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COLLABORATIVE PERFORMANCE AS A FUNCTION OF NETWORK MEMBERS' PERCEPTIONS OF SUCCESS

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ABSTRACT: *Interorganizational networks are a common collaborative approach to tackle complex issues such as public health, national security, education, and poverty. While there is a consensus that networks are a viable approach to these issues, it is unclear what factors lead to effective collaborative performance. One issue for assessing performance is the lack of sufficient evaluation/assessment methods and, subsequently, of empirical data. Applying a conceptual model based in the literature, this study examines characteristics of network members and their perceptions of success in order to ascertain the degree to which members' agreement on outcomes varies among networks and the characteristics of members of networks that report greater levels of success or of disagreement about success. This study contributes to the collaborative performance literature by analyzing an unprecedentedly large* N (n = *98) dataset of interorganizational (whole) networks to test empirically the conceptual model. The results show that higher trust and greater resource contributions predicted higher levels of perceived success among members of a network. A second model, with disagreement about success as the dependent variable, more resources, and higher amounts of diversity, predicted higher levels of disagreement about success. We conclude that the literature on interorganizational networks overemphasizes the benefits of network diversity, and that diversity may, in fact, hinder perceptions of success.*

Developing interorganizational networks across boundaries has become an essential function of public sector agencies. Often, these networks are embedded in communities whose mission is to work together as a "collective" to alleviate

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various public sector issues (Agranoff & McGuire, 2001; Mays & Scutchfield, 2010; O'Leary & Bingham, 2009). These collaboratives form social networks that involve diverse types of partners, varying levels of interaction, and multiple types of network configurations. Such collaboration has the potential to improve outcomes by leveraging resources, lowering costs, and identifying solutions that are unachievable by any one agency alone (Rethmeyer, 2005; Thomson, Perry, & Miller, 2009). While it is widely accepted that fostering interorganizational networks to achieve public sector outcomes has advantages (Agranoff, 2006; Mays & Scutchfield, 2010), and the practice of collaboration is growing within the public sector (Varda, Shoup, & Miller, 2012), the complex nature of these efforts makes it challenging to effectively measure and evaluate them (Koppenjan, 2008). It is evident that the literature has an identifiable consensus that networks are a viable, and often successful, management strategy. It remains unclear, however, what makes them successful. Despite the recent widespread utilization of interorganizational networks in the public sector, Isett, Mergel, LeRoux, Mischen, and Rethemeyer (2011) found that public managers still lack significant "knowledge of how networks perform" (p. i163), and recommended that the field could benefit from further research on the performance of interorganizational networks.

One of the primary challenges in addressing questions about interorganizational networks, such as what makes them successful, is the availability of data and valid measures of effectiveness. Given that these factors vary from network to network, complemented by the complex, nested features of network structure, the field has been framed largely in case study examples. Many authors agree that measuring network effectiveness is challenging because of the various perspectives that diverse actors bring to the network in terms of what constitutes an "outcome" and "success" (Bardach & Lesser, 1996; Herranz 2010; Isett et al., 2011; Provan & Milward, 2001; Romzek, LeRoux, & Blackmar, 2012). According to Provan and Milward (2001), "Despite these problems, establishing whether or not a network is effective is critical from the perspectives of those organizations that make up the network, those who are served by the network, and those whose policy and funding actions affect the network" (p. 422).

This article addresses the gap in the literature on interorganizational network effectiveness by operationalizing interorganizational networks as social networks and analyzing a large-*N* whole network dataset to identify the factors that network members link to success. We approach these questions in the context of public health collaboratives (PHCs). While we do not attempt to tackle the question of how to operationalize measures of effectiveness, we take a close look at the characteristics of members of networks and their perceptions of success. The way in which network members report how successful their networks are at achieving results is important both for reporting outcomes and for managing

networks. In the article, we answer the questions: To what degree does members' agreement on outcomes vary among networks? What are the characteristics of members of networks that report greater levels of success and greater levels of disagreement about success?

The following literature review summarizes the rise of interorganizational networks in public health, introduces a conceptual framework for analyzing these networks, and discusses the challenges and complexities of analyzing these networks. This is followed by a discussion of the methodology used, presentation of results, and a final discussion and conclusion.

