). We considered the context in leadership research and examined LMX and its outcomes from the perspective of the larger social networks in which followers are embedded, addressing a gap in the literature (e.g. Liden and Antonakis, 2009; Liden et al., 1997). Our results show that follower social networks have a moderating influence on the relationship between LMX and follower job performance and that, consequently, the other formal and informal relationships in which followers are involved should not be neglected when studying the effects of LMX quality on followers. Whether LMX quality is related to follower job performance or not depends on the moderating influence of follower centrality in the peer network. Although LMX quality motivates followers and provides followers with opportunity enhancing, motivating and facilitating resources offered by supervisors that allow followers to reciprocate with higher job performance, centrality in the peer network provides followers with the ability to actually act on high LMX quality through the extra resource availability inherent to their central position in the peer network.

Third, the results shed more light on the causes of variations in the results that have been found in earlier research on the association between LMX and follower outcomes (e.g. Gerstner and Day, 1997; Liden et al., 1997). This study shows that a positive LMX–job performance relationship is influenced by followers' network centrality. When both follower friendship network centrality and follower workflow network centrality are low, LMX quality does not seem to impact follower job performance, probably because the follower simply is not able to acquire the adequate resources to do so. On the other hand, when follower centrality in the friendship network is high and workflow network centrality is low, LMX quality and job performance are positively related. Thus, the variations in the results regarding LMX and follower outcomes might be explained by the social networks in which followers are involved.

These results also contribute to the social network literature. Our results confirm the importance of distinguishing several network types (e.g. Gibbons, 2004; Liden et al., 1997). Explicitly, we find that when followers are not central in the workflow network and thus control fewer job-related resources, being central in the friendship network still provides these followers with the additional resources needed to reciprocate high LMX quality with higher job performance. Moreover, the results suggest that when followers are central in the workflow network and thus control job-related resources to a greater extent, they are able to reciprocate high LMX quality with higher job performance, regardless of their centrality in the friendship network.

Practical implications

Although it has been recommended to ensure that supervisors form high-quality LMX relationships with their followers, our results indicate that this does not necessarily lead to higher follower job performance. Our results show the importance of followers' relationships with coworkers in determining the impact of LMX quality. Supervisors should be aware that unless a follower is central in the workflow or friendship network, building a high-quality LMX relationship with that follower will not enhance his or her job performance. Because it seems to be an established finding that high- and low-quality social

networks coexist within the same work group (Erdogan and Bauer, 2010), having a better understanding of these networks of followers could help supervisors prioritize the followers with which they should build high-quality LMX relationships. In addition, supervisors should be aware that the performance behavior of followers is not only directly affected by their LMX relationship, but it is also influenced by the broader social context in which the follower is embedded.

Furthermore, followers should develop high-quality exchange relationships not only with their supervisors but also with their coworkers to ensure positive performance outcomes result from their LMX relationships. As suggested by Goodwin et al. (2009), followers may become central in their organizational networks by intentionally accepting the responsibility that brings them into contact with many functions and individuals in positions of authority. The human resource department can become more actively involved in providing followers with opportunities to interact by organizing events that include interactions, such as colocation, meetings, conferences, social events, employee roundtables, internal electronic communication networks, company sponsored mentoring programs, orientation sessions, socialization and job rotation; followers can use these events to create strong network linkages (Uhl-Bien et al., 2000).

In a nursing context, supervisors can use a buddy system, where more experienced nurses partner with less experienced nurses, to stimulate interactions between nurses who are less central in the network and nurses who are more central in the network. Supervisors can also stimulate less-central nurses to join specific work groups or to become experts on a certain topic, such as electronic patient records or nursing protocols, which makes other nurses more dependent on them. Furthermore, currently, supervisors in the nursing context face high turnover among nurses. It can be difficult to know beforehand whether a newly hired nurse will perform well or become a central actor in the friendship network. When hiring new nurses, therefore, supervisors could try to hire only experienced nurses who will be more central in the workflow network because they will provide a good performance regardless of their centrality in the friendship network.

Strengths, limitations and future directions

We chose to measure LMX using follower ratings and recognize that our findings may not be generalizable to LMX measured from a supervisor's perspective because supervisors and followers may have different perceptions of exchange quality (Erdogan and Enders, 2007; Gerstner and Day, 1997). In line with the arguments of Erdogan and Enders (2007), who examined the moderating impact of perceived organizational support on the relationship between LMX quality and follower outcomes, we were especially interested in the follower's perspective because followers should reciprocate with performance when they perceive their LMX to be of high quality.

The generalizability of our findings may be limited because our sample consists only of nurses. Nevertheless, we believe that for occupations that encompass (semi-) professional work, having supervisors or managers that operate from a greater distance is rather common, which implies that such managers are often not in the position to offer resources that are needed to enhance the performance when these professionals do their work.

These professional occupations include, for example, physicians, lawyers, engineers and scientists. In addition to nurses, semiprofessional occupations include, for example, paramedical workers, social workers, teachers and policemen. It is likely that our results are also valid for such occupations. Moreover, nursing and many other work contexts have introduced work systems, such as self-managing teams, where managers operate from a distance and do not intervene in daily work (e.g. Molleman and Van Knippenberg, 1995). We believe that our results may also be generalized to such work settings. However, these generalizations are rather speculative, and to expand the applicability of our results, in future research, this line of research should be extended to other occupations and work settings.

