

RUNNING HEAD: Well-being and communication in a medical setting

Research Report

Organizational well-being and communication in a medical setting

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Abstract

This study examines the relationship between work engagement, organizational commitment and group-level communication in a hospital setting. Social network analysis was used to examine the structure and usefulness of communication in a small group representing diverse responsibilities in a hospital setting. Personnel included physicians, specialist physicians, nurses, unit clerks, and senior administrators ($N = 30$). A pre-test, intervention, post-test design was used. In the intervention, participants reviewed pre-test results and made recommendations to improve communication. In this sample, relationships were observed between engagement, perceptions of useful communication and individual positions in the network. Participants reported a significant increase in work engagement and number of communication connections.

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1. Introduction

Today's increasing emphasis on excellence in the workplace is accompanied by an acknowledgement that to be effective, workers need to have a sense of individual well-being. This is critical in the medical field, where work requires expertise, a feeling of energy and satisfaction about one's work, and the ability to obtain and provide information about patients. However, the relationship between individual well-being and the ability to access information through communication needs further examination because the demands of the health care field require health care providers to be able to access information quickly and efficiently from others.

Work engagement and organizational commitment are useful concepts to examine how the individual functions in an organizational context. However, they are insufficient to understand how an organization functions as a whole, because in most occupations, individuals need to obtain information from, and provide information to, their colleagues. An effective communication network is critical to improve access to important information (Steiner, Ponce, Styron, Aklin, & Wexler, 2008) and enhances productivity (Mintzberg & Glouberman, 2001). Therefore, communication networks provide an excellent way to examine the culture of the organization. This study uses social network analysis to examine relationships between measures of individual well-being at work and network-level communication. Social network analysis is well suited to this type of study because it allows the group-level communication to be examined as a whole.

This study occurred at a hospital in British Columbia, Canada. This hospital was experiencing numerous changes resulting in cultural shifts. For example the hospital was in the process of becoming a teaching hospital at the same time it was experiencing severe budget reductions. Many physicians and employees at the hospital expressed concern that additional work tasks combined with decreasing resources, resulting from fiscal constraints and increasing numbers of patients, place unreasonable demands on

individuals. Cummings (1997) notes when organizational changes occur, individuals and groups tend to fear loss of power and autonomy. In many cases this fear is justified, but can be mitigated. At the same time that other organizations shifts occur, effectiveness of communication often becomes problematic. Problems with work-related communication are a barrier to improving well-being (Beatson, 2009; Stewart, 2008) and are integral to improving organizational dynamics.

2. Well-being

Well-being in organizational contexts is commonly referred to as morale. Morale however, is a problematic term because it may be used to encompass both individual and group emotional, cognitive, and motivational orientation related to goals and tasks (Peterson, Park & Sweeney 2008). Morale is sometimes used interchangeably with a variety of other terms such as work engagement, organizational commitment, and social cohesion. Peterson, et al., (2008) found fourteen different conceptualizations of morale in different examinations and theories of the construct. The study of well-being may be further complicated because some terms such as engagement, commitment, and involvement are sometimes used interchangeably even though they are empirically distinct constructs (Kanungo, 1979; Maslach & Leiter, 1997; Meyer & Allan, 1997; Mowday, 1998 as cited in Hallberg & Schaufeli, 2006). Measures of well-being are further complicated by the blurred distinction between individual and group well-being. For example, many measures that are ostensibly measuring the well-being of a group or organization are actually just collating individual well-being scores (Peterson, et al., 2008). It is possible for individual well-being to be high, while the organization is perceived as dysfunctional (Hallberg & Schaufeli, 2006). A successful examination of organizational well-being must clarify exactly which aspects of well-being are under examination.

A. Individual well-being: Work engagement

One measure of well-being within an organization is work engagement, defined as optimal functioning of the individual within the organization. Work engagement means the presence of continual energy and contentment at work. This is an important first step to examine the well-being of an organization because low levels of work engagement are associated with: increased likelihood to leave the job, cynicism, more negative perception of the organization, emotional exhaustion, depressive symptoms, other physical and psychological health complaints, and decreased organizational commitment. Conversely, high levels of work engagement are strongly associated with measures of individual physical and psychological health (Hallberg & Schaufeli, 2006). Organizational and systemic factors will impact work engagement, but engagement is only valid when applied to individuals, not as a complete measure of organizational health.

B. Individual perceptions of the organization

How an individuals relate to their work and how individuals relate to an organization are associated but unique constructs (von Vultee, Axelsson, & Arnetz, 2004; Peterson, et al., 2008). This is important for physicians who are not employees at a hospital. At the hospital that was studied, physicians are contractors who provide service at the hospital, but who also have their own independent practice. Therefore, physicians may have very different perceptions of the work they do and the organization for which they work. For example, physicians may be engaged in their work, but not committed to the organization. Allen & Meyer's (1990) *Affective Commitment* measures how an individual relates to the organization. Organizational commitment is a measure of individual well-being, but is not a valid measure for groups, and therefore it is necessary to include other measures to understand group functioning.

C. *Organizational well-being*

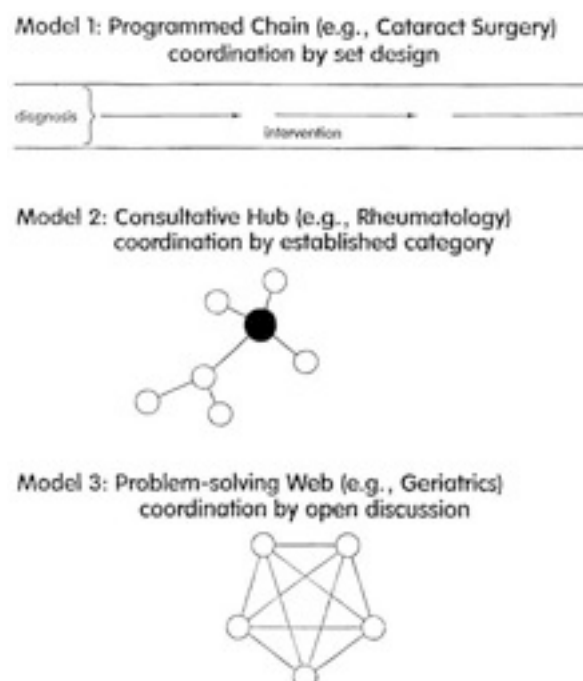
An organizational group is a dynamic, interacting network. Well-being depends not only on optimal functioning of individuals, but also on how the synchronous functioning produces group well-being. Thus, it is necessary to examine the group as an interconnected, communicating system (Tsoukas, 2005). The system can be understood by examining how individuals and groups are connected through communication networks. Therefore, changes at the network level should affect individual functioning.