Literature Review

Interorganizational networks are a common approach to tackle increasingly complex issues such as public health, national security, education, and poverty. A growing expectation today for almost any organization is that it engage in partnerships with other organizations as a way to achieve stated goals. The increased practice of collaboration echoes what is emphasized in the literature. For example, relations that involve the exchange of resources and knowledge among sectors are the norm and certainly the latest trend in successful social service models (Chen et al., 2012; Gulati & Singh, 1998; Isett & Provan, 2005; Kapucu, 2005; Mandell, 2001; Monge, Heiss, & Margolin, 2008; Westley & Vredenburg, 1997). Networks of community organizations working for a common purpose are thought to increase community capacity to meet social needs (Monge, Heiss, & Margolin, 2008; Parker & Selsky, 2004; Westley & Vredenburg, 1997). The benefits of interorganizational networks include (a) bringing diverse groups and resources together, and (b) addressing issues that no group can resolve by itself (Witte, Reinicke, & Benner, 2002). Blau and Rabrenovic (1991) found that "interorganizational linkages are more important than bureaucratic hierarchies for controlling and coordinating work.… linkages are used to integrate programs within a community, coordinate client services, obtain resources, and deal with governmental agencies" (p. 328). However, despite these published benefits of collaboration, it is important to note that in addition to the anticipated benefits, "collaborations are often characterized by a high level of dissatisfaction with their actual outcomes relative to expectations, and correspondingly, a high rate of failure" (Madhok & Tallman, 1998, p. 326). This is in large part due to the challenges of collaborating, such as transaction costs, the potential for conflict, and lack of accountability.

INTERORGANIZATIONAL NETWORKS IN PUBLIC HEALTH

In this article, we focus on interorganizational networks in a public health context for two primary reasons. The first is that the formation of these types

of networks in public health contexts has become a "way of working" and is occurring in almost all areas of the work that is happening in this field. The second is that, in large part because of the number of available networks to study, a large-*N* dataset has been collected on these networks, providing a unique opportunity to address pressing questions about interorganizational networks in the public sector. Below we explain in more depth how these types of networks are conceptualized in public health. Later we discuss the dataset in more depth.

One of the most promising practice-based approaches in public health is the development of interorganizational networks as a way to obtain resources, share knowledge, and, in turn, improve population health outcomes (Valente, Chou, & Pentz, 2007). Partnerships among community agencies, public and private institutions, and concerned citizens have formed around many public health issues (Levin, 2002). These partnerships are "created by an understanding that the antecedents of poor health are multi-factorial and thus require a multi-systemic approach" (Varda, Chandra, Stern, & Lurie, 2008, p. E1). Listed as one of the Ten Essential Public Health Services (designed in 1994 as a framework for the National Public Health Performance Standards Program of the Centers for Disease Control and Prevention), interorganizational networks represent an essential function of public health agencies, defined as "mobilizing community partnerships and action to identify and solve health problems" (Harrell & Baker, 1994, p. 362).

More recently, collaboration across sectors continues to be formalized in public health. For example, the Public Health Accreditation Board (PHAB), the governance body that provides guidance to public health departments in preparation to meet the evolving set of standards and measures for voluntary accreditation, published the revised "Proposed State/Local Standards and Measures" documents (http://www.phaboard.org), emphasizing collaboration as a core competency. The fourth domain addressed in these standards is "Engage the Public Health System and the Community in Identifying and Addressing Health Problems." It emphasizes taking an inventory of partnerships and demonstrating their relevance to demonstrate improved capacity.

This mix of accountability, evidence in research, and experience in practice has, in turn, led to the rise of public health collaboratives (also referred to as coalitions) as a strategy for addressing the most pressing public health problems in communities. Such networks are becoming a critical function of successful health departments, with a focus on a continuum of outcomes from categorical issues to broad fundamental social determinants (Brownson, Baker, & Novick, 1999; Butterfoss, Goodman, Wandersman, 1993; Christoffel, 2000; Roussos & Fawcett, 2000). A new set of public health approaches is being developed to appropriately assess how an array of diverse partners are collectively and systematically addressing complex public health problems and

population health goals (Bakes-Martin, Corso, Landrum, Fisher, & Halverson, 2007). Often embedded in communities, these partnerships, also referred to as coalitions, alliances, and consortia (Lasker & Weiss, 2003), are intended to promote organizations that work together as a "collective" to tackle public health issues (Mays & Scutchfield, 2010; Varda et al., 2008).

