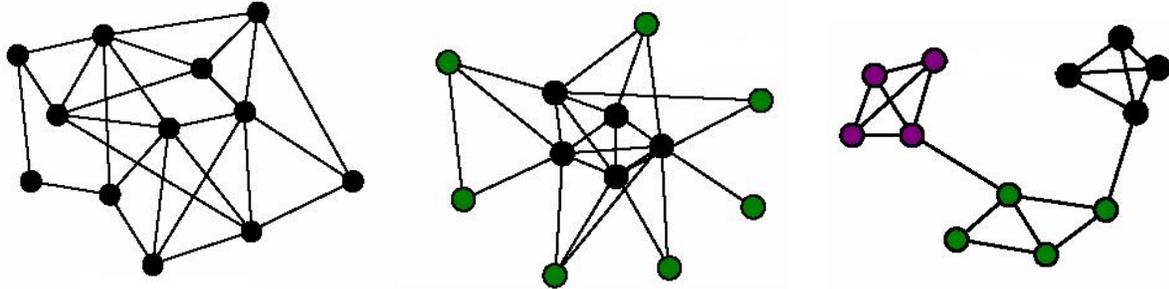


Network Analysis Study

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Research Purpose: The primary purpose of this project is to conduct original research that will be disseminated through scientific conference presentations and peer-reviewed journal publications. This research addresses two general research questions. First, what is the association between network connections among faculty and various faculty outcomes, such as research productivity and job satisfaction? A network connection involves any form of interpersonal interaction occurring between two people in the network, such as giving advice and friendship. Network theory predicts that both an actor's *location* within a network and the *overall* structure of the network will present opportunities and impose constraints on an actor's behavior and shape an actor's perception of their environment (Brass et al 2004; Friedkin 2004; Kilduff, Tsai and Hanke 2006; Pescosolido and Rubin 2000; Wasserman and Faust 1994; Wellman 1988; Coleman 1988). Research in non-academic settings shows that network structure is associated with worker productivity and work satisfaction (Ibarra 1992; Ibarra 1997; McGuire 2000; Sparrowe, Liden, Wayne and Kraimer 2001; Brass 1985; Burt 1998). To date there is no information if similar dynamics occur within an academic setting. Professors differ substantially from business managers, and the structure of universities is substantially more decentralized than in business. We investigate how measures of network connectivity at the individual and departmental level will associate with faculty productivity and satisfaction.

Second, how and why does the structure of academic departmental networks change over time? Network Theory assumes that networks are emergent and dynamic (Barry Wellman 1988; Wasserman and Faust 1994). Network structures arise through interpersonal interaction among network actors and will over time. We will use the first wave of data collection (Spring of 2008) to provide a baseline comparison to subsequent waves of data collection (Spring 2010 and Spring 2012) to assess how the structure of department networks have changed over time. We will also investigate factors associated with changes in network structures, such as department size and

network structure at baseline. Finally, we will consider the changes in faculty connections in light of the unfolding ADVANCE-Nebraska program elements.

The Research Team:

Principle Investigators

Christina Falci is an Assistant Professor in the Department of Sociology. Dr. Falci earned her Ph.D. from the University of Minnesota in 2006. She is developing an expertise in the methodology of Network Analysis. Christina has applied this methodology to numerous substantive research interest areas within sociology, such as mental health, delinquency and organizations. For more information about network analysis please see the section below on Research Activities.

Julia McQuillan is an Associate Professor in the Department of Sociology and Director of the Bureau of Sociological Research. Dr. McQuillan earned her Ph.D. from the University of Connecticut and has been at UNL in the Department of Sociology since 1998. As a methodologist, she collaborates with researchers on a variety of topics (e.g. labor markets and wages, work stress and health outcomes). Her substantive research focus in the last few years has been on the social and behavioral consequences of infertility. She has long had an interest in the sociology of gender, and has collaborated with faculty in other disciplines (e.g. marketing, children's literature, geography) to bring gender theory to shed light on unanswered questions.

If you have questions about the research, then please contact the Principal Investigators Christina Falci (2-3792; cfalci2@unl.edu) or Julia McQuillan (2-6616; jmcquillan2@unl.edu).

Research Activities:

Survey Administration: In Spring 2008, we administered two web surveys to faculty in 26 departments at UNL: the COACHE Job Satisfaction Survey and the Faculty Network and Productivity Survey. The COACHE Survey asked faculty to assess their experiences regarding promotion and tenure, the nature of their work, policies and practices, and the culture and collegiality on their campuses. The Network and Productivity survey asked faculty to report on their research, teaching and service and contained a network mapping survey instrument. A network mapping instrument entails identifying the connections among people within a network, such as faculty within a department, college, discipline or university. A network connection can measure any form of interpersonal interaction occurring between two people in the network, such as communication, exchange, friendship, etc. Generally, network connections are measured by providing a list of names of all individuals within the network to participants in the study. Then, study participants are asked to indicate who they are connected to, to what degree and in what way. It is also possible to identify network connection by asking study participants to provide the names of individuals within the network with whom they are connected. When participants select or identify another person in the survey, they create a "tie" with that person. It would be impossible to create a network tie between two individuals within a network without using the names of the individuals in the network (please see the data confidentiality section below for an explanation of how we maintain the confidentiality of research participants and the confidentiality of persons identified in the network mapping instrument). We plan on

administering the COACHE Survey and Faculty Network and Productivity Survey at two additional future time points (Spring 2010 and Spring 2012).

