The Evolution of Structural Embeddedness and Organizational Social Outcomes in a Centrally Governed Health and Human Services Network

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ABSTRACT

This research examines the effects, over time, of network involvement, or structural embeddedness, on three organizationally-based social outcomes. We argue that in a centralized, publicly funded but mixed sector health and human services network, an organization's structural embeddedness in the network, as measured by its centrality, will be related to its trustworthiness, reputation, and influence, as rated by other network members, and that this relationship will strengthen over time as the system matures. We also examine how service performance is related to network evolution.

Key words:

embeddedness, collaboration, public networks, health and human services, social outcomes.

Much of the literature addressing publicly funded health and human services suggests that services are often fragmented and that they need to be integrated to keep clients from "falling through the cracks" (Agranoff, 1991; Ferlie, Hawkins, and Kewell, 2003; President's New Freedom Commission on Mental Health, 2003). A fundamental assumption among many policy officials, funders, and service professionals who work in these areas is that an integrated network of service delivery is the most effective approach for providing clients with a seamless continuum of care. This logic is especially powerful when addressing so-called "wicked" problems (O'Toole, 1997), such as homelessness, serving the frail elderly (Leishsenring, 2004), disaster relief (Kapucu, 2005), disabled children (Townsley, Abbott, and Watson, 2004), and serious mental illness (Provan and Milward, 1995). The problem is compounded by the fact that many of the people served are likely to be "vulnerable" clients (Aday, 1994), who have multiple and significant needs and who are likely to have difficulty navigating the maze of a fragmented, un-integrated system on their own.

In the public management literature, the focus on services integration has given way to a broader focus on interorganizational networks (Provan and Milward, 1995; O'Toole, 1997; Agranoff and McGuire, 2003). This focus requires a more systematic effort on the part of organizations and their managers to engage in such activities as the co-location of services, joint programs, liaison procedures, common client transfer and referral procedures, and information sharing. Although conclusive research on the impact of networks on client outcomes has been scarce, the general belief is that collaborating service providers will enhance overall effectiveness by utilizing resources more efficiently, recognizing and treating client problems better, and facilitating access to information and expertise (Provan and Milward, 2001).

While client-focused outcome indicators of effectiveness are certainly important, networks are likely to produce other outcomes that may be critical to overall network functioning. In particular, since networks are, essentially, social systems, they are likely to generate social outcomes related to network participants. In many publicly funded networks, especially in health and human services, nonprofit, public, and even for-profit organizations may be embedded in extensive networks of exchange involving referrals, contracts, joint programs, and information sharing. These ties are developed to enhance the level of services provided to clients. But they also have implications for how organizations relate to one another, and may, in fact, explain why organizations choose to interact with some providers and not others. Specifically, organizational researchers have found that an organization's embeddedness, or involvement, especially in a voluntary exchange network, is related to a number of social indicators, including the organization's level of trustworthiness, its reputation for high-quality services, and its influence in the network (Galaskiewicz, 1985; Laumann, et al., 1978; Stuart et al., 1999). These aspects of network involvement by individual organizations constitute an important component of the social capital of the community (Putnam, 1993) and when aggregated from the organization to the network level, may contribute significantly to the building of community capacity (Chaskin et al., 2001).

The research reported here is an examination of the relationship between various task-oriented indicators of an organization's network embeddedness and three social outcomes: organizational trustworthiness, reputation, and influence. The research is an extension of previous work by Huang and Provan (2007a), who examined network data collected at a single point in time, when the system studied was first established. The work presented here is longitudinal, comparing data collected four years after the system's creation. The system was

centrally governed by a large national for profit network administrative organization (Provan and Kenis, 2007) at both points in time.

THEORETICAL BACKGROUND AND HYPOTHESES

The key assumption we make is that an organization's embeddedness, or involvement, with other organizations in a network, will be based on its structural position in that network. In operational terms, this refers to the centrality of the organization. Network centrality describes the extent to which an organization is located in a core position in a web of exchanges (Diani, 2002). Central organizations are more embedded in the flow of information and resources in the network than non-central, or peripheral actors, and have typically been found to have greater power (Cook and Emerson, 1983). As noted above, and consistent with Huang and Provan (2007a), we argue that trustworthiness, reputation, and influence are key social outcomes that are likely to result from a position of network embeddedness, operationalized as centrality. Trustworthiness, which is based on trust, is the extent to which an organization can be depended on to honor its commitments with its exchange partners. Reputation refers to perceptions by others that the organization is doing a good job, especially providing high quality services to its clients. Influence refers to the extent to which an organization's views and actions are taken into consideration by other organizations when these organizations make their own important decisions.