Communication networks exist in different forms. Lamothe (1996, as cited in Mintzberg & Glouberman, 2001) outlines three types of communication networks that occur in hospitals (Figure 1). The most basic type of communication occurs as a programmed chain, where each person shares information with one person, and information is transferred through a linear process. Information is shared based on a few, pre-existing connections, no new connections are established. Another type is a consultative hub, bidirectional flow of information transmits information between many peripheral individuals and a few central individuals. The individuals at the centre are the focal point of information, which they tend to sequester. The third type of communication is a problem-solving web coordinated by open discussion. In the problem-solving web, connections exist between all individuals so that information can flow quickly and efficiently to any part of the web, as needed. Medical practice is often perceived as a programmed chain, with minimal contact between specialists, but some organizations are slowly shifting toward the web model. The problem-solving web has a much greater ability to adapt, coordinate, customize, and even self-organize to meet new demands and challenges (Mintzberg & Glouberman, 2001). When possible, web models of communication are most desirable, so information can be shared quickly and efficiently. Clearly a problem-solving web is not always possible or desirable. In surgeries, for example, a linear or hub structure will be more efficient and to a certain extent necessary.

An appropriate investigation of organizational well-being must look at the structure of communication. Social network modelling offers an opportunity to move from measures of individual well-being to a model of organizational well-being. *Network data* correspond to a model of individuals (nodes) in a network and their social ties (van Duijn & Vermunt, 2006). These data allow an investigation of connections between individuals, the quality of communication, the systematic structure of interaction, as well as other measures (see Wasserman & Faust, 1994 for comprehensive review).

For organizational well-being, a network should have effective interactions (Barki & Pinsonneault, 2005; Mintzberg & Glouberman, 2001) and effective information flow (Basu & Blanning, 2003; Steiner, et al., 2008). There are two factors that characterize an effective network. First, there must be many connections to all parts of the network. For example, in a linear chain of five people, each of the individuals would have a relatively low *centrality* score because each individual only has one or two connections. In a problem-solving web, each node is connected by a short path to every other node, thus there are many connections, and individuals would have high centrality scores.

Figure 1. Theoretical communication structures (from Mintzberg & Glouberman, 2001).



Second, an effective network is characterized by effective interactions. A network may be well connected, but if the connections do not effectively transmit information, the network is not effective. Thus, both the structure and characteristics of the network are important measures of organizational well-being. An adaptive organization requires an interconnected network that allows information to flow effectively throughout the network (Evans & Thach, 2000; Mintzberg & Glouberman, 2001).

D. Application in a medical setting

Many employees at the hospital suggested that improving communication and well-being would positively affect their work. This study targeted one group within the hospital to investigate the interaction between communication and well-being within a clearly defined group. This group includes hospitalists and their colleagues. Hospitalists are physicians that treat patients with no family doctor, patients whose family doctor does not have hospital privileges, and patients from other jurisdictions with serious conditions.

Griffin, Rafferty, & Mason (2004) found that initiatives where group members had direct involvement and ownership resulted in higher levels of group well-being. Initiatives that were viewed as coming from external leaders with someone else's vision of change resulted in decreased group well-being, and employees reported more negative perceptions of their group leader. Therefore, involving the physicians in developing initiatives and plans for change is an important first step for enhancing organizational well-being and implementing successful change. Perceived support from administration is an important contributor to employee well-being (Jones, Flynn & Kelloway, 1995; Parker, et al., 2003), but it is critical that administrative support involves employees in the decision-making process.

3. Purpose

The purpose of this study was to examine the relationship between well-being and communication within a medical group. First, this study examined the relationship between

measures of individual well-being. It was predicted that measures of engagement and commitment would be strongly correlated, to confirm Hallberg & Schaufeli's (2006) findings. Second, two types of network communication data were obtained for each individual. Each individual was asked if he or she communicated with each of the other participants and how useful the information was. Therefore an individual's ratings of communication were embedded in the social network. It was hypothesized that higher well-being scores and higher ratings of useful communication would be related to higher network scores.

The intervention was conducted over two months, where participants were shown models and data produced from the information they provided in the pre-test and then discussed the implications and personal relevance of the results. Following the discussion of results, participants were asked about the barriers to effective communication, and what personal action they could take to improve communication. For example, one nurse suggested reducing calls to physicians by providing information about multiple patients in a single call. Also, communication between different occupational groups (e.g. physicians and nurses) was a suggested area for improvement. Therefore enhanced communication would correspond to an improvement in the proportion of useful connections, and an increased number of connections, in the network.

4. Method

A. Sample and procedure

Eleven members of the hospitalist team and their colleagues were invited to complete measures of organizational commitment, work engagement, and perceived quality of communication networks. Five hospitalists consented to participate, then nominated sixty-five (65) participants. Twenty-five (25) of these nominees agreed to participate. Thus, the network was thirty (30) hospital employees who represented a

diverse group including, hospitalists, specialist physicians, nurses, unit clerks, and senior administrators. Nineteen of thirty participants (63%) completed the pre-test. Seventeen participants who completed the pre-test also completed the post-test, and two additional participants completed the post-test who did not complete the pre-test. All analyses using well-being measures use only data from participants who completed both pre- and post-test. Network measures were calculated for all participants, however to ensure reliable results, all inferential statistics use data only from participants that completed pre- and post-test measures. As the network measures provided information about all 30 participants, network models show the full 30-person network.

