

WORK AND TALK:
WORK GROUPS AND INFORMAL CONSULTING^{*}

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INFORMATION PROVISION BY INFORMAL CONSULTING IN MEDICAL CLINICS

ABSTRACT

We examine the effect of interdependence, occupational diversity, and interaction groups on information sharing within medical clinics. Sequential and reciprocal interdependence were associated with greater information sharing between dyads, pairs of individuals. Occupationally homogeneous interaction groups with high reciprocal interdependence also had higher information sharing between dyads. Occupationally heterogeneous interaction groups with high reciprocal interdependence had higher levels of generalized information sharing, information sharing between an individual and the interaction group. Dyadic information sharing was also more likely among similar high status professionals and among individuals who were central in work networks within their occupation. The results suggest that there are two faces of talk, one associated dyadic information sharing and one associated with generalized information sharing. Generalized information sharing is more likely to occur in interaction groups that resemble teams composed of occupationally diverse interdependent actors.

Key Words: Informal consulting, information sharing, interaction groups, occupational diversity, interdependence, medical clinics, professions, micro social orders.

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Many professional work settings involve fluid relationships. Even in work settings where teams are officially designated, subjective reporting of team membership can differ significantly from formal designations (Mortensen, 2004; Mortensen & Hinds, 2002). We know that in these fluid settings, interaction groups of regularly interacting individuals emerge and these interaction groups affect climate perceptions (Rentsch, 1990; Totterdell, Wall, Holman, Diamond, & Epitropaki, 2004; Young & Parker, 1999). We extend the interaction groups literature by examining how occupational diversity and interdependence within interaction groups affects dyadic information sharing, information sharing between two individuals, and generalized information sharing, between an individual and others in general.

Our study setting, medical clinics, is particularly appropriate for the study of interaction groups and information sharing. Information sharing through informal or curbside consulting is important in medical organizations where patient and professional knowledge is blended during care giving processes (Keating, Zaslavsky, & Ayanian, 1998; Kuo, Gifford, & Stein, 1998; Manian & McKinsey, 1996). Because occupational diversity, task uncertainty, patient-related informational ambiguity (e.g., symptoms), and interdependence are so fluid, clinical organization is often emergent, complex and idiosyncratic (Berg, 1997). Our analysis examines how occupational diversity and interdependence affect information sharing in this complex, professional environment.

We find that sequential and reciprocal interdependence are associated with greater dyadic information sharing. Greater dyadic information sharing also occurs in interaction groups that are occupationally homogeneous with high reciprocal interdependence. Generalized information sharing, information sharing between an individual and others in general, is more likely in interaction groups that are occupationally heterogeneous with high reciprocal

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interdependence. The differences between the correlates of dyadic and generalized information sharing suggest that information sharing has two faces. One face appears to reflect dyadic, reciprocal exchange while the other face appears to reflect generalized exchange.

INTERACTION GROUPS, SENSEMAKING, AND INFORMATION SHARING IN ORGANIZATIONS

Questions – information sharing in organizations – curbside consulting - dyadic and generalized

Sources of– dyadic effects – with hypotheses – work relations, occupational homophily

Work group – Rentsch and following; interdependence – van Knippenberg and Schippers

Rentsch (1990) found that interaction groups, groups of interacting individuals, in accounting firms have similar interpretations of organizational events and share a common climate. She identified interaction groups using structural equivalence, a social networks approach that identifies groups of individuals who have similar relationships to others within a social network (Boorman & White, 1976; White, Boorman, & Breiger, 1976). She measured the social network using the number of four types of relationships: friendship, work with, talk with about what events were happening in the organization, and talk with about why events were happening in the organization. She found that people within the same interaction group had similar interpretations of organizational events and that there were differences across interaction groups in the interpretation of organizational events and in the meaning attached to these events.

Young and Parker (1999) extended this work by examining the relationship between interaction groups and shared climate perceptions among management and clerical personnel in a consumer products manufacturing firm. They followed a procedure similar to Rentsch, using structural equivalence to identify interaction groups from the relationships of interacting within work: to know what is happening, to know why something is happening, and in friendship. They

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found that while membership in a common department was not related to a shared climate, membership in an interaction group was. Analyzing the relationships separately showed that the effects were not significant for work and friendship interactions, and were significant for information seeking (knowing what is happening) and sensemaking (knowing why something is happening). This suggests that interaction group membership based on information seeking and sensemaking is associated with shared climate perceptions. It also suggests that work and friendship interactions work differently than sensemaking processes. They did not examine whether work relationships were related to sensemaking processes and in particular, whether sensemaking was more frequent within structurally equivalent work groups.

Totterdell and his colleagues (2004) extended Rentsch and Young and Parker's research by examining the relationship between interaction groups and affect (feelings, emotions, and moods) among employees in a vehicle manufacturer. Interaction groups were determined using structural equivalence applied to the work relationship. Cluster analysis was used to cluster individuals by job-related affect. While departmental membership was not associated with affect, interaction groups were associated with affect groups. This shows that interaction groups based solely on work relations are associated with affect. Analyses at the dyadic level, where similarity of affect between ego and alter was regressed on the work-with relationship and on similarity of tenure between ego and alter, showed that the work-with similarity was associated with similarity of calmness and anxiety. Further analyses showed that an increase in work with density was positively related to calmness and happiness and negatively related to anxiety. Overall, they concluded that "the results concerning proximity and contagion paint a picture of affect spreading along work ties that connect employees in organizations." (2004).