Huang and Provan (2007a) found modest support for their general arguments. They attributed some of the weakness of their results to the fact that the system was new, and thus, task-based exchanges and social outcomes among service providers had not yet had a chance to fully develop. By examining these relationships using a second wave of data, the strength of their conclusions can be reassessed. Our core research questions are: a) Is the relationship

between network embeddedness and social outcomes proposed by Huang and Provan supported in an established, as opposed to a newly formed network? b) Does the relationship strengthen over time as the network evolves from early development to maturity? and c) To what extent has agency and overall system performance been affected as the network has evolved? To test the first two general arguments, we propose six hypotheses. The last research question, on performance, will be examined more generally, to provide a better understanding of whether or not network maturity matters. The research is unusual in that it represents one of the few cases in the public management literature where full relational network data, not ego-centric data, is examined over time as the system evolves, using social network analysis methods (see Isett and Provan, 2005, for an exception, and see Rethemeyer, 2005, for a critique of how networks are typically studied in the public management literature).

Granovetter (1985:490), in his call for a new economic sociology, argued that the foundations of embedded economic action in social networks rest on "the wide-spread preference for resorting to trusted informants who have dealt with a potential partner and found this partner trustworthy, or even better, for relying on information from one's own past dealings with that person." Consistent with Granovetter's view of trustworthiness, which is based on the direct experience of partners, Gulati (1995) argued that a similar interaction-based trust-building process occurs when strategic alliances are formed by organizations. Later, Gulati and Gargiulo (1999) examined organizational embeddedness and found that organizations rely on information from the network of prior alliances to determine subsequent alliance partners. Negative gossip by third parties about a party's uncooperative behavior significantly reduced the likelihood of direct relations, whereas positive gossip strengthened the likelihood of direct relations. McEvily, Zaheer and Perrone (2003) also focused on trust in networks arguing that

breaches in trust may initiate a reorganization of the social system, where some actors become more central in the social hierarchy and others are pushed toward peripheral status. Based on these findings, organizations that are central, or strongly embedded, in their networks will be able to achieve and maintain their structural position more readily when they are viewed by other network members as having high levels of trustworthiness. Restating Huang and Provan's first hypothesis, in an established network we expect the following:

H1(static)*: Provider organizations that have higher centrality in a network will experience higher levels of trustworthiness by other network members.*

Extending this hypothesis, we argue that as networks evolve and mature, knowledge of which organizations are most trustworthy is likely to become more widespread and relationships are likely to become more solidified. Thus, trust is likely to strengthen among those organizations that are able to achieve a central position in the network. Formulated as a hypothesis:

H1(dynamic)*: The relationship between network centrality and trustworthiness by other network members is likely to strengthen as the network matures.*

Granovetter (1985) also talked about the reputational effects of embeddedness. His argument was that social embeddedness meant that organizations could not readily perform opportunistically since their actions would become known to others. Thus, reputation in a social system plays a significant role in controlling and limiting behavior. Conversely, organizations that are more centrally embedded in a social system, like a network, are likely to be those that have a good reputation. Reputation then encourages others to interact with the organization, thereby enhancing reputation further. In the business sector, the reputation-enhancing effects of organizational embeddedness have been affirmed through research by a

number of scholars studying joint ventures, endorsements, and strategic alliances (Benjamin and Podolny, 1999; Podolny, 1993; Stuart, Hoang, and Hybels, 1999). Under conditions of market uncertainty (e.g., lack of performance history of startup businesses, difficult-to-understand technological information about products or services) and the high search costs of analyzing past performance, reputation appears to play an important role in determining who to work with and who to avoid.

Although reputation has not been studied empirically in the public management literature, the difficulty in obtaining objective outcome indicators for many public and nonprofit organizations, especially in health and human services, is likely to make the role of reputation extremely important. High reputation agencies are likely to have greater legitimacy, thereby enhancing their capacity to attract resources like funds, clients, and information. For instance, Collins (2005) argues that high reputation agencies attract potential supporters who believe not only in its mission, but in its capacity to deliver on that mission. Thus, high reputation agencies are likely to have greater legitimacy, thereby enhancing their capacity to attract resources like donated time, funds, clients, and information (Collins, 2005). These agencies are likely to have central positions in their service networks, as they are sought out by others (Shrum and Wuthnow, 1988). Maintaining links to agencies with high reputation may even have a spillover effect, as connected organizations enhance their own reputation by maintaining strong ties to high reputation agencies. Based on this logic, we can restate Huang and Provan's second hypothesis, and predict that the relationship they proposed will be supported when re-examined in an established network:

H2(static): *Provider organizations that have higher centrality in a network will experience higher reputation as reported by other network members.*

Extending this hypothesis for use with longitudinal data, it is reasonable to expect that reputations will evolve over time and that the relationship between structural embeddedness/ centrality will strengthen. As the network matures, so too will the relationships maintained by organizational participants, and ties will gravitate toward those agencies that are able to maintain strong reputations over a number of years. Thus, the following hypothesis is proposed:

H2(dynamic)*: The relationship between network centrality and organizational reputation, as reported by other network members, is likely to strengthen as the network matures.*

Finally, influence is an important outcome that can have a substantial effect on network and agency operations. Influence can be based on a number of factors, such as control of material resources, information, and social and political support (legitimacy). Based on social exchange theory (Emerson, 1962) and related resource dependence arguments (Pfeffer and Salancik, 1978), one actor's power over another is rooted in the other's dependence on the resources controlled by the former. For an organization, power is attributed to having other organizations be dependent on it for the resources they need (Provan, Beyer, and Kruytbosch, 1980; Galaskiewicz, 1985). Thus, organizational centrality in an exchange network of resources such as clients and information can be viewed as important for explaining influence, which is the exercise of power. By being central in a network, a focal organization is much more likely to influence the decisions of others in the network, than when an organization has few resource-based connections to others in the network. Central organizations can maintain a "gatekeeping" role in the network, controlling access to valued resources. This link between centrality and influence has been well-established in the general social network literature (c.f.