A CONCEPTUAL FRAMEWORK FOR STUDYING INTERORGANIZATIONAL NETWORK EFFECTIVENESS

While a conclusive theory of network effectiveness has not been formulated, there is a dominant set of variables that are most often mentioned in the literature as factors related to network effectiveness. These include diversity of membership, perceived overall trust and value among the membership, total resources contributed, total number of and agreement on outcome reported, and agreement among members on goals/outcomes (we operationalize each of these variables in our research as independent variables, measured at the whole network level). Together, the factors allow us to take a comprehensive picture of what might make networks effective. We operationalize network effectiveness as the network's success as reported by its members. To account for varying organizational missions and expectations for success, we identify perceived success, and agreement that success has been achieved, among members as a proxy for effectiveness (as dependent variables). This conceptual model is illustrated in Figure 1, followed by a brief discussion of the literature related to each component of this conceptual model.

Member Diversity

Diversity in network membership is viewed as essential to innovation and sustainability (Granovetter, 1982) and allows networks to address issues that

Figure 1. Conceptual Model of Network Effectiveness

no single member could resolve independently (deLeon & Varda, 2009). Mays and Scutchfield (2010) hypothesize that networks with greater breadth will have more diverse resource contributions by their members, a key component for success in collaboration (Casey, 2008; Mays, Halverson, Baker, Stevens, & Vann, 2004). Specifically, resource sharing is a motivating factor for members of interorganizational networks (Brown, Feinberg, & Greenberg, 2010; Casey, 2008; Mays & Scutchfield, 2010); in public health collaboratives, maximizing and leveraging resources is a vital activity (Chen, Roberts, Xu, Jacobson, & Palm, 2012; Honeycutt & Strong, 2012). Differences in network composition are captured through "breadth," which measures the degree of diversity inherent in a particular network (Mays & Scutchfield, 2010).

Resource Contribution

Relationships that involve resource and knowledge exchange throughout the public, private, and nonprofit sectors are the norm and certainly the latest trend in successful social service models (Isett & Provan, 2005; Zenger, Lazzarini, & Poppo, 2002) and policy implementation. Gazeley and Brudney (2007) found that "the motivation to partner is driven by a desire to secure those resources most scarce for the respective sector: expertise and capacity for government, funding for non-profits" (p. 389).

Trust

A high level of trust can influence an effective network (Klijn, Steijn, & Edelenbos, 2010). The antecedents of trust occurring across sectors in inter-organizational networks are complex and include organizational attributes, such as a general tendency to trust, but also relationship aspects, such as the variety or ways in which they interact (not necessarily regularity of interaction) with the network and reputation within the network (Lee et al., 2011). Trusting relationships between public and nonprofit networks can determine the level of cooperation that occurs between network members (Lambright, Mischen, & Laramee, 2010).

Value

Another component important to effective partnerships is whether the members value one another's contributions to the collaborative (Casey, 2008) and recognize the power and influence each member brings to the table (Thorelli, 1986). This domain has been operationalized in network research by the amount of value organizations are perceived to bring to the collaborative in terms of their power and influence to affect change, their level of involvement in the collaborative, and the value of their resource contributions to the work of the collaborative (Varda et al., 2008).

Number of Outcomes and Agreement on Outcomes

A unique and important aspect of effective interorganizational networks is the agreement among members of the network. Goal congruence and agreement on outcomes can have a strong influence over whether or not a network has clear agenda and/or is working effectively toward its goals (Joffres et al., 2004; Lawless & Moore, 1989; Ring & Van de Ven, 1994; Varda, 2011).

Network Effectiveness Operationalized as Success

The way in which members report how successful their networks are at achieving results is important both for reporting outcomes and for managing networks. Research on organizational studies focuses on issues of success (achievement of goals or the specific outcomes of interorganizational relationships) in interorganizational networks (Einbinder, Robertson, Garcia, Vuckovic, & Patti, 2000). Overt reports of perceptions of success in network collaboratives are an important component and often reflect whether or not the group process is adequate and outcomes are being achieved (Mora-Valentin, Montoro-Sanchez, & Guerras-Martin, 2004; Varda et al., 2008). Researchers argue that networks and organizations measure success in differing ways (Mandell & Keast, 2008). This conceptual model focuses on how members of a network define and perceive success, and contributes alternative methods to solely focusing on the value of individual organizations within the network (Mandell & Keast, 2008).

