



Exploring relationships among organizational capacity, collaboration, and network change



Victoria Faust*, Brian D. Christens, Shannon M.A. Sparks, Amy E. Hilgendorf

University of Wisconsin–Madison, USA

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ABSTRACT

Is the collaborative activity of organizations in a network associated with the capacity of individual organizations? How might the structure of collaborative activity and the location of high capacity organizations in a network be related to the network's overall ability to influence community conditions? This article explores these questions among 23 local organizations providing women and new mothers with health care, advocacy, and other services in a single US city. Changes in the interorganizational network of collaborations are depicted in four time periods spanning 12 years and analyzed over time using both whole network and local network measures. Organizational attributes associated with dimensions of organizational learning and organizational effectiveness are examined in relation to interorganizational network changes over time. Results indicate that more adaptable organizations and those with higher capacity were not necessarily central in the network. Overall, findings suggest that increases in cohesion across a structurally diffuse network, relatively well dispersed high capacity organizations, and strategic relational investments may have influenced the reduction in health disparities for infants and expecting mothers. Although community-level interventions often focus on building a strong, central group of high capacity organizations, these findings suggest a need to also take into account the strategic action of a range of individual organizations, their local networks, and how they may advance change in the broader network over time.

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Exploración de las relaciones entre la capacidad organizativa, la colaboración y los cambios en la red

RESUMEN

¿Se asocia la actividad de colaboración de las organizaciones en una red con la capacidad de las organizaciones individuales? ¿Cómo se relaciona la estructura de la actividad de colaboración y la ubicación de organizaciones de alta capacidad en una red con la capacidad global de la red para influir en las condiciones de la comunidad? Este artículo explora dichas cuestiones con 23 organizaciones locales que proporcionan servicios de salud y otras prestaciones a mujeres y madres primerizas en una única ciudad de los Estados Unidos. Los cambios en la red interorganizativa de colaboración se representan en cuatro periodos a lo largo de 12 años y se analizan a lo largo del tiempo utilizando medidas de la red completa y de la red local. Los atributos organizativos asociados con las dimensiones de aprendizaje y efectividad organizacional se examinaron en relación con los cambios en la red interorganizativa a lo largo del tiempo. Los resultados mostraron que las organizaciones más adaptables y aquellas con mayor capacidad no eran necesariamente centrales en la red. En general, los resultados sugieren que el aumento de la cohesión en una red estructuralmente difusa, las organizaciones con altas capacidades relativamente dispersas, y las inversiones relacionales estratégicas pueden haber influido en la reducción de las desigualdades de salud de los bebés y las mujeres embarazadas. Aunque las intervenciones comunitarias con frecuencia se centran en la construcción de un grupo central fuerte de organizaciones con grandes capacidades, estos

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* Corresponding author.

E-mail address: vnfaust@wisc.edu (V. Faust).

resultados sugieren la necesidad de tomar también en consideración las acciones estratégicas de una serie de organizaciones individuales y sus redes locales, y cómo pueden promover el cambio en la red más amplia a lo largo del tiempo.

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Introduction

As in many parts of the industrialized world, provision of social and community services has become more decentralized in the U.S. as the budgets and responsibilities of government agencies have eroded (Milward & Provan, 2000). Private and, in particular, non-profit organizations are increasingly engaged in service provision and community interventions. These organizations often compete for governmental and philanthropic funds to provide these services and interventions. Thus, while the decentralization of social and community services may drive innovation and efficiency in some facets of local systems, it has also increased complexity and fragmentation in organizational systems, as well as increasing the incentives for organizations to compete with each other rather than to collaborate (Frumkin, 2002; Nowell & Foster-Fishman, 2011). Scholars have noted the lack of mutual awareness and coordination in local organizational systems as detriments to these systems' ability to successfully address community problems (Evans, Rosen, Kasten, & Moore, 2014). This context helps to explain the great interest among practitioners and scholars of community interventions in models for achieving better alignment and coordination in local organizational systems (Christens & Inzeo, 2015).

Considering populations of organizations in a community as networks can help us understand or improve the implementation of community interventions. A network perspective on organizations emphasizes the relational links between them alongside the attributes of particular organizations (Neal & Christens, 2014). Individual organizations may be effective or ineffective at achieving narrower organizational goals, but network dynamics including collaborations, referrals, and information exchanges between organizations can play a key role in systems' ability to provide holistic service and effective community interventions (Evans et al., 2014; Foster-Fishman, Salem, Allen, & Fahrbach, 2001). Additionally, organizations that innovate or engage in learning behaviors aren't isolated; their capacity to influence outcomes at a community level or magnify impact across a population can be related to their position in the organizational network.