Cook and Emerson, 1978; Burkhardt and Brass, 1990). Based on this logic, we believe that Huang and Provan's third hypothesis will be supported in an established network:

H3(static)*: Provider organizations that have higher centrality in a network will have greater influence among network members.*

As with the other hypotheses, this one can also be extended for study in a longitudinal context. When a network first forms, the link between embeddedness and influence may hold, but the connection may be tenuous, since centrality is not yet well-established and since agency managers may not be especially receptive to the demands or expectations of other organizations in the network, even well-connected ones that control substantial resources. As the network matures, however, the link between centrality and influence is more likely to become recognized and accepted by network members. Thus, we propose the following hypothesis:

H3(dynamic)*: The relationship between network centrality and influence over the decisions of other network members is likely to strengthen as the network matures.*

RESEARCH METHODS

Data Collection

We examined a network of community-based health and human service agencies providing a wide range of services to adults with serious mental illness in Maricopa County, Arizona, which encompasses the Phoenix metropolitan area (over 3.5 million people). As noted earlier, the network was one studied initially by Huang and Provan and reported in two recent articles (2007a, b). Their work examined the network at one point in time while the research reported here examines the same network four years later, comparing network results as the network evolved. At both points in time, the network was coordinated and funded by nationally owned, for-profit company that specialized in behavioral health, Value Options

(VO). In 1999, VO won the bid for the managed care contract to be the mental heath authority for Maricopa County, which meant becoming the sole purchaser of all government funded mental health services in the county. VO also provided all case management services to the mentally ill population, initially through a wholly owned-subsidiary, and later, on its own.

Network and agency-specific data were collected in 2000 and 2004, primarily through use of a survey that was mailed, along with a cover letter, to all agencies in Maricopa County that provided any type of services to the more than 12,000 adults diagnosed as having a serious mental illness (SMI). Surveys were sent directly to the agency's executive director or to the individual who was most knowledgeable about the agency's mental health services. In 2000, we collected data from 33of 36 mostly nonprofit and public agencies and the two for-profit entities that essentially ran the system, VO and ABS, its wholly owned case management subsidiary. In 2004, data were collected in a similar fashion from 35 of 42 agencies, including VO. By this second round of data collection, ABS had been incorporated into VO, which continued to provide case management services. To keep the data consistent, responses for VO and ABS in 2000 were combined, making for a single network administrative organization at each time period (n = 32). After extensive follow up that lasted several months and included numerous phone calls, emails, and personal interviews, the overall response rates from the two surveys were 91.7% in 2000 and 83.3% in 2004.

The data collection methods and the survey itself were adaptations of methods used previously by Provan, Milward and colleagues (Provan and Milward, 1995; Provan, Isett, and Milward, 2004), thus assuring validity and reliability. Table 1 presents a comparison of basic agency descriptor variables for 2000 and 2004.

Insert Table 1 about here

Measures

Network relationships were measured in the survey by having every respondent indicate its ties to every other organization listed (all those serving SMI adults) regarding four separate types of linkages: contracts, information sharing, client referrals sent, and referrals received. Links had to be "over the past 6 months" and had to focus only on services for SMI adults, creating what Provan and Milward (1995) refer to as a service implementation network. Agency respondents were also asked, a) to rate the overall quality, based on perceived level of trust*(trustworthiness)*, of its relationship with each one of its linkage partners; b) to identify up to five other organizations in the network that "they most admire for doing an especially good job of providing services to adult seriously mentally ill clients" (*reputation*); and c) to identify up to five other organizations "whose needs, goals, decisions, and/or expectations are generally taken into consideration by your agency when major decisions are made related to the services it provides to adults with serious mental illness" (*influence*). Respondents were also asked to estimate the percent of his or her agency's total adult SMI resources devoted to each of 12 SMI services areas.

Independent Variables

As previously mentioned, our operationalization of embeddedness is network centrality. Although there are several measures of centrality that have been used in the past by researchers, including betweenness and closeness, we decided to use the simplest indicator, which is degree centrality. *Degree Centrality* simply measures the number of other nodes, or other organizations in this case, to which a particular organization in the network is connected (Wasserman and Faust, 1994). Unlike other measures of centrality, it only indicates direct

connection with others. Degree centrality scores for each organization were calculated for each of the task-based linkage measures derived from the survey. Specifically, degree centrality scores for each agency were computed for contracts, shared information, referrals sent, and referrals received using UCINET (Borgatti, Everett, and Freeman, 2002). Finally, we calculated centrality scores for the total number of ties (*total ties*), which is the sum of centrality scores for three types of links, shared information and each type of referral tie (contracts were excluded due to little variance – see below).

