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Résumé

Les limites sociales et géographiques de l'infirmier-cadre supérieur et des médecins responsables : une application de l'analyse des réseaux sociaux

Elizabeth West et David N. Barron

Cette étude a pour objectif de décrire les limites sociales et géographiques des réseaux d'infirmiers-cadres supérieurs et de médecins responsables et gestionnaires dans les hôpitaux de soins de courte durée au Royaume-Uni. Une enquête téléphonique a été effectuée au moyen des méthodes d'analyse des réseaux sociaux. Un échantillon aléatoire a été sélectionné à partir d'une liste nationale et échantillonné à répétition jusqu'à ce que 100 répondants aient été interviewés. Le taux de réponse obtenu a été de 49,5 %. Les membres des deux groupes avaient tendance à discuter « de questions professionnelles importantes » avec des personnes semblables à eux sur le plan de la profession, du sexe, de l'âge et de l'ancienneté, les médecins affichant une attitude plus marquée à cet égard. Il en ressort que les coupures dans le réseau de liens informels entraveront la dissémination de l'information et de l'influence sociale entre ces deux groupes importants. Les gestionnaires (non qualifiés cliniquement) semblent jouer un puissant rôle de « courtage ». Les réseaux informels sont essentiellement composés de liens locaux. Les auteurs soutiennent que des stratégies de dissémination et d'influence qui prennent en compte les particularités de la structure sociale ont plus de chances de réussir.

Mots clés : réseaux sociaux, dissémination, relations interprofessionnelles, infirmiers-cadres, médecins, responsables et cadres

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Social and Geographical Boundaries Around Senior Nurse and Physician Leaders: An Application of Social Network Analysis

Elizabeth West and David N. Barron

The purpose of this study was to describe the social and geographical boundaries around the networks of senior nurse executives and physician leaders and managers in acute-care hospitals in the United Kingdom. A telephone survey was conducted using standard social network methods. A random sample was drawn from a national list and repeatedly sampled until 100 respondents were interviewed. The response rate was 49.5%. Both groups tended to discuss "important professional matters" with others who were similar to themselves in terms of profession, gender, age, and seniority, with physicians being more extreme in this regard. The implication is that gaps in the network of informal ties will impede the dissemination of information and the spread of social influence between these 2 important groups. Managers (non-clinically qualified) appear to occupy a powerful "brokerage" role. Informal networks are mainly composed of local ties. The authors argue that dissemination and influence strategies that take features of the social structure into account are more likely to be successful.

Keywords: social networks, influence, dissemination, inter-professional relationships, nurse executives, physicians, leaders and managers

Introduction

The purpose of this paper is to explore the social and geographical dimensions of the social relationships of senior nurses and doctors working in the United Kingdom's National Health Service (NHS). The two groups in our study are Directors of Nursing (DNs), nurse executives who are at the top of the hospital hierarchy, and Clinical Directors of Medicine (CDMs), who lead and manage a clinical team. Our aim is to describe the extent to which these leaders and managers within the hospital interact with those who are similar to or different from them in terms of profession, gender, age, and geographical location. This work is relevant to our understanding of how information spreads through the health system via informal channels as well as how clinical and managerial behaviour might be affected by social processes. An important

question is the extent to which managers and leaders in the NHS are exposed to people who may see the world from a different perspective.

The study is founded in social network theory, whose central premise is that "the structure of relations among individuals and the location of individuals in the network have important behavioural, perceptual and attitudinal consequences both for individual units and for the system as a whole" (Knoke & Kuklinski, 1982). Where ties are dense, information and influence can spread rapidly among all those who are in frequent contact. Where ties do not exist, on the other hand, dissemination through informal interaction is impossible.

One of the key aspects of social network analysis is the analysis of the distribution of ties in a network. Often, network ties are grouped into clusters rather than being distributed evenly across all potential contacts. These clusters can be analyzed in many different ways. For example, numerous studies have found that groups are frequently *homophilous* — that is, comprising people who are similar in one or more characteristics (MacPherson, Smith-Lovin, & Cook, 2001), which might include age, highest educational qualification, gender, and social class.