This research shows that interaction groups based on work relations are associated with similarity in affect, and that sense-making activities through information sharing affect shared climate perceptions. We extend this literature by examining the relationship between

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occupational diversity and reciprocal interdependence within interaction groups on information sharing. We argue that a group of reciprocally interdependent, occupationally homogeneous actors (e.g., doctors) is likely to have information sharing based on dyadic exchange, while reciprocally interdependent, occupationally heterogeneous interaction groups (e.g., doctors and nurses) will have interaction processes with the interaction group.

Our argument builds on recent work on social exchange and group climate. Social exchanges can be classified into two broad groups – exchanges within dyads, and exchanges between an individual and a group. There are three types of individually based exchange – negotiated, reciprocal, and generalized (Lawler, 2001; Lawler, Thye, & Yoon, 2008; Molm, Collett, & Schaefer, 2007). Negotiated exchange occurs when actors bargain and arrange a simultaneous exchange of resources. Reciprocal exchange occurs when actors bargain and arrange a exchange of resources over time, such as when ego provides resources to alter with the expectation that alter will reciprocate in the future. Generalized exchange occurs when individuals provide resources to each other but not directly in dyads. An example would be a specialist helping a primary care physician who helps another primary care physician who in turn helps the specialist. The key difference between negotiated and reciprocal exchange, which are jointly called direct exchange, and generalized exchange is that direct exchange is dyadic exchange, between pairs of individuals, while generalized exchange is not. Lawler, Thye, and Yoon (2008: 525) also propose a fourth form of exchange – productive exchange. Productive exchange “involves a jointly-produced collective goo wherein people unilaterally provide benefits to the group and receive benefit from it. Interdependence is high, yet there are coordination problems that need to be solved to generate the common good and allocate collective benefits.”

Consistent with the findings from the interaction group researchers, Molm, Collett, and Schaefer (2007) showed that generalized exchange processes within groups result in group cohesiveness and solidarity. Similarly, Lawler, Thye, and Yoon (2008) showed that cohesion is strongest in productive exchange relations and weakest in generalized exchange processes,

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and that network cohesion results in greater affective attachment to the network. In contrast to productive exchange, direct exchange resulted in lower global emotions classified as “pleased-displeased, happy-unhappy, satisfied-not satisfied, contented-discontented, and joyful-not joyful” (Lawler *et al.*, 2008, :531) They noted the difference between productive and generalized exchange and suggested that the difference may be because generalized exchange requires a normative context surrounding a network to cause cohesion, solidarity, and positive emotions to emerge. They had ruled out this possibility through experimental design. They suggested “that for generalized exchange to produce an emergent micro order, some form of exogenous ‘spark’ or structural push is needed” (2008: 538). We expect that in interaction groups within medical clinics, this spark is reciprocal interdependence among occupationally diverse individuals who are providing care to patients. The spark is common efforts in care provision combined with professional ethics and organizational culture emphasizing caring activities. Given this spark, either productive or generalized exchange within an interaction group should result in greater cohesion, solidarity, and positive affect.

Because of its experimental design, the research by Molm, Collett, and Schaefer (2007) and Lawler, Thye, and Yoon (2008, 520) provides a sound empirical foundation for the theoretical arguments about the causes of micro social orders, interaction groups that are “emergent social units with group-like properties” that have high cohesion, solidarity, and positive affect. But, because its experimental design structured networks and information sharing, it did not directly address fluid work settings where interaction groups and information sharing are emergent. We build on the complementary nature of the interaction group and micro social order research to develop hypotheses about the relationship between the characteristics of interaction groups (micro social orders) and information sharing.

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Following the micro-social order literature, we characterize information sharing as either dyadic or generalized.¹ Dyadic information sharing is characterized by the similarity in information sharing reported by ego as providing and alter as receiving (e.g., a little, some, a lot). Both members of a dyad agree about a level of information sharing between them. Generalized information sharing occurs when alter and ego report dissimilar levels of providing or receiving information. This occurs in a variety of ways. Alter can report receiving information that ego does not report providing, alter can report receiving a higher level information than ego reports providing, ego can report providing information that alter does not report receiving, or ego can report providing more information than alter reports receiving.

The micro social order literature, in combination with the interaction group literature's findings on sense-making, suggest that generalized information sharing will be greatest in situations where individual contributions to the group's performance are difficult to distinguish, that is in situations where task behaviors are non-separable (Lawler *et al.*, 2008, 524). Non-separability is mostly likely to occur in interaction groups that have the team-like characteristics of occupational diversity and high reciprocal interdependence. In these situations "the exchange task promotes a sense of *shared responsibility* for success or failure at exchange. If the social exchange generates a sense of shared responsibility, actors are more likely to interpret their individual feelings as jointly produced in concert with others and thus attribute those feelings to social units" (Lawler *et al.*, 2008, 524; e.g. interaction groups).

