EXPLORING NETWORK GOVERNANCE STRUCTURES:
EFFECTS OF STRUCTURE ON OUTCOMES

By

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Interorganizational networks is a flourishing topic of research within public affairs, and yet, there is still a significant amount that is unknown about the ways in which networks function (Provan & Kenis, 2008; Popp et al., 2014). Therefore, this study explores how one particular aspect of a network, its governance, impacts network effectiveness. Using Provan and Kenis’s (2008) theory on network effectiveness as a framework, the study asks: What type of network governance structures exist in public health collaboratives? What type of network governance structures lead to effective outcomes? How does governance interact with certain critical contingencies to explain effectiveness?

To address these questions, the study contains a secondary analysis of the PARTNER Dataset, as well as additional data collected during the PARTNER Manager Survey. A descriptive analysis was used to determine what type of governance structures existed within public health. Then, OLS was used to test how these structures impact effectiveness. Finally, the study tested how governance interacted with certain critical contingencies of networks (trust, size, goal consensus, and need for network level competencies) to impact effectiveness.

All three governance structures identified by Provan and Kenis (2008) were found to exist within the dataset, with Lead organization as the most common structure, followed by Shared governance, and then NAO governance. The study also found a
statistically significant relationship between governance structures and effectiveness. However, the findings demonstrate little support for Provan and Kenis’s theoretical propositions. While the governance structure variables were statistically significant and critical contingency variables were statistically significant in some instances, there was an overall lack of support for the interaction of critical contingency variables with governance to explain effectiveness. Finally, different measures of effectiveness resulted in inconsistent results for each model. This either indicates that a construct validity error, or that new measures of effectiveness need to be developed to reflected the complex and multi-faceted nature of the variable.

The study’s findings provide evidence that network governance is an important variable in explaining network effectiveness. It can also provide practitioners with insights on the most effective ways to govern networks. However, as this study has a small sample size, any generalizations about networks and their effectiveness should be made with extreme caution. Further, it demonstrates the need for a multi-theoretical model of network effectiveness.

The form and content of this abstract are approved. I recommend its publication.

Approved: Danielle Varda
DEDICATION

I dedicate this work to my husband Ben. I would not have pursued this career if it had not been for your support along the way. Thank you for pushing me to pursue this dream: it was just as a significant commitment on your part, as it was on mine. I love and adore you. I am grateful every day that I have you standing by my side and as a partner in life.

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CHAPTER I

INTRODUCTION

Background

Today, interorganizational networks have been cited as solutions for pressing public problems and their presence in the public sector is pervasive (Isett, Mergel, LeRoux, Mischen, & Rethemeyer, 2011). “Networks have assumed a place of prominence in the literature on public and private governing structures, gradually nudging hierarchies and markets as the foremost means to organize to address complex problems, share scarce resources, and achieve collective goals” (Weber and Khademian, 2008, p.334). This growing body of literature reflects the growth of networks as a means to solve problems that cannot be solved by single organizations and reflects the complexity of work faced by public managers (Isett et al., 2011, Varda, Shoup, Miller, 2012; Popp, Milward, MacKean, Casebeer, & Linstrom, 2014). In addition to the traditional roles of public managers within single organizations, their responsibilities within this new paradigm also include the role of facilitators and coordinators of networks of public, private, and nonprofit organizations (Graddy & Chen, 2009; Morse, 2011).

While the use of networks and their existence within the literature is significant, there is still a considerable amount not known about networks overall functioning. A criticism of network research is that it is atheoretical: the practice moves forward without a well-founded evidence base (Isett, et al., 2011; Popp, et al., 2014). As Popp et al. (2014) argue:
“Practical knowledge in the field has been growing, contributing to a dynamic interplay between what is known (or not known) through network research and network practice and, at times, advancing the knowledge beyond the published research. While there has been recent rapid growth in the networks’ literature in the Public Administration field as academic research tries to catch up, networks as an area of study is still in its early stages” (p. 16).

Similarly, Isett et al. (2011) outline challenges facing public administration network scholarship which include general theoretical issues (such as conceptual ambiguity and unit of analysis problems), methodological issues (such as sampling and generalizability), and the disconnect between formal and informal network research.

Given this, one particular area where little is known is how networks themselves are governed and how variances in governance relate to network outcomes (Milward & Provan, 2000; Page; 2003; Herranz, 2007; Provan, Fish, & Sydow, 2007; Rethemeyer & Hatmaker; 2007). As public managers increasingly turn to networks to address wicked problems, part of their transformed responsibilities includes an expectation that they have the skills to implement network governance. Network governance is the formal mechanisms of control over a network that consists of “coordinating strategies of actors with different goals and preferences with regard to a certain problem or policy measure, within an existing network of interorganizational relations” (Kickert, Klijn, and Koppenjan, 1997, p.10). This definition is very broad and provides little practical guidance for network managers. While systematic research in this area is very new (Provan & Lemaire, 2012), it is safe to assume that network governance is significant to ensure “that participants engage in collective, mutually supportive action, that conflict is
addressed, and that network resources are acquired and utilized efficiently and effectively” (Provan & Kenis, 2008, p. 230).

Despite evidence that network governance is critical for explaining network effectiveness, little is known about the structures of authority within networks themselves. As Popp et al. (2014) argue: “we may have some understanding of why networks can be a better mode of governance, but little of how networks themselves are governed” (p. 37). This oversight is significant because the appropriate governance structure is necessary to ensure that a network is functioning effectively. The governance structure needs to be able to balance power and authority with participation of individual organizations, giving attention to the importance of informal power and relationships among members. Therefore, given the practical importance and theoretical significance of implementing network governance, this research asks:

R₁: What type of network governance structures exist in public health collaboratives?
R₂: What type of network governance structures lead to effective outcomes?

  a. How does governance interact with certain critical contingencies to explain effectiveness?

**Theoretical Framework**

To answer these questions, this dissertation tests a theory of network governance developed by Provan and Kenis (2008) on the various forms of governance that exist and the impact of each form on outcomes. The theory first utilizes the latent literature to inform a typology of network governance structures. It then postulates a relationship between governance structure and effectiveness under various conditions such as trust and network size. Since the article was first published in 2008, it has been cited
significantly to justify attention to governance (Popp et. al., 2014). However, because of
the inherent difficult in collecting data on networks, statistical analysis that link
governance with effectiveness is limited. So, while the extant literature on governance
within networks has grown, there remains a gap in knowledge as to what structures work
best, under various conditions. The typology and propositions are fully detailed in the
Literature Review chapter; however, a brief synopsis follows.

Network Governance Types

The literature on networks informs a typology of network governance structures
which can be categorized along two different dimensions. The first dimension indicates
whether governance is implemented internally or by an external governing authority. If
governance is led by an external governing authority, the network is said to have a
Network Administrative Organization (NAO) governance form. However, if the
governance of the network is managed internally, the second dimension delineates
whether governance is shared among members or brokered by a lead agency. At one
extreme of this dimension, all organizations with a network interact with each other to
govern the network, resulting in a dense and highly centralized form (i.e. Shared
Governance). At the other extreme, a member of the network acts as a broker, referred to
as a “lead organization,” and is responsible for the governance of the network (i.e. Lead
Organization Governance).

Network Governance and Effectiveness

Provan and Kenis also utilize the extant literature to identify factors (known as
contingencies) that explain variation in network effectiveness: trust, size, goal consensus,
and need for network level competencies. The aims of Provan and Kenis’s theory is not
to identify one structure that is most effective (similar to a best practice), but rather to hypothesize what forms are likely to be effective given these structural and relational contingencies. By demonstrating how these contingencies relate to the effectiveness of a given form, Provan and Kenis are developing a theoretical rationale for the adoption of one form over another. In general, they argue that

as trust becomes less densely distributed throughout the network, as the number of participants gets larger, as network goal consensus declines, and as the need for network-level competencies increases, brokered forms of network governance, like lead organization and NAO, are likely to become more effective than shared-governance networks (p. 237).

While Provan and Kenis (2008) provide a theory that relates to network effectiveness, they recognize that the study of effectiveness has been problematic historically in both conceptualization and measurement. Still, they argue that effectiveness is a critical concept that cannot be ignored by researchers or practitioners. Therefore, this study examines different measures of Effectiveness, testing Provan and Kenis’s theory with four different proxies for Effectiveness. These are: perceptions of success from participating organizations, agreement on success from participating organization, a dichotomous measure of success, and finally, the network manager’s perceptions of success. Each of these is discussed in significant detail in Chapter IV. By utilizing different measures of Effectiveness, this study also contributes to the extant literature by evaluating which measures are more useful than others in capturing the complexity of networks.
Research Context

To test Provan and Kenis’s (2008) theory, this dissertation utilizes survey data from the Program to Analyze, Record, and Track Networks to Enhance Relationships (PARTNER) Dataset. PARTNER is an online social network analysis tool designed to measure collaboration among people and organizations. It allows individuals or organizations to collect and analyze data on their network, which demonstrate how members are connected and how resources are leveraged and exchanged. The data also shows levels of trust within the network. These characteristics can then be linked to the process of collaboration and to outcomes (Varda, Chandra, & Lurie, 2008). The use of this tool has resulted in a large dataset (over 400 networks), all collected using the same methodology. Most of the collaboratives who utilize PARTNER exist within the public health sector. Therefore, the research context of this dissertation will be public health.

Public health is the “science and art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts” (Winslow, 1920, p. 1). It is different from medical care because, while medical care is concerned with healing individuals that are already ill, public health is what a society (primarily the government) does to ensure healthy living conditions, including the prevention of diseases in the first place (Institute of Medicine [IOM], 1988).

This context is appropriate for investigating network effectiveness, as interorganizational relationships are a core feature of public health: assuring conditions of population health is beyond the scope and parameters of any single organization or government agency (National Association of County and City Health Officials [NACHO], 2012). Public health is “implemented through the combined actions of
multiple government and private agencies that vary widely in missions, resources, and operations (Mays & Scutchfield, 2010, p.116). Further, utilizing community partnerships is a goal of the National Public Health Performance Standards Program (NPHPSP) in their efforts to improve the practice of public health and the performance of public health networks. These concepts will be expanded upon in Chapter II.

Study Design

While Chapter IV offers a thorough discussion of the study design and methods, a brief synopsis is offered here. The study draws on secondary survey data collected on whole, public health networks. Although the dataset contains both whole network and organizational-level characteristics, the data is analyzed at the network level to reflect the properties of each. This method is unique as the majority of network investigations are conducted at the nodal level (Provan, et al., 2007; Provan & Kenis, 2008; Isett et al., 2011). To supplement the existing PARNTER Dataset, a survey was administered during the Spring of 2015 to a subset of networks in the dataset. Network level variables from the survey were linked to their matching network within the original dataset. Once the data were compiled, the research questions were answered through both descriptive and statistical analysis.

Significance

Despite the considerable amount of attention networks have been paid within the public affairs literature, research in this area lags behind practice: there is a significant amount that is unknown about the functioning of networks, overall (Provan, et al., 2007; Provan and Kenis, 2008; Turrini, Cristofoli, Frosini & Nasi, 2010). Further, other network scholars have noted the lack of a core defining theory or framework of network
studies: rather than a single network theory, various network theories have emerged that
describe various aspects of a collaborative relationship (Provan & Milward, 1995;
Borgatti & Foster, 2003; Provan & Kenis, 2008; Popp et. al., 2011). Recognizing that the
study of network effectiveness has been problematic at both the network and
organizational levels, Popp et al., (2011) argue that evaluating networks and their
effectiveness is a work in progress: “while some promising approaches and evaluation
processes emerge, the conclusion is that much more work needs to be done at a
conceptual, methodological level and certainly at an empirical, evaluative one” (p. 74).
This study addresses that call. By testing Provan and Kenis’s (2008) theory on network
effectiveness, it contributes to the extant literature on networks in the following ways:
demonstrating the type of governance structures that exist, linking governance structures
to outcomes, further analyzing each critical contingency variable as they relates to
Effectiveness, and demonstrating the ability of networks to address complex social
problems. Further, the study scrutinizes the way in which Effectiveness is
operationalized, demonstrating how some measurements of Effectiveness may be more
appropriate than others.

The study also contributes to the practice of governing through networks. For
example, it demonstrates the ability of networks to address the complexity of public
health. There are significant challenges associated with governing through networks:
networks are complex forms that can be difficult to understand, manage, and lead (Varda,
2011). As Varda (2011) argues: “People are used to working and managing within
hierarchies rather than across them, leading to problems and challenges that limit the
potential of networks” (p. 122). Concurrent with the limited theoretical insights on
networks, there also exists a lack of practical knowledge about just how to govern using this new approach. Therefore, in addition to the theoretical significance, this research will also contribute to practice by providing an empirical rationale for the adoption of one governance form over another.

**Plan for Dissertation**

This investigation is presented through six chapters which aim to provide insight into networks, network governance, network effectiveness, and network governance types. *Chapter II* explores the policy context of public health within which this study operates. The chapter starts with a discussion of public health more broadly, including a discussion of the renewed attention that public health has received within the last 30 years. It then discusses networks and their applications to public health, demonstrating that networks are an important concept within the implementation of public health systems that merits further exploration. Finally, the chapter identifies the overall lack of rigorous network studies within the field of public health and discusses how those studies that have been conducted have failed to be linked to practical applications.

*Chapter III* contains a literature review, outlining the scholarly context within which this study operates. It begins with a discussion of public administration and management literature generally, highlighting the evolution of networks within this context. It then covers an in-depth exploration of network literature in the various academic disciplines that utilize network concepts. From there, the chapter moves on to exploring the ideas of network effectiveness. This includes an exploration of the literature that links each critical contingency to effectiveness. The chapter outlines past
evidence of each network governance type, to nest the study’s propositions within the extant literature.

Chapter IV offers a detailed description of all aspects of the research design and methodology used in this study. It beings with a discussion of the PARNTER Dataset, describing how the data were collected. It then discusses the PARTNER Manager’s Survey that was administered to collect data on variables not available in the original dataset and how these two sets of data will be linked. Next, the chapter identifies each variable that was be used in the analysis and provides a detailed description of how each is quantified. The chapter also outlines the analysis methods that were used. Finally, it addresses validity and reliability concerns.

Chapter V details the analysis and study findings. The analysis is split into two parts: one for each research question. The first research question is answered through a descriptive analysis. The second research question is answered through a series of simple regression models. In this section, the results from each regression are presented, along with an interpretation of the regression outputs.

Chapter VI is a discussion of the research findings. The chapter begins with an overview and summary discussion of the findings. It then provides an interpretation of each finding, relating the findings to the research questions and Provan and Kenis’s (2008) theory. The chapter then identifies the study’s contributions to the extant literature and the practice of governing through networks. Finally, it ends by providing directions for future research.
Key Definitions and Terms

Network: The simplest definition of a network is a set of relationships between actors (individuals or organizations) and the nature and meaning of the links between them (Popp et al., 2014). When the nodes are organizations or agencies, the network is an interorganizational network. All networks in this dataset are interorganizational. A more narrow definition, and one that encompasses the networks contained within this research, is “three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal” (Provan & Kenis, 2008, p. 231). Having a common purpose or collective goal is an important distinction, as it narrows the type of network included. There is conceptual ambiguity in this area and the term “network” has been used to describe various types of relationships between organizations. Therefore, defining a network as having common goals, even as broad as public health, ensures that the actions of organizations within each network have some type multilateral coordination. This allows the study to distinguish between “goal-driven” networks and more amorphous types of relationships that exist between organizations. Finally, given the public health context in which this study operates, these networks can further be labeled as public management networks. “A public management network thus includes agencies involved in a public policy making and administrative structure through which public goods and services are planned, designed, produced, and delivered (and any or all of the activities)” (McGuire, 2003, p.5).

Network Governance: Network governance is the formal mechanisms of control over the network itself. Because a network is comprised of actions between autonomous organizations or agencies, governance then, is the “use of institutions and structures of
authority and collaboration to allocate resources and to coordinate and control joint action across the network as a whole” (Provan & Kenis, 2008, p.231). Provan and Kenis (2008) further distinguish network governance from general operational links. They argue that investigations of operation links are most often understood at the dyadic level (between two organizations) which could include information or resource sharing or resources or joint programs. In contrast, network governance needs to be understood at the whole-network level in order for meaningful comparisons to take place, linking effectiveness to characteristics of particular governance forms.

*Network Effectiveness:* Network effectiveness is defined as “the attainment of positive network-level outcomes that could not normally be achieved by individual organizational participants acting independently” (Provan & Kenis, 2008, p.230). Similar to governance, effectiveness is understood at the whole-network level. While individual organizations could be impacted by their participation within the collaborative, these impacts are not considered within the parameters of this research. Consistent with Provan and Kenis, the specific type of outcome is not considered, with outcomes being dependent upon the particular organizations assessing the functioning of their network. In other words, the study does not “consider a certain outcome a priori as the correct one because each presents a potentially valid point of view” (p.230). Given this definition, the study is able to utilize individual assessments of success from network participants. However, it will also utilize three additional proxy measures of effectiveness to validate the findings. Further, by not quantifying effectiveness using strict criteria, the study is able to compare the effectiveness of each network despite potential differences in purpose for each network.
Public Health: As discussed above, public health can be defined as organized community efforts, led by government action, to prevent disease, prolong lives, and to promote physical health (Wilson, 1920). The Institute of Medicine (IOM) further defines public health’s fundamental purpose as “fulfilling society’s interest in assuring conditions in which people can be healthy” (1988, p.140). Given the magnitude and complexity of this task, public health requires a diverse group of public and private stakeholders working in a variety of different ways. Further, the complexity of this task necessitates that interorganizational networks focus on various aspects of public health whether that be prevention, education, or any other activity. So, while public health networks are the focus of this study, public health is defined somewhat broadly so as to be inclusive to the wide range of activities within this context. Therefore, an interorganizational public health network within this study could exist to fulfill a wide range of goals or circumstances including maternal and women’s needs, exercise, diet, smoking cessation, education, decreased air pollution, emergency preparedness and response, cancer control, chronic disease prevention, suicide prevention, or any other task in support of individuals living healthy lives.
CHAPTER II
POLICY CONTEXT

Background

A major goal of the United States’ Department of Health and Human Services (HHS) is to help Americans attain the building blocks of healthy and productive lives (U.S. Department of Health and Human Services [HHS], 2015). Included in this are goals:

- To help more Americans achieve the security of quality, affordable health care for themselves and for their families;
- To keep food and medical products safe;
- To protect against chronic and infectious diseases;
- To help Americans find jobs;
- To help parents access affordable child care;
- To explore the frontiers of cutting-edge biomedical research; and
- To fulfill our obligations to tribal communities for health care and human services (HHS, 2015, para. 2).

Given the wide parameter of goals, it is easy to see the complexity of the public health sector and to understand the necessity of implementing health practices through a network that consists of “the combined actions of multiple government and private agencies that vary widely in missions, resources, and operations” (Mays & Scutchfield, 2010, p.116). By discussing the public health sector and its complexity, this chapter provides the foundation of the policy context in which this study takes place. In doing so, it not only demonstrates the contribution of network thinking to improving public health
systems management, it also demonstrates the current lack of applied research in this area.

**Defining Public Health**

People expect to live and work in healthy conditions; however, defining the parameters of what this encompasses is complex. For example, proper disposal of sewage and increased public knowledge concerning health behaviors have both contributed to a healthier society in different ways. So, while the overall health of the citizenship is public health, public health also refers to “the measures that people take as a society to bring about and maintain that improvement” in lives such as collective efforts for access to clean drinking water, food safety and nutrition, and cleaner air (Schneider, 2010, p.4).

Public health is easily misunderstood because of its complexity. In a 1999 study by the Pew Charitable Trust and the Center for Disease Control (CDC), the researchers found that over half of their survey respondents misunderstood the term. Similarly, Harris (1996) found that less than 4% of his respondents could define public health in a conventional and holistic sense, but instead limited the activities to things like immunizations, medical research, welfare programs, universal health care, health insurance, and Medicaid and Medicare. Winslow, an early leader in public health, captures some of this complexity by defining public health as:

The science and art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing services
for the early diagnosis and preventative treatment of disease, and the development of social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health (1920, p. 1).

In other words, public health is a concerted focus on the environmental and epidemiological conditions that affect health.

To further clarify what public health is, it is helpful to compare the term to medical care (Schneider, 2010). While medical care is concerned with healing individuals who are ill, public health is also concerned with preventing illness and promoting successful population health outcomes. In other words, health is “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (World Health Organization [WHO], 1948). Furthermore, although many sectors of society may be involved in promoting health, governments take primary responsibility for public health. For example, they provide clean water, set legislation regarding food and safety standards, actively pursue safe working conditions for their citizens, and sponsor research and education (Schneider, 2010).