COMPLEXITY AND LIMITATIONS OF ANALYZING INTERORGANIZATIONAL NETWORKS

While a theoretically based conceptual model is essential in a solid research design, the ability to empirically test the model is limited without valid and reliable data. It is widely accepted that fostering interorganizational networks to achieve public health outcomes has advantages, and that the practice of collaboration is growing within the public health system (Mays & Scutchfield, 2010; Singer & Kegler, 2004), but the complex nature of these efforts has made it challenging to effectively measure and evaluate them. Scholars have a tendency to apply traditional viewpoints about successful organizations to networks, and the literature considers this problematic. Scholars reason that a "one-size-fits-all" methodology is common in the realm of network management and analysis, where old ways of looking at independent organizations directly translate to the analysis of networks (Head, 2008; Herranz, 2010). The argument here is that such traditional perspectives are inappropriate within a contemporary framework, where collaborative efforts and effects are far more complicated.

An alternative to the traditional approach to evaluation is the application of a systems science approach. Systems science considers the interdependencies

and nested features of networks, thereby providing an approach to examine the complex nature of interorganizational networks (Mabry, Olster, Morgan, & Abrams, 2008). Systems science theories enable investigators to examine the dynamic interrelationships of variables at multiple levels of analysis (e.g., from cells to society) simultaneously (often through causal feedback processes), while also studying the impact on the behavior of the system as a whole over time (Midgely, 2003). Public health research on partnerships and networks has been slowly incorporating research based in a "systems theory" context that emphasizes complex and nested features of the organizational, economic, and policy issues that health departments must address to tackle current challenges; otherwise known as Public Health Systems and Services Research (PHSSR) (Mays & Scutchfield, 2010). However, the growth in research applying systems science methods has been slow, and in large part it is conducted in isolation of the research conducted in other, related fields.

Lack of Data Present Challenges to Studying Networks

A primary limitation to advancing the field forward is the recognized lack of sufficient data that can adequately account for the complex, nested features of interorganizational networks. As the scale and scope of public health issues become more global and complex, it is evident that traditional quantitative models of public health intervention, implementation, and analysis will not alone suffice to effectively explain how to improve and promote public health problem-solving (deLeon & Varda, 2009; Mabry et al., 2008).

To date, most of the research on interorganizational networks in public health has been done using data from the National Profile Survey of Local Health Departments and the few questions in the survey on the number of partners reported by health departments (http://nacchoprofilestudy.org). In general, across disciplines, the data used to study interorganizational networks rely largely on case studies or cross-sectional surveys (O'Malley & Marsden, 2008; Provan, Fish, & Sydow, 2007; Wholey, Gregg, & Moscovice, 2009), neither of which adequately take into account the complex, nested features of these networks. While the empirical research to study collaborative networks continues to grow, data to inform these efforts are at present deficient, specifically at the "whole network" level, due in large part to the difficulty of collecting relational data (Robins, Pattison, & Woolcock, 2004).[1] Whole network data focus analysis at the network level rather than at the organizational level, but "only by examining the whole network can we understand such issues as how networks evolve, how they are governed, and ultimately how collective outcomes might be generated" (Provan et al., 2007, p. 480).

While the computational sciences have made great strides in collecting data that represent whole networks thanks to the ability to mine electronic data

records (Mabry et al., 2008), the social and behavioral sciences are far behind. Without more appropriate data, collected across a large sample, and the application of systems science analytic approaches, the field is largely limited in theoretical development. The recent development of PARTNER (Program to Analyze, Record, and Track Networks to Enhance Relationships [http://www.partnertool.net]) has resulted in an unprecedented availability of whole network data on public health partnerships. PARTNER is an online social network data collection and analysis tool designed to measure and monitor collaboration among people/organizations. The tool is sponsored by the Robert Wood Johnson Foundation and designed for use by public health interorganizational networks to demonstrate how members are connected, how resources are leveraged and exchanged, the levels of trust and perceived value, and to link outcomes to the process of collaboration (Varda et al., 2008). The use of this tool by the practice community has resulted in a dataset of over 200 whole networks on public health collaboratives, all collected using the same methodology and core questions. The current study focuses on select networks from this data set to investigate behaviors relevant to interorganizational network effectiveness. The availability of these data, and potential analyses, has opened the door to answer questions about interorganizational networks that have been limited to date by small-*N* studies. In this research, using PARTNER data in the public health network context, we will apply the conceptual model presented above to answer the research questions, To what degree does members' agreement on outcomes vary among networks? What are the characteristics of members of networks that report greater levels of success and greater levels of disagreement about success?