Studies of organizational effectiveness and organizational networks have most often focused on formalized coalitions or other forms of interagency alliances in local communities (e.g., Bess, Speer, & Perkins, 2012; Kegler & Swan, 2012). Governmental and foundation initiatives over the last 25 years have spurred the formation and evaluation of local community coalitions. One prominent example is the *Communities that Care* (CTC) program begun in the early 1990s with support from the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA). With support from CTC, local coalitions of organizations established boards or stakeholders and coordinated proactive work toward reducing risk factors for youth in local institutions and environments. Durable effects of the CTC interventions within the networks of local organizations have been detected, with local organizational leaders reporting greater effectiveness in prevention activities (Rhew, Brown, Hawkins, & Briney, 2013). Several other large-scale efforts have employed approaches to interventions in local organizational networks to address community, educational, and public health issues (Christens & Inzeo, 2015). Some studies have taken a network perspective on coalition functioning and have identified particular network structures and features as being conducive to effectiveness

(Feinberg, Riggs, & Greenberg, 2005). Other studies have focused on the impact of coalition participation on organizational capacity (Kegler, Norton, & Aronson, 2008; Nowell & Foster-Fishman, 2011).

In the context of complex and dynamic inter-organizational ecologies, local organizations need to have the capacity to harness resources, opportunities and knowledge to effectuate collaborative partnerships. Such internal organizational capacity involves both sensitivity to the environment and the ability to adapt on the basis of new information (Crutchfield & Grant, 2007). Organizational adaptability has been the focus of studies on learning processes and the development of knowledge in organizations (Argyris & Schön, 1992; Senge, 1990). Such adaptability has also included the ability to fundamentally reorient theories of action and change of an organization (Bess, Perkins, & McCown, 2011; Evans, Hanlin, & Prilleltensky, 2010). Several attempts have been made to capture characteristics of organizational capacity by assessing multiple dimensions of organizational learning and connecting them to measures of organizational performance (Yang, Watkins, & Marsick, 2004; Song, Joo, & Chermak, 2009). For example, a model developed by Yang, Watkins, and Marsick (2004) identifies seven dimensions of a learning organization, (1) continuous learning, (2) dialog and inquiry, (3) team learning, and (4) staff empowerment, which are considered at the individual level. At an organizational level, the model identifies, (5) efforts to establish and embed learning into the organizational system (embedded system), (6) global thinking and actions to connect the organization to external systems (system connection), and (7) the provision of strategic leadership.

Taking a network perspective prompts the question: how are organizational characteristics such as these dimensions of learning situated in relationships? This organizational network perspective is similar to the notion of economic embeddedness, in which economic ties are considered in the context of, and therefore are influenced by, social ties (Granovetter, 1985). Network approaches have contributed to understanding organizational learning and effectiveness by providing ways to analyze the interaction effects between network structures, such as strong small world ties with diverse others, and organizational attributes, such as preexisting collaborative endeavors and acquisition of knowledge (Powell, Koput, & Smith-Doerr, 1996). Burt (1993) identified organizational effectiveness as a function of the density of an organizations network, or the strength and number of interconnected ties among immediately surrounding organizations, and degree, or the number of ties that a single organization maintains. In Burt's study, high density was negatively related to performance, while high degree was positively related. This finding provides an example of negative effects of network constraint on organizational effectiveness, suggesting that a tension can exist between the benefits of strong ties among a group of organizations that foster trust and nurture interdependence, and the fact that such interdependence creates restrictions on an organization's capacity to adapt to its environment and its freedom to transform learning into action.

Learning across an entire population of interconnected organizations can be amplified by organizational characteristics. Some organizational characteristics and behaviors are infectious. For example, diffusion of practices and the spread of innovation across a network have been found to be dependent on the learning capacity

of an organization and the structural position, or social proximity, of organizations (Greve, 2005).

Taken as a whole, a network of organizations that is composed of organizations with high levels of organizational learning, and that has certain structural characteristics as a network, could be expected to be more capable of altering community conditions to produce beneficial outcomes. In fact, the characteristics and effectiveness of individual organizations is likely related to the structure of the collaboration network in which it is embedded. These are important topics that are relatively underdeveloped in the research literature on community interventions. It is these perspectives that have informed the current study, which is an exploration of both organizational characteristics and interorganizational network structure in a single U.S. city.