Participants were given pre-test and post-test measures, which included: the UWES-9, Allen & Meyer's (1990) Affective Commitment scale, and a measure of the usefulness of communication, using a polytomous 5-point Likert scale (from 'never' to 'always').

Pre-test data were analyzed; and participants given preliminary results (Appendix A) and the opportunity to reflect on their role in the communication and provide suggestions about enhancing communication. As part of the intervention there were two purposes of this discussion. First, to engage participants by discussing their role in the communication network with colleagues. Second, to move the discussions about engagement and work to what information and communication was necessary for individuals to work effectively. Thus participants could reflect on their own behaviour, and provide suggestions to their colleagues about how to improve communication.

B. Instruments

i. Work engagement

The Utrecht Work Engagement Scale was used to measure work engagement: "a positive work-related state of fulfillment that is characterized by vigor, dedication, and absorption" (Schaufeli, Bakker, & Salanova, 2006). The UWES-9 is a modified version of

the UWES-17, with high internal consistency, Cronbach's α ranging from 0.8 to 0.9 (Demerouti, Bakker, Janssen, & Schaufeli, 2001; Durán, Extremera, & Rey, 2004; Montgomery, Peeters, Schaufeli, & Den Ouden, 2003; Llorens, Peiró, & Grau, 2001; Schaufeli & Bakker, 2004). Confirmatory factor analysis supported the three-factor structure (Schaufeli, Martínez, Marques-Pinto, Salanova, & Bakker, 2002; Schaufeli, et al., 2002). A further international investigation collected data from 10 different countries ($N = 14,251$) which supported modifying the original UWES-17 to a 9-item scale to minimize item redundancy and provide a more efficient and effective psychometric evaluation of positive organizational behaviour. Seppala et. al. (2008) found the UWES-9 retained construct validity across samples and time.

ii. *Organizational commitment*

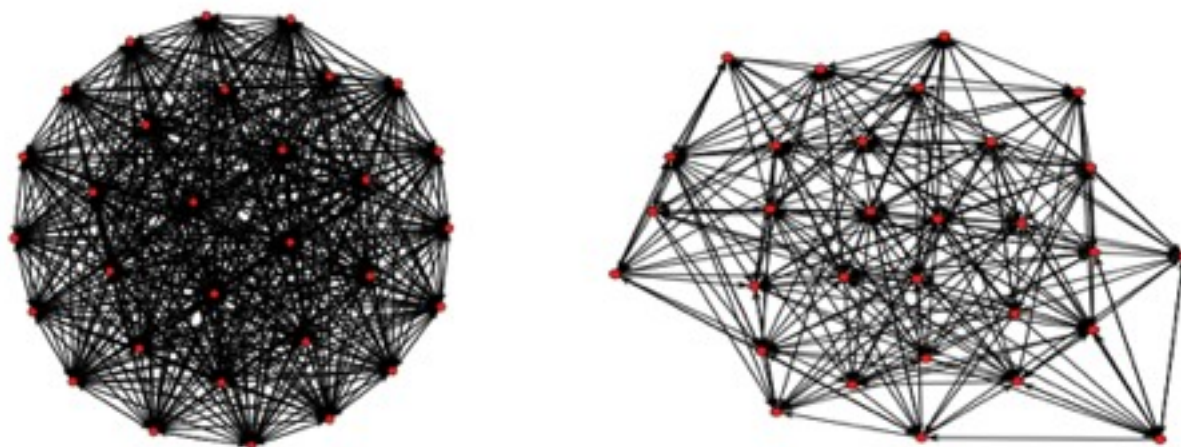
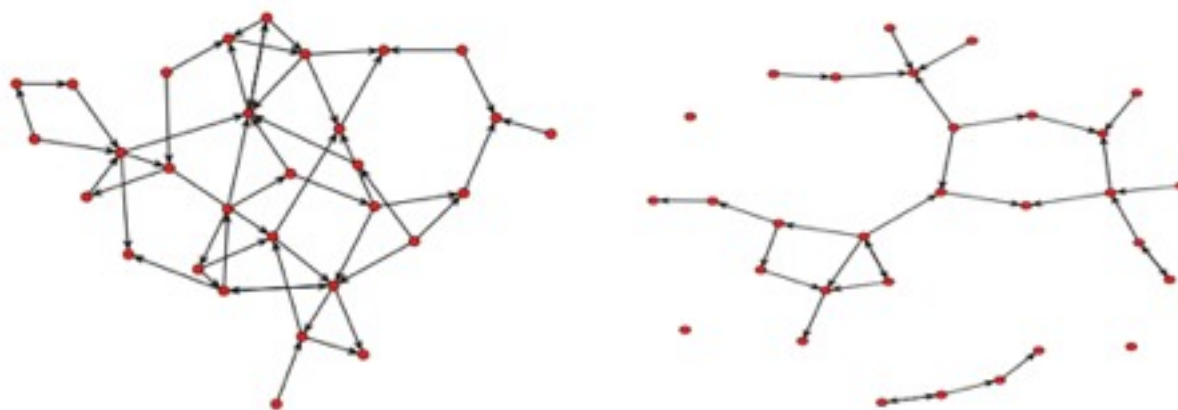
Organizational commitment measures the attachment of individuals to a particular organization. Allen & Meyer (1990) found three separate sub-scales of organizational commitment: affective, continuance, and normative. These were confirmed by canonical correlation analysis (Allen & Meyer, 1990). A meta-analysis of 155 independent samples including 50,146 participants suggests a three-factor structure is valid; organizational commitment is related to work factors and is unaffected by demographic variables. Further studies have confirmed construct validity (Allen & Meyer, 1996; Allen & Meyer, 2002). This study used only the Affective Commitment sub-scale. Affective Commitment has been used alone to measure organizational commitment, and is an empirically distinct construct from work engagement (Hallberg & Schaufeli, 2006).

iii. *Social network modelling*

Social networking modelling considers individuals as nodes and identifies connections between them. The model allows an analysis of the characteristics and interactions of the network (Hanneman & Riddle, 2005). Social network modelling allows investigation on both an individual and group level. Group level scores describe the

structure of the entire network. For example, Figures 2 and 3 are randomly generated networks, each with 30 nodes, and differing densities. Density scores range from 0 to 1: 0 corresponds to no connections; 1 corresponds to every individual being connected to every other. Figure 2 shows densely connected networks that would be problem-solving webs, in a network the same size as this study. Figure 3 shows sparsely connected networks, that more closely resemble a consultative hub (left) and a programmed chain (right) in a 30-person network.