**History of Public Health**

Elements of Winslow’s (1920) definition of public health are found in the earliest evidence of communal living. For example, the effects of disease are found on the earliest remains of humans in their fossils and other artifacts. Further, primitive societies attempted to control the spread of disease, creating the position of “shamans” who were trained in this area. Thus, even primitive societies provided an organized approach to disease management and protecting the health of their communities (Breslow, 2002).
Despite the evidence that even primitive societies organized to promote health, the establishment of cities and the exigencies of urban living necessitated major developments and government attention in this sphere. Primary examples of early developments include municipal water supplies and sewerage systems. The presence of the plague in Europe further compelled a communal attention to health and propelled a science-based approach. Early scholars were not only able to demonstrate a relationship between sanitation, personal hygiene, poverty, and health outcomes, but were also able to link improvements in health with significant economic development impacts. For example, the control of yellow fever and malaria in Cuba and Panama permitted the erection of the Panama Canal which had earlier been abandoned because of the impact of these diseases on the progress of its construction (Breslow, 2002).

While a focus on communal health is evident in the United States from its colonial origins forward, the public health service wasn’t commissioned by legislation until 1878. Several name changes and expanded responsibilities later, the Public Health Service was established in 1912 to control the spread of contagious diseases, conduct biomedical research, regulate the good and drug supply, provide health to underserved groups, and other activities. The Great Depression furthered the government’s foray into health, connecting the problems associated with poverty to lower health outcomes (Gostin, 2008). It was during this time that Winslow became a seminal figure in public health and published the definition that is still used to this day (Yale, 2015).

Since Winslow’s time, public health has had many successes including reducing infectious diseases and lengthening the American lifespan. However, a focus on public health became lost as most took for granted the safety net in society. Warning signs such
as exorbitant spending demonstrated that the system was not functioning properly. For example, America spends more on medicine than any industrialized country in the world, and yet ranks fairly low on most health outcomes measures such as life expectancy and infant mortality (IOM, 2012). This, coupled with the emergence of new public health problems (such as the Aids epidemic, pollution, and again populations), renewed interest and focus in the concept (Schneider, 2010).

**Modern Public Health**

A 1988 study conducted by the Institute of Medicine (IOM) helped to refocus attention on public health, specifically on the role of public health agencies and their partners as a network. Included in their study was a redefinition of public health around four key dimensions: mission, substance, organizational framework, and core functions. The mission of public health, as defined by the study, was “the fulfillment of society’s interest in assuring the conditions in which people can be healthy,” while the substance of public health was “organized community efforts aimed at the prevention of disease and promotion of health” (IOM, 1988, p. 7). The organizational framework encompasses “both activities taken within the formal structure of government and the associated efforts of private and voluntary organizations and individuals” (IOM, 1988, p.7). Finally, the three core functions set out included assessment, policy development, and assurance. These core functions were later translated by the Core Public Health Functions Steering Committee into a set of activities called *The Ten Essential Public Health Services* (CDC, 1994).

These essential services describe the activities that all communities should undertake to support health and serve as a framework for the National Public Health Performance
Standards Program (NPHPSP). The NPHPSP, a collaborative effort of seven national partners including the Centers for Disease Control and Prevention, the American Public Health Association, and the Association of State and Territorial Health Officials, was developed as an effort to improve the practice of public health and the performance of public health systems. According to the assessment instrument, public health systems should:

1. Monitor health status to identify and solve community health problems.
2. Diagnose and investigate health problems and health hazards in the community.
3. Inform, educate, and empower people about health issues.
4. Mobilize community partnerships and action to identify and solve health problems.
5. Develop policies and plans that support individual and community health efforts.
6. Enforce laws and regulations that protect health and ensure safety.
7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
8. Assure competent public and personal health care workforce.
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
10. Research for new insights and innovative solutions to health problems.

As noted in the 4th Essential Service, these criteria began to outline the importance of collaboration and networks to public health because they institutionalized collaboration as a necessary component of public health.
Since the essential services instrument was developed, the NPHPSP has been expanded to further articulate the definition of each core dimension. Pertinent to this study, Essential Service 4 includes:

- Identifying potential stakeholders who contribute to or benefit from public health and increasing their awareness of the value of public health.
- Building coalitions to draw upon the full range of potential human and material resources to improve community health.
- Convening and facilitating partnerships among groups and associations (including those not typically considered to be health-related) in undertaking defined health improvement projects, including preventive, screening, rehabilitation, and support programs (CDC, 2014).

In addition to the formalization of networks within policy, the formation of public health services and systems research (PHSSR) emerged as “a field of study that examines the organization, financing, and delivery of public health services within a community and the impact of those services on public health” (Scutchfield & Patrick, 2007, p. 173). PHSSR has identified system structure and performance as a priority research area that includes increasing understanding of interorganizational relationships and partnerships.

While collaboration and interorganizational networks have been formally institutionalized as essential to public health and collaboration exists as a practice-based approach to public health, empirical evidence to inform practice has not kept pace (Varda, 2011). This idea will be explored more in the following section.
Networks and Public Health

With the emphasis in public health on a collaborative approach, a growing scholarly interest has risen in understanding these interorganizational networks and measuring various aspects of each. Given the complexity of the public health’s tasks, population health moves beyond the scope and abilities of any one organization or government agency (National Association of County and City Health Officials [NACHO], 2012). Given this, interorganizational relationships become a core feature of the system. While the public health system is anchored by governmental public health agencies, networks of public, private, and nonprofit organizations enable public agencies to carry out their core functions (NACHO, 2010).

A network approach to public health is distinctive from traditional approaches in a variety of ways. For example, a network perspective focuses on the entire network and its effectiveness, rather than focusing on individual organizations and their traits. Further, networks can improve effectiveness and inefficiencies in performance by improving information flow, reducing duplication of effort, achieving economies of scale and scope, and accelerating the adoption of effective practices (Huxham & Vangen, 2005; Provan & Kenis, 2008; Mays & Scutchfield, 2010; Provan & Lemaire, 2012). Also, systems science methodologies such as network analysis allow for greater richness in analysis because it utilizes both quantitative and qualitative data (Kilduff & Tsai, 2003). The network approach is promising for capturing interorganizational relationships: it offers greater opportunity for “identifying, leveraging, and concentrating resources” (Wholey, Gregg, & Moscovice, 2009, p.1842). Finally, if public health networks are related to improved health status, studying individual component parts will
be insufficient for understanding the impacts of these systems (Wholey, Gregg, & Mosovice, 2009).

Despite the promise of network research for public health, applying network concepts to the sector is relatively new (Scutchfield & Patrick, 2007). First conceptualized as public health systems research (PHSR) and now PHSSR, the study has been around for just over 10 years, with the Robert Wood Johnson Foundation (RWJF) establishing a PHSSR program in 2004 (Scutchfield, 2011). However, there is significant potential of PHSSR not only to improve health outcomes, but also to identify ways in which these networks can be more effectively managed. As Scutchfield, Marks, Perez, & Mays (2007) argue:

PHSSR can reveal the organizational structures, financing systems, workforce characteristics, and delivery mechanisms necessary to implement interventions effectively in various practice settings. In doing so, PHSSR might provide insight into the “carrying capacity” of public health systems to implement and maintain evidence-based interventions, in particular as they grapple with how to balance intervention opportunities for specific categorical diseases and risks like cancer, diabetes, and heart disease (p. 170).

Thus, while PHSSR has the potential to improve both health outcomes and the management of health systems, there remains a significant amount that is not known about these systems.

The current state of research on public health reflects this shift in the conceptual orientation of the field: a network framework “that considers connections among different components requiring multidisciplinary collaborative thinking and active
engagement of those who have a stake in the outcome” (Varda, 2011, p. 122). The extant literature focuses on different aspects of collaboration in public health including examining the appropriateness of a network governance model for public health (Mays & Scutchfield, 2010; Claude, 2010), an examination of the network characteristics of public health collaboratives, (Wholey, Gregg, & Moscovive, 2009; Varda & Retrum; 2012), an examination of the relationship between network characteristics and quality of connection (Varda & Retrum; 2012), data-driven management strategies (Varda, 2011), and the benefits of collaboration (Levin & Fleischman, 2002).

Although networks have increased in both theory and practice within public health, there still remains little guidance on how to design and manage a network with the field. While the increased use of network data is apparent, data-drive management decisions are lacking (IOM, 2002; Varda, 2011). As Varda and Retrum argue (2012): “While the benefits of collaboration have become widely accepted, and the practice of collaboration is growing within the public health system, the ability to measure, document, and strategize to affect practice has been weak” (p.171). Recognizing this problem, practitioners and researchers alike have proposed to improve. For example, HHS argues that as an organization they will “push the outer bounds of innovation and discovery…to working smarter and better” (2015, para. 3). So, while network studies are promising within public health, obtaining a better understanding of how to utilize their findings is critical for developing strategies to improve the quality of public health services. Thus, this dissertation will not only have theoretical contributions, but practical contributions through the advice of appropriate governance structures for public health collaboratives.
CHAPTER III

LITERATURE REVIEW

Overview

Many of today’s most pressing social challenges, such as homeland security, disaster response, climate change, and public health cannot be neatly compartmentalized in one public organization or even one sector (Hicklin, O’Tool, Meier, & Robinson, 2009). Public health, a sector that has formalized the implementation of networks (described in Chapter II), for example, is “implemented through the combined actions of multiple government and private agencies that vary widely in missions, resources, and operations” (Mays & Scutchfield, 2010, p.116). Public health systems are thus complex systems that operate through the actions of heterogeneous agencies, necessitating strong coordination mechanisms. Networks have become an answer to addressing the complex nature of these systems, specifically as a means to leverage the knowledge, resources, and collective efforts from a group of organizations rather than any single organization alone.

This chapter reviews the relevant extant literature on interorganizational networks in order to place this study within the broader context of public affairs and administration. It begins with a background discussion of research on public organizations, giving specific attention to the new models of public sector service delivery that emerged from the 1990s and the governance and New Public Management (NPM) movements. It then outlines the study of networks more specifically, starting with a historical overview of their study and their subsequent integration with public administration scholarship. The chapter then highlights how network effectiveness has been investigated in the past, noting how past studies have not resulted in vetted theory of
network effectiveness. Further, this chapter highlights variables that have been shown to relate to network effectiveness. Finally, the chapter nests the study positions within the extant literature to demonstrate their contributions to current understanding of networks and their overall functioning.

**Public Management and Governance**

The study of public administration emerged during the early 20th century with a focus on the ability of managers to create and work within systems that most efficiently and effectively implemented the public will. Specifically, public administration started as a reform movement in response to the problems of delegation, control, and accountability that developed out of the rise of the administrative state. The emergence of a permanent government necessitated reform: a need to ensure that the “unelected administrative core would reflect the popular will or the public interest” (Bertelli & Lynn, 2006, p. 5). Responding to this need, Wilson (1887) called for a study of administration that not only treated public administration synonymous with private administration, but also established efficiency as the key measure of success in policy implementation. Since that time, scholars have continually attempted to inform practice by documenting the most efficient and effective practices and structures of public organizations.

The move from public administration to public management reflects this focus on creating effective service delivery systems. Public management, a move from the traditional administrative model, seeks to improve public organizations by making them more flexible and market-based (Hughes, 2011). Within this context, two particular areas of research have emerged to describe new methods for public sector service delivery: NPM and governance.
The NPM was a reform-oriented movement that reinvented government through a focus on results, marketization, and customer-driven results, rather than just efficiency singularly (Denhardt, 2000). Gow and Dufour (2000) seek to distinguish NMP from public administration (its rival) and public policy (its complementary). They articulate NPM as a new way of understanding management different from the classic or Wilsonian view of management in that it explains public management in the time of devolution.

Similar to the NPM movement, governance studies articulated new forms of service delivery and new roles for public managers. Governance studies focused on the funding and oversight roles of government agencies especially as privatization and contracting increased (O’Leary, Gazley, McGuire, & Bingham, 2009). Governance was a departure from the more tradition models of public administration and government in that it focused on “steering” the implementation of public services, instead of “rowing” (i.e. through mechanisms of contracts, privatization, and partnerships) (Osborne and Gaebler, 1992). The governance approach to public service emphasized social inclusion and partnerships across sectoral and disciplinary boundaries, blurring the distinction between state and civil society (Rhodes, 1997; Ferlie & Geragthy, 2005). Further, in a governance model, networks and partnerships became “steering” mechanisms for the administration of government programs.

The governance movement and its focus on partnerships and networks led to the creation of a new term, collaborative governance, which more fully describes both scholarly and practical trends. As Ansell and Gash (2007) argue: “a new form of governance has emerged to replace adversarial and managerial modes of policy-making and implementation. Collaborative governance…brings public and private stakeholders
together in collective forums with public agencies to engage in consensus-oriented decision making” (p. 543). Collaborative governance is not just a research tradition, but rather, a term that describes the practice of implementing public policy and delivering public services. The government is often no longer solely involved in creating public value (Salamon, 1986; Moore, 1995; Kettl, 1996, 2002). For example, Salamon (2002) finds that almost 19 of every 20 dollars of federal spending are funneled through third parties.

Given both the theoretical interest in governance, along with the move away from bureaucratic service provision in practice, a large body of research has accumulated. Pressman and Wildavsky (1973), for example, articulate the attempt to address the problems of unemployment of minorities in Oakland in terms of shared, collaborative management. Other studies have focused on antecedents to collaboration (Arganoff & McGuire, 1998; Foster & Meinhard, 2002; Gazley & Brudney, 2008), decisions to participate (Fleishman, 2009), and the effects of collaboration on policy implementation (O’Toole, 1985; Hull & Hjern, 1987; Andrews & Entwistle, 2010). Finally, others have investigated the effects of contracting and privatization on the state. Several scholars have published on the concept of the “hollow state” (e.g. Frederickson & London, 2000), a term coined by Provan and Milward, which describes not only the trend of third party governance, but also that governments become more hollow as the degree of separation between itself and the services it funds grows (1993, 2000).

The NPM and governance movements provided the impetus for studying networks within public administration and management (Isett et al., 2011). NPM and governance rested on market based principles, and yet “the problem of small numbers
bargaining and transaction-specific capital attenuated the expected efficiency benefits of marketization” (Isett, et al., 2011, p. i159). Further, markets were poorly suited to address the complex problems often faced by government, which required the cooperation of experts from disparate fields to solve. At the same time, citizens were demanding less government and more governance (Osborne and Gabealer, 1992).

Because new models of service delivery were advocated for, new tools for delivering services were necessary. Integrating network concepts into public administration was “a response to the insufficiencies of NPM in the face of complexity, mission expansion, government de-legitimization, and knowledge creation needs that are posed by wicked problems” (Isett et al, 2011, p. i159). Scholars and practitioners alike realized the potential of interorganizational networks to create collective solutions to complex problems. Networks allowed governments to manage public problems by leveraging expertise of various organizations. For those looking to improve responses to complex problems, networks were seen as particularly effective because of their ability to leverage resources, mitigate risks, and other advantages discussed in the next section.

**Networks**

The study of networks within public administration and affairs has a relatively short history. While a handful of prescient studies, such as Salamon’s (1981) article that identified new models of service delivery in the sector, existed most scholars date the primary program of network studies within public administration to the late 1990s (Isett et al., 2011). However, networks as a unique phenomenon have a more lengthy history outside of public administration: an extensive body of literature on networks exists that spans the boundaries of many academic disciplines including economics, anthropology,
and sociology. This fragmentation has resulted in fundamental theoretical issues concerning the definition of networks. As Isett et al. (2011) lament: “we have an amorphous set of studies that do not necessarily belong to a distinct intellectual tradition or even a clear understanding of what studies hang together as subsets of a broader tradition” (p. i160).

The study of networks can arguably be attributed to sociologists such as Durkheim, Simmel, and Tonnies in the late 1890s with their focus on social groups and relationship ties. For example, Georg Simmel’s many writings including *The Philosophy of Money* (1900), *The Metropolis and Mental Life Conflict* (1903) *The Stranger* (1908), and *the Web of Group Affiliations* (1922), identifies the nature of social networks, how network size impacts outcomes, and social interactions in groups. Similarly, Durkheim (1893) argued that social location shapes identity and behavior. According to Durkheim, societies cannot become complex without a division of labor. In this instance, individuals are bound to society because they are dependent upon their social role within it. Finally, Tonnies (1887) foreshadowed networks with his work on social groups: Gemeinschaft (community) and Gesellschaft (society).

This work laid the foundation for other fields and their investigations of social interactions, networks, and impacts on individuals and society. The work of Parsons (e.g. 1937, 1951, 1961) was influential in that it articulated the importance of social systems in society. According to Parsons (1951) individuals interact with one another in terms of mutually acceptable behavior and this interaction exists within a social system. The system allows societies to remain stable and functioning. Similarly, Blau (1964, 1977) and Homan’s (1958, 1961, 1964) work on social exchange viewed interactions between
individuals as “actions contingent on actions contingent on rewarding reactions from others” (Blau, 1977, p. 91). While Blau agreed with Parson’s (1951) assertion that social systems were generally stable, he believed that social mobility and conflict could lead to structural change. Other prominent sociological studies of networks include Milgram’s (1967) small world experiments that showed the degree of connectedness of individuals within society, Wellman’s (1988) theoretical and methodological contributions on ego-centric networks, and Granovetter’s (1978, 1983, 1985, 2005) contributions to the concepts of embeddedness and weak ties. Finally, more recent sociological studies of networks, particularly that on social capital (e.g. Putnam, 2000; Mouw, 2006; Lin and Erickson, 2008), showed how connections between individuals and organizations can be a valuable resource. Granovetter (1973), for example, argued that “weak ties” to individuals outside an individual’s immediate social circle can enable that individual to rise in the social ladder of occupations.

Many of the authors discussed above, particularly Granovetter’s (1985) work on embeddedness, launched the “new economic sociology” movement within the field. The new economic sociology argues that while economics and sociology have been separated as unique disciplinary traditions, it is important to understand the economy in its social context: economic relationships between organizations (or individuals) are embedded in networks and bound by institutions that constrain or enable behavior. In particular, networks are prominent determinants of economic outcomes because they are the carriers of new economic practices and ideas of what it means to be rational and efficient (Dobbin, 2004). These studies are applicable to the study of networks within public administration in a variety of ways. First, it allows governments a rational to understand
their interventions in the economy and as a provider of services as embedded within a larger social structure. This then allows them alternatives means for intervening into large, intractable problems of society rather than direct service delivery or through the market alone: networks (and collaborative relationships) become an option. Finally, the concept of social capital provides justification for government’s use of networks to approach complex problems because of the value added to society given these relationships.

While a bulk of network studies has been done in sociology, several other academic disciplines have investigated networks including anthropology, psychology, and mathematics. For example, sociometry, a quantitative method for measuring social relationships, was developed in psychology by Moreno (1951, 1953) in his investigation of individual interactions in small groups such as classrooms and work groups. In anthropology, theoretical and ethnographic work (Brawnislaw, 1913; Radcliffe-Brown, 1930, 1940; Levi-Strauss, 1947; Barnes, 1954) documented how networks impacts individual positions in society. One example is Levi-Strauss’s (1947) investigation of family and kinship ties, which found that kinship ties plan an important role in determining how individuals regulate their own behavior and formed social groups.

**Social Network Analysis**

In addition to the theoretical advancements that network studies have made, network methodologies have also seen significant advancements. For example, social network analysis (SNA) has provided researchers a sophisticated and vetted method for analyzing networks. Like network theories, SNA also have roots in the work of early sociologists, who studied relationships among social entities, and the patterns and
implications of these relationships (Wasserman & Faust, 1994). Also like networks more generally, growth on SNA has been an interdisciplinary endeavor: a propitious meeting of social theory and application, with formal mathematical, statistical, and computing methodology” (Wasserman & Faust, 1994, p.10).

Moreno (1953)’s sociogram, a visual display of group structure, is often cited as the empirical motivation of SNA. Recognition that sociograms could be used to study social structures led to rapid development of analytic techniques (Harary, Norman, & Cartwright, 1965). Development of mathematics allowed the use of matrices as a novel method for studying these networks. For example, Bock and Husain (1950) tested the applicability of depicting sociometric data in a matrix to reveal clusters of choices and unreciprocated choices in their study of groups and subgroups.

While some credit the underpinnings of SNA to Moreno (1951), others argue that Coleman, Katz, and Menzel’s (1957) seminal investigation of the diffusion of innovative practices among physicians was an impetus for advances in SNA. Shortly after this time, a group at Harvard published extensively on SNA. For example, White, Boorman, & Breiger, (1976) and White and Booreman (1976) develop a “blockmodel” framework for understanding ties between entities. Their article became a base understanding for structural equivalence: a concept that describes the extent to which two individuals or organizations are connected to the same others, or have the same social environments. Similarly, (Breiger & Pattison, 1983, 1986) studied social roles from the perspective of individual actions, which further added progress to the algebraic analysis of social networks.
At the same time, many other academic disciplines were contributing to the growth of SNA. For example, anthropologists were turning their attention towards complex societies and found that traditional approaches of describing social organizations in terms of institutions were insufficient for describing human behavior (Wasserman & Faust, 1994). The inadequacy of past approaches led anthropologists to investigate density (Bott, 1957), distance (Thurman, 1980), connectedness, clusterability, and multiplexity (Kapfer, 1969) as a way to describe human behavior. Similarly, in psychology, researchers were using graphic depictions of channels of communications between individuals, arguing that both properties of group structure and properties of individuals within these structures were important for group problem solving and performance (Leavitt 1949, 1951; Smith, 1950). These studies highlighted the structural properties of actor centrality and group centralization. Finally, in mathematics, inroads on graph theory, statistical and probability theory, and modeling become important mechanisms for researchers to measure reciprocity, mutuality, balance, and transitivity (Wasserman & Faust, 1994).