Methods

This study is a secondary data analysis of a subset ($n = 98$ whole networks) of the PARTNER (Program to Analyze, Record, and Track Networks to Enhance Relationships, http://www.partnertool.net) data set.

SAMPLE

With IRB approval, we extracted, cleaned, and analyzed a subsample of 98 public health interorganizational networks from the PARTNER data set based on a set of criteria: (1) mission focused on public health, (2) organizations as the unit of analysis, (3) use of the same or similar PARTNER survey questions and response options, and (4) state or local public health departments as members of the collaborative. The subset sample consists of interorganizational networks ($N = 98$) whose membership includes organizations ($n = 2{,}486$) working together on public health issues, analyzed at the whole network level, and with responses from organizations representing a multitude of diverse sectors that

responded to network surveys ($N = 1{,}098$). For this study, data are examined at the whole network level for each collaborative network ($N = 98$) and some variables were created using organizational and dyadic data.

The networks chosen for this study represent interorganizational networks made up of a group of organizations. These networks are located throughout the United States, and each network works on various public health topics, in response to the various motivations described above (e.g., providing essential services, voluntary accreditation, etc.). For example, a network in the data could represent a group of organizations coming together to work on tobacco issues in the community, or early-intervention services for children, or community preparedness, or alleviating obesity in youth (topics vary, but all are related to public health issues). The networks are often convened with support from some kind of funding (but not all), are governed with a collaborative governance approach (shared decision-making), and their representatives meet in person on a regular basis.

Data were collected by each network, using the PARTNER survey, with identical methodology (using the online system) by one member (usually the coordinator) of each network. The data were collected using a bounded list: a predetermined list of network members that make up the whole network. The respondents of the survey are member organizations of each network.

Each network varies in size, level of interaction, and centralization. Within the PARTNER data set, response rates vary from 43% to 100%, with a mean of 67%. In this analysis, we determined that we would include those with less than 50% because the results did not substantially change when we removed those with less than a 50% response rate. Missing data are not uncommon in whole network studies, but must be taken into consideration (Kossinets, 2006). Although there is little guidance or agreement on suitable response rates, two studies have identified acceptable thresholds. Kossinets (2006) argues that a response rate ranging from 50% to 70% is acceptable, as it is unlikely to affect the results of the analysis (Grosser, Lopez-Kidwell, & Labianca, 2010). However, others emphasize that a response rate of 75% and higher for a whole network could limit the possible negative effects of missing data in social network analysis (see Wasserman & Faust, 1994).

MEASURES

Specific questions from the full PARTNER survey were selected to create the variables measured for each network, including organizational information unique to each network (see Table 1). Independent variables for the collaborative networks include diversity of membership, perceived overall trust and value among the membership, total resources, total outcomes reported, and agreement on the most important outcomes (those presented in the conceptual model).

Table 1. PARTNER Questions Used to Measure Independent and Dependent Variables

Organizational Description: Type of organization, Outcomes of collaborative, resources contributed by organization to network

Perception of Success: How successful has your collaborative been at reaching its goals? (Not Successful, Somewhat Successful, Successful, Very Successful, Completely Successful)

Relational Questions: "Please list all organizations/divisions/agencies/programs with which you have a relationship to meet the goals of your collaborative." After selecting the organizational partners, the respondent answered the following questions:

1) **Extent of Value:** (a) Power/Influence, (b) Level of Involvement, (c) Resource Contribution. (None, Small Amount, Fair Amount, Great Deal)

2) **Extent of Trust**: (a) Reliable, (b) In Support of Mission, and (c) Open to Discussion. (None, Small Amount, Fair Amount, Great Deal)

Dependent variables examined were perceived success and level of agreement on perceived success within each collaborative network.

Diversity was operationalized as the proportion of different organizations existing in the network and coded by low, moderate, and high diversity categories (Mays & Scutchfield, 2010). The "type of organization" was coded for each organization represented in the data, which allowed us to create a measure of the diversity of a network; the more different types of organizations in a network, the higher the diversity. These measures are based on 15 possible organization types (e.g., public health; education; funders; hospitals, government [non–public health]) A network was considered to have low diversity if from one to three organizations (out of 15 total possible types) were represented, moderate diversity if four to seven organization types were present, and high diversity if eight or more organizations were included.