Clusters can also be geographical. It is widely believed that people today experience higher levels of geographical mobility in the course of their careers than did people in past times. It is important to know whether clinicians maintain the geographically dispersed professional ties they accumulate throughout their career, or whether their social networks reflect only their current geographical location. We suspect that, despite the widespread use of e-mail and other boundary-spanning technologies, people's social networks remain strongly influenced by the geographical space they currently occupy. This would be consistent with some recent work in the newly emerging field of the geography of nursing (e.g., Andrews, 2002, 2003). In particular, Andrews argues that geographical space is not something neutral but that certain spaces have particular meanings for people. We think that the "local" space is often particularly important to people, in the sense that it engages feelings of belonging, loyalty, and solidarity.

Rather than attempt to study clinicians of all types, we decided to concentrate on two distinct groups, DNs and CDMs. We selected these two groups because they play key roles in the hospital organization. DNs are full-time managers, often executive directors of the hospital trust, and are often responsible for the quality of care. They have no direct clinical involvement. Because they are at the top of the hospital nursing hierarchy, we thought that we would have maximal chances of finding professional social networks that have significant national or even international components.

CDMs are consultant physicians who are released from direct clinical care for one or two sessions per week to devote time to managing the directorate. Unlike the case with DNs, their job is still primarily clinical and they often have the help of a full-time business manager. Each trust has several clinical directors, each of whom is responsible to the medical director. We selected this group mainly because they are seen as leaders with a role that has important clinical and managerial components and because they are at the mid-level of the medical career hierarchy. Because they are in the middle of the hospital hierarchy, they should be able to make relationships up — to the hospital board — and down — to co-workers in their clinical directorates — as well as to a group of their peers, the other clinical directors in the trust. From this point in the paper we will often refer to these two groups as simply "nurses" or "doctors," respectively, instead of DNs and CDMs; it is important to remember, particularly in interpreting the findings, that this paper focuses on two quite specific occupational groups.

The Nature of Clinicians' Social Networks

Although recently a great deal of emphasis has been placed on the philosophy of multidisciplinarity and working across professional boundaries, the professions are still powerful entities in many health-care systems, including the NHS. Professional background is often an important element of individual identity and determines, to a certain extent, concrete life chances such as job mobility. Professional associations, such as the Royal Colleges in the United Kingdom, benefit members in many ways, such as by providing education and insurance; they also represent the profession in salary negotiations and participate in policy formation.

Since Abbot (1988) published his work on the sociology of the professions, many nurse researchers have adopted his perspective (e.g., Allen, 2001). Briefly, Abbot argues that the professions exist in a system. The evolution of each profession depends on its interactions with other professions. In particular, Abbot emphasizes the fundamentally competitive nature of the relationships among the professions in a given field, where "jurisdictional boundaries are perpetually in dispute, both in local practice and in local claims." Because professional affiliation is important both for the construction of individual identity and for collective action, we expect that professional social networks will be composed mainly of people with the same professional background.

Conjecture 1: Clinicians' social networks will demonstrate professional homophily.

In the past, medicine and nursing recruited almost exclusively from one gender. The 20th century saw the progressive erosion of this pattern,

particularly in medicine. As a result, the two professions are now more integrated in terms of gender than ever before. However, when we examine medicine and nursing at the level of specialization, we can see that sex segregation is still the norm (Crompton, 2001). In the United Kingdom, 90% of nurses are female, but as male nurses tend to work in learning disability and mental health, sex segregation at the ward level is even greater than this figure would suggest. Similarly, male doctors predominate in prestigious specialties such as neurology, cardio-thoracic medicine, and renal medicine. Female physicians, by contrast, predominate in dermatology, ophthalmology, and community medicine. This pattern is consistent with much research on sex distribution in other industries, sectors, and countries. Following Marsden (1990), we therefore hypothesize that:

Conjecture 2: Clinicians' networks will tend to be homophilous in terms of gender.