As in most social network studies (Umphress et al., 2003), we used a cross-sectional design. We are therefore limited in drawing strong conclusions regarding the direction of causality between the variables. The results of this study align with our theoretical arguments, and the impact of LMX quality on follower job performance has been well established in earlier research, but the actual causality might differ from what we hypothesized. It is possible that a good performance triggers the leader to develop trusting, reciprocal relationships, and it may also be the case that leaders prefer to develop high-quality LMX relationships with well-liked, highly central followers. Therefore, we recommend using a stronger design, such as a longitudinal design, for future research. For example, a cross-lagged panel design, using the same constructs, would enhance the ability to draw more precise conclusions regarding causality.

Another potential weakness of our study is that we apply a single-item measure for followers' friendship network centrality and followers' workflow network centrality. We used a round-robin design. In this design, every follower rates and is rated by every other team member; therefore, multiple measurements are used and thus the risk of error should be reduced (Denissen et al., 2008; Kenny, 1994). Nonetheless, if feasible, multiple item measures should be used for network centrality.

One strength of this study is that the data were provided by three sources (i.e. supervisors, coworkers and followers), reducing common source concerns. Supervisors provided data on follower job performance, and the followers provided data on LMX quality. Moreover, our network measures are stronger measures than data that are self-reported. Coworkers rated followers' workflow network centrality, and a combination of followers' and coworkers' ratings was employed to measure mutual liking; this information established the basis for the measure of followers' workflow network centrality and friendship network centrality, respectively.

In this study, we examine the role of degree centrality in the relationship between LMX and follower job performance, as this type of centrality measure closely resembles the availability of resources. Of the three types of network centrality measures distinguished by Freeman (1979), degree centrality is based solely on direct connections. It might be interesting for future studies to analyze the role of the other two measures of centrality as well, that is, betweenness and closeness measures of centrality. These two types of network centrality measures also consider the indirect and mediating connections between individuals (see, e.g., Brass and Burkhardt, 1992).

Our study indicates that the broader social network can predict when LMX will be positively related to follower's performance. Future research should also include the

moderators from previous research that have proven to be relevant to see if the broader social network variables explain the variations in the LMX-performance relationship beyond the moderators used in this study.

Our research could be extended by including other LMX outcomes as dependent variables in the research model. We suggest, for example, investigating the moderating roles of follower workflow and friendship network centrality on the relationship between LMX and affective organizational commitment, which is also a frequently studied outcome of LMX (Cogliser et al., 2009) for which the effect size of the relationship with LMX quality has also been heterogeneous in prior studies (e.g. Gerstner and Day, 1997). Liden et al. (1997) note that the findings of previous studies have been inconsistent regarding the relationship between LMX and turnover, warranting future research that examines the role of moderators, such as followers' centrality in peer networks.

In the current study, we theorized and analyzed our data at the individual level. In doing so, we have delivered an important contribution to the literature by examining network centrality as a moderator of the LMX quality-follower performance relationship (see also Goodwin et al., 2009). Future research could use a similar approach to examine the LMX-performance linkage beyond the individual level. On the dyadic level, for example, it might be interesting to investigate whether an individual's LMX relationship is influenced by his or her friendship network (e.g. so that followers with a friendship connection develop similar LMX relationships with the same leader). At the same time, followers may be more likely to become friends when they share a similar LMX relationship with their leader (i.e. because of network transitivity; Louch, 2000). A network approach could also generate meaningful insights when applied at the group level of analysis. It may be interesting to examine whether group-level network variables influence the extent to which followers develop stronger or weaker LMX relationships with their supervisor. In groups where workflow network density is high (indicating that there is a high incidence of dependence on each other for materials, means and information in order to carry out work adequately; Friedkin, 1981), for example, employees may focus more on the quality of their relationships with their coworkers rather than with their leaders. In sum, we think that the design we used opens avenues for interesting and relevant research on different aspects of human relations.

Conclusion

This study sheds light on the social context in which the leader-member dyad is embedded. We show that the degree and presence of the positive effect of building high-quality LMX relationships on follower job performance is dependent on other follower's interpersonal relationships at work, on the specific type of these interpersonal relationships and the combinations of these relationships. Supervisors and followers should be aware that follower job performance is not only influenced by the quality of LMX relationships but also by the quality of the follower's relationships with coworkers, so they can take the appropriate actions to improve follower job performance. The results of this study are encouraging, and it will be interesting to further explore how the social context in which leader-member dyads are embedded might

determine the impact of LMX on outcomes. Furthermore, we hope that the present study will inspire organizations and researchers to consider how different social relationships intertwine in impacting employee outcomes.


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Notes

- 1 We note that using this ‘threshold’ approach yielded highly similar estimates and significance patterns in all of our subsequent analyses. Specifically, we dichotomized (so that scores 4 and lower were coded as 0, and scores 5 and higher were coded as 1) and summed all the incoming network ties. Subsequently, we used these dichotomized data in UCINET 6 (Borgatti et al., 2002) to create a centrality measure for a respondent’s workflow network (see Marsden, 1990). When this measure was used as an alternative to the workflow centrality measure reported above, the results and conclusions remained virtually identical. The same procedure was used for the friendship network measure reported below, with similar results. These analyses and results are available from the third author.
- 2 We note that our measure of friendship centrality deviates from previously used measures of centrality as we focused on mutual liking and assumed that the follower with the highest mutual liking score is the most central player in the unit’s friendship network.

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Appendix A

Questionnaire items regarding job performance

1. Nursing skills
2. Knowledge concerning nursing skills
3. Communication with the patient/family of the patient
4. Communication about the patient
5. Collaboration
6. Administration
7. Planning of tasks
8. Improving care and coordination
9. Job involvement
10. Improving the image/performance of the ward