The current study

This study reports findings from a retrospective study of organizational networks and characteristics designed to delineate changes thought to have affected fluctuating rates of Black infant mortality in Dane County, Wisconsin, USA. Infant mortality rates are a key indicator for overall population health (Carr, Szapiro, Heisler, & Krasner, 1989). As an outcome at the population level, it is thought to reflect not just the health of mother and child during and immediately after childbirth, but health and wellness throughout the life course (Lu & Halfon, 2003). Dane County, which has approximately half a million residents, is the state capital of Wisconsin. In the 1990s, the county had a Black infant mortality rate (BIMR) that ranged from two to three times greater than the rate for non-Hispanic White residents born in Dane County. Shortly after the turn of the millennium, the BIMR dropped by about two-thirds and equalized with the rate for non-Hispanic Whites for several years (Schlenker & Ndiaye, 2009). From an epidemiologic viewpoint, this sudden disappearance of a pronounced racial disparity on an important population health indicator is incredibly rare.

The decline in the BIMR therefore spurred several lines of investigation, including a mixed-methods action research collaboration investigating changes in the organizational ecology of the county. This research project investigated the hypothesis that greater levels of collaboration and organizational capacity may have preceded or coincided with the decline in the BIMR in Dane County. This hypothesis was based on theory and findings from other research (see Darnell et al., 2013 for a recent example), as well as on qualitative interviews carried out with key informants during the first phase of the study (see Sparks, Faust, Christens, & Hilgendorf, 2015). Therefore, the current study explores (1) how organizations in Dane County are situated in the collaborative network over time, and (2) if organizational capacity, as understood through assessments of organizational learning and effectiveness, is associated with the collaborative activity of these organizations.

Methods

Organizational network survey

The population of organizations included in this study was identified through a series of interviews with key community partners. Interviewees were given a list of organization in Dane County associated with the health and well-being of expecting and new mothers and were asked to eliminate the least relevant organizations and to add important organizations that did not appear. Through these interviews, 23 organizations were identified as particularly important to maternal and child health in Dane County, Wisconsin. Although all organizations operated in Dane County, they ranged in their geographic scope and sector and

included hospitals, insurance companies, single and multi-sited social service organizations, public agencies, childcare providers, and grassroots health advocacy groups.

These 23 organizations were next asked to complete a survey regarding their collaborations spanning over 12 years. We spoke with organizational staff to identify either a single or multiple respondents who would be able to represent each organization's current operations and perspectives as well as changes over the past 12 years. We had these individuals complete a survey on behalf of the organization. Interorganizational relationships were assessed according to direct collaboration, defined as communication and other interorganizational transactions through formal or informal channels, at four different time periods. Organizations were asked to rate their levels of direct collaboration with other organizations on a five-point scale from "Very low" to "Very high" levels of collaboration at each period of time. The survey also included a series of questions on the environment and culture of the organization. Organizations were asked to respond to each question on a five-point scale ranging from "Strongly disagree" to "Strongly agree". Measures of organizational learning and effectiveness were used alongside these network measures to observe the distribution of highly functioning and adaptable organizations across the whole network over time, as well as to identify any relationships between organizational capacity and network location or local network dynamics.

Network measures

Collaborative relationships between organizations were assessed in several ways. Specifically, we examined the changes in the whole network over the four time periods, organizational location in the network across time, and changes in local networks. All network analyses were completed in UCINET 6 (Borgatti, Everett, & Freeman, 2002). We examined cohesion in the whole collaborative network, as measured by density, and how central or diffuse the relationships were, as measured by the standard deviation of the coreness of organizations. The standard deviation of coreness was a useful measure here because it captures the extent to which the network is organized around a structural center maintained by strong relationships among a few organizations. Organizational location in the network was observed in two ways: (1) the extent to which organizations were more central to the network and connected to others that were central, as measured by each organization's coreness, and (2) the extent to which organizations could efficiently be reached by other organizations through collaborative relationships, as measured by each organization's level of closeness.¹ The local network of organizations was observed through changes in the cohesion of relationships immediately surrounding an organization in the network, or its ego network density, and changes in the levels of investment in collaborative relationships with neighboring organizations, as measured by the average strength of the relational tie to and from these neighbors.