We make similar predictions with regard to age. This is partly because of the correlation between age and rank or status. Social interactions in organizations are more likely to occur between individuals at the same grade, because people tend to encounter their peers more often in the course of their work and because of the importance of peers in the construction of social identities. We share a common history with people who are of the same generation and we share many experiences with people whom we consider our equals. Our expectation is that social network groups will include a majority of members of a similar age and rank.

Conjecture 3: Clinicians' networks will tend to be homophilous in age and rank.

The fact that DNs and CDMs occupy different positions in the nursing and medical hierarchies, respectively, leads us to expect that the two groups may differ in the extent to which they interact with colleagues who are junior and senior to them. The doctors occupy key roles *in the middle* of the hospital hierarchy, whereas the nurses are *at the top* of their profession within the organization. It therefore seems logical to expect nurses' networks to contain more discussion partners who are either junior to them in rank or working in another organization. DNs will have many more opportunities to interact with junior colleagues and fewer opportunities to interact with senior colleagues and peers than will CDMs.

Conjecture 4: DNs will interact with more junior colleagues than CDMs. DNs will interact with fewer senior colleagues and peers than CDMs.

So far we have concentrated on social boundaries, but the geographical boundaries around networks are also interesting. To what extent do doctors and nurses maintain relationships with people who do not live

and work in the same area, perhaps people with whom they trained or have met at conferences? We predict that such ties will be in the minority. This is partly because, as we argued above, the "local" is imbued with particular meaning for people. More prosaically, simple frequency of contact is an important factor in the formation and duration of relationships. Trust is more likely to develop between people who interact face to face. There are simply many more opportunities for meeting people who work in the same organization. Nevertheless, the NHS is a national organization, drawing workers from diverse educational institutions spread across the country and further afield. It provides some opportunities for employees to attend conferences and for some access to the Internet. These factors suggest that most health professionals will also have a significant number of national or international ties.

Conjecture 5: Clinicians' networks will tend to be geographically local.

Research Design and Methods

We drew random samples of DNs and CDMs from a national list (*Binley's Directory of National Health Service Management*, 1996). We contacted members of the two groups (DNs and CDMs) to invite them to participate in the study; the acceptance rate was 49.5%. We continued sampling until we had interviewed 50 people in each professional group. Most people we contacted were interested in the study and willing to participate. Those who refused to take part most often cited pressure of work, holidays, being new on the job, or imminent retirement. Nothing in their responses led us to suspect that there might be some correlation between characteristics of their social networks and their disinclination or inability to participate. After a respondent had agreed to participate, information was faxed to him or her in advance of the interview. Responses were recorded on paper and then entered into SPSS by the interviewer, Juliett Dowsett, the research assistant on the project. Data were then checked, cleaned, and analyzed by the second author. At the time the survey was conducted, ethics committee approval was not required for research that did not involve patients.

A key component of social network data collection is the *name generator:* the question used by the interviewer to illicit names of people who are members of the interviewee's social network. We based our survey methodology on that developed for use in the United States General Social Survey special module on social networks (Burt, 1984). Our name generator was: *From time to time people discuss important professional matters with other people. In the past 12 months, who are the people with whom you have discussed important professional matters?*

Data were collected via telephone interviews lasting about 30 minutes. On the phone, we defined "important professional matters" to include both clinical and managerial issues, and asked respondents to give the initials of or otherwise identify every person with whom they had discussed important professional matters in the previous 12 months. Having obtained the long list, we then asked respondents for detailed information on the first five people.[1] This information included demographic characteristics, the nature of the relationship between the respondent and each of his or her discussion partners — known as "alters" in the network literature — and the nature of the relationship between each pair of alters. We also collected personal details about the respondents, including age, marital status, and education, as well as information about relevant professional behaviour, including the number of professional journals read and memberships in professional and social associations.

Findings

The analyses reported below use descriptive statistics to investigate the social boundaries based on profession, gender (and the intersection of profession and gender), age, rank or status, and geography. Throughout this paper we report data on the highest number of responses available and indicate the denominator where appropriate.