Network data are considered non-standard because the statistically common assumption that all cases are independent is not required (van Duijin & Vermunt, 2006). Cases are not independent because individuals interact with one another. Therefore, statistical hypothesis testing is not appropriate for measures such as network density. However, individual scores can be derived from network data, which may subsequently be used for statistical hypothesis testing.

Figure 2. $N = 30$, density = 1.00 (left) & $N = 30$, density = 0.30 (right)Figure 3. $N = 30$, density = 0.06 (left) & $N = 30$, density = 0.03 (right)

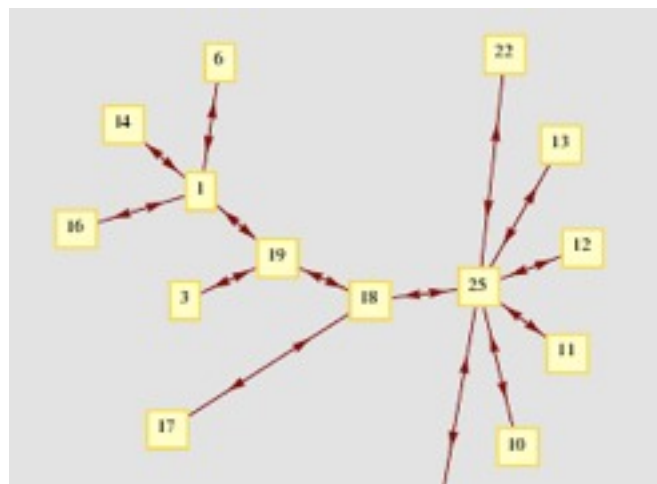
This study investigates three network measures. These describe how individuals interact within the network (Handcock, Hunter, Butts, Goodreau, Morris, 2003). *Centrality* is the relative importance of the individual in the network based on the number and position of connections. An individual with a high centrality score has many connections with others in the network, and will therefore be represented nearer to the center of the graph. An individual with lower centrality will have fewer connections, and be represented peripherally on the graph. However, centrality also accounts for the total number of connections in the network. This means that an individual could be connected to many

others, but still have a relatively low centrality score if they have fewer connections than most others in the network.

Betweenness is the relative number of times the individual is a critical communication link (shortest path). The betweenness score represents the number of shortest paths an individual is on, relative to the number of shortest paths other individuals in the network are on. For example, Figure 1 shows a sample shortest path graph. In this example, subject 25 has a very high betweenness score, but subject 22 has a low betweenness score because subject 25 is a necessary link on many “shortest paths”, but subject 22 is not. Individuals with the highest betweenness scores are typically critical links in the communication network.

Closeness is the relative distance to all other individuals in the network. For example, in Figure 4, subject 25 has a high closeness value, because he or she is only one link away from many individuals; however subject 6 has a low closeness value, because he or she is proximate to few others.

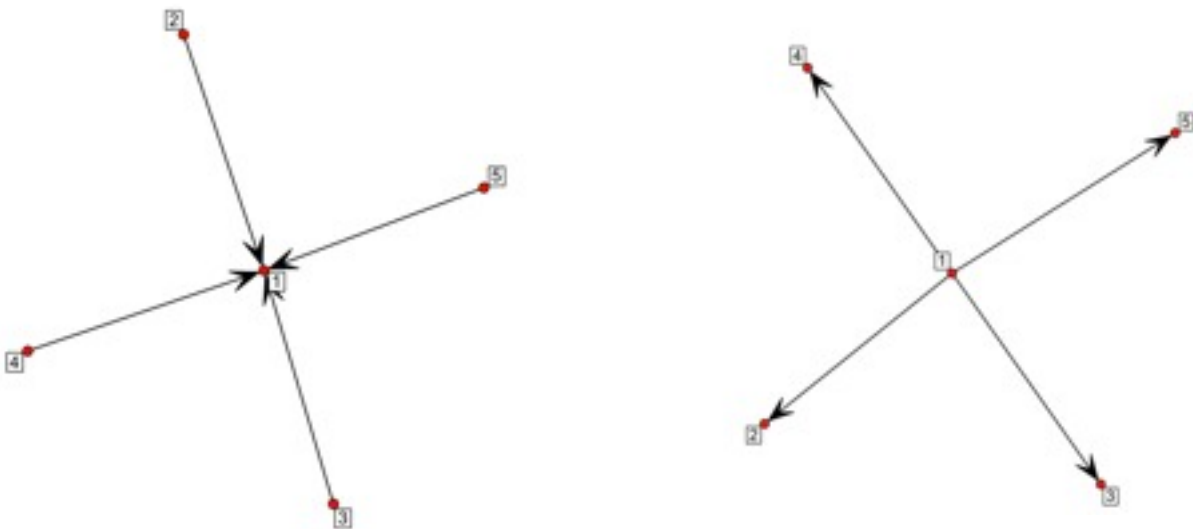
Figure 4. Sample shortest path graph



The differences between incoming and outgoing communication were also investigated. *Incoming* communication represents how useful individuals perceive information coming from others. Figure 5a shows an example of incoming communication

connections to subject 1. *Outgoing* communication represents how others rate that individual's communication. Figure 5b shows an example of outgoing communication connections to subject 1. Usefulness of communication is measured as the percentage of connections rated 'always' or 'frequently' useful. Outgoing communication is measured as the percentage of others who rate that individual's communication as useful.