Organizational capacity measures

Through the surveys of organizational representatives, we assessed the extent to which each organization exhibited attributes of a learning organization and its overall organizational effectiveness. Four dimensions were used to capture features of a learning organization, including strategic leadership, embedded systems,

¹ Specifically in-degree closeness, as network relationships were directed. As closeness does not take into account the strength of a relationship and only its presence or absence, a dichotomized version of network responses were used in the analysis of closeness to represent a relationship of any strength.

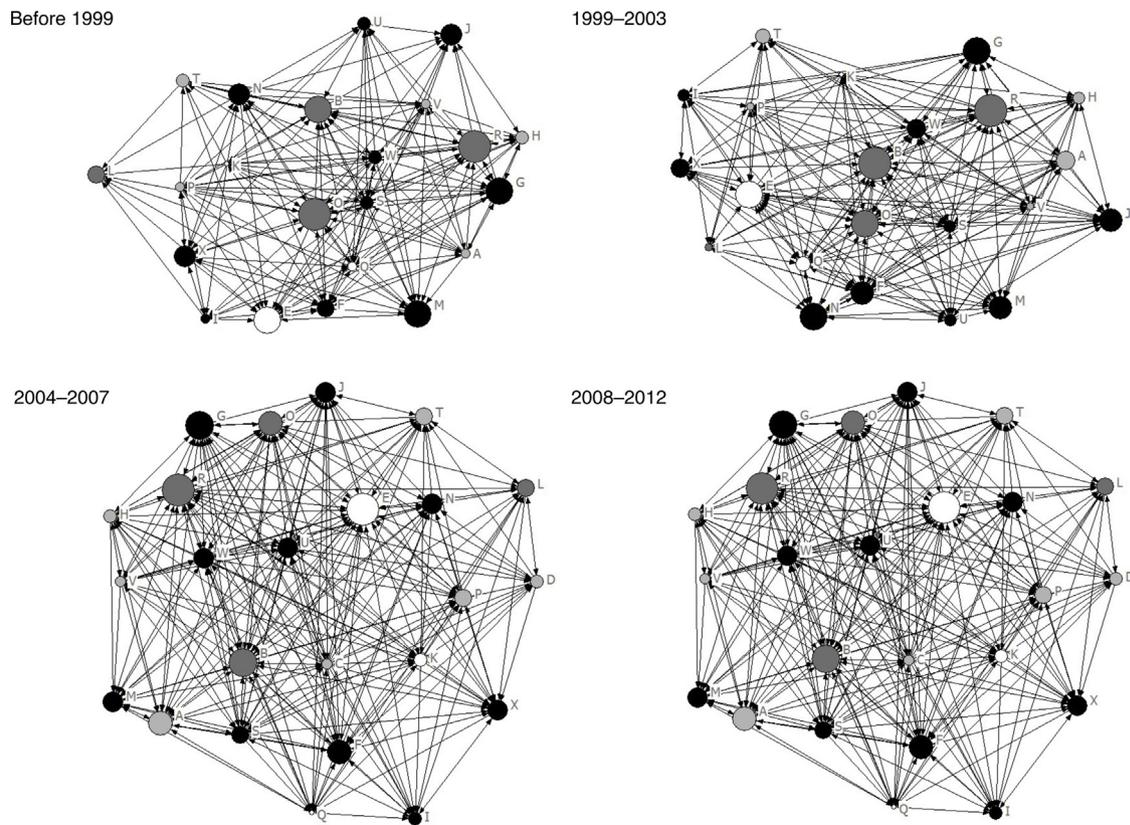


Fig. 1. Organizational collaborations across four time points with node size indicating closeness and node shading indicating organizational effectiveness.

staff empowerment, and systems connection. These dimensions were based on organizational learning theory and have been previously measured using two- and three-item subscales (Bess, Perkins, & McCown, 2011; Marsick & Watkins, 2003; Yang, Watkins, & Marsick, 2004). In this study, only the composite measure of learning organizations was used, which was constructed as the mean score across the learning organizations subscales. Organizational effectiveness was captured in a single scale assessing clarity of organizational purpose and functioning, financial health, and overall success (Maton, 1988). Cronbach's alpha was used to determine the internal consistency of each set of measures for analysis. Cronbach's alpha for the organizational learning scale and the organizational effectiveness scale were .94 and .89 respectively, indicating consistency among items.