The sociodemographic characteristics of the two groups are reported in Table 1. The doctors and nurses in the sample were similar in age (the means of both were nearly 50) but the sex distribution was highly skewed; only 3 out of the 50 doctors were female, whereas 36 nurses were female and 14 were male.

Table 1 *Sociodemographic Characteristics of the Sample*

	Clinical Directors of Medicine	Directors of Nursing
Average age	49	46
Males	47	14
Females	3	36
Married	38	27
Single	5	16

[1] Burt (1984) discusses the practical and theoretical reasons for limiting to five the number of people about whom detailed information is collected.

1. Professional Homophily

The occupations of all the discussion partners named by respondents were divided into five broad categories — doctor, nurse, manager, kin (including spouse), and friend. Recall that the respondents were asked to give the *current* occupation, rather than the professional background, of their discussion partner. Some of the alters that we have classified as a manager may have begun their professional career as a doctor or nurse, then moved into management at a later date. However, any alter categorized as a doctor is unlikely to have had any other career in the past.

As hypothesized, most discussion partners were in the same profession as the respondent. About 60% of nurses' networks, for example, consisted of other nurses (111 of 184 ties). We expected that the second most common category would be doctors, but we were wrong. Only 20 of the nurses' 184 alters were medically qualified. After fellow nurses, DNs spoke most frequently to managers (44 of 184, or about 24%). As we mentioned above, some of the alters currently working as managers may have had a nursing or medical background. Friends and family were uncommon relationships in these networks: there were only nine assorted relatives in the whole alter pool. Where respondents did select a relative they would often add another reason for choosing the person, over and above family membership, such as working in a related field.

The tendency towards professional homophily was even more marked among doctors. In exact figures, 83 of the 116 alters named were doctors, most commonly "fellow consultants." Managers were the next most common (23) and nurses (7) were third. That means 75% of doctors' alters were medically qualified, 15% were managers, and only 5% were nurses. These results suggest that the boundary around the medical profession is very strong and the preponderance of "fellow consultants" among respondents' discussion partners suggests that the consultant network could comprise a powerful block within the hospital. Like the DNs, this group of doctors had more contact with managers than we had anticipated. Although we hypothesized that in-group association (homophily) would be present, we assumed that nurses and doctors would be important components of each other's networks. They were not, but because both DNs and CDMs include so many managers in their networks, at least some of the communication between the members of these two groups might have been mediated through managers. The last category — friend and kin — together accounted for only seven of the CDMs' alters, which suggests that both CDMs and DNs draw a clear distinction between work life and home life. In sum, the most interesting and robust finding about professional homophily is

the lack of doctors in the nurses' discussion networks and the lack of other professions in the doctors' networks.

2. Gender Homophily

Males predominated among the alters of the 30 male doctors who supplied this information. They identified 117 men and 30 women in total — that is, about 80% of the discussion partners of male doctors were also male. This figure is close to Marsden's (1990) estimate of 19.4% of cross-sex ties formed in the workplace. In our study, 21 (out of 30) male doctors had discussion networks that were either entirely male or included one woman, leaving nine whose networks might be described as "mixed," with two or three of each gender. There appeared to be no pattern in the sequence of genders; men and women were equally likely to appear as first, second, third, fourth, or fifth alter. What is striking is the predominance of males across the board.

There were only three female CDMs in this study. Although we cannot generalize from such a small number, it is interesting to note that female doctors also frequently chose males as their discussion partners, naming a total of 10 men and 4 women. In our small sample of female doctors, 73% selected *only* males as discussion partners. If these data are at all representative, then, female doctors are only slightly more likely than their male colleagues to include women in their networks.

At the aggregate level, the distribution of alters across genders was much more even in the social networks of the DNs, with only slightly more females than males in the sample of alters (65 to 59). But gender homophily became apparent when we examined the patterns of association of male and female nurses separately. Female nurses talk to more women than men, at a rate of 54 to 40 (57%). This means that, although their networks are predominantly composed of their own gender, female nurses have a much higher likelihood of forming cross-sex ties at work than either male doctors (who only had 20% cross-sex ties) or the male nurses in this sample (37% cross-sex ties). Again, we have data on only six male nurses so we cannot generalize about this subgroup, but it is interesting that in a female-dominated profession 63% of all male nurses' discussion partners are male. This could be due to male nurses working in clinical areas, such as learning disability or psychiatry, where males predominate, but it may also indicate the preferences of respondents for same-sex ties.