Within medical clinics, non-separability is most likely to occur in a situation where individuals in an interaction group are occupationally diverse and see themselves as highly interdependent. For example, technicians such as bone densitometrists serve as buffers between measurement technology and physicians, while nurses serve as brokers between patients and physicians (Barley, 1996). Because of their buffering and brokering roles,

¹ We use the terms generalized and productive interchangeably because given the study context

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technicians and nurses are interdependent with physicians. In addition to role differences, differences in occupational training and in work activities each bring a distinctive set of knowledge and skills to work. The lack of role, occupational, and work similarity makes the likelihood of developing a common view on these aspects of work unlikely. What is common between the individuals is the patients being served, which provides a foundation of shared responsibility which results in greater information sharing. Consistent with this argument, DeDreu's (2007) research showed that information sharing was greater in teams in which members perceived higher outcome interdependence within the team. We expect this shared responsibility to be associated with generalized information sharing because status, role, and occupational expertise are likely to be a barrier to dyadic information sharing (exchange).

Hypothesis 1: The interaction of occupational diversity and reciprocal interdependence in an interaction group is positively associated with generalized information sharing.

In occupationally homogeneous interaction groups where individuals see themselves as highly interdependent, commonalities in occupational training, roles, and status provide the foundation for a shared world view. In these interaction groups, the focus is likely to be less on the patients being served than it is on the techniques of serving patients. Consistent with this argument is Blau's study of information sharing among agents who audited employers to determine compliance with federal laws (1963 (1955)). Information provision among agents had to be informal because it was proscribed by formal rules. Blau found that information requests for solving difficult problems were addressed to more expert agents, who gained status as a consequence of providing help. He also found that reciprocity in informal consultation was a special case of informal consultation since it "virtually eliminated the danger of rejections as well as the status threat implicit in asking for help, since the roles questioner and consultant were

they will have the same effect.

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intermittently reversed” (Blau, 1963 (1955), 131). The information sharing among professionals described by Blau is dyadic in nature. Because the common occupational foundation provided a shared understanding, interaction is likely to be seen as dyadic among occupationally similar individuals rather than between an individual and a group. The interaction would be interpreted as interdependence – working with each other. This suggests

Hypothesis 2: The interaction of occupational diversity and reciprocal interdependence in an interaction group is negatively associated with dyadic information sharing.

DATA AND METHODS

The study setting is four medical clinics. Information sharing through informal consulting is widely recognized as important in medical practice. It is "an informal process whereby a physician obtains information or advice from another physician to assist in the management of a particular patient. The consultant neither reviews the patient's record nor examines the patient and does not document his/her recommendations" (Kuo *et al.*, 1998). Informal consulting facilitates the expeditious diagnosis and treatment of patients (Wrobel *et al.*, 2003) and is a “survival skill” of busy health care professionals. Physicians may perceive informal consulting as a more efficient practice than a literature search, or a formal consultation for a complex case. (Golub, 1998) They may also find it useful in spreading knowledge, and building relationships for more formal consultations.

Some research has looked at the types of questions asked in informal consultations. For example, a study of questions asked in informal consultations of infectious disease specialists showed that most questions involved solutions and pointers to related information: determining the correct treatment, selecting a prophylaxis, interpreting laboratory reports, and providing antibiotic information (Leblebicioglu *et al.*, 2003). Myers (1984) reported that about one-third of informal consults involved straightforward questions which were covered in standard texts and training programs.

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Other studies have looked at the characteristics of those involved in informal consultation in a clinic setting. Age, specialty, and setting are associated with the frequency of informal consulting (Kuo *et al.*, 1998). Older generalists are less likely to seek information consulting (Kuo *et al.*, 1998), generalists are more likely to request information than specialists, and specialists are more likely to receive requests than generalists (Keating *et al.*, 1998). Physicians in group settings are more likely to request and provide information (Keating *et al.*, 1998), which is consistent with a propinquity interpretation (Kuo *et al.*, 1998). Similarly, physicians are most likely to consult informally with readily available colleagues (Rappolt, 2002). Physicians who see more patients are more likely to request information, which is consistent with the argument that informal consulting is an efficient, shortcut way of gathering information in a busy day (Keating *et al.*, 1998). Incentives and managed care influence informal consulting. Physicians who are capitated for health care services (i.e., paid a fixed sum per patient per period of time) are more likely to request and provide information (Keating *et al.*, 1998; but see Kuo *et al.*, 1998). Physicians employed by a health maintenance organization are more likely to consult informally (Kuo *et al.*, 1998). The capitation and managed care effects are consistent with the argument that physicians who share an incentive to minimize health care costs avoid formal consultation costs through informal consults.

Physicians strongly approve of informal consulting, with generalists expressing a more positive attitude than specialists, who worry about receiving incomplete information in questions from requestors which results in incomplete answers (Kuo *et al.*, 1998). Both generalists and specialists feel that informal consulting saves “money for the patient and third-party payer and that these consultations [are] an important way for physicians to stay current with medical knowledge” (Kuo *et al.*, 1998, 907).