Results

Figs. 1 and 2 depict the interorganizational network over four time periods during the twelve-year span when the BIMR sharply decreased in Dane County. In the two sets of maps, lines indicate ties of direct collaboration at a level of three or higher on the Likert-type response scale. The organizations, represented by circular nodes on the maps, are positioned by their strength of ties to one another. Their size signifies their closeness scores, or how efficiently they can be reached by every organization in the network across strong or weak collaborative ties. In Fig. 1, the shading of the node corresponds to the organization's reported level effectiveness. In Fig. 2, the shading indicates the extent to which the organization exhibits characteristics of a learning organization. Darker shading represents higher scores on either scale, with those in black scoring a 4.5 or above out of 5 and dark gray scoring 4.0–4.5. Mean scores for characteristics of organizational learning and effectiveness were 3.9 and 4.1 respectively, a difference observable in the

Table 1

Network density and standard deviation of coreness across time.

Time Period	Network Density	SD of Coreness
Before 1999	2.23	.089
1999–2003	2.54	.062
2004–2007	2.74	.055
2008–2012	2.74	.055

greater number of darkly shaded nodes in Fig. 1. Note that data were missing on organizational characteristics for node E in white.

In Fig. 2, learning organizations do not appear to be central to the network throughout the time of the BIMR decline, nor do they appear to be particularly well connected to one another. They also vary in their level of closeness, or reachability from all others in the network. Alternatively, in Fig. 1, organizations scoring higher in effectiveness are more prevalent and appear to be more central and well connected to one another. In addition, the larger sizes of the black and dark gray nodes appear to indicate that effective organizations in this network also tend to have higher closeness scores.

Overall changes in density reported in Table 1 demonstrate a relatively consistent level of collaboration across the network, with slight increases earlier that endure over the final six years of this study. The variation in coreness among organizations is low at the start and decreases slightly over time, suggesting that on average the network became increasingly less reliant on strong relationships among a few key organizations.

Spearman correlations² for each of the four time periods further illuminate potential associations between organizational

² Spearman correlations were chosen due to the fact that the data was not normally distributed and therefore required a non-parametric analytic approach.