Organizations were also asked to select from a closed-form list what resources they contributed to the work of their network. The number of resources was calculated by aggregating the number of resources members of each collaborative reported bringing to the collaborative. In order to normalize the variable across collaboratives, we calculated the mean of the number of resources from the total number of resources contributed by organizations and then divided by the total possible for that network. A higher proportion indicates that a network had a higher number of types of total resources.

Each network had a varying number of outcomes listed that its organizations could select as what they believed to be the outcomes achieved by the network. Outcomes were select intermediary outcomes, including process and policy outcomes. Examples of outcomes that were used in a closed-form list include more education, policy change, and improved services, among other outcomes that indicate system-level changes. We calculated the total number of reported select outcomes, rather than the types of outcomes reported, because the nature of these networks (with varying missions) results in a variety of outcomes.

The total outcomes variable was calculated for each network to reflect the number of outcomes each network was working on during the time of the survey; again, this was normalized to make them comparable across networks. In addition, a variable was created to identify the amount of agreement among the members regarding what their most important outcome was. Networks were scored on a scale of 1–3 based on the total number of outcomes that were identified as the most important. Since respondents could only choose one response, the number of outcomes "indicated" as most important served as a proxy score for agreement. The score for level of agreement given to each network could be either low (more than 7 most important outcomes chosen), moderate (between 4 and 6), or high (between 1 and 3).

Each network has a unique culture of value and trust which is measured in several of the PARTNER survey relational questions, and the corresponding responses create dyadic data ($N = 12{,}355$ dyadic ties). Trust and value were calculated for each collaborative, based on three-item scales (see Table 1) developed specifically to measure trust and value within interorganizational networks (Varda, 2008). These measures have been tested for validity, and found to be both reliable and valid measures of trust and value (Retrum, Chapman, & Varda, 2013). Trust and value variables were calculated in this research by creating total trust scores and total value scores for each organization (averaging the relational scores, which ranged from 3 to 12) and then calculating mean scores at the whole network level.

Success of networks was measured using the item that directly asks network respondents to score the level of success the network has had in accomplishing its work (see Table 1). By averaging the success scores reported by each member of the network, we calculate an overall (whole network) success score. In order to assess the degree to which the network members agree on their perceptions of the level of success, we took the standard deviation for success scores in each network. The larger the standard deviation score, the higher the level of disagreement among the network respondents' perceptions of success.

ANALYSIS

Descriptive statistics exploring collaborative characteristics, independent variables, perceptions of success, and disagreement about success were performed. Research question 1 was addressed by examining variations in perceptions of success among the collaborative networks using bivariate correlations. To answer research question 2, two models, using stepwise regression with all independent variables, were tested for each dependent variable.

Results

The networks in the study ($N = 98$) represent 2,486 member organizations with 1,098 organizations that responded to their respective network PARTNER

surveys (ranging from 8 to 83 members per collaborative). There were 68 collaboratives with 8–20 organizational members, 19 with 21–50 members, and 11 with over 50 members. The response rates for the surveys ranged from 43% to 100% ($M = 67\%$). Among all 98 networks, the mean trust score was 11.66 and the mean value score was 10.87 (both on an index of 3–12). The average network contributed 47% of the total possible resources. Table 2 presents the *average* percentages for all resources contributed by organizations, broken down by resource type.

Respondents were asked to identify the number of select intermediary outcomes achieved by their network, such as new policy development, education campaigns, and reduced health disparities. On average, respondents reported that 67% of the outcomes listed were addressed by their network (range 25% to 94%). Respondents were then asked to pick which of the listed outcomes was the "most important" (they could choose only one). Collaboratives varied on the extent that their members "agreed" that certain outcomes were the most important. About a third of the networks (35.7%) had low agreement; 33.3% had moderate agreement; and 31.0% had high agreement.

Using bivariate correlations to initially test relationships among variables, we found that higher trust ($r = 0.66$, $p < 0.001$), value ($r = 0.25$, $p = 0.01$), total resources ($r = 0.34$, $p = 0.001$), and total outcomes reported ($r = 0.24$, $p = 0.02$) were all significantly related to higher perceived success. Additionally, higher agreement on success among network members was significantly related to higher agreement about what is the most important collaborative network outcome ($r = 0.23$, $p = 0.02$).