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SAMPLE AND SURVEY

Study data come from surveys of all members of four clinics (A, B, C, and D). A, B, and C are part of a large multi-specialty medical group that focuses on highly integrated primary care, namely internal medicine, pediatrics, and obstetrics/gynecology. The overall group has over 130 providers with 22 medical and surgical specialists. D is part of another large multi-specialty medical group that focuses on highly integrated primary and specialty care. While the clinics were not randomly sampled, they were chosen to provide contrasts: A - a small pediatrics practice; B and C - family practice clinics from the same medical group; and D - a specialty clinic caring for patients with chronic conditions with extensive co-morbidities. Table 1 shows descriptive statistics for clinic's respondents and describes each clinic's practice.

METHODS

All personnel at each clinic, including physicians, nurses, technical staff, and administrative staff, were asked to fill out questionnaires. The members of each clinic were identified by the clinic administrator and physician leaders, who also identified a convenient day for clinic members to fill out the questionnaire and informed clinic members about the survey. During survey administration, the research team was available to answer questions about the survey. Overall clinic response rates ranged from 75% to 91%. Response rates among physicians and nurses ranged from 85% to 94%.

The survey asked about demographics, roles, work, and relationships. The demographic measures included birth year, gender, ethnicity, education, certification, and licensing. Role- and work-related measures included number of years practicing at the clinic, number of days per week, hours worked in most recent workweek, average number of patient contacts per day, primary occupation in clinic (e.g., physician, nurse, staff, technician), and clinical role (e.g., medical director, triage nurse, receptionist, medical supplies clerk). Other measures included percent of time by activity in a week for: patient care (including activities such as ordering tests, calling in prescriptions, talking with patients on phone); clinic

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administration; medical group administration; staying current professionally (e.g., continuing medical education); and resolving health insurance issues.

The survey measured respondents' perceptions of four relationships: work with (reciprocal interdependence), refer patients (sequential interdependence), providing and receiving information. Relationships were measured with items that listed all clinic members by name down the page in rows and relationships across columns. The respondent answered the following questions for each person in the clinic (i.e., for every row): For those people you know, how much do you interact with them in each of the following relationships): (a) work-with to provide patient care; (b) refer patients to; (c) provide information to in informal consults; and (d) receive information from in informal consults.

Definitions provided to respondents were:

- Work-with means that you and the other are interdependent when caring for patients – your actions affect each other. It does not refer to the situation where you and the other contribute separately to clinic performance because you work in the same location. Please consider all others, such as physicians, rooming nurses, staff, laboratory technicians, and receptionists, with whom you work when delivering patient care.
- Refer patients to means referring a patient to another provider in your clinic, such as a physician, triage nurse, or patient education.
- Informal consultation refers to obtaining or providing information about caring for a patient without formally consulting with the patient, formally reviewing the patient's record, or formally documenting the consultation.
- Patient care means all patient care activity, including activities such as direct patient contact, ordering prescriptions, managing laboratory and radiology testing.

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MEASURES

The dependent variables were dyadic and generalized information sharing. Dyadic information sharing was measured using a binary variable indicating confirmed information provision from A to B in a dyad. The indicator was set to 1 if the confirmed information provision relationship was greater than zero on an item scale of 0 (“Never”), 1 (“A little”), 2 (“Some”), or 3 (“A lot”). Confirmed information provision was measured using ego and alter’s response. In the provide question, each respondent indicates to which colleagues she provides information. In the receive matrix, each respondent indicates from whom she receives information. Transposing the “receive information” matrix and combining it with the “provide information” matrix by taking the minimum of corresponding cells forms the confirmed information provision relationship. For example, if ego reports providing information to alter “A lot” (3) and alter reports receiving information from ego “Some” (2), the information provision relationship is “Some” (2). Because we used both send and receive relations to obtain a confirmed information provision network, the information provision matrix is asymmetric – ego could provide information to alter but alter may not provide information to ego. Information provision was a relatively rare event, with 285 dyads confirming information sharing at some level. Because the events were rare among dyads and to facilitate multivariate analysis, the levels were collapsed into a variable indicating some level of confirmed information provision.

Generalized information sharing was measured as an indicator variable set to one whenever ego reported providing more information to alter than alter reported as receiving or alter reported receiving more information than ego reported as sending. The generalized information sharing relationship is asymmetric. Generalized information sharing was reported in 878 dyads. There were 436 dyads in which alter reported receiving more information than ego reported sending and 442 dyads in which ego reported providing more information than alter reported receiving. 183 dyads reported both dyadic and generalized information sharing.

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Following the interaction group literature, interaction groups were measured as sets of structurally equivalent individuals identified using the reciprocal interdependence relationship (work-with). The CONCOR structural equivalence algorithm implemented in SPAN (Moody, 2000), a social network analysis package for SAS, was used. The number of splits was set to 3 and the convergence criteria to .001. Because of clinics A and D smaller size, the group partitions at the third level were used. Because of clinics B and C's larger size, group partitions at the fourth level were used. There were 3 groups in A, 6 groups in B, 8 groups in C, and 4 groups in D. The identification of structurally equivalent work groups nested dyads in interaction groups consisting of several actors having similar reciprocal interdependence (work-with) ties to other clinic members. For each dyad in a clinic matrix, two actors either did or did not belong to the same structurally equivalent interaction group.