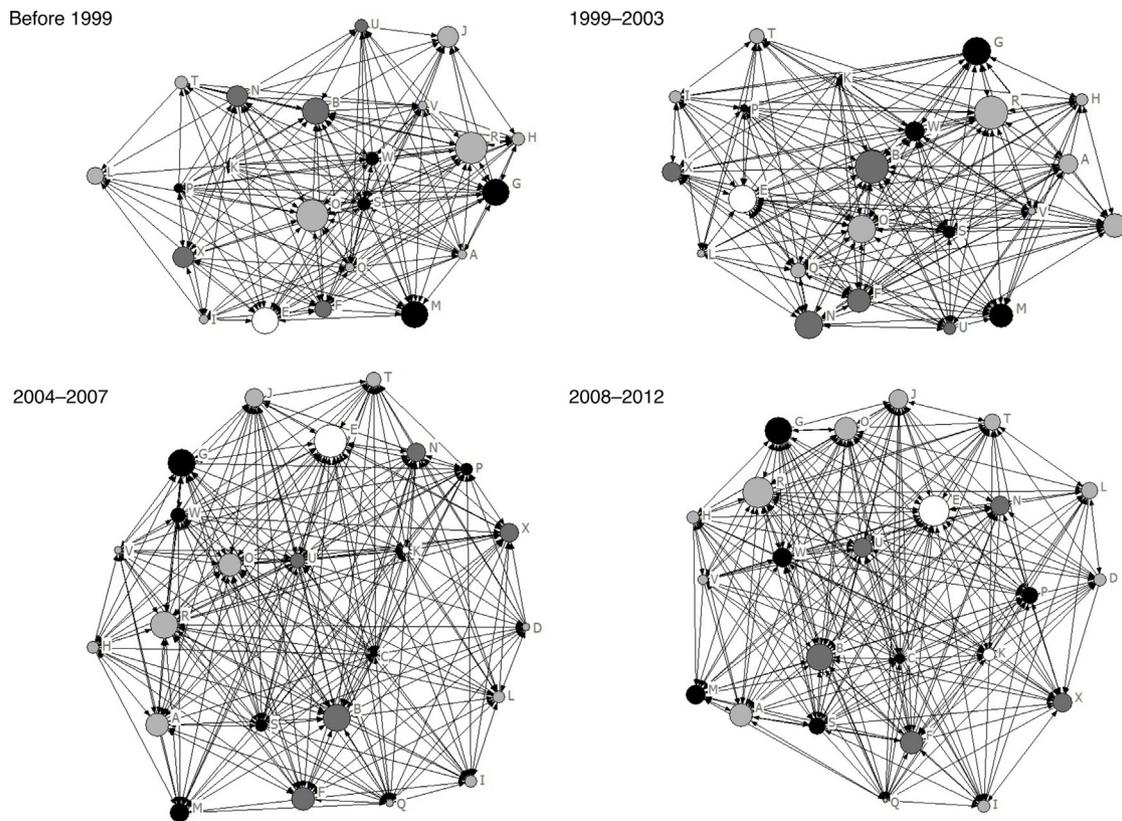


Fig. 2. Organizational collaborations across four time points with node size indicating closeness and node shading indicating characteristics of a learning organization.

Table 2
Correlations between organizational location in network and organizational characteristics.

	Before 1999		1999–2003		2004–2007		2008–2012	
	Coreness	Closeness	Coreness	Closeness	Coreness	Closeness	Coreness	Closeness
Organizational Learning	.151	-.260	.240	-.200	.204	-.283	.249	-.362
Organizational Effectiveness	-.094	-.456*	-.015	-.444*	.065	-.465*	.222	-.540*

* $p < .05$.

characteristics, coreness, and closeness. As Table 2 displays, only closeness was correlated with organizational effectiveness. No relationships between coreness or closeness and organizational learning were detected. These findings suggest that effective organizational characteristics are associated with the extent to which an organization is reachable even through weak collaborations, while organizational learning does not appear to be associated with an organization’s location in this network of interorganizational collaborations. Additionally, although organizations scoring higher on the measure of organizational effectiveness appeared to be well connected in the visual displays of the network, the lack of consistent association between coreness and organizational effectiveness would suggest that this was actually not a trend in the data.

Grassroots health advocacy organizations maintained slightly higher level of coreness relative to the population of organizations. This suggests that advocacy groups focused on various overlapping groups, such as women, African-Americans and Latino/as, connected with one another and potentially helped facilitate change across the network. On average, however, these types of organizations tended to have low organizational effectiveness scores and varied in their scores on the measure of organizational learning characteristics.

Additional Spearman correlations reported in Table 3 were used to explore changes in organizations’ local networks prior to 1999 until 2012. Change in ego network density was not correlated

with organizational effectiveness or learning. Rather, organizations with the greatest change in their ego network densities appeared across the range of organizational learning and effectiveness scores, suggesting that working to build the cohesiveness among collaborators may have been differentially productive for organizations depending on their context. Although changes in organizations’ average in-degree were not correlated with organizational effectiveness or learning, changes in average out-degree were associated with organizational effectiveness. This finding suggests a potential relationship between organizational effectiveness and increased investment in existing independent collaborative relationships in this network.

Although not correlated with the specific organizational measures, the organizations with the highest change in average in-degree – those with whom the network increasingly strengthened

Table 3
Correlations between changes in local network dynamics and organizational characteristics.

	Δ Ego Network Density	Δ Average In-Degree	Δ Average Out-Degree
Organizational Learning	.140	.036	.074
Organizational Effectiveness	.050	-.038	.470*

* $p < .05$.

its relational investments – consisted entirely of public agencies and direct healthcare providers (i.e., hospitals and clinics). Across this network, then, organizations overwhelmingly reached out to strengthen their relationships with public and healthcare providing entities. These public and healthcare providing organizations, however, were not commonly represented among the organizations with high increases in out-degree. It can thus be inferred that they were not particularly focused on strengthening their own interorganizational relationships over time. Although it was not discernable from the changes in average degree, grassroots health advocacy organizations as a group maintained relatively high out-degree scores, particularly during the first two time periods. This finding may suggest that these groups had strong investments in their immediate network that helped to advance a focus on maternal health across diverse populations early on, encouraging future collaboration.

Interestingly, characteristics of organizational learning and organizational effectiveness were highly correlated (.615, $p < .01$), but no decipherable relationships were found between organizational learning and network location or collaborations.