Figure 5a. incoming communication (left) Figure 5b. outgoing communication (right)



C. Analysis

i. Procedure

The *statnet* package for R (Handcock, et al., 2003) was used for all network analysis. Network models that were presented to the participants (see Appendix A and B) used neighbourhood models to represent sub-groups within the network. These were presented to participants because the whole network was densely connected, and difficult to interpret for participants who may not have the necessary time or experience to interpret the models accurately. The neighbourhood models were ideal to present to participants because they display smaller groups, where connections and patterns more apparent. In these models, vertices were colour-coded by sorting the occupational groups into the three categories, physicians, nurses and other.

ii. Results

Table 1 presents descriptive statistics of well-being and communication variables. This information shows information about the difference between incoming and outgoing communication. Incoming communication is represented as the proportion of connections *from others* that the individual rates as useful. Table 1 shows that the ratings of incoming communication were substantially different from the ratings of outgoing communication. There was much higher variability in how individuals rated *others* compared to how individuals were rated by others. This means that the variation in how each individual was rated was relatively low, but there were some individuals who typically perceived most others' communication as not useful.

There are also important differences in the distribution of well-being scores. The range and standard deviation of Affective Commitment is nearly double that of engagement. This is because more participants reported relatively low commitment. This is extremely important, because it shows that all participants reported moderate to high engagement in their work. However, participants were less likely to be committed to the organization. The possible reasons for this will be elaborated in the discussion section.

After pre-test data were collected, a summary of preliminary findings was provided to all participants. Participants had an opportunity to discuss the findings, and were asked to provide suggestions about how communication could be improved. One of the key themes that emerged was challenges with communication between different departmental groups, for example, between physicians and nurses. Suggestions were provided to enhance useful communication for both occupational groups. Physicians suggested calls from nurses could be combined. Instead of calling to report about different patients individually, these calls could be combined to provide information about multiple patients at once. Physicians suggested this would save time and be more useful for them. Nurses suggested if physicians could provide more clear and comprehensive documentation

about patients by ensuring information was always complete and making sure all documentation was structured consistently, they would be able to do their job more effectively. These recommendations were shared with all participants, and network models with these suggestions were posted in highly visible staff areas such as bulletin boards and office doors.

Pre- and post-test descriptive statistics are shown in Table 1. Centrality, betweenness and closeness were derived from network data, then subsequently can be used for hypothesis significance testing. Inter-item reliabilities in this sample were high for engagement ($\alpha = 0.82$) and commitment ($\alpha = 0.87$). Engagement significantly increased $t(18) = -5.17, p < 0.001, d = 0.99$ from December to February. All network measures increased, but the only significant network increase was centrality $t(18) = -2.54, p < 0.05, d = 0.53$ from December to February.

Table 1

Descriptive statistics of pre-test and post-test variables and differences

Variable	Mean		Standard deviation		Pre-test, post-test change
	Pre	Post	Pre	Post	<i>d</i>
Percent of useful communication (incoming)	86	86	24	21	0
Percent of useful communication (outgoing)	82	82	9	11	0
Engagement (UWES) 0-6	4.25	4.93	0.65	0.71	0.99*
Affective Commitment 1-7	4.68	4.75	1.38	1.20	0.054
Centrality	0.034	0.039	0.0093	0.0095	0.53*
Betweenness	12.89	16.22	15.23	17.17	0.21
Closeness	0.71	0.76	0.13	0.11	0.42
Age	48.68	48.83	9.80	9.80	-
Length of time employed at the hospital	8.5	8.75	7.27	7.27	-

* $p < 0.05$.

Relationships between variables

There was a strong correlation found between work engagement and organizational commitment ($r = 0.66$, $p = 0.0023$), consistent with Hallberg & Schaufeli's (2006) findings.

Table 2

Intercorrelation matrix between all variables N = 17

	1	2	3	4	5	6	7	8	9
1. Engagement	-	0.66***	0.15	-0.01	0.22	0.43	0.47*	-0.15	0.05
2. Commitment		-	-0.09	-0.20	-0.22**	0.13	0.33	-0.19	0.05
3. Percent useful Connections (Incoming)			-	0.38	0.60	-0.10	-0.38	0.15	0.15
4. Percent useful Connections (Outgoing)				-	0.42*	0.27	-0.05	-0.14	-0.18
5. Centrality					-	0.16	-0.09	-0.19	0.27
6. Betweenness						-	0.78***	-0.22	-0.21
7. Closeness							-	-0.25	0.15
8. Age								-	0.12
9. Time Employed									-

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.005$.

A more in-depth examination of how individuals function within their work groups suggests that although commitment and engagement may both measure individual well-being, these two factors can have dramatically different relationships with group-level functioning. Using linear regression, three variables were found to be significant predictors of an individual's relative importance in the network (centrality). Engagement, commitment and perception of others' communication (see Table 3) predicted a significant proportion of the variance of centrality scores $R^2 = 0.52$, $F(3, 15) = 5.30$, $p < .05$. Control variables such as age and length of employment did not predict significantly more variance than engagement, commitment and perception of others' communication.

Table 3

Summary of hierarchical regression analysis for variables predicting centrality (N = 17)