Network Analysis: Upon measuring the ties among individuals within a network, network analysis is the statistical analytic technique used to describe patterns of ties among people in the network. Individuals are often connected to one another in numerous ways. Network analysis allows us to identify and describe the connections among individuals by creating numerous network structure measures (both at the individual level and departmental level). Some core network concepts entail: degree (the number of ties within the network), eigenvector centrality (the number of ties to resource-providers), density (the percentage of possible network ties that are actual network ties) and clustering (the extent to which network ties are segmented into partitions or subgroups based on actor commonalities). Upon creating these network measures, we will use hierarchical linear regression models to assess how individual and departmental measures of network structure correlate with faculty productivity indicators and measures of departmental climates.

Data Confidentiality: For the network mapping survey instrument, we provided each respondent with a list of names of the people in their department. We have also provided ways to add names of other faculty members for people who hold joint appointments and/or engage in activities with UNL faculty outside of their primary department. **THE PRINCIPAL INVESTIGATORS AND ADMINISTRATORS ON CAMPUS DO NOT HAVE ACCESS TO ANY FACULTY NAMES.** The staff in the Bureau of Sociological Research (BOSR) converted this data so that each faculty member and each department have a unique numeric code used for analyses and reporting (for example, fac001 and depart01). Only BOSR staff will have the link between codes and names, and this information is secured (see below). Using these alpha-numeric codes keeps all of the data confidential. **SPECIFICALLY, FACULTY NAMES AND DEPARTMENTS ARE NOT PART OF THE DATA PROVIDED TO THE PRINCIPAL INVESTIGATORS.** The investigators only have access to coded data, which allows us to see how many connections (ties) there are within and across departments among faculty, but we will not know who the faculty member is or in what department he/she resides. Furthermore, the principal investigators will take all necessary precautions to avoid deductive disclosure. In other words, if it is possible to identify individuals from a combination of their responses, then this information will not be made available in any reports. Again, administrators on campus do not have access to the data.

Data Security: For a secure web survey administration, we used a Debian Linux 4.0 64-bit web server. It has a static private IP address, which means it isn't accessible outside of the router connecting Bessey, Oldfather, and Burnett halls. Another Debian Linux server acts as a firewall, routing HTTP from the outside world to the web server. Both firewall and web server use gShield which creates a list of firewall rules using iptables to block all unnecessary ports. The firewall server runs Snort, an intrusion detection system. Both firewall and webserver also run portsentry, fail2ban, logcheck, tiger, and chkrootkit, which are security utilities for detecting problems. Logs from all servers are emailed to a private email address and checked daily. The webserver software is Apache2.2, the survey software is Limesurvey 1.70+, and data is stored in a MySQL 5.032 database, listening on the localhost only. Limesurvey has its own username and password. Two system administrators only have the root usernames and passwords to both the firewall and web server. There are only two regular user accounts on the server, belonging to the system administrators. Usual precautions are taken regarding changing and length of passwords.

All servers have automatic updates.

BOSR staff export data from the web server and store it on a Windows 2003 32-bit SP2 file server in private folders protected by NTFS security user permissions. Staff computers are connected to an active directory server, and thus all user accounts centrally controller. Access to private folders containing data is rigorously monitored and controlled. All workstations connecting to the file server as well as the file server itself have private static IP addresses. Workstations all run Windows XP SP2 and have firewall permissions set by group policy from the active directory server, and dropped connections to the firewall are logged. All file servers are stored in a locked, dedicated server room in Oldfather Hall. The room is temperature controlled and has a motion-detector alarm directly connected to the UNL police. Two staff have a key to this room, as well as the police and building maintenance. All servers are kept logged off, and again, only two system administrators have the admin passwords to the file server.

Backups are performed hourly to hard drives on another Windows 2003 server, 64-bit, SP2 in a locked room in Oldfather Hall, protected with another alarm system. Two staff secretaries and two system administrators have physical access to this machine. A monthly offline backup is also kept, stored on NTFS-encrypted USB drives. No over writing of old data is done, however when the drives are removed from service, which is generally done in a 3-year cycle before the drives can suffer failures, we use Eraser to delete all data from the disks. Should any drives fail before we can erase them, we store them permanently in a locked file cabinet in the secure server room. No off-site backups are currently kept.

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