Interaction group reciprocal interdependence density was measured as the density of the confirmed work-with relationship. Interdependence density takes on values from zero (no interaction group members report working with each other) to one (all interaction group members report working with each other). Interaction group occupational diversity was measured using one minus the Herfindahl index of the sum of the squared proportions of each occupation within the interaction group (Herfindahl values range from 0 to 1, with 1 representing a perfectly occupationally homogenous interaction group). The hypotheses were tested using interaction group interdependence, interaction group occupational diversity, and their interaction.

CONTROLS

An indicator for working in the same interaction group controls for the effect of being in the same interaction group. Work group size was included as a control variable because density varies with group size and larger groups provide more opportunity for information sharing. Within interaction groups the main effects of reciprocal interdependence and occupational diversity were also included so that their interaction was not confounded with main effects.

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A variety of control variables capturing dyadic characteristics that may be correlated with interaction group characteristics likely to affect information sharing were included. Sequential and reciprocal interdependence in a dyad were controlled for using patient referral and reciprocal interdependence relations. Sequential interdependence was measured with a *refer patient to* relationship. It is asymmetric (e.g., A may refer patients to B and B may not refer patients to A). Values ranged from 0 (None) to 3 (A lot). Relationship confirmation procedure, such as that used for information provision, was not used because receivers of patient referrals may not always be aware of who sent the patient. Reciprocal interdependence was measured using the confirmed work with relationship (minimum values of ego and alter's responses). Occupational similarity, which has been shown to facilitate information sharing, was controlled for using indicators for specific occupational pairs (e.g., physicians-physicians, nurses-nurses, physicians-nurses). The measure of occupational similarity was coded based on degrees and roles (MD/OD, RN, CMA/LPN, technicians, and staff). Degrees were used for medical staff because of the homogeneity of degrees and training. Roles were used for staff and technicians because of the heterogeneity of degrees and training. Technicians were coded in a separate category if enough technicians in the clinic responded to make individuals unidentifiable when clinic-specific graphs were viewed by clinic members; otherwise they were included with staff. Similarity in gender and age were included as control variables. An indicator was set to one if both individuals were the same gender, and the absolute value of the age difference was used.

METHODS

Logistic multivariate models implemented in PROC GLIMMIX in SAS were used to test the hypotheses. The multivariate analysis was complicated by the dyadic nature of the dependent variable. Because the unit of analysis was the dyad, each individual was included in the analysis multiple times as an information provider and as an information receiver. This can result in correlated errors. This problem has been approached in a variety of ways by network researchers, such as using the quadratic assignment procedure (QAP), including a fixed effect

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for each sender and receiver, and including a random effect for each sender and receiver. The QAP procedure was not feasible for our analysis because it does not take into account the binary nature of dependent variable. Fixed effects models were not feasible to use because sender and receiver fixed effects were strongly correlated with the group membership, making the tests of the work group hypotheses infeasible. The inclusion of the sender and receiver random effects addressed correlated errors by assuming that the unobserved sender and receiver characteristics that affect information provision are uncorrelated with the other effects in the model and are uncorrelated with each other and the usual error term (Lazega & van Duijn, 1997; van Duijn, Snijders, & Zijlstra, 2004). The random effect is normally distributed with mean zero for each provider and receiver. It measures an individual's average propensity to provide or receive information. The correlation between provider and receiver random effects from Models 2 and 4 were .77 and .83, meaning that individuals who were information providers were also information receivers. The sender and receiver random effects were regressed on individual characteristics (age, gender, occupation), role (clinic medical director, nurse supervisor, triage nurse), and centrality in referral and work networks. For generalized information sharing, triage nurses were more likely to be information providers. For dyadic and generalized information sharing, individuals with high referral in-degrees were more likely to be information receivers. The impact of clustering within clinics on errors was managed using robust estimation with clinics as the cluster.

RESULTS

Table 2 shows network density and centralization for the information provision relationship and the densities of the reciprocal (work-with) and sequential (refer patients) interdependence relationships. The density measures suggest that information provision mostly occurred intra-occupationally and more often among physicians than among other individuals of other occupations. Inter-professional information provision tended to flow from physicians to nurses. Interestingly, the highest levels of information provision among physicians occurred in

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clinics A and B, even though clinic organization differs markedly between them. A's small size, focus on pediatrics, and staffing from pools may encourage dense, decentralized information provision among physicians. B's dense informal consulting among physicians appears to be associated with one physician's central role. The network centralization measures for the strong informal consulting relationship support this argument as B was most centralized.

Table 3 shows the results of the multivariate analyses which support both Hypotheses 1 and 2. The interaction of occupational diversity and reciprocal interdependence density had a positive relationship with generalized information sharing and a negative relationship with dyadic information sharing. Generalized information sharing decreases as reciprocal interdependence and occupational diversity increase and increases at high levels of both. Dyadic information sharing increases as reciprocal interdependence and occupational diversity increase and decreases at high levels of both.