This early work laid the ground work for sophisticated analysis tools that enable network researchers significant capabilities for analyzing networks. For example, the analysis tool UCINET has been developed through the collaborative efforts of many scholars (Freeman, 1985; MacEvoy, 1987; Borgatti; 1992; Borgatti, Everett, & Freeman, 2002). The tool allows for complex analysis of networks and even includes a network visualization tool. The growth of these tools, along with tools like PARTNER, have not only made complex analysis easier, but have also made understanding and evaluating networks and collaboration more accessible for practitioners.
Networks and Public Administration

While early networks scholars studied networks for a variety of reasons, public administration research on networks was necessitated by the changes in the way that government implemented policy. As Isett et al. (2011) argue:

There is little doubt that practitioners have sprinted ahead of academic research with regard to networks. Network forms of organization emerged and spread during the 1970s but seem to have flowered during the 1990s when the Clinton Administration embraced government reinvention in the face of renewed political resistance to expanded government (p.i159).

With some exceptions, network studies in public administration are dated in the late 1990s as a response to a new administrative reality.

One of the areas in which public administration scholars have contributed to network studies is to identify the types of networks that are found within the public sphere. The extant literature in public administration identifies three broad types of networks that exist: policy, collaborative or governance (Isett et al., 2011). Policy networks refer to groups of organizations that work together with common interest in a particular arena of policy because they are interdependent or have a shared fate (Laumann & Knoke, 1987; Isett, et al., 2011). In contrast, collaborative networks are entities that consist of public, private, and nonprofit organizations who work together to provide a good or service that a single agency could not provide on its own (O’Toole, 1997; Arganoff & McGuire, 2001; Isett, et al., 2011, Popp et al., 2014). Finally, a governance network is an entity that combines the goals of collaborative public goods and collective policymaking, as in a business district (Klijn & Koppenjan, 2000;
Sørensen and Torfing, 2005). All of the networks contained within this study could be identified as collaborative networks, as they exist in order to improve health outcomes in their community in different aspects.

Collaborative networks can be further broken down into several subtypes by the scope of activities undertaken among members. These include service implementation, information diffusion, problem solving, and community capacity building ((Popp et al., 2014). In service implementation networks, governments fund services using a contract with multiple organizations, with horizontal management of the key tasks. In contrast, information diffusion networks have horizontal and vertical ties to government agencies, with the primary focus of sharing or spreading information across departmental boundaries. Problem solving networks focus on solving existing complex problems. Finally, community capacity networks exist to build social capital in community settings with both a current and future outlook (Milward and Provan, 2006).

**Advantages to Networks**

Along with identifying types of networks, scholars have attempted to identify the potential advantages to this new way to address complex problems. Huxam and Vangen (2005) provide an overhead term “collaborative advantage” arguing that “almost anything is, in principle, possible through collaboration because you are not limited by your own resources and expertise” (p.3). Similarly, access to and leveraging resources (Alter & Hage, 1993; Bryson, Crosby, & Stone, 2006; Milward & Provan, 2006; Gazley & Brudney, 2007; Provan & Lemaire, 2012), shared accountability (Romzek, LeRous, & Blackmar, 2012; Johnston & Kempf, 2014) and shared risk (Huxham & Vangen, 2005; Casebeer, Popp, & Scott, , 2009; Kapucu & Demiroz, 2011; Hoberecht, Joseph, Spencer,
& Southern, 2011) are also seen as advantages to the network form. Networks are also seen as a more efficient use of resources because of their ability to achieve economies of scale and ability to provide coordinated, higher quality services, while remaining flexible to deal with unforeseen problems (Huxham & Vangen, 2005; Provan & Kenis, 2008; Kenis & Provan, 2009; Hoberecht et al., 2011; Isett et al, 2011; Provan & Lemaire, 2012). Finally, network innovation or “positive deviance” is noted as an advantage because networks can be a forum for thinking beyond traditional organizational norms, structures, and mandates (Brass, Galaskiewicz, Greve, & Tsai, 2004; Klijn, Casebeer et al, 2009, Edelenbos, & Steijn, 2010; Goldsmith, 2014).

In addition to the benefits of using networks to deal with complex societal problems, the extant literature also notes the advantages of networks’ advocacy abilities: as a whole, networks are able to exert more pressure than singular organizations due to greater political clout and community reach resulting from their size and diversity (Provan & Lemarire, 2012). This advantage can be linked closely with policy networks, which grew out of research on interest groups and agenda setting (Dowding, 1995; Klijn, 1997; Marsh & Smith, 2000). Frequent interaction and exchange among organizations with similar goals has led to the establishment of stable relationships and coordination of mutual interests. These networks can then be linked to policy change (Adam & Kriesi, 2007). Therefore, a benefit of networks, in the policy arena, is that they enable organizations to overcome collective actions problems by ensuring that actors are working together toward mutually beneficial goals.
**Limitations to Networks**

Despite the potential advantages, networks are not a cure-all solution for solving complex issues. Scholars note the limitations of networks, arguing that they should not be seen as a panacea, given the inherent difficulties in managing and working in a complex context (Huxham and Vangen, 2005; Bryson et al., 2006, Huerta & VanderPlaat; 2006; McGuire, 2006; McGuire & Arganoff, 2011; Popp et al, 2011). For example, collaborative inertia refers to the tendency of collaboration to move more slowly and painfully than expected (Huxham & Vangen, 2004). Similarly, Huerta & VanderPlaat (2006) discuss the challenge of coordination fatigue and costs: working collaboratively takes time and resources away from member organizations day-to-day work. Bryson et al, (2006) discuss the inherent difficult in achieving consensus and cultural clashes (competing institutional logics) that can impede decision making. Other disadvantages include burdensome reporting requirements and difficulty in measuring outcomes (Fleishman, 2009).

**Implementation of Interorganizational Networks**

Given the advantages and limitations of networks, it is clear that networks need to be implemented in the most effective ways. However, there is a lack of evidence-based practices in network implementation. For example, Salancik (1995) laments the lack of application from findings. In other words, while the study of networks in public administration has increased significantly, much of that work is descriptive, making translation to practice difficult. One reason for this may be the way in which networks have been analyzed in extant literature. Much analysis has been done at the ego or nodal level of the network, limiting generalizability. Provan and Kenis (2008) also argue that
practical advice to network practitioners is limited due to the small degree of work done on whole networks and network governance. They argue that the literature on networks is dominated by two approaches: the “network analytical approach” and the “network as a form of governance” approach. While each approach has merits and contributes to our knowledge of how networks operate, there needs to be a connection between the areas to have a more complete picture of networks.

The network analytical approach often focuses on entire networks or parts of networks to describe, explain, or compare relational configurations and uses these to explain outcomes (Provan & Kenis, 2008). For example, under this approach Provan and Milward (1995) utilize the centrality of key organizations, along with network density to measure network integration. They argue that integration and related issues of coordination can be understood through the basic building block of any network: the linkages between organizations. Further, they link these measures of integration (centrality and density) to network outcomes, finding that the more centralized a network is, the more likely it is to be effective. Other studies that have utilized this approach include Uzzi’s (1997) research on embeddedness of organizations in interfirm networks, Burt’s (1992) research on structural holes, and Meagher and Rogers (2004) research on how network density affects innovation. In this approach, researchers are describing network structures by looking at nodes and describing the links (or lack thereof) between them. While this approach highlights how connections among network actors can affect outcomes, it does little to describe the effect that various governance forms (the qualitative way in which people in networks make decision about the network processes) have on network effectiveness in a more holistic sense (combining both the structure
charactersitics and governance as a way to understand effectiveness) (Provan & Kenis, 2008).

The second approach for research on interorganizational networks distinguishes networks as a form of governance distinct from hierarchies or the market. Governance and its various forms have an extensive history, evolving from Williamson’s (1975) dichotomy between markets and hierarchies. He states that decisions to form organizations are based on transaction costs: if it were less expensive to perform a task internally, rational actors would leave the market. He further theorized that all other forms of organization would fall between market and hierarchy.

While Williamson’s theory of transaction costs moved the concepts of organizations forward, he also contributed to governance studies by demonstrating that the market was not the only efficient system of nonhierarchical coordination. Powell (1990) refuted Williamson’s claim that all forms of organizations fall between market and hierarchy, arguing that networks were a third option of organizational form. According to Powell, networks allowed organizations to come together and engage in collective action while remaining formally separate. Powell and Williamson’s work, along with what was happening in practice, helped to legitimize the concept of networks as an independent concept worthy of further study. However, while networks were understood by researchers to be distinct from hierarchy and the market, the governance approach has traditionally treated networks as an undifferentiated form. In other words, these studies do not consider the structural variations of networks (Provan & Kenis, 2008). While researchers identified networks as distinct from other forms, they did not recognize that networks themselves may have various forms or structures (nor have many
considered that other forms of governance, such as markets or hierarchies, may themselves be networks). So, while this approach views networks as a response to the failures of market and hierarchies, it fails to adequately address that networks themselves can have differences (such as in structure, governance, structure, or other network characteristics) and that these differences can impact outcomes.

**Provan and Kenis (2008): Theory of Network Governance**

Provan and Kenis advance a theory of network effectiveness that moves beyond both the “network-analytic” and “network as a form of governance” approach. Provan and Kenis (2008) argue (p.233):

The governance perspective is valuable in that the network itself is considered to be the unit of analysis. Networks are forms of social organization, which are more than the sum of actors and their links and which deserve to be studied in their own right (O’Toole, 1997). The network analytical perspective contributes another central idea to our work – that networks are a set of actors or nodes, with relationships between these nodes as being either present or absent. Thus, networks are considered to vary with regard to their structural patterns of relations.

By combining approaches, governance structure becomes a variable, enabling examination of different network governance configurations. In this approach, network effectiveness becomes equated with the appropriate governance structure under consideration of the critical contingencies.

This dissertation will test Provan and Kenis’s (2008) theory of network effectiveness, which equates effectiveness with the appropriate governance structure.
Provan and Kenis identify areas that are lacking in consensus by arguing that while network studies have proliferated, there still remains considerable discrepancy and knowledge about the most appropriate ways to govern networks. They argue “there has been no theory on various forms of governance that exist, the rationale for adopting one form versus another, and the impact of each form on network outcomes” (p. 231); this claim remains true today. Thus, rather than articulating the differences of structural variations, they argue that effectiveness is attributed to appropriate governance forms under a given set of conditions, which they label as contingency factors. These contingency factors (trust, goal consensus, network size, and need for network–level competences) are derived from the extant literature and are predicted to be key indicators of the likelihood of success. Further, Provan and Kenis identify four propositions about the relationship of these that summarize the basic relationships across all contingency factors. The basis of their theory is that the role of management is critical for effective network governance, especially regarding the handling of tensions inherent in each governance form: “Essentially, our focus is not on networks as a means of governance, but on the governance and management of networks themselves” (p.235).

**Governance in Networks**

The first part of Provan and Kenis’s (2008) theory is to articulate a typology of network governance types. In networks, “wicked” problems of society are resolved “in a setting of mutual dependencies” (Koppenjan & Klijn, 2004). Rather than top-down centralized processes, network governance focuses on processes that are more inclusive, horizontal, and dynamic (Arganoff, 2007). While a large amount of research is devoted to networks in public sector settings, a lack of understanding regarding the governing of
networks exists. More specifically, while different governance forms are identified within the literature as a way to manage networks, there remains no theoretical rationale for adopting one form of the other. While justifications for chosen form could be mimicry, past experience, or personal preference, these justifications could result in limited success. Rather, decision makers should be making structural choices based on evidence regarding what form seems most likely to be effective under a particular set of conditions (Provan & Kenis, 2008).

Governance of networks has received much less attention than either the study of networks or governance themselves. For example, collaborative governance studies focus on the changing role of managers within the increasingly networked and collaborative context, rather than focusing on the formal mechanisms of control within networks. Vangen, Hayes, and Comforth (2014) help to further distinguish between collaborative governance and governing collaboration. They argue that while collaborative governance is concerned with governance through the formation of networks, the latter is concerned with the governance of these entities themselves. Governing collaboration, then, entails “leadership and management of interorganizational relationships” with the goal of “achievement of collaborative advantage/joint collaboration level goals” (p. 3). As previously noted, governing collaboration has not received significant attention with the literature (Milward & Provan, 2000; Page; 2003; Herranz, Jr., 2007; Provan, Fish, & Sydow, 2007; Rethemeyer & Hatmaker; 2007). This oversight in the literature is significant in that, some form of governance is necessary “to ensure that participants engage in collective and mutually
supportive action, that conflict is addressed, and that network resources are acquired and utilized efficiently and effectively” (Provan and Kenis, 2008, p.231).

This lack of attention to network governance could possibly stem from the lack of attention whole networks themselves have been given. Provan and Kenis (2008) distinguish the study of whole networks from other network studies by arguing that in studies of whole networks, the networks themselves are treated as the unit of analysis. In contrast, other studies explain the nodes and relations that comprise the network. While the amount of attention whole networks have been given is increasing, much of this work has been descriptive (van Bueren, Klijn, & Koppenjan, 2003; Arganoff & McGuire, 2003; Goldsmith & Eggers, 2004; and Huxham & Vangen, 2005). A validated theory of network governance requires the collection and analysis of data on multiple networks, which until recently would be difficult, costly, and time-consuming to obtain. However, the development of new technologies such as PARTNER and UCINET have made the gathering and analysis of network level data a reality (Borgatti, Everett, & Freemen, 2002; Varda, Usanov, Chandra, & Stern, 2008). For example, public health collaboratives’ use of PARTNER has resulted in a detailed dataset of over 400 whole networks. While practitioners are utilizing the tool to inform collaborative practice, its use has also given researchers unprecedented amounts of data at the whole network, dyadic, and organizational levels.

**A Typology of Network Governance**

The literature on whole networks informs a typology of networks governance forms along two dimensions. The first dimension identifies whether governance of the organization is shared among participants equally (shared governance) or highly brokered
through a single lead organization (brokered governance). This is often conceptualized by the way in which organizational interactions can be frequent and highly decentralized (Shared Governance) or at the other extreme, few direct organization-to-organization interaction (brokered governance). An organization in the middle of the spectrum may have organizations dividing some governance responsibilities while leaving other decisions to a lead organization (Provan and Kenis, 2008).

The second dimension of the network governance typology identifies differences between participant or externally governed networks. Participant governed networks can have either shared governance or may have one lead organization. Externally governed networks are governed by a network administrative organization (NAO). NAO forms of governance can either be voluntarily established or it may be mandated in a formal network formation process. Each governance form will have distinguishing structural characteristics, which will impact the effectiveness. Rather than argue what form is supreme, Provan and Kenis (2008) argue that each form has particular strengths and weaknesses that will impact outcomes, based on various contextual factors. Taken together, these two dimensions results in three different network governance structures that can be seen in Table 1.

**Table 1: Forms of Network Governance**

<table>
<thead>
<tr>
<th><strong>Dimension 2</strong></th>
<th><strong>Dimension 1</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brokered</strong></td>
<td><strong>Shared</strong></td>
</tr>
<tr>
<td><strong>Internally Governed</strong></td>
<td>Lead Organization-Governed Networks</td>
</tr>
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</table>


In the following section, these three forms of governance structure are discussed individually beginning with Shared Governance, followed by Lead Organization, and finally NAO.

**Shared Governance**

The simplest and most common form of governance structure of networks is Shared. In Shared Governance structures, network members collaborate to govern the network with no separate and unique governance entity. Furthermore, governance can occur formally or informally. Formally, governance could be maintained through regular meetings of designated organizational representatives. On the other hand, informal governance would involve ongoing, uncoordinated efforts by network participants who have a stake in organizational success. Participant governed networks can have different structural characteristics depending on network leadership.

Shared Governance networks are unique because they depend exclusively on the involvement and commitment of a significant portion of network members for managing both internal and external operations and relationships. Power in participant governed networks is relatively symmetrical among organizations, despite differences in their size and resource capabilities. Furthermore, although there lacks a formal administrative entity, some administrative and coordination activities may be performed by a subset of the whole network. Theoretically, the network “acts collectively and no single entity represents the network as a whole” (Provan and Kenis, 2008, p. 235).

Shared governance structures appear across sector. For example, a Shared Governance structure is common in fields like health and human services because in
these fields, networks are seen as legitimate means for building “community capacity” (Chaskin, 2001). Furthermore, Varda (2011) argues that “where collective action is in place for the development of public goods like public health, highly centralized networks can be ineffective to the progress of a collaborative” (p.8). When all members have relatively equal power within the network, ensures members will be committed to network level goals. Shared Governance has also been found in the private sector in multi-firm alliances designed to develop new products and to attract new business that could not be accomplished through the efforts of each firm independently (Venkatraman and Lees, 2004). Finally, Crane and Ecces (1987) found this form consistent with multilateral relationships among investment banking firms and venture capitalists.

**Lead Organization**

A second form of governance proposed in the network governance framework is Lead Organization Governance. This structure can be theoretically rational in situations that may not be conducive to decentralized decision-making. Lead Organization Governance can mitigate some of the inefficiencies suffered by a Shared Governance model. In this form, a lead organization provides administration and coordination in their efforts to achieve network level goals which often are similar to the goals of the lead organization itself. Furthermore, the lead organization may be responsible for contributing resources (such as financing) to support the cost of network administration or it may receive resource contributions from network members. Alternatively, the lead organization may be responsible for seeking and controlling access to external resources and funding such as grants and other contributions. The role of the lead organization can
formally mandated or emerge from the members of the network themselves (Provan and Kenis, 2008).

Like Shared Governance forms, the Lead Organization form has been found across sectors. Gerlack (1992) provides an obvious example in his examination of Japanese manufacturing. Similar models are also found in cooperative buyer-supplier models (Inzerilli, 1990; Lazerson, 1995; Uzzi, 1999). This model has also been found in the public sector. For example, Provan and Milward’s (1995) findings discussed in the introduction found a high degree of centrality within a community health network and that the lead organization (in this case, the city’s core mental health agency) was easily the most powerful player within the system. Other examples of this form can be found in Weiner and Alexander’s (1998) work on community health, Teisman and Klijn’s (2002) exploration of government sponsored economic development, and Graddy and Chen’s (2006) exploration of lead organizations in child welfare networks.

**Network Administrative Organization**

In contrast to participant governance structures, networks governed externally are done so by an NAO. Similar to Lead Organization Governance, this form results in a highly centralized network structure with the network broker playing a key role in coordinating and sustaining the network. The main difference between these two models is that the NAO is not a network member, with the position either formally mandated or articulated by the members themselves for the sole purpose of network governance. The NAO can operate in a variety of ways. For example, an NAO can be a small, single organization led by a single individual (network facilitator). Alternatively, one can be run by an executive director, staff, and board of directors. Finally, many formalized
NAOs have board structures that include network members (Evan & Olk, 1990; McEvily & Zaheer, 2004; Provan, Isett, & Milward, 2004). NAOs are typically public or nonprofit firms but can be a for-profit entity such as a global accounting network administrative organization studied by Koza and Lewin (1999).

The NAO governance model exists across all sectors, just as the other two forms of network governance do. For example, Human and Provan (2000) discuss two networks in the wood processing industry run by NAO firms. While the organizations within the networks are for-profit, the NAO itself is established as a 501 (c)3 nonprofit. NAOs have also been found to exist within the public and nonprofit sector (Isett & Provan, 2005). Finally, Hoflund (2013) examines an NAO in the health care industry in order to determine how it can build a social base.

The research on NAO is similar to the discussion of backbone organizations within research on collective impact initiatives (CI). Collective impact initiatives are similar to other types of collaborative arrangements in that they consist of organizations from different sectors working towards a specific agenda for a specifically social problem (Kania & Kramer, 2011). Kania and Kramer (2011) argue that in order for CI arrangements to be effective, a dedicated staff that is separate from participating organizations is necessary. The power of these initiatives is not from the number of participants or the uniformity of their efforts, but rather, from the coordination of their differentiated activities. According to scholars in this area, this necessitates an outside, decision-making authority.
Network Effectiveness

The second part of Provan and Kenis’s (2008) theory is to articulate how governance types relate to effectiveness. To do this, they investigate the extant literature on network effectiveness to identify key variables (contingencies) that impact outcomes. This section first discusses the difficulty in measuring effectiveness in the public sector generally, and then outlines past studies on network effectiveness. In doing so, it highlights variables that have been previously found to significantly impact outcomes in networks.