Combining the information we have about gender and profession leads to some loss of data but reveals interesting tendencies. Male doctors' networks are predominantly composed of other male doctors. Male managers are the next most common group. Among the female alters of male CDMs, there were six doctors, six managers, and four nurses.

Table 2 *Gender and Professional Background of CDMs and DNs by Gender*

Alters	Male CDMs	Female CDMs	Female DNs	Male DNs
Male doctors	63	7	8	4
Female doctors	6	1	1	0
Male managers	15	1	10	10
Female managers	6	1	16	1
Male nurses	3	0	14	3
Female nurses	4	0	41	8

Interestingly, then, male doctors speak to as many female managers as they do female doctors, and almost as frequently to male nurses as female nurses, although we would expect female nurses to predominate in acute-care trusts where CDMs are working.

3. Age and Rank

Is age an important social distinction among professions? What we did not anticipate before we began collecting the data was that many of the respondents would be unable to give the exact age of their alters; we had to be content with their estimate to the nearest decade. The average age of respondents was late forties (49 for doctors, 46 for nurses), and most of the alters were also in their forties. There was a tendency for doctors' alters to be older than nurses' alters.

To gain an idea of respondents' subjective assessment of their status in relation to their discussion partners, we asked whether they considered each alter to be "senior," "equal," or "junior" to themselves. Doctors described most of their alters as "equal" (137 of 225, or 60.8%), compared with "juniors" (48, or 21.3%) and "seniors" (40, or 17.7%). DNs showed a similar tendency to select "equals" (119 of 220, or 54.1%), but they included a larger proportion of "juniors" (31.3%) than did CDMs. DNs considered only about 15% of their network to be their "seniors."

4. Geographical Boundaries

Nurses reported the geographical distance between themselves and their alters as ranging from zero to 130 miles, with zero being the most common distance, reported about 47% of the time. Many of the remaining discussion partners were close by; 25.6% were within a 20-

mile radius, so may in fact have been part of the same organization (we did not ask this question specifically). The remaining quarter of the nurses' alters lived more than 20 miles away.

Doctors' networks were even more local, with zero distance between respondent and alter being reported 76% of the time. Only 11.5% of their alters were within a 20-mile radius and the remaining 10.3% were more dispersed. These figures clearly indicate that the networks of CDMs are more locally based than those of the DNs. Whereas 72% of nurses' alters could be described as "in the vicinity" of the respondent, the figure for doctors is 87.5%.

5. Characteristics of Contact

The frequency of contact between respondents and their discussion partners follows from the geographical spread of the alters of the two groups. Doctors' alters are, most frequently, people they talk to every day. Summing the number they talk to either daily or weekly, we account for 73.1% of their alters. Only about 17%, then, are people they talk to less frequently than weekly. By contrast, only about 54% of nurses' contacts could be described as people with whom they are in contact on a daily or weekly basis. This raises some interesting questions. Do doctors simply do more talking about professional problems? Is their work life organized in such a way that contact with other doctors and peers is maximized? Or are doctors simply more able to get advice, information, or support in dealing with professional problems from within their own institution? Perhaps the fact that a peer group is available for CDMs but not for DNs within the hospital contributes to this striking difference in their patterns of relationships.

The data show that face-to-face communication is the norm among CDMs (194 of 233). Only 39 respondent-alter relationships featured communication that was primarily via the phone. Letters and e-mail were not commonly used. The DNs show a similar pattern, with most reliance placed on face-to-face communication (154 of 233). However, more of their relationships were conducted over the phone (69 of 233), which seems consistent with the fact that their alters are more dispersed than those of the CDMs in the sample.