The estimates for the control variables measured dyadic effects. The estimates show that information provision was influenced by work organization - sequential and reciprocal interdependence were associated with both greater dyadic and greater generalized information sharing. This is consistent with the argument that within a complex, uncertain work context, information is summarized by bracketing and redacting before it is provided. This is likely to result in more informal consulting to follow-up on incomplete information. Consistent with the arguments about occupational similarity and status providing a foundation for information sharing, physicians are more likely to have dyadic sharing relationships than are nurses. The effects of gender and age similarity are insignificant.

Finally, the relationship between being in the same interaction group for dyadic information sharing when it is included in a model without the interaction group characteristics is consistent with the findings of the interaction group literature: co-location in the same interaction group is associated with more dyadic information sharing. Co-location in the same interaction group is not associated with more generalized information sharing.

Our analysis of the relationship between occupational diversity and reciprocal interdependence in interaction groups found that talk in interaction groups has two faces, dyadic and generalized. Our results are consistent with the predictions of the affect theory of social exchange (Lawler, 2001) and provide an exchange-based foundation for findings in the interaction group literature. Our research is limited because we did not measure identification with the work group, cohesion, and a shared purpose, which should be shared? in occupationally diverse, highly interdependent interaction groups.

Our research may provide a new method for identifying teams within fluid work environments such as medical clinics. Methods for identifying teams can be classified on two dimensions: realism/nominalism and objective/subjective. The realism/nominalism dimension is similar to methods used in social networks research to identify network boundaries. Realism uses a formal definition of team membership, such as all members of a software engineering team. Nominalism identifies team members as those individuals who fit a membership criterion based on the researcher's conceptualization, such as top management teams being defined as senior managers.

The objective/subjective dimension derives from the source of the information used to classify an individual as a member of a team. Objective identification of teams occurs using information external to the individual, such as when an organization provides a list of members of software engineering teams. Subjective identification of group members involves using individual self-reports of group membership. Mortenson's recent work on boundary disagreement, for example, compares realist, objective definitions of groups (groups as specified by the organization) with realist, subjective definitions of groups (membership in teams identified by the organization as reported by individuals). Even with relatively formalized settings where a realist objective approach would seem most likely to work well, such as that found with

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software engineering groups, there is boundary disagreement - individuals who are formally in a group do not agree on their membership status (Mortensen, 2004; Mortensen & Hinds, 2002).

Because of the complexity and fluidity of work in medical clinics, using an objective approach, either realist or nominalist, is likely to be problematic. Teams in medicine can be either formally designed and emerge from interaction, as individuals find others with whom they are comfortable working with, are collocated with, or are interdependent with because of the technology (e.g., a rheumatologist (physician) working with a bone densitometrist (technician)). Team emergence may also be an unintended consequence of organizational decisions. For example, in a medical clinic, emergence could be due to the physical placement of nurse stations and physician offices, which affects proximity, which in turn affects who works with whom. Because of the emergent nature of work groups in professional settings, asking individuals to which team or group they belong may also be problematic because a team may not fit the individual's perception of the defining characteristic of the institutional structure. If this is the case, asking individuals about team membership could be interpreted as a demand effect in the study design, with the question about membership reifying the concept.

Using a structural equivalence approach as developed by interaction group researchers combined with the implications of affect theory of social exchange may be a promising avenue to identify teams using a nominalist/subjective method. This approach has a foundation in complexity perspectives in organizational theory that work teams either are formally constituted on the basis of or emerge out of patterns of interdependence (Carroll & Burton, 2001; Simon, 1962; Thompson, 1967). Kozlowski and Ilgen's definition of a team can guide this approach (2006). A team is minimally a group – a set of “(a) two or more individuals” who “(g) are together embedded in an encompassing organizational system, with boundaries and linkages to the broader system context and task environment.” This suggests that team members are necessarily members of a work group that has similar relationships with other actors in an organization. This is the definition of structural equivalence. This definition suggests a minimal

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criterion for a work group: it should consist of groups of actors who are structurally equivalent in work relationships with others in the organization.

Again following Kozlowski and Ilgen, a team as a work group with individuals who “(f) have different roles and responsibilities” who are interdependent “and who (e) exhibit interdependencies with respect to workflow, goals, and outcomes.” Because roles are closely identified with occupations in medical clinics, occupations can be used to define roles and reciprocal interdependence in work with relations can be used to measure interdependencies. A team exists when an interaction (work) group has high occupational diversity and high interdependence.

Examples illustrate the argument. In a medical clinic, the medical records staff is a set of employees who relate to other clinic members in a structurally equivalent manner. The staff’s responsibility is to organize the medical records and provide them to persons occupying other roles as needed. The interdependence among the medical records staff is pooled, with staff simply being collocated and going about their jobs independently. In contrast, a care team consists of a reciprocally interdependent physician and rooming nurse.

Further research is required to examine this approach to identifying and measuring work groups. One test would be to examine whether teams identified using the nominalist/subjective approach are cohesive and share a common purpose related to organizational activities and to examine whether formally constituted teams are reflected in teams identified by the nominalist/subjective approach. An example is the implementation of prepared practice teams (PPTs) in medical clinics (Institute for Healthcare Improvement, 2007). PPTs are designed to be teams of three physicians, three rooming nurses, and one registered nurses providing care to a patient population. The method we have developed for identifying teams could be used to assess the degree to which PPTs match teams identified through a nominalist/subjective approach and to see the relationship PPT and nominalist/subjective teams, cohesion, purpose, and affect.