Given the problems in assessing the effectiveness of singular public programs on their own, the growing significance of interorganizational networks raised new challenges for public administrators. Much of the early research on network effectiveness suggests that it depends on the ways in which networks are structured (Provan & Milward, 1995; O’Toole, 1997; Arganoff & McGuire, 1998). Provan and Milward (1995) argue “differences in network effectiveness could be explained by aspects of network structure and context, namely, centralized integration, external control, stability, and resource munificence” (Provan and Milward, 1995, p.27). Network structure describes the entire pattern of linkages between organizations within a given boundary, and is sometimes used as a proxy to determine network effectiveness at a macro level (Wasserman & Faust, 1994). In addition to assessing patterns of relationships, “network structures can be formal or informal, and typically intersectoral, intergovernmental, and based functionally in a specific policy or policy area” (McGuire, 2003, p.5).
Researchers sought to understand how structural characteristics of a network, such as density or centrality, enabled networks to attain positive outcomes. For example, Provan and Milward (1995) found that networks which were coordinated centrally through a core agency were likely to be more effective than dense, cohesive network integrated in a decentralized way (in a service delivery setting). In contrast, other studies identify decentralized network structures as ideal because they result in even power distribution between members (Varda, 2011). Equal power distribution is associated with increased trust, buy-in, and a likeliness that members will engage in working towards network goals (Varda & deLeon, 2009). A more decentralized network is often characterized by, shared power and responsibility, along with an equal distribution/contribution of resources. Given a wide range of network contexts and conditions, there is a lack of consensus as to what structures are most effective in varying situations.

In addition to centralization, other scholars have attempted to identify other structural aspects of networks and their impact on network effectiveness. Arganoff and McGuire (1998) found that density was positively related to the achievement of objectives in local economic departments. Furthermore, Carlsson and Sandstrom (2008) found high network density is positively related to policy implementation. Other scholars have attempted to combine centrality and density for a more complete view of network’s structure. For instance, Dhanaraj and Parhke (2006), argue that a low density and highly centralized network is effective for innovation networks. Similarly, Provan and Milward (1995) argue that highly dense and centralized public service delivery networks work well under conditions of institutional norms that promote cooperation and collaboration.
Finally, Mays and Scutchfield (2010) use density, breadth, and centralization to explore effective prevention programs and their overall impacts on public health.

**Network Processes and Their Relationship with Effectiveness**

While much of the literature on the evaluation of networks focuses on network structures, there are other aspects of a network that have been linked to effectiveness include network process and relational variables (Popp et al., 2014). Gilchrest (2006) discusses the differences between these types of studies: structural studies are interesting in the outcomes of a network, but a relational investigation is interested in ‘how’ results are achieved. This includes generating knowledge about the type and quality of the relationships within networks, as well as the path of evolution and particular life stage of the network being evaluated (Popp et al., 2014).

Popp et al. (2014) discuss how traditional structural measures fall short of demonstrating the effectiveness of an interorganizational network: “When traditional performance measures are emphasized, other aspects of performance are often ignored, such as: relationship development; changing values and attitudes; trust-building; and longer term and system level impact” (p.78). Traditional measures of effectiveness do not enable a researcher to identify the agreement on key issues, individual members dedication and work towards the collective mission, measure the sustainability of the network beyond funding, and use the network as a problem solving mechanism (Birdsell et al., 2003). However, these aspects of a network contribute to a network’s effectiveness just as much, if not more than, its structure.
Relational Variables Associated with Network Effectiveness

Because process measures of network effectiveness also contribute to thinking on network effectiveness, Provan and Kenis (2008) also utilize these past studies to identify four key relational contingencies (Drazin & Van de Ven, 1985) that explain considerable variance and should form the basis of the rationale for choosing one form of governance: trust, size (number of network members), goal consensus, and the nature of the task (the need for network level competencies). They argue (p. 237):

In general…as trust becomes less densely distributed throughout the network, as the number of participants gets larger, as network goal consensus declines, and as the need for network-level competencies increases, brokered forms of network governance, like lead organizations and NAO are likely to become more effective than shared governance networks.

Table 2 identifies all four contingencies and predicts at what levels each is likely to result in effectiveness for each governance form. Finally, Provan and Kenis relate these contingencies to network governance by arguing that the choice of one governance form over another will be based on the discretion of key network decisions makers.

**Table 2: Key Predictors of Effectiveness of Network Governance Forms**

<table>
<thead>
<tr>
<th>Governance Forms</th>
<th>Trust</th>
<th>Number of Participants</th>
<th>Goal Consensus</th>
<th>Need for Network-Level Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Governance</td>
<td>High</td>
<td>Few</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Lead Organization</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderately low</td>
<td>Moderate</td>
</tr>
<tr>
<td>NAO</td>
<td>Moderate</td>
<td>Many</td>
<td>Moderately high</td>
<td>High</td>
</tr>
</tbody>
</table>

Source: Provan and Kenis, 2008, p. 237
The following sections describe each of these contingencies in more detail.

**Trust**

The first critical contingency that Provan and Kenis (2008) identify is trust. The importance of trust has been well documented within both the network literature and the public affairs literature less specifically (Ostrom, 1998; Putnam, 2000; Rothstein, 2000). Trust, the positive expectations of both intentions and competence, has been found to be vital to network functioning in a variety of ways (Graddy & Chen, 2009). Trust is based on reputation and past interaction experience (Provan and Kenis, 2008). As Graddy and Ferris (2006) discuss, partnerships are inherently risky endeavors given that mutual interdependence implies vulnerability to the behaviors of others: some risk may be mitigated by collaborating with organizations viewed as trustworthy. The value of trust is demonstrated in the findings of Edelenbos and Klijn (2007) in their survey of public-private partnerships. In their survey of over 200 practitioners, almost 87 percent agreed that trust was the most important condition for success. Further, Muthusamy and White (2005) found that trust has a positive impact on knowledge transfer among members. Other scholars that have linked trust to network performance and stability include Powell (1990), Larson (1992), Uzzi (1997), Isett and Provan (2005), Lundin (2007), and Daly and Chrispeels (2008).

While the extant literature on trust is lengthy, Provan and Kenis (2008) argue that similar to the lack of studies on whole networks themselves, trust is not frequently studied at the network level: it is almost exclusively on dyadic relations and reputational effects based on the trust of specific network members. In order to understand trust completely, its distribution throughout the network is critical. Therefore, not only can
trust be a network-level concept but it is also the case that network governance must be consistent with the general level of trust that occurs across the network as a whole. Different levels of trust are predicted to impact the effectiveness of a given governance form, as demonstrated in Table 2 (Provan and Kenis, 2008).

**Network Size**

In contrast to trust, network size (number of members) is not covered as extensively in the literature possibly because the benefits of networks are often taken for granted over some of the inherent issues with coordination and control. As members join a network, the number of potential relationships grows exponentially. Therefore, their governance becomes increasingly complex. Complexity also grows as networks become more geographically dispersed, making frequent face-to-face-interaction difficult. As networks grow, shared governance could become more inefficient (Faerman, McCaffrey, & Van Slyke, 2001; Retrum, Chapman, & Varda, 2013). Therefore, Provan and Kenis postulate that growth necessitates moving toward a more centralized approach. This necessitates either an NAO or Lead Organization Governance structure. Which type is more appropriate will depend on the other critical contingencies; mainly trust (Provan and Kenis, 2008).

**Goal Consensus**

Goal consensus is also discussed extensively within the public affairs and network literature. While the public affairs literature focuses more on how goal consensus can aid organizations in partnerships and networks to work together better during conflicts, the network literature has extended on with this concept with the homophily theory. Homophily, or the concept that similarity breeds connection, has been utilized as a
rationale for why certain partnerships form. However, instrumental reasons also drive partnerships, and similarity can help the process. Goal consensus has also been discussed more generally as O'Toole (2003) argues that shared interests are powerful facilitator of cooperation. Empirical evidence also confirms the importance of this contingency. For example, Levine and White (1961) demonstrated that agreement on goals was as an important aspect of interorganizational relationships. Similarly, Schmidt and Kochan (1977) found a correlation with comparability of goals and cooperation. Finally, Lundin (2007) found goal consensus to be an important factor influencing interorganizational cooperation.

Goal consensus is predicted to relate to network governance in various ways according to Provan and Kenis's theory. Specifically, Shared Governance is likely to be effective when network members have high-level agreement on network goals. In this case, member organizations can work together without conflict while simultaneously contributing to both network level and individual goals. Lead organization and NAO forms of governance are predicted to be more effective when members are less able to resolve conflict and are only partially committed to network-level goals. Further, Lead Organization Governance forms will be likely when network participants have moderately low goal consensus whereas NAO forms are likely when goal consensus is moderately high. NAO governance often required participation from a subset of network organizations, implicating the differences between the two forms on this contingency.

Network-Level Competencies

The last critical contingency that Provan and Kenis (2008) predict as important for impacting the effectiveness of one form of governance over the other is need for
network-level competencies (NNLC). This contingency is founded in the reasoning for joining or forming networks. The literature documents the various reasons for forming or joining a network including gaining legitimacy (Kickert, Klijn, & Koppenjan, 1997), serving clients more effectively (Logan, Davis, & Parker, 2010), attracting resources (Van de Ven, Emmett, & Koenig, 1975), reducing redundancies (Burt, 1992), and addressing complex social problems (Aldrich, 1976). At the most basic level, however, organizations join networks to achieve something they could not do individually. An important question then becomes, how can the competencies required to achieve network-level goals be attained (Provan and Kenis, 2008).

Provan and Kenis (2008) argue that network-level competencies are related to network governance structures in that different structures place the burden on different network players. Two concepts then relate to network-level competencies: nature of the task being performed by network members internally and external demands on the network. For example, if the network’s task required significant interdependence among member organizations, the need for network-level coordination will be high. Specifically, they argue (p.241):

Shared governance will be less likely to be an effective form of governance when interdependent task requirements are high, since demands will be placed on individual network members for skills they may not possess, like grant writing, quality monitoring, or even conflict resolution. Conversely, it is precisely these task conditions that favor lead organizations or NAO models, which are more able to develop specialty skills related to network-level needs.
In terms of external demands, if they are high, NAO or lead organization structures are likely to be more effective. However, NAO formations may lack the resources or size of some member organizations.

**Propositions Developed from the Framework**

Provan and Kenis (2008) then, utilizing the extant literature and some of their own findings, offer four propositions that theorize the relationships among all four critical contingencies and the network governance structures which they identified. These are (p.241):

**P₁:** The greater the inconsistency between critical contingency factors and a particular governance form (both in terms of the number of inconsistent factors and the extent to which these factors are inconsistent with characteristics of the governance form), the less likely that the particular form will be effective, leading either to overall network ineffectiveness, dissolution, or change in governance form.

**P₂:** Shared network governance will be most effective for achieving network-level outcomes when trust is widely shared among network participants (high density, decentralized trust), when there are relatively few network participants, when network-level goal consensus is high, and when the need for network-level competencies is low.

**P₃:** Lead organization network governance will be most effective for achieving network-level outcomes when trust is narrowly shared among network participants (low density, high-centralized trust), when there are a relatively
A moderate number of network participants, when network-level goal consensus is moderately low, and when the need for network-level competencies is moderate.

P₄: NAO network governance will be most effective for achieving network-level outcomes when trust is moderately to widely shared among network participants (moderate density trust), when there are a moderate number to many network participants, when network-level goal consensus is moderately high, and when the need for network-level competencies is high.

This dissertation investigates Provan and Kenis’s theory on network effectiveness by testing these propositions empirically. Further, it will do so by utilizing data collecting on public health networks and collaboratives.

There is one important note to be added to this review. In addition to positing propositions about the relationship between the critical contingencies and network effectiveness, Provan and Kenis (2008) posit additional propositions that relate to tensions inherent in network governance that must be addressed by network managers. While acknowledging that an understanding of these tensions is important for network managers, testing these propositions is beyond the scope of this study which limits itself to understanding network governance structures as they relate to network effectiveness. This research is focused on the governance forms that are already in place within networks and why one form may be effective than another. Thus, it is the first step towards understanding governance, while the additional propositions would be a second step, once the importance of governance type has been established.
The Challenge of Measuring Program Effectiveness

The extant literature reviewed in this chapter demonstrates the difficulty in measuring effectiveness of networks. This difficulty is common in measuring the performance of public organizations more generally. Coinciding with the NPM movement and new models for public service delivery such as networks, the past several decades has been considerable growth in a body of literature that focuses on measuring the performance and effectiveness of public organizations (Dahler-Larsen, 2007; Ovretveit, 2007). Yet, while for-profit organizations can utilize profit-maximization as a standard on which to judge their effectiveness, there is no such standard by which to judge public organizations: public organizations produce goals and services that are not exchanged in the market. Therefore, measuring effectiveness in the public sector and in networks that address public problems is problematic for a number of reasons, which include: the evolution of goals, unclear standards for judging results, and practical uncertainty. Further complicating matters are intergovernmental relations and new models for service delivery which includes service delivery networks, partnering, and contracting.

Kettl and Fesler (2005) discuss the problem of evolving goals: goals evolve through the implementation process because administrative reality is difficult to forecast. Unexpected events such as economic growth or recession, natural disasters, or disease outbreaks, for example, can cause public programs to have to adjust their aims and priorities. Further, organizational goals are inextricably linked to the political process: given the complex interplay between government officials at different levels and sometimes from different branches results in a system that is rarely a linear, start-to-finish
process. Because goals are unclear and ever-changing, there are no clear standards for measuring how effective a public program or organization is (Kettl and Fesler, 2005). Finally, even if program goals do not evolve, legislative intent is often unclear. For example, the War on Poverty in the 1960s resulted in legislation that required local community to provide “maximum feasible participation” for the poor when they were making spending decisions. The conceptual of this goal led local communities to produce “maximum feasible misunderstanding” (Moynihan, 1974).

Goal ambiguity and evolution is closely related with another problem in measuring effectiveness: unclear standards for judging results. For example, some would judge public programs by the standard of efficiency. This would result in determining the number of outputs produced, given a particular set of inputs. A program or organization would be judged as more effective than another if it produced more outputs for the same level of inputs. On the other hand, some would judge public organizational effectiveness by how responsive it is to public will. While both efficiency and responsiveness are important, organizations that maximize efficiency often do so at the expense of responsiveness: there are tradeoffs between the two (Kettl and Fesler, 2005). Another way to assess program effectiveness treats those interacting with public organizations as customers, and yet, a quality public service is more than just one that produces happy customers (Ovretveit, 2005).

These unclear standards leave more questions than answers. For example, should welfare reform be judged on the basis of reducing the welfare rolls or is its effectiveness more complex? Should welfare reform be judged on the number of individuals that were able to utilize the programs to improve their standard of living? Health care provides an
example; it could be judged by different standards which include accessibility, relevance to need, equity, social acceptability, and efficiency (Ovretveit, 2005). These examples demonstrate that any particular standard measure of effectiveness could be inherently biased in some way, or at least represent a normative choice of one standard over another.

Measuring the effectiveness of public health networks is also difficult and provides another example. As Thacker et al. (2006) discuss, current measures of public health include rates of mortality, morbidity, and cost. However, using a single measure of public health is misleading and oversimplifies matters. Further, consensus on the best measures of public health does not exist:

The choice of measures might reflect individual and societal values. For example, emphasis on measures of morbidity such as incidence or disability implies that value is placed on suffering as well as death. Use of YPLL [years of potential life lost] implies that extra value is placed on premature deaths. Measures that do not capture broader aspects of burden (e.g., pain and suffering, deterioration in quality of life, and emotional and physical impacts on families) imply that these values are not as important as traditional measures (p. 19).

In addition, there are difficult-to-measure activities that are essential to the public’s health. For example, emergency preparedness is essential to the public’s health, yet the traditional measures of health are not designed to assess preparedness.

Measuring the effectiveness of any network becomes more complex because the type of organizations involved in improving health outcomes is varied, having different missions, goals, and tasks themselves. It may be difficult to separate the impacts of these single organizations from the impacts of the network as a whole (Popp et al., 2014).
Further, given the different types of activities that contribute to health outcomes, the mission and goals of any network may be diverse or vague. Therefore, there may be unclear standards for judging whether a network is accomplishing its goals. Therefore, determining the effectiveness of any public health network becomes complex and difficult (Thacker et al., 2006).

These differences in standards also demonstrate the practical uncertainty of assessing the effectiveness of many public programs: the public sector is tasked with solving complex, uncertain social problems that may have no known solutions. Crime, for example, has many potential causes and therefore, many potential solutions. Further, many potential solutions often result in problems of their own. For example, the War on Crime (and its subsequent policies) during the 1980s and 1990s could be viewed as overwhelming effective for reducing recorded criminal activity within the United States; however, over-crowded jails and prisons are a reality in most states (American Legislative Exchange Council, 2015). Similarly, the networks within this study are tasked with improving population health outcomes. This goal is large and complex, resulting in the lack of any narrow practical way with which to judge effectiveness.

This study recognizes that operationalizing effectiveness is not only difficult, but also is inherently biased. As Thacker et al. (2006) demonstrate, any particular measure could reflect some particular perspective on effectiveness over another. Therefore, this study will utilize different measures of effectiveness to validate the findings and to mitigate against any biases contained within one measure.
CHAPTER IV

METHODOLOGY

Overview

This chapter provides a detailed description of the design and procedures used in this study. The chapter is structured so that the methodology of each research question is contained within a separate section. First, the chapter begins by describing the data and data collection methods for the study, including the sampling methodology. A detailed description of each variable and how it operationalized is also included. Finally, the study validity and reliability concerns are also covered.

The methods have an epistemological backing in network theory, and the procedures are consistent with a network approach. The study draws on secondary survey data collected on public health networks within the United States, including both whole network and organizational level data. A similar approach has been utilized in previous research of public health systems, including Morrissey, et al. (1994), Provan and Milward (1995), Provan, et al., (2003), Varda (2011), Varda and Retrum (2012), and Retrum, Chapman, and Varda (2013).

Data Collection

PARTNER Dataset

This study utilizes variables collected on whole networks and member organizations. The majority of the data utilized in this study are found within the PARTNER Dataset. PARTNER is an online social network analysis tool designed to measure collaboration among people and organizations. It allows members of a collaborative to collect and analyze data on their network. Using a number of analytics,
including social network analysis and other statistical methods, the tool provides a number of measures to networks to demonstrate how members are connected, how resources are leveraged and exchanged, levels of trust within the collaborative, and link the process of collaboration to outcomes like effectiveness (Varda et. al, 2008).

PARTNER includes both a survey and analysis tool, which are linked for ease of analysis. The survey is conducted through the PARTNER website (http://www.partnertool.net/) by a manager from each network. The network manager is an individual from each network that takes the lead role in coordinating the collaborative partners to take the survey, administers the survey, and completes the analysis. This includes disseminating the results of the analysis. This individual can be from a member organization of the network or an outside individual. The manager identifies all member organizations within the network. Once the manager identifies and records all network members, an organizational representative from each receives an online survey invitation through email. Managers are also responsible for modifying the default questions from the original survey template that will be used for their own network.

The default PARTNER survey includes different types of question, each that measure some aspect of the network’s collaboration. The PARTNER survey has a total of 19 standard questions; however, many of the questions are customizable. More specifically, the survey questions include (Retrum, Chapman, & Varda, 2013, p.16S):

- Demographic Questions (organizational description): Job title, length of time as a member of the collaborative, types of activities engaged in, outcomes of the collaborative, resources contributed to the collaborative
• Perception of Success: How successful has your collaborative been at reaching its goals? (Not Successful, Somewhat Successful, Successful, Very Successful, Completely Successful)

• Outcome Questions: Collaborative outcomes, Factors contributing to successful outcomes

• Relational Questions: “Please list all organizations/divisions/agencies/programs with whom you have a relationship with to meet the goals of your collaborative.”

Once a respondent selects their organizational partners from a bounded list they typically answer questions related to:

– Frequency of Interactions with Partner (none, once a year, every few months, every month, every few weeks, once a week, every day)

– Level of quality of activity in the relationship (none, coordinated, cooperative, integrated)

– Extent of value as follows: (a) Power/influence, (b) Level of involvement, (c) Resource contribution (none, a small amount, a fair amount, a great deal)

– Extent of trust as follows: (a) Reliable, (b) In support of the mission, and (c) Open to discussion (none, a small amount, a fair amount, a great deal).

The default survey questions were derived empirically from qualitative work in early development (Varda, et al., 2008), and validated through analysis more recently (Varda, 2011; Varda & Retrum, 2012; Retrum, Chapman, & Varda, 2013, Bevs, Retrum, & Varda, 2015). The comprehensive research that went into survey development has resulted in PARTNER as a validated instrument for network analysis.
The use of this tool has resulted in a dataset of 433 whole networks (as of May 2015), all collected using the same methodology. Each network within the dataset has opted to use the tool in order to evaluate how the organizations within their network are collaborating. The majority of networks within the PARTNER dataset are considered “goal-direct,” meaning that they are convened with the purpose of addressing a defined goal of all the participating members. However, membership is typically voluntary, although some are organizations are mandated to participate. The networks are a mix of funded and non-funded.