Conclusions, Implications, and Future Research

This paper describes the social and geographical boundaries around the social networks of two groups of senior health-care professionals. Following standard network methods (Burt, 1984), we collected data on the profession, gender, age, rank, and location of the alters of 100 senior nurses and doctors in the United Kingdom's National Health Service, as

well as frequency of contact and the most common mode of communication. Consistent with our conjectures, we found that both groups discuss important professional matters with clinicians from a similar professional background and that this tendency is more marked among doctors than among nurses. Perhaps doctors feel that only other doctors can understand and contribute to discussions about the important professional matters that they face. An alternative explanation is that clinicians do discuss professional issues more widely but remember only the conversations that they have with members of their own professional group. Whichever explanation comes closer to the truth, it is clear that professional identities are highly salient and permeate relations in a workplace that, formally, espouses the principles of multidisciplinarity. Medicine and nursing appear to function in parallel, and there is little evidence of integration in the social structure of the hospital. Nurses sometimes complain that doctors do not know what they do, or fail to appreciate the fact that nursing has a different philosophical orientation from medicine, as well as different aims and goals. If these findings can be generalized to other levels of the medical and nursing professions, it may be quite true that doctors and nurses know very little about each other.

We were surprised to find that managers constitute such an important group in the networks of both DNs and CDMs and that nurses and doctors figure so rarely in each other's networks. In the United Kingdom, hospital management grew out of administration and is a relative newcomer to the health professions. These data show that managers are integrated into the networks of both nurses and doctors. Since both nurses and doctors discuss important professional matters with managers and seldom with each other, part of the managers' job may be to facilitate communication between the two groups. Managers may be seen as occupying an important "brokerage" role between the traditional health-care professions, a role that is widely acknowledged in sociological theory as one of the most powerful in a social system (Burt, 1992). Carving out this role, especially over such a short period, must be seen as a real achievement for the profession.

The NHS is highly segregated along gender lines. This is reflected in the social networks we studied. The networks of male CDMs were about 80% male, and although we found that both male and female DNs were more likely to have cross-sex ties at work (approximately 40%), the majority of their ties were also to same-sex alters. This is at least partly a product of gender segregation at the level of the specialty, but our findings suggest that the demography of the professions is not the entire answer. Why, when the ratio of female to male consultants in general medicine is 1:6, are female doctors selected as discussion partners at a rate of less than 1:10? Similarly, recall that female nurse managers outnumber

males at a rate of 5:1 in general nursing — so why do male doctors select as many male as female nurses as the people with whom they discuss important professional matters? This tendency to relate to one's own gender, which appears to be particularly marked among men, may be one of the mechanisms perpetuating both gender segregation and gender inequality at work. Women are curiously absent in this study, both from our sample of doctors and from the networks of male and female respondents. Previous research suggests that people who are infrequently selected as discussion partners miss out on opportunities for socialization and for access to important information, which may have a detrimental impact on their careers (Kanter, 1977).

Age and rank also emerged as clear boundaries in the social networks of both professional groups, with the extent of homophily being more marked among the doctors. In fact, all of the findings summarized above show that the doctors' networks are likely to comprise people who are very similar to themselves — in profession, gender, age, and rank. Doctors' networks are composed of people who work in the same institution and with whom they talk, almost daily, in face-to-face interactions. Current theorizing in this area suggests that any network configuration is likely to have advantages and disadvantages (Burt, 1992; Ibarra & Smith-Lovin, 1992). The main advantage of a homophilous network is that the information it conveys will tend to confirm the respondent's perceptions and assumptions about the social world, reaffirming his or her identity and sense of belonging. A homophilous network will also be relatively simple to handle because the behaviour of alters will be predictable and it will provide clear models for the kinds of behaviour that are acceptable to an audience of peers. The main disadvantage of such a network is that the respondent will not have access to knowledge that has been acquired in distant regions of social or geographical space. Such a network will not convey much new information or insight and will tend to reassure rather than challenge the perceptions of members (Granovetter, 1973). For the doctors in this sample, this means that they rarely get the opinion of a woman or of someone whose background is different from their own.