To determine the measures of centrality, using the data from the network questionnaires, for each year of data we constructed four square matrices, one each for contracts, information sharing, referrals sent, and referrals received. These matrices were 33-by-33 in 2000 (ABS and VO were then collapsed, making the n=32) and 35-by-35 in 2004. Initially, these matrices were developed using unconfirmed ties, where as long as either of a pair of organizations reported a tie to be present, the tie was counted and the cell corresponding to the linkage between the two organizations was assigned a "1" for both organizations. However, unconfirmed measures are not reliable indicators of the presence of a tie (Marsden, 1990). Thus, considered only confirmed ties, where a relationship is counted as present only if it is reported by both organizations. We obtained confirmed matrices for contracts and information sharing by symmetrizing the two matrices by product, replacing cell X_{ij} and cell X_{ji} in both the contract and information matrices by $X_{ij}*X_{ji}$, $i < j$.

The procedure for referrals was somewhat different. Unlike information sharing and contracts, which must be reciprocated, directionality matters for client referrals, which can be either sent or received. We obtained a confirmed referral matrix by multiplying the referrals sent matrix with the transpose of the referrals received matrix in Excel (Hoffman, Stearns, and

Shrader, 1990). After we obtained the three confirmed matrices, we used the Netdraw sub-routine of UCINET 6 for Windows (Borgatti, Everett, and Freeman, 2002) to obtain network plots for each year. The plots for the two contract networks are shown in Figures 1 and 2.

Insert Figures 1 and 2 about here

It can be seen from Figures 1 and 2 that the contract network was highly centralized around VO. Thus, we decided not to include contract centrality in subsequent analyses since there was little variance in this measure. For both years of data collection VO had contracts with most of the agencies in the system, while there were no SMI contracts between most of these other agencies. Figures 1 and 2 also confirm that the networks in both years of data collection were indeed highly centralized, at least around the control of funds. This, of course, is not surprising since VO was awarded the state's contract to become the area's Regional Behavioral Health Authority and given the right to organize the system as they saw fit. These plots represent the formal network established by VO based on its control of funds. But the contract network is much more highly centralized than the networks for shared information and referrals, which is the focus of our subsequent analyses.

Dependent Variables

Trustworthiness was based on the average quality-of-relationship ratings by each agency's network partners. From the survey, each agency was asked to rate, on a 1 (poor relationship) to 4 (excellent relationship) scale, the overall quality of the agency's working relationship with each organization to which it was linked. While we are aware of other approaches to measuring trust (Dyer and Chu, 2003; Mayer and Davis, 1999), the concept is difficult to capture empirically. Although not a direct indicator of trustworthiness, we believe

ours is a good proximate indicator of the concept. If partners report good relationships with a particular agency, that agency is likely to be trusted. Trustworthiness was calculated by dividing the sum of all reported relationship quality ratings for a target agency by the number of partners of the target organization.

A second dependent variable, reputation, was based on which agencies in the network were most admired. We mentioned earlier that each agency was asked to list up to five other agencies that they admired for being especially effective regarding provision of client services. Unlike our measure of trustworthiness, the agencies listed did not have to be agencies that were linked to the responding organization. Based on the number of times each agency was nominated by others on the "most admired" list, a reputation score was computed. This measure is conceptually quite different from trustworthiness. While two organizations that have an excellent working relationship would have to trust one another, it is possible that neither organization would be admired and respected throughout the network as they might be colluding against the best interests of the network.

The third dependent variable, influence, refers to the extent to which an agency is perceived to be able to influence the activities of other agencies. Specifically, influence was measured by counting the number of nominations each agency received for being "taken into consideration when respondents make important decisions about services to clients with SMI." Unlike the independent variables, which attempt to capture actual network involvement (through confirmed contracts, shared information, and referrals), all three measures of social outcomes are based on the perceptions of other network members.

The data we derived from our name generated indicators of reputation and influence allowed us to construct two matrices, indicating who listed whom for each question. Thus, we

were able to generate network data for these two variables. However, because influence and reputational relationships need not be reciprocated in social life (c.f., Emerson, 1962), we used the raw influence and reputation matrices rather than the confirmed matrices for actual network involvement.

Control Variable

Specialization was used as a control variable. Based on the logic of population ecology (Carroll, 1985), it is likely that large, generalist organizations will hold central positions in a resource exchange network, having extensive links to other organizations. In contrast, specialist organizations are more likely to be located at the peripheral of the resource exchange space, with fewer links to other organizations. This argument was supported empirically in work by Banaszak-Holl and her colleagues (1998) on a network of nonprofit organizations serving a disabled population.