The PARTNER tool uses concepts and measures from social network analysis such as centralization and density to identify areas where resources could be used to strengthen collaboration and improve outcomes. This involves looking at the quality of the relationships between member organizations and the exchange between them. Further, it identifies resources within the network, including resources spent managing relationships between member organizations. Finally, the tool also allows each network to represent themselves via a network graph so that they can visualize the links between all organizations.

The bulk of networks within the PARTNER Dataset (approximately 80%) are public health collaboratives from across the United States. Other than their purpose (public health), the networks within the dataset vary in terms of size and connectivity. They also vary in terms of what types of organizations are within each network. For example, some networks contain only public and nonprofit organizations, while other contains organizations from the public, nonprofit, and private sectors. There are currently 433 networks contained within the PARTNER Dataset, representing 10,848
organizations, and 65,222 dyadic ties. The mean network size is 65.25. The response rates per network range from 25% through 100%, with a mean of 63%.

The data from the PARTNER dataset contained within this study were collected from October 2009 – December 2014. Despite the time lag between the survey of the earliest networks and the latest, the data were collected using the same methodology ensuring no substantial differences between the networks based on time.

**PARTNER Manager’s Survey**

In addition to the existing PARNTER data, a survey was administered in February 2015 to users of the PARTNER tool (called “Managers”), identified from the original PARTNER dataset, to add more detailed information about each network from the original PARTNER survey. Sampling rationale is described further below. The survey was administered by the PARTNER team, located in the School of Public Affairs at the University of Colorado Denver (led by Dr. Danielle Varda) and was completed to collect more data about the way each network was formed, managed, how they operate, and what each has achieved. Three questions were added to the manager’s survey for use in this study. While they are more fully detailed in the *Variables and Measures* section of this chapter, their main purpose was to determine the governance structure and the need for network level competencies of each network of each network.

**Human Subjects Review**

The PARTNER Manager Survey was reviewed and approved by the Colorado Multiple Institutional Review Board (COMIRB Protocol 15-00079).
Population and Sample

The population of the study is public health networks in the United States that have opted to use the PARTNER tool to measure their collaboration. From the PARTNER Dataset a smaller group of networks (N= 135) was surveyed in the PARTNER Manager Survey, resulting in a smaller sample than the whole dataset. The PARTNER manager survey sample was determined when each network in the PARTNER dataset was assessed to see if the network qualified for further research. Disqualifications for participation in the manager survey included networks that are 1) not health related, 2) were part of research directed projects (not initiated by the community, eliminating bias of self-selection vs. research-selected networks), and 3) the manager was no longer a part of the manager (meaning that there was no longer a known point of contact to take the survey). In total, 135 networks were invited to participate in the manager’s survey. Of these, 95 participated for a response rate of 70.37%.

The sample for this study is derived from the 95 survey responses of the PARTNER Manager Survey linked with the original network responses from the PARTNER dataset. Of the 95 networks that responded to the survey, 31 networks used different success measures than the default PARTNER survey and thus, were excluded from statistical analysis. There is also a large degree of missing data from these networks that further limits the number of networks that are included within each analysis. For example, in some instances the manager was unable to answer the questions that coincided with this study: 29 respondents either did not answer the question on governance type or answered that they did not know. Similarly, only there were only 61 responses for the Need for Network Level Competencies questions. Therefore, while the
sample size is 95, the number of networks contained within each statistical analysis (95 minus the missing data) varies between 43 and 55. The total cases contained within each analysis will be noted alongside the results of each in *Chapter V*.

Exclusion of certain networks from the PARTNER Survey could possibly result in a sample that is not representative of the PARTNER population as a whole. However, a comparison of network attributes between the study population and sample seems to assuage these concerns. Table 3 provides a visual of the differences between the PARTNER Dataset and those networks who responded to the PARTNER Manager’s Survey, by providing the mean of different network attributes contained within both:

**Table 3: Mean Network Attributes Scores from Study Population and Sample**

<table>
<thead>
<tr>
<th></th>
<th>PARTNER Dataset</th>
<th>PARTNER Manager’s Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>65.25</td>
<td>37.80</td>
</tr>
<tr>
<td>Centralization</td>
<td>44.44</td>
<td>45.27</td>
</tr>
<tr>
<td>Density</td>
<td>50.57</td>
<td>41.72</td>
</tr>
<tr>
<td>Trust</td>
<td>75.67</td>
<td>73.78</td>
</tr>
<tr>
<td>Response Rates</td>
<td>63.00</td>
<td>61.11</td>
</tr>
</tbody>
</table>

The table shows a distinct difference in the mean size of the networks between the population and the sample. There also appears to be a large difference in the density between the two. Density describes the number of actual connections in a network against the potential connections. However, the centralization (which measures the degree to which members of the network are connected), response rates, and trust scores between the sample and the population are very similar.

While the limitations of the sample size are discussed at length in *Chapter VI*, it is worth acknowledging impact of the small sample of this analysis. While there is no universally agreed upon rule for the number of observations contained within an analysis,
it is generally acknowledged that the more data you have, the better (Fields, 2009).

Because of the small number of observations contained within each analysis, the generalizability of the findings (presented in Chapter V) will be limited. A small sample size increases the chances that the observed responses are unrepresentative of the population as a whole. Therefore, given that the number of cases contained within each analysis is small (from 43-55), any extrapolation from the results will be very limited.

**Data Collection**

On February 16, 2015, an email invitation to participate in the study was sent to all managers of networks that were chosen to participate in the study. The email contained further information about the study and a link to the survey which was hosted on Survey Monkey (surveymonkey.com). Three subsequent reminders were sent to those who had not responded on February 19, February 25, and March 2. This approach is consistent with the Dillman Survey methodology for conducting survey research through email (Dillman, Smyth, & Christian, 2009). The survey instrument was designed utilizing the literature on networks as a guide, and was pre-tested both by members of the PARTNER team and several volunteer network managers.

Once respondents followed the link included in their email invitation to participate, they were routed to an introduction of the study which provided them with relevant information about the study and why it was being conducted. After the participants were given the details of the study, they were routed to a consent form which outlined their participation in the study. The consent form detailed why they had been chosen to participate, what to expect during their participation, any potential discomfort or risk resulting from their participation, the benefits of the study, potential
compensation, the nature of their participation (voluntary), contact information for both the primary researcher and COMIRB, and how the information will be used. There was an incentive for participation provided. Once participation in the manager’s survey was completed, responses were linked to the original PARTNER survey for analysis. Specific question wording, as it pertains to the variables in this study, are detailed further below.

The networks that did participate in the PARTNER Manager Survey were all public health related, but had other differences. For example, the Managers that responded represented networks from across the United States. Further, networks within the sample formed for varied reasons and were in different developmental stages. Finally, while some respondents were outside evaluators to the network themselves, other individuals represented participants within the network.

**Research Questions and Propositions**

This study addresses the following research questions:

**R1**: What type of network governance structures exist in public health collaboratives?

**R2**: What type of network governance structures lead to effective outcomes?

   *a*: How does governance interact with certain critical contingencies to explain effectiveness?

**Research Question One**

To address Research Question 1, Provan and Kenis’s typology of network governance structures was used to guide exploration. As discussed in *Chapter II*, network are can be either internally or externally governed. If they are internally governed, that governance can either be brokered through a single organization or shared
among network members (Provan and Kenis, 2008). This results in three types of governance structures:

- Network Administrative Organizations Governance
- Lead Organization Governance
- Shared Governance

Data on governance structure was collected in the PARTNER Manager Survey. To determine the governance structure of each network, network managers were provided with a vignette that described different structures and then had the manager choose between the three different types identified by Provan and Kenis. The specific wording of the vignette was:

> Sometimes, all partners within the network have an equal say in the decision making and coordinating strategies of the collaborative, known as shared governance. In other cases, a lead organization within the collaborative is responsible for the administration and decision-making of the network. Finally, some collaboratives dedicate these responsibilities to an external individual or governing board. This individual or group does not participate within the network, but rather, their purpose is solely to coordinate and sustain the collaborative. Of these three, how would you categorize the decision-making and coordination strategy of your collaborative?

Responses included: Shared, Lead Organization, or External individual or governing board. Respondents were also allowed to indicate if they were not sure or if the choices didn’t apply, to describe how their network was governed.
**Analysis**

To answer research question one, descriptive statistics were used. In other words, descriptive statistics from the Governance Structure question in the PARTNER manager survey indicate which, if any, structure the network has.

**Research Question Two**

Research Question Two was answered by empirically testing the three governance types as an explanatory variable for effectiveness and then testing Provan and Kenis’s (2008) propositions that hypothesize about the relationship between governance structures, critical contingencies, and effectiveness. While a more detailed explanation of the variables is offered below, this section details each model’s specifications.

Model 1 is represented in the following formula:

$$\text{Effectiveness} = f(\text{Governance Structure})$$

To answer the second part of Research Question Two, this study tests Provan and Kenis’s (2008) theoretical propositions about the relationship between critical contingencies, governance structure, and effectiveness. Model 2 tests Proposition 1:

**P1:** The greater the inconsistency between critical contingency factors and a particular governance form (both in terms of the number of inconsistent factors and the extent to which these factors are inconsistent with characteristics of the governance form), the less likely that the particular form will be effective, leading either to overall network ineffectiveness, dissolution, or change in governance form.

Model 2 is represented by the following equation where effectiveness is the dependent variable and consistency (explained below) is the explanatory:
Effectiveness = \( f(\text{Consistency}) \)

Given the small sample size, simple models were necessary for testing the relationship between each critical contingency variable, governance structure, and Effectiveness. In other words, it may be theoretically ideal to test each proposition as a whole, the small sample size limits the number of variables that can be contained within one model. Therefore, very simple models that test one governance structure along with one critical contingency and their interaction terms at a time are necessary to bolster the explanatory power of each model. The propositions are listed below, with an equation that represents portions of the proposition that follows.

\( P_2 \): Shared network governance will be most effective for achieving network-level outcomes when trust is widely shared among network participants (high density, decentralized trust), when there are relatively few network participants, when network-level goal consensus is high, and when the need for network-level competencies is low.

Model 3: \( \text{Effectiveness} = f(\text{Shared} + \text{Trust} + \text{Shared}*\text{Trust}) \)

Model 4: \( \text{Effectiveness} = f(\text{Shared} + \text{Size} + \text{Shared}*\text{Size}) \)

Model 5: \( \text{Effectiveness} = f(\text{Shared} + \text{Goal Consensus} + \text{Shared}*\text{Goal Consensus}) \)

Model 6: \( \text{Effectiveness} = f(\text{Shared} + \text{NNLC} + \text{Shared}*\text{NNLC}) \)

\( P_3 \): Lead organization network governance will be most effective for achieving network-level outcomes when trust is narrowly shared among network participants (low density, high-centralized trust), when there are a relatively moderate number of network participants, when network-level goal consensus is moderately low, and when the need for network-level competencies is moderate.
Model 7: Effectiveness = \( f(Lead + Trust + Lead\times Trust) \)

Model 8: Effectiveness = \( f(Lead + Size + Lead\times Size) \)

Model 9: Effectiveness = \( f(Lead + Goal\ Consensus + Lead\times Goal\ Consensus) \)

Model 10: Effectiveness = \( f(Lead + NNLC + Lead\times NNLC) \)

\( P_4: \) *NAO network governance will be most effective for achieving network-level outcomes when trust is moderately to widely shared among network participants (moderate density trust), when there are a moderate number to many network participants, when network-level goal consensus is moderately high, and when the need for network-level competencies is high.*

Model 11: Effectiveness = \( f(NAO + Trust + NAO\times Trust) \)

Model 12: Effectiveness = \( f(NAO + Size + NAO\times Size) \)

Model 13: Effectiveness = \( f(NAO + Goal\ Consensus + NAO\times Goal\ Consensus) \)

Model 14: Effectiveness = \( f(NAO + NNLC + NAO\times NNLC) \)

The next section provides a thorough description of each variable, where it comes from, and how it is operationalized. A summary table follows the description.

**Dependent Variables**

The dependent variables in all models are Effectiveness. However, as discussed in *Chapter I and III*, measuring effectiveness is not only difficult, but has been considered problematic both in the public sector and within interorganizational networks more specifically. Therefore, this study analyses each statistical model in four ways, with each containing a different proxy for Effectiveness. Using different measures of effectiveness will validate the results, especially given the small sample size of the study. Each of these measures is discussed more in depth below.
Effectiveness$_1$

The PARTNER variable of Success will be used as the proxy for Effectiveness$_1$. Success is a variable collected at the organizational and then aggregated at the network level to reflect the whole. To identify individual organization’s perceptions of success the PARTNER asks: How successful has this community collaborative been at reaching its goals? Participants indicated 1 – 4, with 1=Not Successful; 2=Somewhat Successful; 3=Successful, and 4=Very/Completely Successful. Success is then aggregated at the network level by calculating the mean score across the collaborative.

There is precedence in using individual perceptions of success as proxy measure for effectiveness. In their research on teams and groups, Cohen and Bailey (1997) investigated various dimensions of effectiveness as a dependent variable in teams, collaborations, and work groups. They found that internal team member perceptions of success were the second most common measure of team effectiveness. Similarly, Isballa and Waddock (1994) investigated various factors that explained performance in different scenarios including a group banking simulation experiment. They found that perceptions could have stronger effects than objective reality in determining performance. Finally, some scholars use the terms effectiveness and success somewhat interchangeably while others indicate that “success factors” influence effectiveness (Rangone, 1997; Tones, 1998; Jenkins, 2007).

Effectiveness$_2$

Effectiveness$_2$ is similar to Effectiveness$_1$ in that it is based off the organizational responses to the Success question from the PARTNER Dataset. However, rather than calculating the mean, Effectiveness$_2$ is operationalized to measure the level of
agreement within each network on the Success question. To calculate the measure, a Herfindahl-Hirschman Index (HHI) was used to measure the agreement in responses. HHI is often used in economics to measure the market concentration of the 50 largest firms within a given industry. HHI is based on the sum of squares logic, and lies on a scale of 0-1 (U.S. Department of Justice). The formula for HHI is:

$$H = \sum_{i=1}^{N} s_i^2$$

where $s_i$ is the market share of firm $i$ in the market, and $N$ is the number of firms. As a score approaches zero, the market is occupied by many firms with a relatively equal share of the market. However, if the resulting figure is above a certain threshold, the market is considered to be highly concentrated (Tutterow, 2015). It is appropriate in this case because it captures the degree of concentration within the responses.

This proxy for Effectiveness is interesting for a number of reasons. In particular, it is interesting because it is possible that a network have a high agreement score while the participants actually view the network as unsuccessful. In other words, a high agreement score could possible reflect consensus on a lack of success achieved. However, because relationships are a key aspect of networks, consensus on various dimensions is considered essential.

Consider the example of newly formed networks: networks are complex and difficult to implement. Because of this, one would expect younger networks, on the whole, to be less successful than networks that have been in existence longer because the extra time gives the individual organizations more chances to build relationships, trust, and to learn how to work collaboratively. In other words, there may be a learning curve to operating within a network. While a younger network may not have made significant
process towards its goals, evidence demonstrates that network processes themselves (i.e. the relationships, working together) are still essential to network effectiveness. As Popp et al. (2014) discuss: “Exploring how results are achieved provides the network with important information on the health of the network itself, including an assessment of the relationships and whether the desired culture of the network is being implemented and maintained” (p.78). Further, scholars have identified particular indicators that impact the trust and evolution of a network towards maturity, one of which includes achieving agreement on key issues. Therefore, a focus on agreement may allow for a younger network (which hasn’t had significant time to reach outcomes) to still be considered Effective and may capture the nuances of the interorganizational relationships in the networks that isn’t captured by the mean alone.

**Effectiveness**

The third proxy measure of Effectiveness used in this study is a dichotomous (Effective or Not Effective) measure also calculated from the Success variable of the PARTNER Dataset. To operationalize the variable, the scale from the PARTNER Success question (1-4; where 1=Not Successful; 2=Somewhat Successful; 3=Successful, and 4=Very/Completely Successful) was simply split in half. If the mean score for a network was a 3 or higher, the network was coded as 1 (Effective). If the mean score of Effectiveness was below a 3, the network was coded as 0 (in-effective). Inclusion of a dichotomous variable allows a more nuanced comparison of networks that identify themselves as effective with networks that do not identify themselves as effective than the previous two proxies of Effectiveness provide (which are only measuring how changes in success or agreement impact Effectiveness).
Effectiveness

The fourth proxy for effectiveness is derived from the PARTNER manager’s survey, which asked: “How successful would you say your collaborative has been in fulfilling this mission/meeting its goals?” Responses fell on a scale of 1-5, with (1) Not successful at all (have not achieved any objectives or outcomes of mission); (2) Somewhat successful (working towards a plan to achieve objectives and outcomes); (3) Successful (have a plan in place and are beginning to work towards meeting objectives and outcomes); (4) Very Successful (are using our plan and have met most of our anticipated objectives and outcomes); and (5) Completely Successful (met all of the anticipated objectives and outcomes and are in the process of making a new plan to further these outcomes). This proxy for Effectiveness is valuable because it provides a comparison between the perspectives of one individual from the network (the manager) with that of the whole (mean success used as Effectiveness). An individual perception of success may capture nuances or variation not reflected in an aggregated score. Therefore, the inclusion of an individual perception makes an interesting comparison against the aggregated measure.

Independent Variables

Consistency

Consistency between critical contingency factors and a particular governance form was operationalized by creating a scale for each contingency factor and then aggregating that to a total consistency score. The creation of the consistency variable was a two-step process.
Step 1: Transforming Critical Contingencies into Ordinal Variables

Step one involved transforming each critical contingency variable from a scale variable to an ordinal variable. This step was done to match Provan and Kenis’s (2008) categorization of each critical contingency into categories of low, moderate, and high measure. For example, while number of participants is a simple count (scale variable) for Propositions 2-4, for Model 1, networks needed to be categorized as small, moderate, or large. Similarly, while Trust is measured as an index in latter analyses, this model treats it as High, Moderate, and Low. The Need for Network Level Competencies variable was already ordinal. For all variable transformation, a theoretical or empirical justification was utilized. The variable transformations are in Table 4, with a rationale that follows:

**Table 4: Ordinal Measures for Critical Contingencies**

<table>
<thead>
<tr>
<th>Critical Contingency Variable</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>Less than 70 %</td>
<td>70-85%</td>
<td>More than 85%</td>
</tr>
<tr>
<td>Size</td>
<td>Less than 15 organizations</td>
<td>15 – 35 organizations</td>
<td>More than 35 organizations</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>Less than .20</td>
<td>.20 -.30</td>
<td>More than .30</td>
</tr>
</tbody>
</table>

*Transforming Trust to an Ordinal Variable*

As indicated below, trust is an index from 0-100 created by utilizing the three trust measures from the PARTNER data set. Trust was divided into three categories: (1) greater than 85 for high trust, (2) 70-85 for moderate trust; and (3) less than 70 for low trust. The range of each category was based off of its frequency distribution and a rationale that relates to the measure itself. The frequency distribution revealed a high concentration of trust scores between 70 and 85 percent. Therefore, the ordinal
categories were chose so that they did not arbitrarily split between measures of trust that were substantively. The frequency of each trust category was:

- High Trust \( (n = 16) \)
- Moderate Trust \( (n = 50) \)
- Low Trust \( (n = 29) \)

*Transforming Network Size to an Ordinal Variable*

The size category was also empirically derived (determined by analyzing the data). Network size was mapped linearly to visualize the distribution (see Figure 1 below). This was used to create categories that were relatively uniform in size, without arbitrarily splitting between networks that were similar in size. The frequency of trust in each category was:

![Figure 1: Frequency Distribution of Network Sizes](image-url)
• Small \((n = 25)\)
• Moderate \((n = 30)\)
• Large \((n = 40)\)

_Transforming Goal Consensus to an Ordinal Variable_

To create categories for Goal Consensus, an empirical rationale was again utilized. The scores were mapped to determine their frequency distribution (see Figure 2 below). From this, categories were developed to be uniform in size while not separating any scores that were theoretically similar. The frequency of each category was:

• Low \((n = 38)\)
• Moderate \((n = 29)\)
• High \((n = 25)\)

![Figure 2: Frequency Distribution of Goal Consensus Scores](image)
Step 2: Calculating the Consistency Variable

The second step, creating a consistency variable, was completed by comparing the contingencies from each network to those predicted by Provan and Kenis. For each network, each contingency factor was rated on a scale of 0-2, with 0 = Consistent, 1 = somewhat consistent, and 2 = not consistent based on the governance type of that network. Then, the points were added together for a total possible consistency score of 8 that would indicate consistency across all factors: the higher the score, the less consistent the network’s contingencies are with its governance type. A score of 0 indicates that all critical contingency factors were at the levels predicted by Provan and Kenis according to the governance form. For example, if a Shared Governance network had high Trust, small Size, high Goal Consensus, and a low NNLC then the consistency score would equal 0. However, if the Shared Governance network had low levels of Trust, was large in Size, had low Goal Consensus, and a high NNLC, their consistency score would be 8.