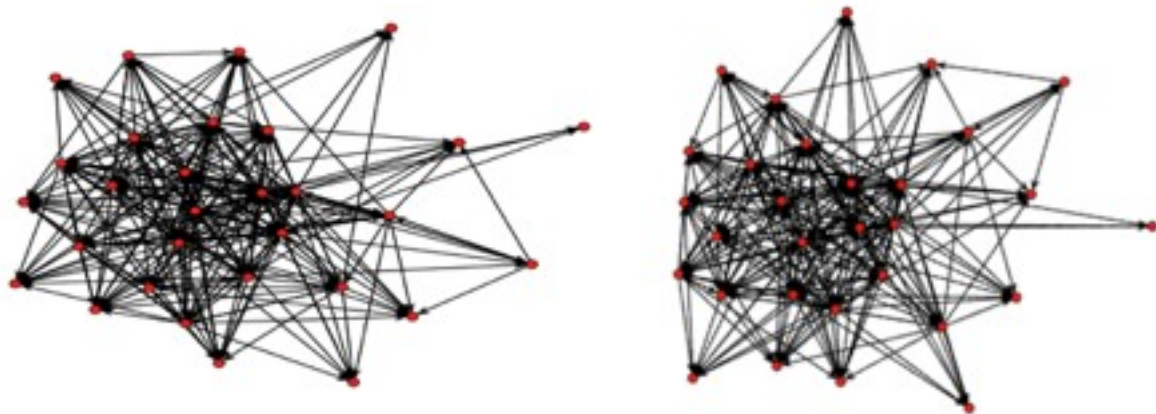
	<i>B</i>	<i>B SE</i>	β
Step 1			
Affective Commitment	-0.0037	0.0016	-0.56*
Work engagement	0.0085	0.0032	0.60*
Perception of others' communication	0.022	0.0080	0.49*
Step 2			
Affective Commitment	-0.0051	0.0021	-0.76*
Work engagement	0.0083	0.0044	0.58
Perception of others' communication	0.0088	0.011	0.20
Length of employment	0.00054	0.00040	0.43
Age	0.00021	0.00019	0.22
Occupation	0.0058	0.0053	0.28
Gender	0.0083	0.0068	-0.45

Note. $R^2 = 0.52$ for Step 1 ($p < 0.05$); $\Delta R^2 = 0.052$ for Step 2.

* $p < 0.05$. ** $p < 0.01$.

Analysis showed the group studied was very densely connected (density = 0.34) in the pre-test network (see Figure 9). Post-test network (Figure 10) density increased slightly (density = 0.35).

Figure 6a. Pre-test network (left), Figure 6b. Post-test network (right)



iii. Discussion

First, it is important to note that age and time employed at the hospital had no significant relationship with any measures of communication or well-being. The range of participants' employment length, between two months and twenty-five years, suggests that in this type of organization it is not necessary to work at the organization for an extended time to form useful communication connections, or to become engaged in the work. This may not be true at all organizations, but in a healthcare organization it is likely that forming connections that provide useful information is critical, and happens quickly.

In this network, higher engagement, lower organizational commitment and higher usefulness ratings of incoming communication were related to higher centrality. This means that the more immersed an individual is in their own work, the more important that individual tended to be in the network. This is especially relevant to health care organizations, because individuals need to access information from many individuals to provide effective patient care. These data would suggest that individuals who are very engaged in their work and perceive others as providing useful information are the most adept at obtaining information from the communication network.

Finding lower commitment to the organization predicted higher network centrality was unexpected. Although ostensibly higher commitment to one's organization might be

related to being more central in the communication network, information provided by participants in discussion groups and meetings, and as quantitative feedback explains why the reverse is true. Although most of the participants work *at* the hospital many said they don't work *for* the hospital. Physicians are independent contractors, who have their own practices, and they clearly define their roles as apart from the hospital. Many administrators work 'for' the health authority, not the hospital directly. Other individuals who work at (but not for) the hospital expressed similar feelings during the research process. For example, at the beginning of the study one participant said:

"I do not belong to [the hospital]. I am community based, however I spend a good chunk of my workday at [the hospital] as this is one of the areas I cover. Since I do not "belong" to [the hospital] I do not know that I am qualified to be part of your study."

The relationship between organizational commitment and the other variables suggests that high commitment may not be necessary or adaptive to functioning in the communication network. Participants who were most committed to their work, and perceived others as contributing information that was useful to their work were the most important actors in the network.

Finally, an individual's ratings of incoming communication was strongly related to centrality. Individuals who rated others' communication as more useful tended to be relatively more important actors in the network. This is important, because it suggests the most important factor for being central to a communication network is perceiving others' communication as useful.

The network analysis showed a densely connected network. This was confirmed by participants' descriptions of communication at the hospital. For example, many participants described communication as "an open-door policy", "direct interpersonal contact", "multidisciplinary rounds that encourage sharing information". Some participants attributed

this communication structure to the hospital being relatively small, which makes it easier to develop and maintain positive interpersonal relationships. There are multiple, important, implications for this type of network. First, it shows that the current structure of communication is adaptive. There are many useful connections that allow information to flow quickly and effectively through the network. This network most resembles Mintzberg & Glouberman's (2001) problem-solving web. Second, because each individual communicates with many others, individuals are able to create positive change in their network.

The comments also suggest individuals would be able to affect change. For example, one participant said, "it is relatively easy to reach people and I find most people I deal with interested in solutions." Another participant said, "it is relatively easy to establish contact personally or by phone". If the network was sparsely connected network this would manifest as difficulties establishing communication with others. This is especially important in a medical setting, where many of the actors in this network represent individuals who will have information that many others will need (for example, specialist physicians). If even a small group of individuals change how they communicate with others, this will significantly affect such a densely connected network.

It became clear in the analysis that the most substantial room for improvement would be in the quality of communication. Although there are many connections, there are also substantial sections of the network where communication is not 'useful'. Some participants suggested that there was room for improvement in the quality of communication, especially between occupational groups.

iv. Limitations

Although this study found a relationship, it is difficult to establish whether increased well-being leads to improved communication, or whether improving communication in a network improves the well-being of individuals within the network. It is likely that this is a

reciprocal interaction, future research is necessary to investigate this. However it is extremely important to understand that individual well-being in an organization does not occur alone. Each individual is part of a larger communication network that affects all individuals.

This study examined a small communication network in a medical setting. This was desirable for the exploratory nature of this study. Given the busy schedules of participants, it was necessary to focus on a small group. Future research is necessary to determine how individual well-being is related to network variables in larger samples. Participants' occupation was also an important focus, because of the opportunities and potential benefits of improving communication and well-being in a medical setting. This type of research would also be useful for other organizations. Yet, different types of occupations and organizations may have very different relationships between individual well-being and communication networks.