Two models using stepwise regression with all independent variables were then tested (see Table 3. The model with perceived success as the dependent) variable revealed that higher trust and greater resource contributions predicted

Table 2. Average Percentage of Total Resources by Resource Type

Resource Type	*Average Percentage*
Community Connections	76%
Information/Feedback	70%
In-Kind Resources	62%
Facilitation/Leadership	54%
Advocacy	52%
Health Expertise	51%
Expertise (not health)	48%
Data Resources	42%
Volunteers	40%
Paid Staff	31%
Decision-Making	19%
Funding	18%
IT/Web Resources	12%

Table 3. Stepwise Regression on Dependent Variables

Final Models	*Trust (β)*	*t*	*Resources (β)*	*t*	*Diversity (β)*	*t*	*Adjusted* R^2	*Final Model F-Statistic*	*Final Model Sig.*
Success	0.285**	2.927	0.264**	2.71			0.18	14.2	$p < 0.001$
Disagreement on Success			0.229*	2.33	0.438**	4.46	0.17	10.49	$p < 0.001$

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

higher levels of perceived success within collaboratives. In a second model, with disagreement about success as the dependent variable, more resources and higher amounts of diversity predicted higher levels of disagreement about success.

DISCUSSION

Developing networks with diverse types of organizations is increasingly common, but the way these networks develop and the process through which they are managed are complex. As networks evolve as a legitimate form of governance, there remains a need to identify patterns among them that can be linked to effectiveness and subsequently inform how they are managed. Among the commonalities that we found across the networks were overall high levels of trust and value among members. There also seems to be consistency among the kinds of resources network members reported contributing, with the most common resources contributed as connections to the community, the exchange of information/feedback, contributions of in-kind resources, facilitation and leadership, advocacy, and health expertise. However, the findings from this analysis tell a more in-depth picture about how the diversity that characterizes interorganizational networks creates both opportunities and challenges.

Our first research question asked to what degree members' agreement on outcomes varies among networks. We found that across the large sample of networks, there was an even division of networks that agree or disagree on the outcomes achieved. One-third of the networks had low agreement, one-third had moderate agreement, and one-third had high agreement. This division is symbolic of the challenges faced by interorganizational networks in establishing consensus on what they should achieve as a group, and later, on what they have achieved. Organizations commonly join networks with the intention to work on a common goal that no one organization could accomplish on its own (Zakocs & Edwards, 2006). While some argue that goal congruence may be as essential as goal diversity for success (Vangen & Huxham, 2011), the lack of agreement on goals can make network management particularly challenging. This kind of variation in networks represents an important focus point for further research

and translation to practice. In turn, these complexities make it difficult to confirm a conceptual model (or theory) of what makes a network successful. However, we were able to confirm parts of the conceptual model presented here though additional analysis.

We addressed this in our second research question, which asked about the characteristics of members of networks that report greater levels of success and greater levels of disagreement about success. Our findings confirm that several factors included in the conceptual model, including level of trust and value among members and amount of resources, relate to perceptions of successful network outcomes. However, we also found that two factors in the conceptual model, an increased number of resource contributions and greater diversity among organizational types, resulted in more disagreement about whether the network has been successful (N.B. this measure looks at how much they agree on the perception of success, regardless of whether they reported success or not). It appears that more breadth (greater diversity and resources contribution) could possibly create new challenges, such as difficulty in reaching consensus. This is not surprising, and given the finding that networks with more diversity identify a greater disagreement over success, we hypothesize that networks with more diversity could experience a more complex set of organizational motivations and missions leading to complex dynamics related to consensus about goals, a critical dynamic in network success (Casey, 2008; Provan et al., 2007; Varda et al., 2012).

There is strong evidence that members of a network typically form ties because of their similarities (their homophilous characteristics) (McPherson, Smith-Lovin, & Cook, 2001). In these types of networks, which are, in turn, less diverse, trust is often reported as high and members report perceptions of highly valued relationships. However, as the level of diversity in a network increases, there is more of a chance that mutual agreement and perceptions will be varied. While bringing together a diverse group of organizations has theoretical benefits (e.g., Granovetter's [1973] strength of weak ties theory), in practice the reality of balancing multiple organizational missions, cultures, and governance structures can be a barrier against coming to consensus on what resources are needed, how they are shared, and what actions should be implemented to be successful, although this may not always be the case (Keast et al., 2004). More diversity may even require more centralized or hierarchical structures to reconcile the challenges of organizational differences and the desire to leverage a diversity of resources. This finding is confirmed in other research that concluded that more decentralized networks report a greater number of outcomes (Retrum et al., 2013). In that research, networks with less breadth appeared to have a higher number of resource contributions and lower agreement about the most important outcome in their work together. This begs the question of whether it is more

effective to develop fewer, more intense relationships than to increase the level of breadth in a network to optimally leverage resources. This is an important finding, leading us to ask further: Is the "cost" of including a more diverse membership compromising important network processes?