Trust

Several different measures of trust are contained within the PARTNER dataset, and for the purposes of this study, TotalTrust was used. TotalTrust was calculated by averaging three separate measures of trust collected at the dyadic level of the network. Once organizations identify which other members of the network that have relationships with, they then identify the following about each of these organizations:

- Trust 1: Reliability (network members to rank the other organizations in their network on reliability).
• Trust 2: Mission Congruence (network members indicate to what extent do other organizations share a mission with this community collaborative’s mission and goals)

• Trust 3: Open to Discussion (network members are asked to indicate how open each organization is to discussion)

Each Trust variable is measured using a Likert scale of 1-4 where 1= Not at all, 2 = a small amount, 3 = A fair amount, and 4 = A great deal. These scores are then aggregated at the whole network level by taking the mean of each across the dyads and then transforming this score into an index. If every respondent gave every partner a score of 4, on all three measures, the overall network score would be 100%.

**Number of Participants**

The Size of network is a straightforward count of how many members are in the network. Members were identified by each network manager when they prepared to administer their surveys.

**Goal Consensus**

To operationalize Goal Consensus, a variable was created from the original PARTNER dataset which indicated the level of agreement on the most important outcome question responses was utilized. Each member of a network was asked: What is this community collaborative's most important outcome? A list of outcomes was provided to the respondents that represented outcomes identified by the network manager during survey development. While each list is unique to each network, the default options include: increased services, reduction of health disparities, increased resources sharing, increased knowledge sharing, new sources of data, community support, public
awareness, new policies, improved health outcomes, and improved communication. The number of responses is then summed, and from these agreement was calculated. Similar to Effectiveness2, an HHI was used to measure the agreement in responses.

**Need for Network Level Competencies**

The NNLC is a variable not already contained within the PARTNER dataset, and was created from responses to two questions in the PARTNER Manager’s survey. According to Provan and Kenis (2008), a need for network-level competencies is reflected by the nature of the task being performed by the network (i.e. how interdependent the network members need to be to do the work of the network), as well as the external demands that a network is facing. To determine this, network managers were provided with the following vignettes with accompanying options:

- In some networks, tasks require significant coordination (high interdependence) among partners. In other instances, organizations are able to fulfill their duties to the network without much coordination between partners (low interdependence). How would you categorize the interdependence among the most active members of your network? [Options: High Interdependence (tasks require a great deal of coordination among members); Moderate Interdependence (there are varying degrees of high and low interdependence among members to complete tasks); Low Interdependence (tasks can typically be completed without much coordination); or Not sure]

- Sometimes, if the collaborative receives grant-funding or was created as a formal way of implementing a particular government policy or procedure, there may a high degree of external pressure on the collaborative to produce results.
Conversely, if the collaborative is more informal or if the goals or tasks of the collaborative are not mandated by a government policy, there may be less external pressure on the collaborative to produce results. What degree of external pressure does your collaborative have? [Options: Low External Pressure; Moderate External Pressure; High External Pressure; Not Sure; or If these choices don't fit your collaborative, how would you explain the pressure from external forces on your collaborative?]

The results from the two questions were aggregated to create NNLC variable, with high, moderate, and low need as follows, and the transformed to a scale variable for analysis. Table 5 provides a summary of all variables for Phase 2, how they are operationalized, their origin, the method of analysis.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of Original Collection</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness&lt;sub&gt;1&lt;/sub&gt;</td>
<td>Organization</td>
<td>Scale Mean Success from PARTNER Dataset How successful has this community collaborative been at reaching its goals (1=Not Successful, 2=Somewhat Successful; 3=Successful, 4=Very/Completely Successful)</td>
</tr>
<tr>
<td>Effectiveness&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Organizational</td>
<td>Agreement on Success Responses collected to Success Question from PARTNER Dataset Agreement Measured using HHI: [ H = \sum_{i=1}^{N} s_i^2 ]</td>
</tr>
<tr>
<td>Effectiveness&lt;sub&gt;3&lt;/sub&gt;</td>
<td>Organizational</td>
<td>Dichotomous Success 0=Not Successful, 1 = Successful Success Variable from PARTNER Dataset Transformed Responses &lt; 3 = 0; Responses 3 ≤ = 1</td>
</tr>
<tr>
<td>Effectiveness&lt;sub&gt;4&lt;/sub&gt;</td>
<td>Network</td>
<td>Scale Mean Success from PARTNER Manager’s Survey How successful would you say your collaborative has been in fulfilling this mission/meeting its goals?” (1 = Not successful at all; 2 = Somewhat successful; (3) = Successful; 4 = Very Successful; 5 = Completely Successful)</td>
</tr>
<tr>
<td>Governance Structure</td>
<td>Network</td>
<td>Categorical (2 Dummy Variables, dichotomous (1,0), one representing Lead Organization Governance and one representing Shared Governance, with NAO as the base category )</td>
</tr>
<tr>
<td>Consistency</td>
<td>Dyadic, Organizational, and Network</td>
<td>Scale Each explanatory variable is transformed from a 0-2 scale, and compared to the scale from Provan and Kenis’s (2008) propositions. For example, if the positions predict that within a Shared governance structure the level of trust is high, and the actual observation is high, the consistency for that variable is 0. The consistency for each variable is calculated and then summed for a total ordinal scale of 0-8. (0-8 scale where 0= Completely Consistent, 8 = Completely Inconsistent)</td>
</tr>
<tr>
<td>Variable</td>
<td>Level of Original Collection</td>
<td>Measure</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Trust</td>
<td>Dyadic</td>
<td>Scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trust Total</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trust 1+Trust 2+Trust 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Each organization ranks every other organization within the network on the three trust indicators, scores are then totaled for each organization within the network, calculate mean; aggregate to the network level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trust 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How reliable is the organization/program/department? (1=Not at all, 2= A small amount, 3=A fair Amount, 4= A great deal)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trust 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To what extent does the organization/program/department share a mission with this community collaborative’s mission and goals? (1=Not at all, 2= A small amount, 3=A fair Amount, 4= A great deal)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trust 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How open to discussion is the organization/program/department? (1=Not at all, 2= A small amount, 3=A fair Amount, 4= A great deal)</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>Organizational</td>
<td>Scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agreement on Most Import Outcome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Which is this community collaborative's most important outcome?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Herfindahl-Hirschman Index :</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$H = \sum_{i=1}^{N} s_i^2$</td>
</tr>
<tr>
<td>Need for Network Level Competencies</td>
<td>Network</td>
<td>Ordinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interdependence + External Pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How would you categorize the interdependence among the most active members of your network? (Low Interdependence, Moderate Interdependence, High Interdependence)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What degree of external pressure does your collaborative have?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>((1)Low External Pressure, (2)Moderate External Pressure, (3)High External Pressure)</td>
</tr>
<tr>
<td>Variable</td>
<td>Level of Original Collection</td>
<td>Measure</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Size</td>
<td>Network</td>
<td>Scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Network Participants</td>
</tr>
<tr>
<td>Governance Structure</td>
<td>Network</td>
<td>Categorical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sometimes, all partners within the network have an equal say in the decision making and coordinating strategies of the collaborative, known as shared governance. In other cases, a lead organization within the collaborative is responsible for the administration and decision-making of the network. Finally, some collaboratives dedicate these responsibilities to an external individual or governing board. This individual or group does not participate within the network, but rather, their purpose is solely to coordinate and sustain the collaborative. Of these three, how would you categorize the decision-making and coordination strategy of your collaborative? (1) Shared; (2) Lead Organization; (3) External individual or governing board; (4) Not sure [Open-ended])</td>
</tr>
</tbody>
</table>
Analysis

OLS Regression was used to analyze all models. Models were be analyzed using SPSS 23.0. Because the theory does not identify one network form as more effective over another, but rather, predicts that one form will be more effective given the critical contingencies, an interaction term is introduced in each analysis for Models 3-14. Interaction terms allow for analysis of a situation in which the variables in the model are not additive (for example, governance + trust), but rather that level of one explanatory variables impacts the other (for example, high trust and shared governance) (Schofer, 2007).

Validity and Reliability

Attempts to control for threats to internal, external, and construct validity have been made. In the case of internal validity, the onetime data collection structure eliminates many threats such as maturation, mortality, and instrumentation. However, selection is a concern as opting in may predispose networks to have certain outcomes. A random sample of public health networks, however, is not likely or easy to obtain: random sampling at any level in network studies does not make sense. Threats to external validity are also limited as findings of causation are not sought. Further, by not including research directed networks within the PARTNER Manager Survey (and only community initiated) the threats of opting in are mitigated.

Construct validity is the largest concern for this study, especially as most of the data are a secondary analysis. For example, a detailed measured defined as “Effectiveness” was not contained within the original data set. Therefore, the study tests each model using four different proxy measures for effectiveness (detailed above).
Similarities between the regression outcomes will demonstrate the reliability of the results. Differences in any regression results may limit reliability, but do allow for a discussion of which measure might be more valid in capturing Effectiveness.

Further, some of the measures of Effectiveness are already vetted within the extant literature. For example, success is an appropriate proxy measure for effectiveness because both measures are concerned with the attainment of positive network level outcomes (Retrum, Chapman, & Varda, 2015; Bevc, Retrum, & Varda, 2015). Further, threats to validity were mitigated by the field tests of the PARTNER Manager survey to ensure that questions within the original survey elicited the indicate responses. Finally, the PARTNER survey has been administered in over 500 communities, and the resulting data have been validated in numerous studies, including but not limited to Varda, 2011; Retrum & Varda, 2012; Retrum, Chapman, & Varda, 2013; Varda, Retrum, and Chapman (2014); Varda and Retrum (2015), Bevc, Retrum, and Varda (2015).

Reliability is also a concern for this study. One concern for reliability is the varying response rates of different networks. The sample of networks utilized in the analysis range in size, resources, and level of interactions. This is consistent with previous studies of multiple networks, including in the findings of Mays, Scutchfield, and Smith (2010), demonstrating how the sample is representative. Within each network, varying amounts of missing data are common, and must be considered (Kossinets, 2006). Missing data can be the result of skipped or missing questions on a survey, or indicative of an organization failing to respond as a whole. While Wasserman and Faust (1994) argue that response rates of networks should be 75 percent or high, more recent studies argue that anything higher than 50 percent is acceptable (Kossinets, 2006). However,
Retrum, Chapman, & Varda (2013) have demonstrated that analysis that includes networks with low response rates has not significantly altered results. Therefore, within this study, response rates vary from 25 percent to 100 percent, with a mean response rate of 61.11 percent, are included. This approach for dealing with missing data is further validated in Varda and Retrum (forthcoming) and Bevc, Retrum, and Varda (forthcoming).

There is also a reliability issue between using secondary data and the collection of new data. The time lapse, especially with some of the earliest collected networks, makes continuity, recall, and accuracy an issue. There is a concern that the networks have evolved from their original form contained within the data. However, the researchers made all attempts in the PARTNER Manager Survey to clarify what stage the network was at and have respondents answer for that time frame.

A final concern for the study is its small sample size. The small sample size results in a larger sampling error, which may underestimate or overestimate the parameters of the relationship between variables. In other words, the magnitude of the relationships, represented in the coefficients from the analysis, is more likely to be misrepresented with a small sample. This limits the ability of the results to be used for extrapolation. Because of this, the study has used four different proxy measures of Effectiveness to mitigate threats to its reliability from the small sample. In other words, the reliability of the findings of the study will be improved when the models have consistent results (in either direction and magnitude, or both) across all of the analyses containing different proxy measures.
CHAPTER V
ANALYSIS

Overview

This chapter contains the findings from of the descriptive analysis and statistical analyses outlined in the Methods chapters. The chapter is organized by the research questions and the methods utilized to answer them. The first research question is answered by a descriptive analysis. To answer the second research question is answered by testing 14 different models in different ways, to not only ascertain how governance structure, critical contingencies, and their interactions impact effectiveness, but also to identify if the regression findings change across different measures of Effectiveness. Comparisons between models and their contribution to insights on network effectiveness are also discussed in Chapter VI. As a reminder, the research questions which guide this study are:

R₁: What type of network governance structures exist in public health collaboratives?

R₂: What type of network governance structures lead to effective outcomes?
   
a. How does governance interact with certain critical contingencies to explain effectiveness?

Research Question 1

Research Question 1 of this study asked: What type of network governance structures exist in public health collaboratives? To determine what type of network governance structures exist in public health, descriptive statistics from a question in the PARTNER Manager Survey were used (detailed further in the Methods chapter).
Specifically, respondents were asked to identify their network’s governance structure. Responses are detailed in Table 6:

### Table 6: Frequency of Network Governance Structures

<table>
<thead>
<tr>
<th>Governance Structure</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Governance</td>
<td>21</td>
</tr>
<tr>
<td>Lead Organization Governance</td>
<td>46</td>
</tr>
<tr>
<td>NAO Governance</td>
<td>5</td>
</tr>
<tr>
<td>Not sure/Didn’t Answer</td>
<td>23</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>95</strong></td>
</tr>
</tbody>
</table>

The responses indicate that Lead Organization is the most common form of governance, with more than twice as many occurrences than the second most common: Shared governance. Very few (n=5) respondents indicated the use of an external individual or governing board or NAO.

In addition to the large frequency differences between each, Table 7 provides the mean score of each study variable per network governance type.

### Table 7: Mean of Each Study Variable per Network Governance Structure

<table>
<thead>
<tr>
<th></th>
<th>Shared</th>
<th>Lead</th>
<th>NAO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness$_1$</td>
<td>2.84</td>
<td>2.92</td>
<td>3.08</td>
</tr>
<tr>
<td>Effectiveness$_2$</td>
<td>0.42</td>
<td>0.40</td>
<td>0.60</td>
</tr>
<tr>
<td>Effectiveness$_3$</td>
<td>0.34</td>
<td>0.41</td>
<td>0.33</td>
</tr>
<tr>
<td>Effectiveness$_4$</td>
<td>2.94</td>
<td>2.46</td>
<td>3.33</td>
</tr>
<tr>
<td>Trust</td>
<td>73.90</td>
<td>73.70</td>
<td>76.60</td>
</tr>
<tr>
<td>Size</td>
<td>34.03</td>
<td>36.24</td>
<td>25.80</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>0.26</td>
<td>0.27</td>
<td>0.17</td>
</tr>
<tr>
<td>NNLC</td>
<td>1.75</td>
<td>1.94</td>
<td>2.00</td>
</tr>
<tr>
<td>Consistency</td>
<td>3.70</td>
<td>3.52</td>
<td>5.60</td>
</tr>
</tbody>
</table>

This table begins to provide a picture of the differences between networks of each governance type. In addition to the differences in effectiveness per each group, the table...
seems to indicate that while Shared and Lead Governance networks have similar means per critical contingency variable, NAO governance models in particular stand out. For example, while the mean Trust score of the NAO networks is slightly higher, an NAO’s size is approximately 10 less organizations, on average. Further, NAO Goal Consensus is around .10 less on average, which may be significant given that the scale for Goal Consensus is 0-1. Finally, while their NNLC mean may not appear significantly different, the NAO variables appear to be much less Consistent with the predictions of Provan and Kenis (2008).

**Research Question 2**

The second research question has two parts. One part tested the relationship between Governance and Effectiveness and one investigated the interaction of Governance with critical contingency variables to explain Effectiveness:

R$_2$: *What type of network governance structures lead to effective outcomes?*

a. *How does governance interact with certain critical contingencies to explain effectiveness?*

Table 8 provides a summary of the measures of central tendency and other descriptive statistics for all variables utilized to answer the second research question:
### Table 8: Descriptive Statistics for Variables Used to Answer Research Question 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measure</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness_1</td>
<td>1-4 Scale</td>
<td>2.96</td>
<td>2.90</td>
<td>3</td>
<td>.46</td>
</tr>
<tr>
<td>Effectiveness_2</td>
<td>0-1 Scale</td>
<td>.40</td>
<td>.36</td>
<td>.34</td>
<td>.131</td>
</tr>
<tr>
<td>Effectiveness_3</td>
<td>Dichotomous</td>
<td>.36</td>
<td>0</td>
<td>0</td>
<td>.50</td>
</tr>
<tr>
<td>Effectiveness_4</td>
<td>1-5 Scale</td>
<td>2.65</td>
<td>2</td>
<td>2</td>
<td>.813</td>
</tr>
<tr>
<td>Trust</td>
<td>Index 0-100</td>
<td>74.17</td>
<td>74.7</td>
<td>68.5</td>
<td>12.98</td>
</tr>
<tr>
<td>Size</td>
<td>Scale</td>
<td>37.80</td>
<td>29.00</td>
<td>10.00</td>
<td>36.82</td>
</tr>
<tr>
<td>NNLC</td>
<td>1-3 Scale</td>
<td>1.87</td>
<td>2</td>
<td>2</td>
<td>.670</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>0-1 Scale</td>
<td>.25</td>
<td>.22</td>
<td>0</td>
<td>.14</td>
</tr>
<tr>
<td>Governance</td>
<td>Categorical</td>
<td>N/A</td>
<td>N/A</td>
<td>Lead</td>
<td>N/A</td>
</tr>
<tr>
<td>Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAO</td>
<td>Dichotomous</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Shared</td>
<td>Dichotomous</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Lead</td>
<td>Dichotomous</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Each section below details one model used to answer R$_2$. There are 14 models total. Model 1 addresses the first portion of R$_2$: the relationship between Governance and Effectiveness. Model 2 addresses Proposition 1 from Provan and Kenis (2008). Models 3-14 each test a portion of Propositions 2-4 from Provan and Kenis (2008). These models are tested using OLS regression, in two separate ways. The first approach contains a governance variable, a critical contingency variable, and their interaction term. The second approach contains two analyses run sequentially: the first analysis contains the governance and critical contingency variables and then the second contains their interaction governance and critical contingency variable. This allows the researcher to ascertain whether the individual terms are significant and is particularly important given the small sample size.

With each model run using both approaches (resulting in three analyses per model), and each of these analyses re-run using the four different proxies for
effectiveness as the dependent variable, the total number of analyses for Models 3-14 is 144. Models 1 and 2 are also run four times; one for each proxy of Effectiveness. In total, the results from 152 regression analyses are presented.

**Model 1**

Model 1 investigated the impact of Governance on Effectiveness. Because Governance is a categorical variable, the variable is transformed into 2 dichotomous, dummy variables for analysis: one for Shared and one for Lead. NAO was used as the base line for comparison, and left out of the model. As Field (2009) discusses, when doing analysis with a categorical variable, the number of dummy variables is always equal to the number of categories minus one, which serves as your base line for comparison. Because of this, the beta values are interpreted different than a scale variable: the coefficient represents the difference between group means. Therefore, in this model, the resulting beta values are interpreted against the base, as the difference in Effectiveness from NAO. Model 1 was represented by the following equation:

\[
\text{Effectiveness} = f(\text{Governance})
\]

The results from the analysis are found in Table 9:

**Table 9: Regression Results for Model 1 (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness(_1)</th>
<th>Effectiveness(_2)</th>
<th>Effectiveness(_3)</th>
<th>Effectiveness(_4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>-.664**</td>
<td>-.176**</td>
<td>.078</td>
<td>-.392</td>
</tr>
<tr>
<td>Lead</td>
<td>-.572**</td>
<td>-.195**</td>
<td>.010</td>
<td>-.876*</td>
</tr>
<tr>
<td>Model F value</td>
<td>3.558</td>
<td>3.618</td>
<td>.117</td>
<td>3.335</td>
</tr>
<tr>
<td>Model significance</td>
<td>.036</td>
<td>.034</td>
<td>.889</td>
<td>.043</td>
</tr>
<tr>
<td>level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>.087</td>
<td>.088</td>
<td>.004</td>
<td>.080</td>
</tr>
</tbody>
</table>

\(* *p < .05; *p < .10.*\)
Dummy variables were utilized in the model to represent Shared and Lead governance, using NAO as the base. Fields (2009) discusses that dummy variables are a way to use categorical variables as explanatory variables (as predictors variables should be scale), by representing groups using only zeros and ones. The number of dummy variables needed to represent the categorical, is the number of categories (in this case three: NAO, Shared, and Lead) minus one. The group left out of the analysis serves as the comparison from which the analysis b’s are interpreted. Therefore, the b values from the analysis represent the change in in Effectiveness if a Shared or Lead structure is present, compared to an NAO. The difference (represented in the b) is the actual difference between the group means. The b-value is converted to a t-statistic and has its corresponding significance reported. The t-statistic demonstrates if there is a statistically significant difference between group means, which in this case indicates whether there is a statistically significant difference between the means of NAO and Shared, and NAO and Lead Governance. The results demonstrate that while there were differences in the degree to which Shared and Lead forms of governance explain the variability in Effectiveness, all models indicate that NAO structures has a higher group mean than Shared or Lead. In all but one instance, that difference is statistically significant. The coefficients for each analysis can be interpreted as:

- For Effectiveness₁, a Shared governance structure is associated with a .664 decrease in Effectiveness compared to NAO governance. Similarly, Lead governance has a .572 decrease in Effectiveness, compared to NAO governance. Both variables were statistically significant at the p < .05 threshold.
• For Effectiveness$_2$, a Shared governance structure is associated with a .176 decrease in Effectiveness compared to NAO governance. Similarly, Lead governance has a .195 decrease in Effectiveness, compared to NAO governance. Both variables were statistically significant at the $p < .05$ threshold.