The pre-test post-test design could be improved. A longer-term, time-series analysis would be useful to confirm the findings of this study. It may also be useful to standardize the intervention, however the flexibility of this study to respond to information provided by participants was a strength as well as a limitation.

Finally, there was no control group in this study because of ethical considerations. It would not have been ethical or even possible in this small hospital to exclude participants from the study which was designed to improve physicians' well-being and communication, and consequently patient outcomes. However, the lack of a controlled study means alternative conclusions may be drawn from the data. For example, participants' well-being and communication may have increased because seasonal differences in demands on medical personnel affect their work. Or, measures may have increased in response to the Hawthorne Effect.

v. Conclusion

The first, most important, conclusion of this study is that individual well-being is closely linked to the overall functioning of a communication network. Moreover, this relationship means that it is essential to understand how a communication network interacts to understand organizational well-being. Individual well-being measures provide insufficient information to understand organizational functioning. Mintzberg & Glouberman's (2001) model of communication in medical settings provide an excellent framework to assess communication in medical settings. However, it is also necessary to examine how connections are perceived in the communication network because this study found an individual's perceptions of others' communication as useful was a significant predictor of centrality.

Second, methods to improve well-being and communication in an organization can come from participants. Qualitative data in this study confirmed the findings of Griffin et al. (2004); it is important for participants to actively participate in any improvement initiatives. This is especially important because participants had many suggestions about how communication could be improved. Because participants are immersed in the network, they know what needs to change to improve their communication and well-being. In this study, participants had specific recommendations, such as combining calls and general suggestions, such as focusing on communication between different occupational groups to improve communication. It is likely that different organizations will have different barriers, so it is important to consult with those involved to find solutions particular to specific settings.

Many of the participants expressed interest in the research process and the results. Throughout the research process, participants were provided with results and encouraged to ask questions and make recommendations. Many participants actively sought more information, were eager to understand the network, and provide suggestions and ideas for improving communication. However, this active participation took time to encourage.

Stocking (1992) suggests that disseminating information is not sufficient to change behaviour. However, the results of this study would suggest using information as a catalyst for discussion and action planning for behaviour change may result in improved well-being and communication.

It is possible that engagement significantly improved in this sample because participants were asked to focus more on their own work and their interaction with others. Hence, this focus affected both their interaction with others, and their interaction with their own work. However, future research is needed to confirm this in other groups, and with larger samples.

5. Acknowledgements

I would like to thank Dr. Susan J. Wells for supervising this project and her hard work, advice, support and continued encouragement throughout this research project. Without her ongoing guidance and assistance this research project never would have been possible.

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Finally, I would like to thank all participants at the hospital who gave up time from their busy work schedules to participate in this study.

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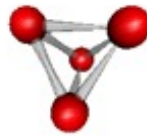
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Appendix A: Preliminary results presented to participants

Well being and communication study results

12 Jan 2010

**Initial Results**

Research Study: Organizational well being and communication in a medical setting

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STUDY PURPOSE: To better understand communication networks and the relationship of professional communications with well being at Kelowna General Hospital (KGH).

DESIGN: Describe existing communication patterns and well-being in a selected social network at KGH, discuss together how these patterns affect how work is conducted, and follow-up this discussion with a second examination of any possible changes over time.

DEFINITIONS OF CENTRAL CONCEPTS:1. *Communication*

Centrality: The amount of connections an individual has within the network: an individual with more connections is represented by being more central in the network.

2. *Well being*

Engagement: The presence of continual energy and contentment related to work.

Commitment: How the individual feels about, and relates to, the organization.

PEOPLE RESPONDING: Thirty individuals agreed to participate in this study, including hospitalists, patient care coordinators, consultants and administration. Nineteen participants completed the pre-test questionnaire. Length of affiliation with KGH mid-point was 8.5, ranging from 0.2 years to 25 years. Sex, age and length of time at KGH had no relationship with communication or well being.

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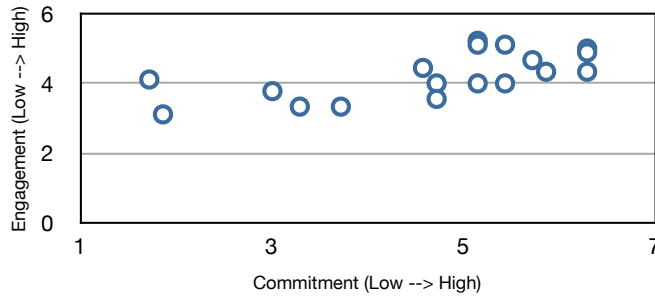


RESULTS:

Well being:

- Engagement scores on a 0 - 6 scale (Average = 4.25) ranged from 3.11 to 5.20.
- Commitment scores on a 1 - 7 scale (Average = 5.14) ranged from 1.71 to 6.29.
- Higher engagement scores corresponded with higher commitment scores.

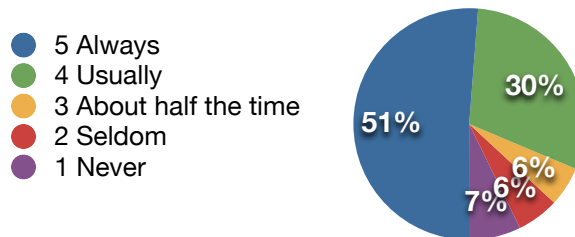
Figure 1. Relationship between engagement and commitment



Communication: The network was very densely connected with 289 connections among 30 individuals. Eighty-one percent (81%) of connections were rated either as useful either 'usually' or 'always.' Six percent (6%) of connections were rated as useful 'about half the time' while 13% were rated as being useful seldom or never (see Figure 1). Eighty-eight percent (88%) of communication was classified as "considerate".

- Higher work engagement is related to having *more* connections with other staff.
- Higher organizational commitment is related to having *fewer* connections with other staff.