Some of this complexity—balancing increased diversity while managing varying missions and expectations—could be managed by appropriately leveraging qualities of network members, such as those with high perceptions of trust and those that have many resources to contribute. In this analysis, we found that, on average, higher perceptions of network success are reported by networks that have members with higher perceived trust toward their partners and also have more resources to contribute.

INFORMING THE CONCEPTUAL MODEL

In a time of diminishing resources, public organizations are seeking methods for leveraging resources and exploring creative program activities. In this research, we explore a variety of factors to determine which of them may be related to perceptions of successful network outcomes. Our findings confirm that several factors, including level of trust and value among members and amount of resources, relate to perceptions of successful network outcomes. This leads us to believe that the conceptual model we worked with in this research has merit, with some components more convincing than others. The model was based on the literature. After completing this analysis, we propose that the empirical evidence suggests slight variations to what is emphasized in the literature. A modified version of the framework is pictured in Figure 2, altered to suggest that the factors of Value, Trust, and Resource Contribution, interacting with varying levels of Diversity within a network, will have the greatest implications for Perceptions of Success and Agreement of Success by the network members.

What makes this model different from the previously developed model is its emphasis on how diversity *may* play a role in the level of agreement of success

Figure 2. Revised Conceptual Model, Based on Empirical Findings (Graph is meant to show process/flow, not causality)

reported by network members. It appears that increased diversity in a network could inhibit consensus on success/outcomes, and therefore the literature emphasizing that more diversity in a network is a positive strategy for building up a network may be premature, or more complex than is currently suggested. This research found that more diversity increases complexities to such an extent that it may be harder for a network to achieve consensus about success/outcomes.

Conclusion

The findings presented above are important for network managers. Leading a network is a daunting task, and there are few guidelines for identifying successful strategies. However, it may be useful for a manager to consider members with high perceptions of success as important influencers to the other network members. If perception of success is a valid proxy for network effectiveness, then it would be logical to conclude that a higher number of members reporting success will lead to greater actual effectiveness. The interesting part of this logic is that in this case, network effectiveness is defined as achieved when the members perceive it to be achieved. This is different from measuring actual outcomes, although, given the difficulty of measuring actual network outcomes, it may be an appropriate (and valid) proxy measure. In this case, increasing levels of trust among members and increasing the number of members who can contribute resources may lead to greater perceptions of success and, hence, to greater effectiveness.

While an unprecedented amount of data was used to examine these questions, several variables were not included that may be useful in future studies exploring this topic. Specifically, the resource variable only looked at the number of resources contributed and not the types or size of the resources. For example, we know only that a given resource was contributed, but not the level contributed (e.g., financial resources could be $5,000 or $50,000). Having this information could help us to understand how resource contributions affect network effectiveness. Another variable that would be helpful in understanding network effectiveness is the particular issue area that each network is working on. More complex issues may affect both the types of members participating in the network and the ways they perceive network success. Future examinations of network effectiveness, and particularly the way that diversity plays a role in it, would benefit by an examination of these two variables.

Overall, these findings could have important implications for interorganizational networks, summarized as: (1) facilitating trust between members and managing how resources are leveraged might be an important priority for interorganizational network management, and (2) organizational diversity in membership may mean challenges when it comes to finding consensus about what outcomes are important and how success is defined.

As working with partners across sectors is a popular method for addressing public health problems, we see a need for more research to determine what makes these networks successful. We recommend that future research apply more complex system science methodologies to explore the relational dynamics at the network, organizational, and dyad levels that may influence collaborative outcomes, and, as well, examine how network structure influences specific outcomes of interorganizational networks. A focus on data collection (and use of large-*N* datasets like PARTNER) for this type of analysis is an important priority for the field. Specifically, continued use of system science methods to arrive at a better understanding of these networks will allow us to move beyond the dominant literature of networks based largely on case studies or single-network analyses, toward findings based on large samples that lend themselves to broader generalizations.

Note

1. For example, our review of 32 empirical studies on whole network studies in public affairs/public health found that the number of whole networks analyzed ranged from one to 12, with the majority analyzing less than two. One study, by Faust and Skvoretz (2002), compared 42 networks, but the composition of the variables included and the methods for collecting data varied considerably.

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