• For Effectiveness$_3$, a Shared governance structure is associated with a .078 increase in Effectiveness compared to NAO governance. Similarly, Lead governance has a .010 increase in Effectiveness, compared to NAO governance. The variables were not statistically significant.

• For Effectiveness$_4$, a Shared governance structure is associated with a .392 decrease in Effectiveness compared to NAO governance. Similarly, Lead governance has a .876 decrease in Effectiveness, compared to NAO governance. In this analysis, only Lead governance is a statistically significant predictor of Effectiveness, at the $p < .10$ threshold.

The results show consistency in the direction of the relationship in three of the four analyses. The differences in the magnitude of the relationship are not meaningful for comparison, as the scale for each proxy measure is different. In order to compare the magnitude of the relationship across different proxies, the same scale would need to be used for each.

The adjusted $R^2$ is a parameter of the goodness of fit of each analysis. The adjusted $R^2$ is similar to the $R^2$, which shows how well terms (data points) fit the line of the regression equation. Peyman (2015) argues that adjusted $R^2$ provides a better representation of the goodness of fit for each regression line because it provides you with
the percentage of variation explained by only the independent variables that actually
impact the dependent variable, while the $R^2$ assumes that every single independent
variable explains variation in the dependent variable. In other words, the adjusted $R^2$ is
usually viewed as the best estimate of the degree of a relationship (Fields, 2009).
Therefore, this study reports the adjusted $R^2$ to demonstrate the goodness of fit for each
analysis. For Model 1, the results are interpreted as:

- For Effectiveness$_1$, the independent variables explain 8.7% of the variability in
  Effectiveness. The analysis is statistically significant at the $p < .05$ threshold.
- For Effectiveness$_2$, the independent variables explain 8.8% of the variability in
  Effectiveness. The analysis is statistically significant at the $p < .05$ threshold.
- For Effectiveness$_3$, the independent variables explain .4% of the variability in
  Effectiveness. The analysis is not statistically significant.
- For Effectiveness$_4$, the independent variables explain 8.0% of the variability in
  Effectiveness. The analysis is statistically significant at the $p < .05$ threshold.

The results show consistency between three of the four analyses. The results for
Effectiveness$_3$ are not consistent with the results from the other analyses for Model 1.

**Model 2**

Proposition 1 was tested using the following empirical model (Model 2), where
Effectiveness was the dependent variable and Consistency (explained below) is the
explanatory. Model 2 empirically tested Proposition One from Provan and Kenis (2008,
p. 241) which states:

**P$_1$: The greater the inconsistency between critical contingency factors and a
particular governance form (both in terms of the number of inconsistent factors**
and the extent to which these factors are inconsistent with characteristics of the
governance form), the less likely that the particular form will be effective, leading
either to overall network ineffectiveness, dissolution, or change in governance
form.

Model 2 is represented by the following equation:

\[ \text{Effectiveness} = f(\text{Consistency}) \]

The results from the analysis are found in Table 10:

**Table 10: Regression Results for Model 2 (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effectiveness(_1)</td>
</tr>
<tr>
<td>Consistency</td>
<td>(0.077^{**})</td>
</tr>
<tr>
<td>Model F value</td>
<td>4.822</td>
</tr>
<tr>
<td>Model significance</td>
<td>0.034</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>(0.083)</td>
</tr>
</tbody>
</table>

\(**p < .05; *p < .10.\)

The results demonstrate that each analysis identifies a decrease in Consistency\(^1\) is associated with an increase in Effectiveness. However, these differences were only statistically significant for Effectiveness\(_1\). The coefficients can be interpreted as:

- For Effectiveness\(_1\), a one unit decrease in Consistency is associated with a .077 increase in Effectiveness. The results were statistically significant at the \(p < .05\) threshold.
- For Effectiveness\(_2\), a one unit decrease in Consistency is associated with a .006 increase in Effectiveness. The results were not statistically significant.

\(^1\) As a reminder, the consistency variable is calculated so that an increase on the scale (0-8) is presentative of a decrease in Consistency.
- For Effectiveness\(_2\), a one unit decrease in Consistency is associated with a \text{.058} increase in Effectiveness. The results were not statistically significant.

- For Effectiveness\(_3\), a one unit decrease in Consistency is associated with a \text{.083} increase in Effectiveness. The results were not statistically significant.

The direction of the relationship between Consistency and Effectiveness is the same across all proxies.

The adjusted \(R^2\) demonstrates the goodness of fit of each regression analysis. A negative score generally indicates that the independent variables were not predictors of the dependent. Therefore, the results for Effectiveness\(_2\) Consistency is likely not a significant predictor of Effectiveness. For Effectiveness\(_1\), Consistency explained \text{8.3\%} of the variability in Effectiveness, statistically significant at the \(p < .05\) threshold. For Effectiveness\(_3\), Consistency explained \text{1.3\%} of the variability in Effectiveness, but the results were not statistically significant. For Effectiveness\(_4\), Consistency explained only \text{.1\%} of the variability in Effectiveness and the results were not statistically significant.

Model 3

Models 3-14 each test a portion of Proposition 2-4 from Provan and Kenis (2008) which make predictions about the interaction of each critical contingency variable with network governance structure on Effectiveness. The models are simple (because of the small sample size), testing one interaction per model.

Model 3 tested the relationship between Shared Governance, Trust, and the interaction of Shared Governance with Trust. Model 7 was represented by the following equation:

\[
\text{Effectiveness} = f (\text{Shared} + \text{Trust} + \text{Shared} \times \text{Trust})
\]
The results from the analysis can be found in Table 11:

**Table 11: Regression Results from Model 3 (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>.506</td>
<td>.110</td>
<td>1.226</td>
<td>1.081</td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td>.007</td>
<td>.003**</td>
<td>.003</td>
<td>0.010</td>
<td></td>
</tr>
<tr>
<td>Shared*Trust</td>
<td>-.009</td>
<td>-.001</td>
<td>-.016</td>
<td>-.009</td>
<td></td>
</tr>
<tr>
<td>Model F value</td>
<td>1.379</td>
<td>2.134</td>
<td>.662</td>
<td>1.532</td>
<td></td>
</tr>
<tr>
<td>Model significance level</td>
<td>.260</td>
<td>.107</td>
<td>.579</td>
<td>0.218</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.21</td>
<td>.059</td>
<td>-.019</td>
<td>.029</td>
<td></td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.**

The results from each analysis are interpreted as follows:

- Shared governance, Trust, and their interaction explain 21% of the variability in Effectiveness₁; however, the results were not statistically significant.

- Shared governance, Trust, and their interaction explain 5.9% of the variability in Effectiveness₂; however, the results were not statistically significant.

- The negative adjusted $R^2$ indicates that Shared, Trust, and their interaction do not result in a model that is significantly better than chance at predicting Effectiveness₃.

- Shared governance, Trust, and their interaction explain 2.9% of the variability in Effectiveness₄; however, the results were not statistically significant.

The percentage of variability in Effectiveness, explained by the model’s independent variables, fluctuates largely between the different proxies for Effectiveness.

In order to determine how the interaction term impacts the analysis, the beta from the interaction term is added to the individual terms. The coefficient of the beta from the
interaction term reflects the difference in the slope from the governance structure present in the model (compared to the other two types). The size of the coefficient indicates the actual difference in slope. So, to determine the relationship between each critical contingency variable and each governance structure, the betas for each critical contingency variable from the analysis are added with the $b$-values from the interaction term. Therefore, the coefficients from the analyses are interpreted as:

- For Effectiveness$_1$, a one-unit increase in Trust is associated with a .002 decrease in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .497 increase in Effectiveness, compared to NAO and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_2$, a one-unit increase in Trust is associated with a .002 increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .109 increase in Effectiveness, compared to NAO and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_3$, a one-unit increase in Trust is associated with a .013 decrease in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a 1.216 increase in Effectiveness, compared to NAO and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_4$, a one-unit increase in Trust is associated with a .001 increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a 1.072 increase in Effectiveness, compared to NAO and Lead structures, when holding Trust constant at its mean.
The results from Model 3 across different proxies are not consistent, with two of the analyses demonstrating a positive relationship between Trust and Effectiveness and two of the analyses demonstrating a negative relationship between Trust and Effectiveness (in the presence of a Shared Structure). The direction of the relationship between a Shared structure and Effectiveness is consistent across all proxies.

In addition, the analyses were re-run as two, sequential models, detailed in Tables 12 and 13.

**Table 12: Regression Results from Model 3 Sequential Analysis Part I (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>-.134</td>
<td>.005</td>
<td>.070</td>
<td>.420*</td>
</tr>
<tr>
<td>Trust</td>
<td>.006</td>
<td>.003**</td>
<td>.001</td>
<td>.009</td>
</tr>
<tr>
<td>Model F value</td>
<td>1.699</td>
<td>3.132</td>
<td>.123</td>
<td>2.227</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.193</td>
<td>.052</td>
<td>.884</td>
<td>.118</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.025</td>
<td>.073</td>
<td>-.034</td>
<td>.043</td>
</tr>
</tbody>
</table>

**Table 13: Regression Results from Model 3 Sequential Analysis Part II (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared*Trust</td>
<td>-.002</td>
<td>9.827E-5</td>
<td>.001</td>
<td>.006*</td>
</tr>
<tr>
<td>Model F value</td>
<td>1.320</td>
<td>.038</td>
<td>.077</td>
<td>3.047</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.256</td>
<td>.846</td>
<td>.783</td>
<td>.087</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.006</td>
<td>-.018</td>
<td>-.017</td>
<td>.064</td>
</tr>
</tbody>
</table>

**$**p < .05; *p < .10.
The sequential models demonstrate the significance of the independent variables in explaining Effectiveness. These included:

- Shared governance, Trust, and their interaction did not have a statistically significant relationship with Effectiveness\(_1\).

- Trust was significant in explaining the variability in Effectiveness\(_2\), at the \(p < .05\) threshold. Neither Shared governance nor the interaction between Shared governance and Trust were statistically significant.

- Shared governance, Trust, and their interaction did not have a statistically significant relationship with Effectiveness\(_3\).

- Both Shared governance and its interaction with Trust have a statistically significant relationship with Effectiveness\(_4\) at the \(p < .10\) threshold. Trust, on its own, was not statistically significant.

In summary, Trust is only significant for Effectiveness\(_2\), while a Shared structure and its interaction with Trust is significant only for Effectiveness\(_4\).

Further, in three of the four analyses the adjusted \(R^2\) was improved by removing the interaction from the model. The adjusted \(R^2\) allows for a comparison of the explanatory power of each regression that contains a different number of predictors. The adjusted \(R^2\) will increase if an additional variable improves the model more than would be expected by chance, and will decrease if an additional predicted improves the model less than expected by chance (Fields, 2009). This means that the interaction between Trust and Shared governance does not significantly improve the models more than would be expected by chance in these instances.
Model 4

Model 4 examined the impact of Shared, Size, and the interaction of Shared and Size on Effectiveness. The model is represented by the following equation:

\[ \text{Effectiveness} = f(\text{Shared} + \text{Size} + \text{Shared} \times \text{Size}) \]

Results from the analysis are found in Table 14:

Table 14: Regression Results from Model 4 (Displaying Unstandardized Coefficients)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness(_1)</th>
<th>Effectiveness(_2)</th>
<th>Effectiveness(_3)</th>
<th>Effectiveness(_4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>-.433**</td>
<td>-.014</td>
<td>-.296</td>
<td>.146</td>
</tr>
<tr>
<td>Size</td>
<td>-.006*</td>
<td>-.002**</td>
<td>-.003</td>
<td>-.017**</td>
</tr>
<tr>
<td>Shared*Size</td>
<td>0.010*</td>
<td>.001</td>
<td>.006*</td>
<td>.011</td>
</tr>
<tr>
<td>Model F value</td>
<td>1.866</td>
<td>2.429</td>
<td>1.550</td>
<td>3.693</td>
</tr>
<tr>
<td>Model significance</td>
<td>.147</td>
<td>.076</td>
<td>.213</td>
<td>.018</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>.046</td>
<td>.074</td>
<td>.030</td>
<td>.130</td>
</tr>
</tbody>
</table>

\(*p < .05; **p < .10.\)

The results from each analysis are interpreted as follows:

- Shared governance, Size, and their interaction explained 4.6% of the variability in Effectiveness\(_1\); however, the results were not statistically significant.
- Shared governance, Size, and their interaction explain 7.4% of the variability in Effectiveness\(_2\). The results were statistically significant at the \(p < .10\) threshold.
- Shared governance, Size, and their interaction explain 3.0% of the variability in Effectiveness\(_3\) but the results were not statistically significant.
- Shared governance, Size, and their interaction explain 13% of the variability in Effectiveness\(_4\). The results were statistically significant at the \(p < .05\) threshold.
The results demonstrate a wide degree of inconsistency between the models.

The coefficients from the analyses are interpreted as:

- For Effectiveness₁, a one-unit increase in Size is associated with a .004 increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .423 decrease in Effectiveness, compared to NAO and Lead structures, when holding Size constant at its mean.

- For Effectiveness₂, a one-unit increase in Size is associated .001 decrease in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .013 decrease in Effectiveness, compared to NAO and Lead structures, when holding Size constant at its mean.

- For Effectiveness₃, a one-unit increase in Size is associated .003 increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .290 decrease in Effectiveness, compared to NAO and Lead structures, when holding Size constant at its mean.

- For Effectiveness₄, a one-unit increase in Size is associated .006 decrease in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .157 increase in Effectiveness, compared to NAO and Lead structures, when holding Size constant at its mean.

The relationship between Size and Effectiveness (in the presence of a Shared structure) is inconsistent between the different proxies of Effectiveness, with Size having a positive relationship with Effectiveness in two of the analyses and a negative relationship with Effectiveness in two of the analyses. A Shared structure had a negative relationship with Effectiveness in three of four analyses.
In addition, the analyses were re-run as two, sequential models. The results of the regression are detailed in Tables 15 and 16:

**Table 15: Regression Results from Model 4 Sequential Analysis Part I (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness1</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>-.129</td>
<td>.014</td>
<td>.059</td>
<td>.480**</td>
</tr>
<tr>
<td>Size</td>
<td>-.001</td>
<td>-.002**</td>
<td>.002</td>
<td>-.011**</td>
</tr>
<tr>
<td>Model F value</td>
<td>.753</td>
<td>3.498</td>
<td>.341</td>
<td>4.822</td>
</tr>
<tr>
<td>Model significance</td>
<td>.476</td>
<td>.038</td>
<td>.713</td>
<td>.012</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.009</td>
<td>.085</td>
<td>-.025</td>
<td>.124</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.**

**Table 16: Regression Results from Model 4 Sequential Analysis Part II (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness1</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared*Size</td>
<td>.000</td>
<td>-.001</td>
<td>.005*</td>
<td>.003</td>
</tr>
<tr>
<td>Model F value</td>
<td>.003</td>
<td>.710</td>
<td>2.904</td>
<td>.446</td>
</tr>
<tr>
<td>Model significance</td>
<td>.957</td>
<td>.403</td>
<td>.094</td>
<td>.507</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.019</td>
<td>-.005</td>
<td>.034</td>
<td>-.010</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.**

The sequential models demonstrate the significance of the independent variables in explaining Effectiveness. These included:

- Shared governance, Size, and their interaction did not have a statistically significant relationship with Effectiveness1.
• Size was significant in explaining the variability in Effectiveness$_2$, at the \( p < .05 \) threshold. Neither Shared governance nor the interaction between Shared governance and Size were statistically significant.

• Shared governance, Size, did not have a statistically significant relationship with Effectiveness$_3$. Their interaction had a statistically significant relationship with Effectiveness at the \( p < .10 \) threshold.

• Both Shared governance and Size had a statistically significant relationship with Effectiveness$_4$ at the \( p < .05 \) threshold. However, their interaction was not statistically significant.

Size was a statistically significant predictor of Effectiveness$_2$ and Effectiveness$_4$, while a Shared structure was only significant for Effectiveness$_4$. Their interaction was significant in the analyses that included Effectiveness$_3$ as the dependent variable.

Further, in three of the four analyses the adjusted \( R^2 \) was reduced by removing the interaction from the model. This means that the interaction between Trust and Shared governance improves the models more than would be expected by chance in these instances.

**Model 5**

Model 5 tested the relationship between Shared, NNLC, and their interaction on Effectiveness. The model is represented in the following equation:

\[
\text{Effectiveness} = f(\text{Shared} + \text{NNLC} + \text{Shared} \times \text{NNLC})
\]

The results from the regressions are found in Table 17:
Table 17: Regression Results for Model 5 (Displaying Unstandardized Coefficients)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>.014</td>
<td>-.159</td>
<td>.211</td>
<td>-.437</td>
</tr>
<tr>
<td>NNLC</td>
<td>0.99</td>
<td>-.058</td>
<td>.070</td>
<td>-.115</td>
</tr>
<tr>
<td>Shared*NNLC</td>
<td>-0.072</td>
<td>.085</td>
<td>-.090</td>
<td>.374</td>
</tr>
<tr>
<td>Model F value</td>
<td>0.633</td>
<td>.791</td>
<td>.124</td>
<td>.440</td>
</tr>
<tr>
<td>Model significance level</td>
<td>0.598</td>
<td>.506</td>
<td>.945</td>
<td>.726</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>-.027</td>
<td>-.015</td>
<td>-.067</td>
<td>-.041</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

The results from each analysis are interpreted as follows:

- Shared governance, NNLC, and their interaction were not significant predictors of Effectiveness₁, Effectiveness₂, Effectiveness₃, or Effectiveness₄.

The coefficients from the analyses are interpreted as:

- For Effectiveness₁, a one-unit increase in NNLC is associated with a .918 increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .058 decrease in Effectiveness, compared to NAO and Lead structures, when holding NNLC constant at its mean.

- For Effectiveness₂, a one-unit increase in NNLC is associated with a .027 increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .074 decrease in Effectiveness, compared to NAO and Lead structures, when holding NNLC constant at its mean.

- For Effectiveness₃, a one-unit increase in NNLC is associated with a .020 decrease in Effectiveness, in the presence of a Shared governance structure. A
Shared structure is associated with a .121 increase in Effectiveness, compared to NAO and Lead structures, when holding NNLC constant at its mean.

- For Effectiveness$_4$, a one-unit increase in NNLC is associated .259 with an increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .063 decrease in Effectiveness, compared to NAO and Lead structures, when holding NNLC constant at its mean.

The direction of the relationship between NNLC and Effectiveness (in the presence of a Shared structure), and a Shared structure and Effectiveness is consistent for three of the four Effectiveness proxies.

In addition, the analyses were re-run as two, sequential models. The results of the regression are detailed in Tables 18 and 19.

**Table 18: Regression Results from Model 5 Sequential Analysis Part I (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness$_1$</th>
<th>Effectiveness$_2$</th>
<th>Effectiveness$_3$</th>
<th>Effectiveness$_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>-.109</td>
<td>-.013</td>
<td>.078</td>
<td>.208</td>
</tr>
<tr>
<td>NNLC</td>
<td>.072</td>
<td>-.026</td>
<td>.036</td>
<td>.019</td>
</tr>
<tr>
<td>Model $F$ value</td>
<td>.905</td>
<td>.328</td>
<td>.130</td>
<td>.290</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.431</td>
<td>.723</td>
<td>.878</td>
<td>.750</td>
</tr>
<tr>
<td>$N$</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.005</td>
<td>-.033</td>
<td>-.043</td>
<td>-.034</td>
</tr>
</tbody>
</table>

**$^{**}p < .05; *p < .10.$**
Table 19: Regression Results from Model 5 Sequential Analysis Part II (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared*NNLC</td>
<td>-.062</td>
<td>.003</td>
<td>.030</td>
<td>.151</td>
</tr>
<tr>
<td>Model F value</td>
<td>.858</td>
<td>.016</td>
<td>.116</td>
<td>1.047</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.360</td>
<td>.901</td>
<td>.735</td>
<td>.321</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.003</td>
<td>-.024</td>
<td>-.021</td>
<td>.001</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

The sequential models demonstrate the significance of the independent variables in explaining Effectiveness. None of the variables had a statistically significant relationship with any of the different measures of Effectiveness.