The specialization measure was derived from the list of 12 SMI service areas and defined as the extent to which an agency focuses its resources on SMI service provision. Based on survey responses, we computed a Herfindahl index of specialization for each agency, calculated as the summation of $(Pi/P)^2$, where P*i* is the reported percent figures in the *i*th service area (*i*=1-12) and P equals the sum of all the reported percent figures of an organization (Sherer, 1995). A value approaching 1 indicates high specialization around a single service area, while a value approaching 0 indicates a generalist agency providing a broad range of services (Sherer and Lee, 2002).

Network Performance

Network effectiveness, or performance, was assessed through the evaluations of survey respondents. This was done separately at each point in time using identical items. Specifically,

for each type of performance (agency and system level), respondents were asked to rate, using a five-point Likert scale (1 = significantly negative impact to 5 = significantly positive impact), the impact of the VO-led system on both their agency's and the overall system's performance. Agency directors and program heads responded to a series of separate outcome indicators including cost control, quality of services, coordination of care, access to services by clients, and resource availability. Items in each scale for each time period were highly correlated and each set of items fell primarily into a single factor using factor analysis. Reliability for each single dimension scale at each time period was very high, with Cronbach's alphas of 0.919 for Agency Impact and 0.917 for System Impact in 2000 and 0.857 for Agency Impact and 0.946 for System Impact in 2004.

FINDINGS

Tables 2 and 3 report descriptive statistics and correlations for the networks in 2000 and 2004, respectively, while Table 4 shows the regression analysis results. The regression analysis follows the procedure used by Huang and Provan (2007a), testing each of the three sets of hypotheses in four models. Specifically, each of the four network embeddedness measures (degree centrality based on information sharing, referrals sent, referrals received, and total ties) was the independent variable in each equation, with specialization used as the control variable. Ideally, all three independent variables, plus the control variable, would be used in the same equation. However, due to the relatively small population size of each network, there were few degrees of freedom. Thus, we chose to use only a single independent variable (plus the control variable) in each equation. The overall impact of structural embeddedness on social outcomes was tested in the fourth model (model 1d, 2d, and 3d), which uses total ties as the independent variable (i.e., combined shared information and the two types of referral links). Results are

reported for both years of data collection, allowing comparison of findings as the network matured. Our tests of hypotheses and discussion of findings will focus solely on the regression results.

Insert Tables 2, 3 and 4 about here

Models 1a-d offer tests of both static and dynamic versions of hypothesis 1, examining the relationship between network embeddedness and trustworthiness. Model 1a indicates that the information sharing degree centrality of an organization had a positive and marginally significant effect on its trustworthiness (beta = .31, $p<.10$) in 2000. This relationship had strengthened by 2004 (beta = .38, $p<.05$). In other words, agencies that shared information with other agencies in the network were more likely to be viewed as trustworthy by their network partners, as hypothesized, and this relationship was likely to hold or even strengthen as the network matured, even when controlling for an agency's service specialization. When centrality was measured regarding referrals received (model 1b), support for hypothesis 1 was very strong for the emergent network (beta = .55, $p< .01$) but not for the mature network (beta = .18, not significant). The relationship between referrals sent and trustworthiness (model 1c) received no support for either year. Finally, the combined impact of centrality (based on total ties) on trustworthiness, when controlling for specialization, was positive but not significant in the emergent network (beta = .29) but it was significant in the mature network (beta = .36, $p<.05$). Overall, we conclude that support of hypotheses 1 (both static and dynamic), related to organizational trustworthiness, received some support, but the findings were mixed.

Regression models 2a-d test hypothesis 2, focusing on the relationship between network embeddedness and agency reputation. Model 2a indicates that the degree centrality of an

organization based on information sharing had a positive and marginally significant effect on the organization's reputation (beta=.31, p<.10). This relationship was supported and somewhat strengthened in the mature network (beta = .36, p<.05). None of the remaining three degree centrality measures were significant predictors of reputation in models 2b and 2c, or for model 2d in the emergent network. However, the results for total ties were quite strong in the mature network (beta = .47, p<.01), with the overall equation explaining 26 percent of the variance in reputation (F = 5.61, p<.01). Therefore, although the relationship between embeddedness and reputation was only supported in the emergent network for shared information, both the static and dynamic versions of hypothesis 2 were generally supported in the mature network.

Models 3a-d examine the relationship between network embeddedness and the influence of an organization over the decisions of other agencies. Models 3a (information sharing) and 3b (referrals received) received no support for either year of data collection. In both models, however, the control variable, service specialization, was negatively related to influence, suggesting that the most influential agencies in the network were generalists; that is, agencies offering a range of services. In contrast, model 3c demonstrates a very strong positive relationship between an organization's centrality in the referrals sent network and its influence, while model 3d indicates that the organization's overall centrality (using all three types of ties combined) was positively related to its influence in the network. The findings for both models 3c and 3d held regardless of whether the network was emergent or mature and specialization was not a factor in either of these models. Thus, the static version of hypothesis 3 received strong support for referrals received and total ties. The dynamic hypothesis was not supported since there was little difference in findings comparing emergent and mature networks.