Discussion

The goals of this study were to investigate changes in collaboration over time and associations between organizational capacity and collaborative activity that may have significantly influenced the birth outcomes of African American mothers and reduced racial disparities in infant mortality in Dane County. Findings indicate that there was an increase in collaboration across a relatively diffuse network of organizations that were important to new and expecting mothers during the 12-year time period that was the focus of the study. High capacity organizations, as indicated by organizational learning and effectiveness, were spread out across the organizational population and did not occupy particularly central spaces in the collaboration network. Additionally, high capacity organizations were not necessarily representative of a particular organizational type, suggesting that variation in capacity across different organizational subpopulations in a diffuse network may be helpful for advancing systems change.

Highly effective organizations, or those reported to have clarity of organizational purpose and functioning, financial health and overall success, were also those that appear to have been increasingly sought out by others in the network. In addition, these organizations exhibited the largest increase in average strength of outgoing collaborative ties. It appears, then, that effective organizations tended to strengthen their investment in relationships with existing collaborators over time and made themselves at least peripherally available to other organizations seeking a connection. Such a structural dynamic may have allowed these organizations to continue efficiently accessing flows of information and resources from across the network to meet their organizational goals while investing strategically in collaborations.

This therefore suggests that the network of organizations in Dane County may not have been successful at improving maternal and infant health simply by increasing strong, trusting collaborations across all organizations in this informal network. Rather, several key organizations appear to have engaged in strategic collaborative relationships that allowed the organizational network as a whole to be more successful at reaching its goals. Furthermore, the strong relationship between organizational learning and effectiveness could suggest that internal processes of organizational learning are stimulated by effectiveness, with strong organizations adapting and engaging in alternative approaches to service. It may also be the case that organizational learning cultures facilitated gains in organizational effectiveness.

Findings also reveal that the presence of health advocacy organizations and their influence through collaborative ties in the network may have played a role in the increased health and well-being of African-American infants and mothers. These were not necessarily high capacity organizations, as is often the case with grassroots initiatives, but exhibited strong outward ties and may have been integral to pushing on the system to address disparities in birth outcomes and inequities in care. This finding provides support for community interventions that target resources to key advocacy organizations to increase their capacity to advance changes in policies, systems and environments to address health disparities, as well as those that encourage collaboration among traditional service providers and advocacy organizations. The increased investment by organizations across the network in collaborative relationships with primary care providers and public agencies may also indicate that organizations engaging those most impacted by disparities must push on larger health service providers to influence systems of care.

Findings for this study must be interpreted while considering limitations. Three limitations are particularly important to note. First, the data on organizational effectiveness and organizational learning were only collected for one time point, so could not be analyzed longitudinally alongside the longitudinal data on interorganizational collaborations. Second, although the interorganizational network ties were assessed for multiple time periods, they were all assessed retrospectively in a single wave of data collection. Organizational representatives' ability to accurately recall the strength of collaborative ties over time periods in the more distant past were almost certainly limited. All retrospective self-reports are vulnerable to biases and lack of accuracy in recall, but these are likely amplified in the longer-term retrospective self-report method that was used for this study. When possible or necessary, however, we sought to mitigate this limitation by having multiple organizational representatives confer. Third, we used a bounded network of 23 organizations in a single city. In this city alone, there are hundreds of additional nonprofit and public social and human service agencies. Therefore, although we used a mixed-methods approach to identify the boundaries of the network for this study, there are numerous other influential interorganizational relationships that our data do not capture or allow us to analyze. The lack of evidence for intensity of collaborations and organizational learning and effectiveness may be in part attributable to this limitation. In other words, it is possible that organizational learning was indeed promoted through overlapping networks that were not associated with this particular set of cross-sector informal and formal collaborations.

This study examined dynamics of one particular network with a bounded population of organizations that provided services, information, and opportunities to new and expecting mothers in Dane County, Wisconsin, USA. This network of organizations was targeted for investigation specifically because of the likelihood that these organizations played roles in the reductions in the BIMR that occurred during the early years of the 21st Century (see Sparks, Faust, Christens, & Hilgendorf, 2015). While some aspects of the current study limit generalizability to other contexts, findings do provide insights into how collaboration and organizational capacity in a diverse population of organizations may have been influential in the reduction in health disparities for infants and expecting mothers. Furthermore, they provide descriptive insights into the ways that cross-sector organizational networks are evolving over time in an era of decentralized and fragmented systems of care. Future research in Dane County, WI will analyze organizational network data alongside other qualitative and quantitative data to continue to shed light on fluctuations in the BIMR. Future research in the field more broadly should seek to determine whether organizational learning and effectiveness do tend

to be associated with the properties or dynamics of organizational networks.

Conflict of interest

The authors have no conflict of interest to declare.

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