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Our analyses may also provide a new approach to understanding the mixed effects of diversity (van Knippenberg & Schippers, 2007). Our analyses are consistent with earlier research that shows that interdependence moderates the effect of group diversity. It also suggests two important points about the effect of diversity. First, the measurement of information sharing affects the moderating effect of interdependence. High interdependence and homogeneity increase confirmed information sharing. This is consistent with a direct or reciprocal exchange process. High interdependence and heterogeneity increase unconfirmed information sharing. This is consistent with a generalized exchange process. The implication is that the moderating effect of interdependence on diversity is a function of the face of information shared.

An alternative explanation for our findings is that interdependence, measured using a question on work with, and information provision capture the same phenomena. While response-response bias is a possibility, we do not feel that this is an issue for a few reasons. First, if it were true, then the models for dyadic and generalized information sharing should have been similar. They were not. Second, the work-with and information provision questions were explicitly worded to capture different concepts. Third, the analysis of confirmed information providing, both interdependence (work-with) and dyadic information sharing were confirmed relations. For response-response bias to occur, it would have to occur at the dyadic level – both ego and alter would have to have the same level of response-response bias. Fourth, informal consulting (information provision) has a strong institutional foundation in medical care. Because of its institutional definition, it is likely that respondents will see it as different from the interdependence (work-with) relation. For these reasons, we feel that the reciprocal interdependence (work-with) and information provision questions capture different phenomena and that our results are not due to response-response bias.

A similar alternative explanation is that individuals who work with or refer patients with each other may notice and report higher levels of dyadic and generalized information sharing

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just because of a work interdependence propinquity effect. This is controlled for with the inclusion of reciprocal interdependence (work with) and sequential interdependence (patient referral) at the dyadic level. Because the alternative explanation is controlled for, the interaction group effects should not include the effect of higher reporting due to work interdependence propinquity. And, the alternative explanation would work against finding a negative interaction effect of interdependence and occupational diversity on dyadic information sharing.

A second limitation is that we studied information provision within clinics. Individuals could obtain information from others outside their clinic. The research could be extended by including boundary-spanning relationships and examining how externally acquired information is shared within a clinic. Understanding when external sources function as substitutes for internal sources and when external sources provide knowledge that is shared within a clinic may be a key to understanding which clinics are more successful at implementing evidence-based care and becoming a learning organization.

There are generalizability limitations. First, the research is based on four self-selected clinics were studied. In contrast to other professional service firms that provide services to organizations and individuals, medical clinics provide services only to individuals. Within medical clinics, there is likely to be strong orientation to patient care. This may provide a stronger common goal orientation than is found in other settings.

Finally, we cannot make causal arguments about the relationship between work organization (interdependence) and information sharing because arguments can be constructed for both work organization affecting information provision and for information provision affecting work organization. Examples of using work organization to influence information provision include physically co-locating individuals, assigning individuals to the same group, or having individuals attend common training sessions. Examples of the effects of information provision on work organization would be individuals who find that they are sharing information identifying

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common tasks and projects they could work on together. Longitudinal studies of work and information sharing networks are needed to disentangle these effects.

In conclusion, this paper extends organizational research on the effect of interaction groups on information sharing by using the affect theory of social exchange to develop and test hypotheses about the relationship between interaction group characteristics and information sharing and by developing the idea of two faces of talk, one based in dyadic exchange and one based in generalized exchange.

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Table 1: Descriptive Statistics for Respondents by Clinic and Clinic Descriptions				
	A (N = 14) MEAN (SD)	B (N = 29) MEAN (SD)	C (N = 26) MEAN (SD)	D (N = 19) MEAN (SD)
Age	45.00 (15.51)	45.38 (9.70)	48.15 (7.94)	49.00 (10.32)
% time spend on direct patient care	71.64 (34.78)	40.48 (34.88)	47.88 (35.70)	46.42 (37.86)
Days per week worked	4.39 (1.06)	3.75 (1.67)	4.06 (1.61)	4.68 (0.67)
Patients seen per day	17.92 (9.69)	27.38 (26.21)	27.94 (14.63)	21.23 (28.41)
Years at clinic	9.20 (6.83)	5.14 (4.33)	9.25 (7.44)	6.87 (6.14)
	%	%	%	%
Female	0.79	0.72	0.73	0.74
Occupation				
Physician	0.43	0.21	0.42	0.26
Nurse (=1)	0.57	0.31	0.42	0.26
Staff (=1)	0.00	0.41	0.13	0.32
Technician (=1)	0.00	0.07	0.04	0.16
Clinic Descriptions				
A is a pediatrics service consisting of 6 pediatricians, 1 nurse practitioner, 6 medical assistants (MAs), 2 registered nurses (RNs) and 2 receptionists. The pediatrics department is supported by administrative staff from the larger clinic. The administrative staff from the surrounding clinic was not included in the survey. In this clinic (unlike the other three), the formal staffing model is functional. Nurses and physicians are organized into separate occupational pools and assigned to work together on a rotating basis.				
B is a freestanding family practice clinic consisting of 8 primary care providers (5 adult physicians, 1 pediatrician, 1 obstetrician, and 1 osteopath), 2 RNs, 2 LPNs, 4 CMAs, 4 medical records staff, and 4 receptionists. Physicians and nurses or CMAs are assigned to work together on a regular basis as a team.				
C is a freestanding family practice clinic consisting of 11 primary care specialists (7 internal medicine, 1 pediatrician, 1 obstetrician, 1 nurse practitioner, and 1 counselor), 2 RNs, 4 LPNs, 3 CMAs, 6 receptionists, and 4 medical records staff. Physicians and nurses or CMAs are assigned to work together on a regular basis as a team.				
D is a specialty clinic within a large multi-specialty medical group. This clinic has 5 physicians, 8 nurses, 6 staff, and 4 technicians. The physicians practice predominantly at the specialty clinic, but also regularly practice in the medical group's family practice clinics. As in clinics B and C, teams of mixed occupations are the staffing practice in clinic D.				