In some ways the respondents in this study, particularly the medical staff in whom all the tendencies to in-group interactions are more marked, might be described as *socially insulated,* which means that they are unlikely to hear through informal channels how other, different, kinds of people see the world. We have long known about the existence of "glass ceilings" that stop some groups rising up the ladder of promotion in some organizations. This study reveals the existence of "glass walls" between some groups of staff in health-care organizations. Although

invisible to the naked eye, there are barriers between physicians and non-physicians, between men and women, and between the generations. It is particularly important that nurses be aware of the informal structure of the hospital, because as (mainly) women and as nurses, they may be excluded from some very powerful groups. Further research is needed to explore the consequences of the lack of diversity in the networks of health-care professionals and the effect this might have in terms of relating to patients and staff at different levels in the hospital organization. It is also important that researchers realize that the formal and informal structures of the organization may differ in some respects. Focusing on the latter when studying social processes such as communication, power, influence, and teamwork could be rewarding.

The results of this study are relevant to a number of other health-policy concerns: how to improve the human resource management of health-care workers and to find better ways to disseminate information through the health-care system and influence the practice of clinicians. These results suggest that we should examine further the relationship between social networks and affective aspects of the quality of work life, such as sense of involvement, participation, and commitment to the organization. Further research is particularly needed on those people who are present in the work environment but are infrequently selected as discussion partners. The outstanding example of such a group in this study is female doctors. We need to ask why female doctors appear so infrequently as discussion partners and what the consequences for them might be in terms of the benefits that can accrue from networks, such as mental and physical health as well as promotion opportunities and job success. In addition, the networks of female nurses seem to be less supportive than those of male doctors — the alters of female nurses are more dispersed and are consulted less frequently, often on the phone rather than face to face. When a nurse in the sample has an important professional issue to discuss, she often has to rely on alters who are probably less familiar with the context of the problem than are the discussion partners of doctors.

The findings of this study support the conclusion of previous authors (e.g., Strong & Robinson, 1990) that nursing and medicine have quite different social structures. In addition, we have identified a gap in the structures of medicine and nursing, where there are few informal ties. This means that information is unlikely to be spread between the two professions by informal routes. This makes formal arrangements for communication all the more important. The role of managers may also be crucial: managers could be in a position to broker relationships between the two professions.

Consistency with the literature increases our confidence in the generalizability of our results. However, we should emphasize that our samples are small and that we concentrated on two distinct, albeit important, groups of doctors and nurses. We cannot be sure that our results would be the same if we had studied doctors and nurses at other grades. Looking for similarities and differences in this regard would be an interesting subject for future research.

The implication of these findings for dissemination and implementation is that quite different strategies are probably required to spread information and influence throughout nursing and medicine. The main benefit of nurses' more dispersed, heterogeneous networks is that nurses are more likely to have access to diverse sources of new information than doctors, who are embedded in closely knit homophilous networks. The latter type of network structure would be much more effective in implementing changes in clinical behaviour through the mechanisms of social control. As a tightly knit clique, however, doctors would also have the power to resist external pressures to change (West, Barron, Dowsett, & Newton, 1999). The implications of our findings are, in effect, hypotheses. Based on what we now know about the social and geographical boundaries around the two professions, we should try to design dissemination and implementation strategies to fit these different network patterns. The effectiveness of different strategies for different groups could then be compared in practice using randomized controlled trials.

Further research could build on, and improve upon, the research tool we have developed to gather network data from health professionals. Future studies could, for example, gather more information about the professional background of alters. This study was hampered by the fact that we cannot distinguish between people who are currently working as managers but come from a nursing background and those who have made their careers in management. Its most robust findings on professional homophily concern the medical profession's dominance of doctors' networks and absence from nurses' networks. Our claims about nurses and managers would have been much stronger had we been able to gather data on their career trajectories. Future researchers might also want to gather data on the institutional affiliation of alters in addition to the geographical distance between respondent and alter. It would also be fascinating to gather more information about the heterogeneity of the organizations and teams that provide the professional context in which social networks are formed. This would enable the analyst to begin to disentangle the roles of choice and opportunity in the formation of social networks. We hope that future research will also pursue questions about the implications of different network configurations for individuals' careers and their experience of work life.

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