The strong positive relationship between referrals sent and influence for both years is consistent with prior research in community-based social service systems done by Oliver and Montgomery (1996). Client referrals reflect resource flows in the system, and consistent with resource dependence theory, one actor's influence over another is rooted in the other's dependence on the resources controlled by the former (Cook, 1977; Pfeffer and Salancik, 1978). Our empirical results reinforce this argument. In contrast, the weak results we found information centrality are surprising and inconsistent with prior research by Galaskiewicz (1979). He argued that information is an important resource that helps community organizations cope with uncertainty, and thus, influence should accrue to those who maintain central positions in the flow of information.

Finally, as mentioned earlier, we examined both agency and system performance as a result of implementation of the centrally controlled VO system. Using the multi-item scales we developed, we found that both agency and overall system performance improved as the network moved from its emergent status in 2000 to its mature status in 2004. Specifically, on our five-point scale, the mean agency-level performance score in 2000 was 2.75. This increased to 3.18 in 2004 (the difference is significant at the .05 level). For the system-level indicator of performance, the mean score in 2000 was 2.62, increasing to 2.92 in 2004 (not statistically significant). These data were graphed and are presented in Figure 3. It can be seen from this figure that agency-level performance was not only higher than system-level performance at each time period, but also, that the rate of improvement of performance was higher at the agency-level.

Insert Figure 3 about here

Discussion and Conclusions

Building on prior work by Huang and Provan (2007a), the results of this study provide additional evidence of the importance of studying both embeddedness and performance in publicly funded networks. Unlike much of the research on public networks, this study examined full relational data at the level of the whole network (versus ego-centric ties only). In addition, networks were examined over two points in time, providing a greater understanding the stability of network findings as the network evolved from newly emergent to mature.

We were able to demonstrate that network involvement, or embeddedness in a network, is generally positively related to key social outcomes, although the impact of embeddedness varied depending on the type of network tie being considered. Although our data were longitudinal, the time lag between our data collection efforts makes it difficult to say what is cause and what is effect. We suspect, however, that the relationship is reciprocal (c.f., Dyer and Chu, 2003), with centrality regarding key resources like information and clients helping to determine social outcomes, while social outcomes like reputation, trustworthiness, and influence also helping to attract resources. Use of longitudinal data did, however, allow us to compare networks at different life cycle stages. Doing so, we found significant and stable results for the impact of shared information on both trustworthiness and reputation. We also found strong and stable results over time for the impact of referrals sent and total ties on agency influence. Finally, although not the focus of our hypothesis testing, we also found that as the network evolved, both agency-level and system-level indicators of service performance in addressing the needs of the adult SMI population improved.

In general, it appears from our two waves of data that organizations that become more embedded in publicly funded health and human services networks tend to have higher levels of

trust, reputation, and influence. This conclusion is strongest, however, when the network is mature, as opposed to newly emergent. To the extent that these social outcomes are valued in the broader community in which the agencies are embedded, enhanced legitimacy is likely to result. In the public and nonprofit sectors, where outcome-based performance is typically difficult to assess (Ferlie and Pettigrew, 1996; Provan and Milward, 2001), legitimacy may be a reasonable surrogate measure of organizational success (Frumpkin and Reingold, 2004).

Despite the fact that this study represents an advance in the literature on publicly funded networks, it is not without limitations. For one thing, our focus on a single network of agencies providing mental health and related social services may limit the generalizability of our findings. However, it is reasonable to argue that our results may well be applicable to other publicly funded networks, especially ones that have a high degree of centralized control through a single organization. Second, the relatively small number of organizations in the network at each wave of data collection weakened the power of our statistical tests, making them less likely to detect significant relationships. In addition, our research, despite its use of longitudinal data, is still a study of only one network. Thus, it is reasonable to call for further research that examines multiple networks over time. Such research is extremely time-consuming and costly, however, so a more realistic recommendation may simply be to conduct more longitudinal studies of whole networks, using relational data, but in other settings, so that scholars can build on our findings and those of other scholars. Finally, while our research was longitudinal, the gap between our first and second wave of data collection was four years. Ideally, researchers might study network evolution in smaller increments of time, examining more closely the process of change and the stages of network life cycle that occur in-between early emergence and maturity.