TABLE 2: INFORMATION PROVISION, REFERRAL, AND INTERDEPENDENCE DENSITY AND CENTRALIZATION BY CLINIC AND RELATIONAL STRENGTH (ANY, STRONG)								
	Clinic							
	A		B		C		D	
Information Provision	Any	Strong	Any	Strong	Any	Strong	Any	Strong
Density								
All	.43	.20	.06	.04	.18	.03	.11	.04
Physicians→Physicians	.63	.33	.50	.40	.43	.08	.50	.20
Nurses→Nurses	.64	.23	.18	.11	.23	.06	.05	.00
Physicians→Nurses	.31	.19	.11	.07	.14	.01	.28	.20
Nurses→Physicians	.19	.10	.06	.06	.17	.00	.08	.00
Network centralization ¹	38.5	25.6	29.4	32.8	51.0	17.7	38.9	23.9
Other Relationships								
Density								
Patient Referral	.46	.29	.30	.23	.38	.20	.32	.21
Interdependence	.75	.58	.51	.25	.59	.24	.87	.50

¹ Calculated as: $(\sum (c_{\max} - c_i)) / c_{\max}$ where c_{\max} is the maximum centrality observed and c_i is the centrality of actor i.

TABLE 3: DETERMINANTS OF GENERALIZED AND DYADIC INFORMATION SHARING								
	Generalized Information Sharing				Dyadic Information Sharing			
	Homophily & Work Relations		+ Interaction Group		Homophily & Work Relations		+ Interaction Group	
Interaction Group Characteristics	Coeff.	Err.	Coeff.	Err.	Coeff.	Err.	Coeff.	Err.
Reciprocal Interdependence density			-3.92*	1.52			12.43*	3.29
Occupational Diversity			-4.19*	2.06			13.74*	4.21
Diversity * Density			12.03*	3.76			-33.27*	8.27
Work Relations								
Sequential interdependence (Refer patients)	0.63*	0.08	0.63*	0.08	0.66*	0.13	0.66*	0.13
Reciprocal interdependence (Work with)	0.45*	0.07	0.44*	0.08	0.22	0.12	0.27*	0.12
Occupational Relationships								
MD to MD	-0.40	0.74	-0.30	0.76	2.20*	0.78	2.06*	0.85
CMA to CMA	-1.53	0.83	-1.59	0.83	-1.34	0.94	-1.58	1.01
MD to Nurse (Pair)	-0.11	0.74	-0.23	0.76	0.37	0.73	0.45	0.79
Nurse to MD	-0.15	0.74	-0.24	0.76	-0.93	0.76	-0.87	0.82
Other to Other	-1.13	0.71	-1.19	0.72	-1.01	0.71	-1.27	0.74
Demographic Similarity								
Same Gender	0.26	0.15	0.21	0.15	0.37	0.24	0.44	0.24
Age Difference	0.01	0.01	0.01	0.01	-0.02	0.01	-0.02	0.02
Work Groups								
Same Interaction Group	-0.16	0.17	-0.91	0.91	0.92*	0.24	-9.89*	2.34
Group Size			0.41*	0.16			1.07*	0.33
Clinic Effects (Clinic 1 Contrast)								
Clinic 2	-1.63*	0.53	-1.90*	0.54	-3.67*	0.83	-3.26*	0.86
Clinic 3	-0.62	0.54	-0.84	0.55	-2.56*	0.82	-1.96*	0.84
Clinic 4	-1.32*	0.57	-1.77*	0.58	-2.96*	0.88	-2.58*	0.92
Constant	0.72	0.81	1.05	0.83	-0.68	0.95	-1.10	1.01
Sender Random Effect	0.96	0.21	0.95	0.21	1.91	0.49	1.92	0.50
Receiver Random Effect	1.13	0.23	1.12	0.23	2.94	0.68	3.02	0.71
-2 Residual Log Pseudo-Likelihood	10308.69		10298.01		12608.14		12853.30	
Generalized Chi-square	2298.72		2221.09		815.92		756.42	

* - p < .05