Figure 2. Ratings of 'How frequently information was helpful'



Networks

- Circles/spheres represent individuals
- Lines represent communication
 - Grey lines are frequently useful communication
 - Black lines are less frequently useful communication

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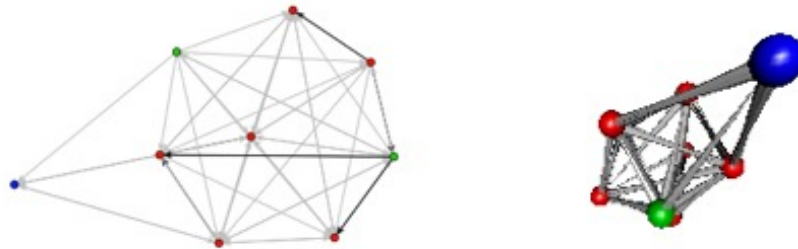
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Figure 3. Medium-sized ‘neighbourhood’

• Physicians • Nurses • Other

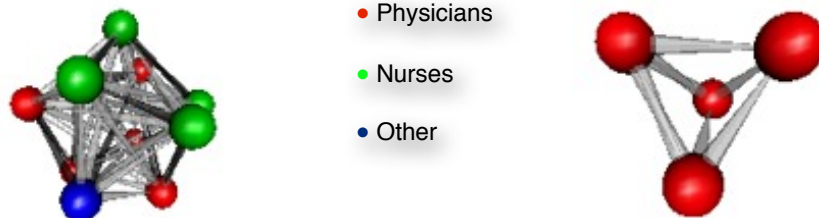


These figures represent ‘neighbourhoods’ which are small networks within the overall network. Figure 3 shows the same neighbourhood in 2D and 3D. This shows a closely linked network, with a majority of the communication being useful frequently or always. In this example, the member of ‘other’ communicates with fewer individuals than all of the physicians and nurses. *The two different images represent the same network, but display how the communication network may seem different from a different perspective.*

Figure 4 shows a very connected network, including physicians, nurses and one other staff member communicating with each other. This network shows a higher proportion of connections that were rated as less useful. Figure 5 shows a small, highly connected network of all physicians. All connections in this small network were rated as being frequently useful.

Figure 4. Medium neighbourhood

Figure 5. Small neighbourhood



A majority of poor connections in this sample were found between individuals in different groups: physicians/nurses, nurses/other, other/physicians. The *structure* of these networks is excellent because there are many, useful connections. Improvements in overall communication could come focusing on, and improving, the usefulness of communication, especially between different occupational groups.

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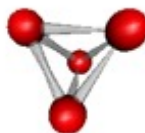
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Appendix B: Final results presented to participants

Well being and communication study final results

22 Mar 2010



Final Results

Research Study: Organizational well being and communication in a medical setting

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RESULTS:

Relationships:

Higher engagement was related to being more central in the communication network.
Lower commitment to the organization was related to being more central to the network.
Higher ratings of *others* was related to being more central to the network.

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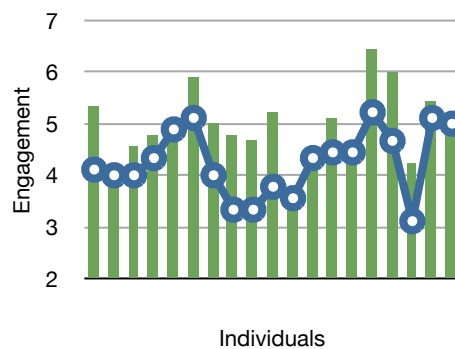
Well being and communication study final results

22 Mar 2010

Engagement:

- Higher engagement was reported in February 2010 than December 2009
- Average engagement in December 2009 was 4.25, average engagement in February 2010 increased to 4.93
- Figure 1 shows individual changes in engagement

Figure 1. Individual engagement levels reported in December 2009 and February 2010



○ December Engagement ■ February Engagement

Communication: In December, 289 connections were reported between 30 individuals. In February, 308 connections were reported between the same group. That is a slight increase in the total number of connections. A slightly higher proportion of useful connections was reported (see Figure 2).

Figure 2. Overall ratings of communication in December 2009 and February 2010: 'How frequently is communication useful to your work?'



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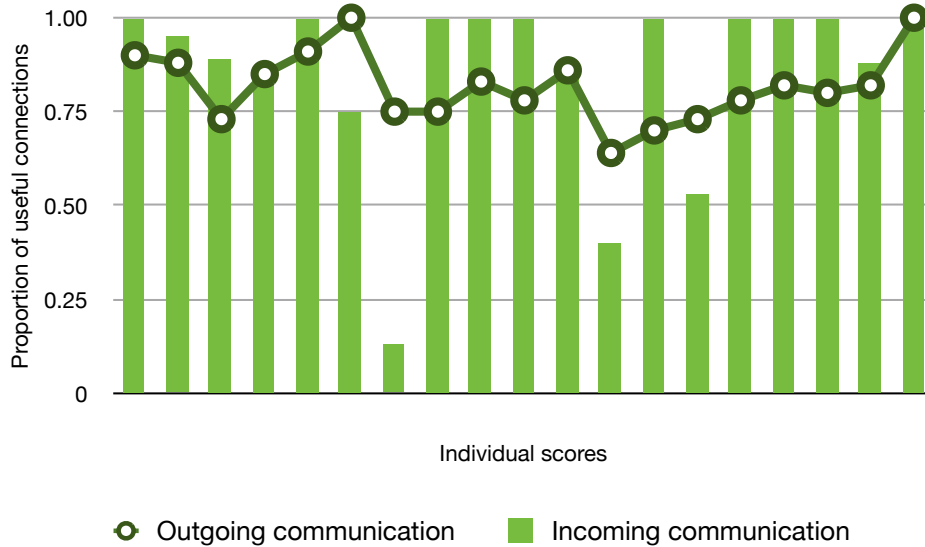
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This chart shows individual ratings of incoming and outgoing communication is important because individuals who rated others highly (who perceived others as providing useful information) tended to be more central in the communication network. Individuals who rated most of their communication with others as not useful, tended to be less central to the communication network.

Figure 4. Comparison of individual ratings of incoming and outgoing communication



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