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Table 1

General Information about Adult SMI Service Providers in Maricopa County

	2000			2004	
	Mean	SD		Mean	SD
Total number of full-time equivalent employees	259	628		259	411
Total number of SMI employees (>half-time)	72	158		117	274
Number of SMI clients per day	82	128		153	303
Number of SMI service sites	5	5		6	8.02
Total budget FY 1998 ($)	10,973,278	32,680,498	FY 2002 ($)	17,835,884	52,371,417
Total budget FY 1999 ($)	13,606,191	35,230,623	FY 2003 ($)	24,932,864	67,049,801
Total budget FY 2000 ($)	14,864,611	39,273,670	FY 2004 ($)	27,234,920	77,925,928
Percentage of total budget devoted to SMI	33%	0.33		45%	0.33

Note: 2000, N=32; 2004, N=35

Table 2

Correlations, Means, Standard Deviations, and Correlations for Emergent Network – 2000 (N= 32)

		Mean	*SD*	1	2	3	4	5	6	7	8
1	Specialization	0.56	0.30								
2	Information sharing	5.31	4.28	-.19							
3	Referrals received	2.42	2.56	-.25	.57(**)						
4	Referrals sent	2.42	3.95	-.23	.33	.20					
5	Total ties	10.00	8.32	-.30	.85(**)	.71(**)	.71(**)				
6	Trustworthiness	3.11	0.25	.02	.29	.50(**)	-.08	.26			
7	Reputation	1.66	2.41	-.15	.36(*)	.19	.03	.26	.24		
8	Influence	1.17	2.75	-.36*	.18	.07	.86(**)	.53(**)	-.28	.10	

* p<.05 (2-tailed)

** p<.01 level (2-tailed)

Table 3

Correlations, Means, Standard Deviations, and Correlations for Mature Network – 2004 (N=35)

		Mean	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Specialization	0.63	0.30								
2	Information sharing	4.57	4.20	-.13							
3	Referrals received	2.29	2.31	-.06	.44(**)						
4	Referrals sent	2.29	3.95	-.37(*)	.01	.01					
5	Total ties	9.14	6.89	-.31	.76(**)	.61(**)	.58(**)				
6	Trustworthiness	3.01	0.37	-.13	.40(*)	.19	.12	.37(*)			
7	Reputation	2.83	3.80	-.25	.38(*)	.28	.30	.50(**)	.31		
8	Influence	2.40	4.84	-.29	.01	-.03	.89(**)	.50(**)	.20	.54(**)	

* p<.05 (2-tailed)

** p<.01 level (2-tailed)

Table 4

OLS Regression Analyses: Predicting Organizational Social Performance in Two Networks - 2000 and 2004

	1a	*1b*	*1c*	*1d*	*2a*	*2b*	*2c*	*2d*	*3a*	*3b*	*3c*	*3d*
Control variable												
Specialization	-.08	-.12	-.11	-.02	-.20	-.24	-.16	-.10	-.29*	-.29*	.04	-.15
	(.07)	(.15)	(-.01)	(0.10)	(-.10)	(-.10)	(-.16)	(-.09)	(-.34*)	(-.37**)	(-.16)	(-.21)
Embeddedness												
Information	.38**				.36**				-.03			
	(.31*)				(.31*)				(.10)			
Referrals		.18				.26				-.05		
received		(.55***)				(.21)				(-.03)		
Referrals sent			.08				.24				.90***	
			(-.10)				(-.01)				(.83***)	
Total ties				.36**				.47***				.45***
				(.29)				(.23)				(.49***)
R^2	.16	.05	.02	.14	.19	.13	.11	.26	.09	.09	.79	.27
	(.09)	(.28)	(.01)	(.08)	(.12)	(.07)	(.02)	(.07)	(.14)	(.13)	(.78)	(.35)
F	3.11**	.86	.37	2.54*	3.71**	2.43*	2.04	5.61***	1.49	1.52	58.85***	5.9***
	(1.40)	(5.51**)	(.13)	(1.20)	(1.85)	(.97)	(.34)	(1.01)	(2.24)	(2.09)	(49.20***)	(7.39***)

Model 1a-d predicts trustworthiness, model 2a-d predicts reputation and model 3a-d predicts influence.

*$p < .1$, ** $p < .05$, *** $p < .01$

N=32 in 2000 and 35 in 2004. Values represent standardized coefficients (2000 results are in parentheses).

Figure 1
Network Plots for Contracts – 2000 (centralization = .77)
(blue = for-profit; red = public and nonprofit)

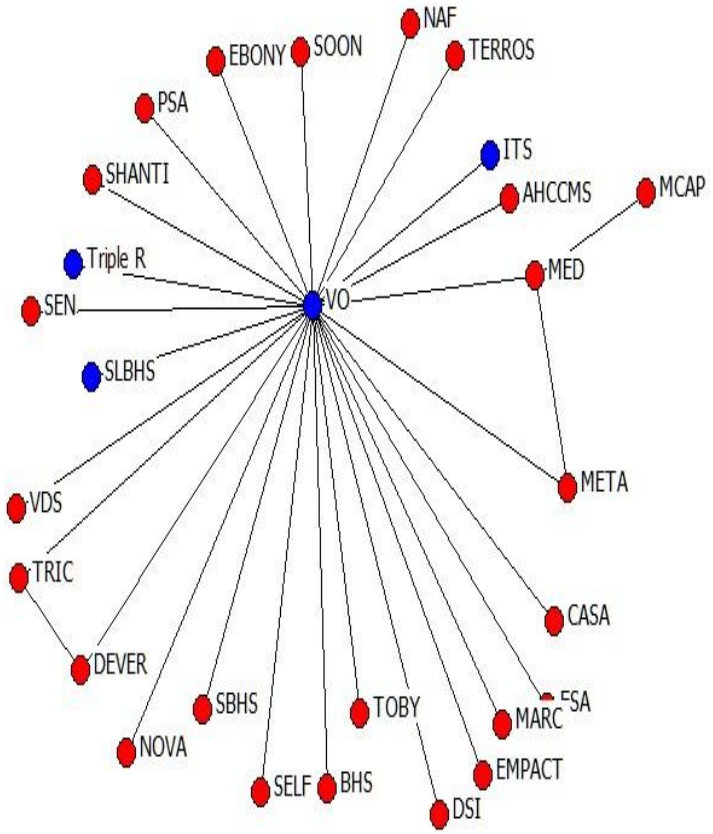

Figure 2
Network Plots for Contracts – 2004 (centralization = .81)
(blue = for-profit; red = public and nonprofit)

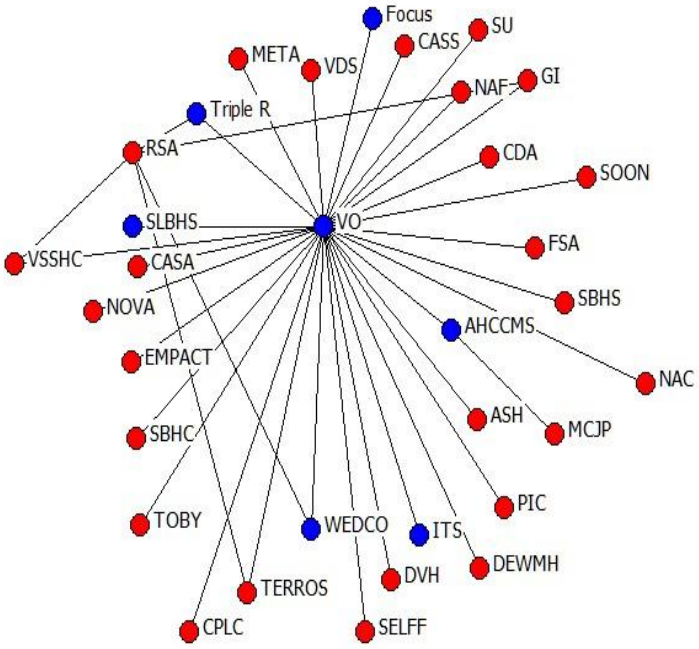
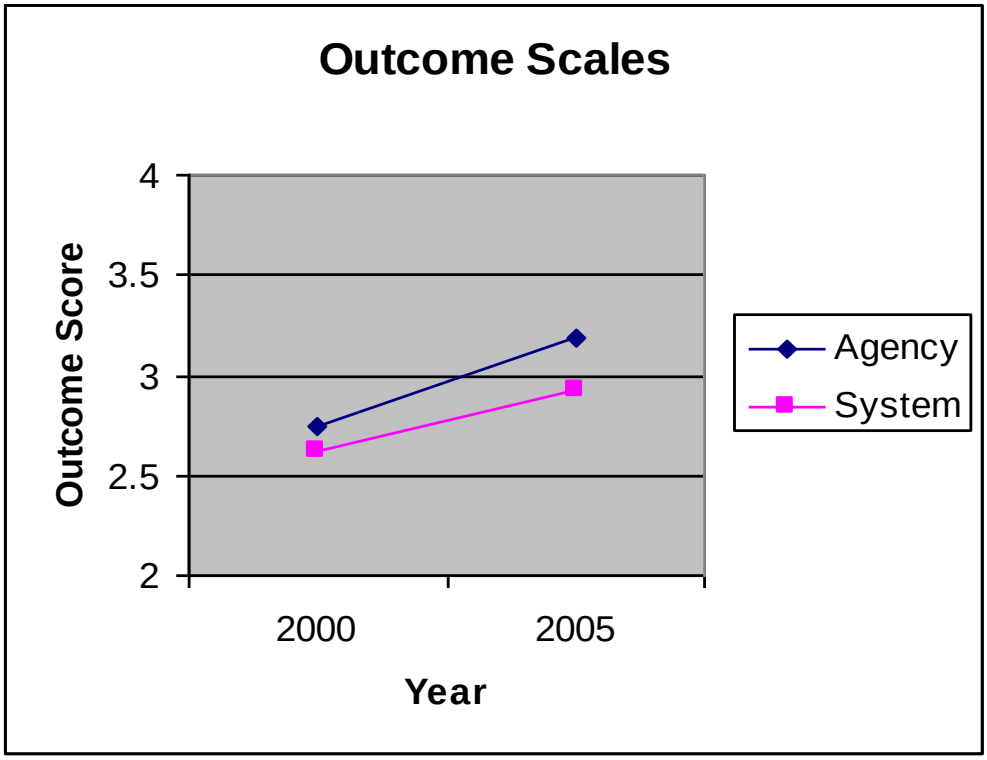
Figure 3
Agency and System-Level Service Performance Indicators