Model 6

Model 6 tested the relationship between Shared, Goal Consensus, and their interaction on Effectiveness. The model is represented by the following equation:

$$\text{Effectiveness} = f(\text{Shared} + \text{Goal Consensus} + \text{Shared} \times \text{Goal Consensus})$$

The results from the analysis are found in Table 20:

Table 20: Regression Results from Model 6 (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>.070</td>
<td>-.100</td>
<td>.621</td>
<td>.743</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>.062</td>
<td>-.112</td>
<td>.771</td>
<td>1.558*</td>
</tr>
<tr>
<td>Shared*Goal Consensus</td>
<td>-.748</td>
<td>.383</td>
<td>-2.054</td>
<td>-1.320</td>
</tr>
<tr>
<td>Model F value</td>
<td>.602</td>
<td>.533</td>
<td>1.333</td>
<td>2.216</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.616</td>
<td>.662</td>
<td>.274</td>
<td>.098</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.023</td>
<td>-.027</td>
<td>.018</td>
<td>.063</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.
The results from each analysis are interpreted as follows:

- Shared, Goal Consensus and their interaction were not significant predictors of Effectiveness$_1$ or Effectiveness$_2$
- Shared Governance, Goal Consensus, and their interaction explained 1.8% of the variability in Effectiveness$_3$. The results were not statistically significant.
- Shared governance, Goal Consensus, and their interaction explain 6.33% of the variability in Effectiveness$_4$. The results were statistically significant at the $p < .10$ threshold.

The results are somewhat consistent among all proxies for Effectiveness.

The coefficients from the analyses are interpreted as:

- For Effectiveness$_1$, a one-unit increase in Goal Consensus is associated $-0.686$ decrease in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a $-0.678$ decrease in Effectiveness, compared to NAO and Lead structures, when holding Goal Consensus constant at its mean.
- For Effectiveness$_2$, a one-unit increase in Goal Consensus is associated $0.271$ increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a $0.283$ increase in Effectiveness, compared to NAO and Lead structures, when holding Goal Consensus constant at its mean.
- For Effectiveness$_3$, a one-unit increase in Goal Consensus is associated $1.283$ decrease in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a $1.433$ decrease in Effectiveness, compared to NAO and Lead structures, when holding Goal Consensus constant at its mean.
• For Effectiveness₁, a one-unit increase in Goal Consensus is associated .238 increase in Effectiveness, in the presence of a Shared governance structure. A Shared structure is associated with a .577 decrease in Effectiveness, compared to NAO and Lead structures, when holding Goal Consensus constant at its mean. The relationship between Goal Consensus and Effectiveness is not consistent against different proxies of Effectiveness, with two analyses showing a positive relationship between the variables in the presence of a Shared structure and two of the analyses showing a negative relationship between the two in the presence of a Shared structure. The results are more consistent for a Shared structure, showing the same direction in relationship across three of the four proxies.

In addition, the analyses were re-run as two, sequential models. The results of the regression are detailed in Tables 21 and 22.

**Table 21: Regression Results from Model 6 Sequential Analysis Part I (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>-.135</td>
<td>.005</td>
<td>-.014</td>
<td>.381</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>-.075</td>
<td>-.041</td>
<td>-.225</td>
<td>1.314*</td>
</tr>
<tr>
<td>Model F value</td>
<td>.648</td>
<td>.061</td>
<td>.432</td>
<td>3.129</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.527</td>
<td>.941</td>
<td>.652</td>
<td>.052</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.013</td>
<td>-.036</td>
<td>-.021</td>
<td>.073</td>
</tr>
</tbody>
</table>

* **p < .05; *p < .10.*
Table 22: Regression Results from Model 6 Sequential Analysis Part II (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared*Goal Consensus</td>
<td>-.527</td>
<td>.060</td>
<td>-.157</td>
<td>1.216</td>
</tr>
<tr>
<td>Model F value</td>
<td>1.819</td>
<td>.245</td>
<td>.398</td>
<td>2.712</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.183</td>
<td>.623</td>
<td>.531</td>
<td>.106</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.015</td>
<td>-.014</td>
<td>-.011</td>
<td>.031</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

The sequential models demonstrate the significance of the independent variables in explaining Effectiveness. Shared governance, Goal Consensus, and their interaction did not have a significant relationship with Effectiveness₁, Effectiveness₂, or Effectiveness₃. For Effectiveness₄, Goal Consensus had a statistically significant relationship with Effectiveness (at the $p < .10$ threshold; however, neither Shared governance nor their interaction had a statistically significant relationship in this instance.

Model 7

Model 7 tested the relationship between Lead, Trust, and their interaction and Effectiveness. Model 7 is represented by the following equation:

$\text{Effectiveness} = f (\text{Lead} + \text{Trust} + \text{Lead} \times \text{Trust})$

The results from the analysis are found in Table 23:
Table 23: Regression Results for Model 7 (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effectiveness&lt;sub&gt;1&lt;/sub&gt;</td>
</tr>
<tr>
<td>Lead</td>
<td>-.720</td>
</tr>
<tr>
<td>Trust</td>
<td>-.001</td>
</tr>
<tr>
<td>Lead*Trust</td>
<td>.010</td>
</tr>
<tr>
<td>Model F value</td>
<td>1.131</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.345</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted R&lt;sup&gt;2&lt;/sup&gt;</td>
<td>.007</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

The results from each analysis are interpreted as follows:

- Lead governance, Trust, and their interaction explained .7% of the variability in Effectiveness<sub>1</sub>; however, the results were not statistically significant.
- Lead governance, Trust, and their interaction explain 9.6% of the variability in Effectiveness<sub>2</sub>. The results were statistically significant at the p < .05 threshold.
- Lead governance, Trust, and their interaction explained 5.2% of the variability in Effectiveness<sub>3</sub> and the results were not statistically significant.
- Lead governance, Trust, and their interaction explain 14.7% of the variability in Effectiveness<sub>4</sub>. The results were statistically significant at the p < .05 threshold.

The results are somewhat consistent across different proxies of Effectiveness. While each analysis demonstrates that Lead governance, Trust, and their interaction explain a percentage of the variability in Effectiveness, the magnitude of the relationship is different across analyses.

The coefficients from the analyses are interpreted as:

- For Effectiveness<sub>1</sub>, a one-unit increase in Trust is associated with a .009 increase in Effectiveness, in the presence of a Lead governance structure. A Lead
structure is associated with a .710 decrease in Effectiveness, compared to NAO and Shared structures, when holding Trust constant at its mean.

• For Effectiveness\textsubscript{2}, a one-unit increase in Trust is associated with a .002 increase in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .116 increase in Effectiveness, compared to NAO and Shared structures, when holding Trust constant at its mean.

• For Effectiveness\textsubscript{3}, a one-unit increase in Trust is associated with a .007 increase in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a 1.761 decrease in Effectiveness, compared to NAO and Shared structures, when holding Trust constant at its mean.

• For Effectiveness\textsubscript{4}, a one-unit increase in Trust is associated .017 increase in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a 2.971 decrease in Effectiveness, compared to NAO and Shared structures, when holding Trust constant at its mean.

The direction of the relationship between Trust and Effectiveness, in the presence of a Lead structure, is consistent across all Effectiveness proxies. The direction of the relationship between Lead governance and Effectiveness is somewhat consistent across the different proxies, with Lead governance and Effectiveness having a negative relationship in three of four analyses.

In addition, the analyses were re-run as two, sequential models. The results of the regression are detailed in Tables 24 and 25.
Table 24: Regression Results from Model 7 Sequential Analysis Part I (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>-.001</td>
<td>-.042</td>
<td>-.057</td>
<td>-.535**</td>
</tr>
<tr>
<td>Trust</td>
<td>.006</td>
<td>.003**</td>
<td>.000</td>
<td>.008</td>
</tr>
<tr>
<td>Model F value</td>
<td>1.044</td>
<td>3.998</td>
<td>.089</td>
<td>3.609</td>
</tr>
<tr>
<td>Model significance</td>
<td>.359</td>
<td>.024</td>
<td>.915</td>
<td>.034</td>
</tr>
</tbody>
</table>

| N                     | 55             | 55             | 55             | 55             |
| Adjusted $R^2$        | .002           | .100           | -.035          | .088           |

**p < .05; *p < .10.

Table 25: Regression Results from Model 7 Sequential Analysis Part II (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead*Trust</td>
<td>.001</td>
<td>.000</td>
<td>6.986E-5</td>
<td>-.005</td>
</tr>
<tr>
<td>Model F value</td>
<td>.292</td>
<td>.471</td>
<td>.002</td>
<td>2.595</td>
</tr>
<tr>
<td>Model significance</td>
<td>.592</td>
<td>.496</td>
<td>.969</td>
<td>.113</td>
</tr>
</tbody>
</table>

| N                     | 55             | 55             | 55             | 55             |
| Adjusted $R^2$        | -.013          | -.010          | -.019          | .029           |

**p < .05; *p < .10.

The sequential models demonstrate the significance of the independent variables in explaining Effectiveness. For Effectiveness₁ and Effectiveness₃, none of the variables were statistically significant. For Effectiveness₂, Trust was significantly significant at the $p < .05$ threshold, but neither Lead governance nor their interaction was statistically significant. For Effectiveness₄, Shared governance was statistically significant at the $p < .05$ threshold, but neither Trust nor their interaction was statistically significant.
Model 8

Model 8 tested the relationship between Lead, Size, and their interaction on Effectiveness. Model 12 is represented by the following equation:

\[ \text{Effectiveness} = f(\text{Lead} + \text{Size} + \text{Lead} \times \text{Size}) \]

The results from the analysis are found in Table 26:

**Table 26** Regression Results for Model 8 (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness(_1)</th>
<th>Effectiveness(_2)</th>
<th>Effectiveness(_3)</th>
<th>Effectiveness(_4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>.124</td>
<td>-.064</td>
<td>.272</td>
<td>-.320</td>
</tr>
<tr>
<td>Size</td>
<td>.000</td>
<td>-.002**</td>
<td>.007</td>
<td>-.007</td>
</tr>
<tr>
<td>Lead*Size</td>
<td>-.004</td>
<td>.001</td>
<td>-.011</td>
<td>-.088</td>
</tr>
<tr>
<td>Model F value</td>
<td>.392</td>
<td>2.986</td>
<td>1.476</td>
<td>4.191</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.759</td>
<td>.040</td>
<td>.232</td>
<td>.010</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>-.035</td>
<td>.099</td>
<td>.026</td>
<td>.151</td>
</tr>
</tbody>
</table>

\(*p < .05; **p < .10.\)

The results from each analysis are interpreted as follows:

- Lead governance, Size, and their interaction were not significant predictors of Effectiveness\(_1\).

- Lead governance, Size, and their interaction explain 9.9% of the variability in Effectiveness\(_2\). The results were statistically significant at the \(p < .05\) threshold.

- Lead governance, Size, and their interaction explain 2.6% of the variability in Effectiveness\(_3\).

- Lead governance, Size, and their interaction explain 15.1% of the variability in Effectiveness\(_4\). The results were statistically significant at the \(p < .05\) threshold.
The amount of variability in Effectiveness explained by Lead governance, Size, and their interaction was varied widely across different proxies for Effectiveness.

The coefficients from the analyses are interpreted as:

- For Effectiveness$_1$, a one-unit increase in Size is associated with a .004 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .120 increase in Effectiveness, compared to NAO and Shared structures, when holding Size constant at its mean.

- For Effectiveness$_2$, a one-unit increase in Size is associated with a .001 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .063 decrease in Effectiveness, compared to NAO and Shared structures, when holding Size constant at its mean.

- For Effectiveness$_3$, a one-unit increase in Size is associated with a .004 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .261 increase in Effectiveness, compared to NAO and Shared structures, when holding Size constant at its mean.

- For Effectiveness$_4$, a one-unit increase in Size is associated with a .095 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .408 decrease in Effectiveness, compared to NAO and Shared structures, when holding Size constant at its mean.

The direction of the relationship between Size and Effectiveness, in the presence of a Lead structure, is consistent among all proxies for Effectiveness. However, Shared governance had a negative relationship with Effectiveness in half of the analyses and a positive relationship in half, demonstrating inconsistency.
In addition, the analyses were re-run as two, sequential models. The results of the regression are detailed in Tables 27 and 28.

**Table 27: Regression Results from Model 8 Sequential Analysis Part I (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>-.009</td>
<td>-.046</td>
<td>-.057</td>
<td>-.545**</td>
</tr>
<tr>
<td>Size</td>
<td>-.002</td>
<td>-.002**</td>
<td>.002</td>
<td>-.010**</td>
</tr>
<tr>
<td>Model F value</td>
<td>.199</td>
<td>4.461</td>
<td>.344</td>
<td>5.971</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.820</td>
<td>.016</td>
<td>.710</td>
<td>.005</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.031</td>
<td>.114</td>
<td>-.025</td>
<td>.155</td>
</tr>
</tbody>
</table>

**Table 28: Regression Results from Model 8 Sequential Analysis Part II (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead*Size</td>
<td>-.002</td>
<td>-.002*</td>
<td>-.003</td>
<td>-.016**</td>
</tr>
<tr>
<td>Model F value</td>
<td>.715</td>
<td>3.924</td>
<td>.853</td>
<td>11.370</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.401</td>
<td>.053</td>
<td>.360</td>
<td>.001</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.005</td>
<td>.051</td>
<td>-.003</td>
<td>.161</td>
</tr>
</tbody>
</table>

The sequential models demonstrate the significance of the independent variables in explaining Effectiveness. For Effectiveness₁ and Effectiveness₃, none of the variables were statistically significant. For Effectiveness₂, Size and the interaction of Size and Lead governance were significantly significant at the $p < .05$ threshold and the at the $p < .10$ threshold, respectively; however Lead governance was not statistically significant, on
its own. For Effectiveness4, all variables were statistically significant at the $p < .05$ threshold.

**Model 9**

Model 9 investigated the relationship between Lead, NNLC, and their interaction on Effectiveness. OLS regression was used to test the following equation:

$$\text{Effectiveness} = f(\text{Lead} + \text{NNLC} + \text{Lead} \times \text{NNLC})$$

The results from the analysis are found in Table 29:

**Table 29: Regression Results for Model 9 (Displaying Unstandardized Coefficients)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness1</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>-.154</td>
<td>-.086</td>
<td>-.081</td>
<td>.773</td>
</tr>
<tr>
<td>NNLC</td>
<td>.085</td>
<td>-.029</td>
<td>.029</td>
<td>.441</td>
</tr>
<tr>
<td>Lead*NNLC</td>
<td>.045</td>
<td>.027</td>
<td>.009</td>
<td>-.641</td>
</tr>
<tr>
<td>Model F value</td>
<td>.473</td>
<td>.551</td>
<td>.063</td>
<td>1.418</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.703</td>
<td>.651</td>
<td>.979</td>
<td>.252</td>
</tr>
<tr>
<td>$N$</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>-.039</td>
<td>-.033</td>
<td>-.072</td>
<td>.028</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.**

The results from each analysis are somewhat consistent (same across three of four analyses) and are interpreted as follows:

- Lead governance, NNLC, and their interaction were not significant predictors of Effectiveness1, Effectiveness2, or Effectiveness3.

- Lead governance, NNLC, and their interaction explain 2.8% of the variability in Effectiveness4. The results were not statistically significant.

The coefficients from the analyses are interpreted as:
- For Effectiveness\(_1\), a one-unit increase in NNLC is associated with a .130 increase in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .109 decrease in Effectiveness, compared to NAO and Shared structures, when holding NNLC constant at its mean.

- For Effectiveness\(_2\), a one-unit increase in NNLC is associated with a .002 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .059 decrease in Effectiveness, compared to NAO and Shared structures, when holding NNLC constant at its mean.

- For Effectiveness\(_3\), a one-unit increase in NNLC is associated with a .038 increase in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .072 decrease in Effectiveness, compared to NAO and Shared structures, when holding NNLC constant at its mean.

- For Effectiveness\(_4\), a one-unit increase in NNLC is associated with a .200 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .132 increase in Effectiveness, compared to NAO and Shared structures, when holding NNLC constant at its mean.

The relationship between Effectiveness and NNLC, in the presence of a Lead structure, is not consistent: the direction of the relationship is positive in half of the analyses and negative in the other half. The relationship between Effectiveness and a Lead structure was consistent in three of four analyses.

In addition, the analyses were re-run as two, sequential models. The results of the regression are detailed in Tables 30 and 31.
The sequential models demonstrate the significance of the independent variables in explaining Effectiveness. In this case, Lead governance, NNLC, and their interaction were not statistically significant for any analysis.

**Model 10**

Model 10 tested the relationship between Lead, Goal Consensus, and their interaction on Effectiveness. Model 10 is represented by the following equation:

\[
\text{Effectiveness} = f (\text{Lead} + \text{Goal Consensus} + \text{Lead} \times \text{Goal Consensus})
\]

The results from the analysis are found in Table 32:
Table 32: Regression Results for Model 10 (Displaying Unstandardized Coefficients)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness&lt;sub&gt;1&lt;/sub&gt;</th>
<th>Effectiveness&lt;sub&gt;2&lt;/sub&gt;</th>
<th>Effectiveness&lt;sub&gt;3&lt;/sub&gt;</th>
<th>Effectiveness&lt;sub&gt;4&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>-.007</td>
<td>-.056</td>
<td>-.092</td>
<td>-.464</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>-.109</td>
<td>-.071</td>
<td>.310</td>
<td>1.539</td>
</tr>
<tr>
<td>Lead*Goal Consensus</td>
<td>-.008</td>
<td>.042</td>
<td>.153</td>
<td>-.275</td>
</tr>
</tbody>
</table>

Model F value | .028 | .595 | .318 | 3.254
Model significance level | .994 | .621 | .813 | .029
N | 55 | 55 | 55 | 55
Adjusted $R^2$ | -.057 | -.023 | -.039 | .111

**p < .05; *p < .10.

The results from each analysis are somewhat consistent (the same across three of four analyses) and are interpreted as follows:

- Lead governance, Goal Consensus, and their interaction were not significant predictors of Effectiveness<sub>1</sub>, Effectiveness<sub>2</sub>, or Effectiveness<sub>3</sub>.
- Lead governance, Goal Consensus, and their interaction explain 11.1% of the variability in Effectiveness<sub>4</sub>. The results were statistically significant at the $p < .05$ threshold.

The coefficients from the analyses are interpreted as:

- For Effectiveness<sub>1</sub>, a one-unit increase in Goal Consensus is associated .117 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .015 decrease in Effectiveness, compared to NAO and Shared structures, when holding Goal Consensus constant at its mean.
- For Effectiveness<sub>2</sub>, a one-unit increase in Goal Consensus is associated .029 decrease in Effectiveness, in the presence of a Lead governance structure. A Lead
structure is associated with a .0014 decrease in Effectiveness, compared to NAO and Shared structures, when holding Goal Consensus constant at its mean.

- For Effectiveness$_3$, a one-unit increase in Goal Consensus is associated with a .463 increase in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .061 increase in Effectiveness, compared to NAO and Shared structures, when holding Goal Consensus constant at its mean.

- For Effectiveness$_4$, a one-unit increase in Goal Consensus is associated with a 1.264 increase in Effectiveness, in the presence of a Lead governance structure. A Lead structure is associated with a .739 decrease in Effectiveness, compared to NAO and Shared structures, when holding Goal Consensus constant at its mean.

The relationship between Goal Consensus and Effectiveness is not consistent across the four proxy measures of Effectiveness, with the relationship being positive in half of the analyses and negative in half of the analyses. The relationship between a Lead structure and Effectiveness is somewhat consistent, showing the same direction in relationship for three of four analyses.

In addition, the analyses were re-run as two, sequential models. The results of the regression are detailed in Tables 33 and 34.

The sequential models demonstrate the significance of the independent variables in explaining Effectiveness.
Table 33: Regression Results from Model 10 Sequential Analysis Part I (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness1</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>-0.009</td>
<td>-0.046</td>
<td>-0.045</td>
<td>-0.532**</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>-0.114</td>
<td>-0.045</td>
<td>-0.234</td>
<td>1.370*</td>
</tr>
<tr>
<td>Model F value</td>
<td>0.042</td>
<td>0.885</td>
<td>0.602</td>
<td>4.944</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.958</td>
<td>.419</td>
<td>.551</td>
<td>.011</td>
</tr>
</tbody>
</table>

**N** = 55

Adjusted $R^2$ = -0.037, -0.004, -0.015, 0.127

$**p < .05; *p < .10.$

In this case, Lead governance, NNLC, and their interaction were not statistically
significant for Effectiveness1, Effectiveness2, or Effectiveness3. For Effectiveness4, Lead
governance and Goal Consensus were statistically significant at the $p < .05$, and the $p$
< .10 respectively; however, their interaction was not statistically significant.

Model 11

Model 11 tested the interaction of NAO and Trust on Effectiveness, which is
represented by the following equation:
Effectiveness = f (NAO + Trust + NAO*Trust)

The results from the analysis are found in Table 35:

Table 35: Regression Results for Model 11 (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness&lt;sub&gt;1&lt;/sub&gt;</th>
<th>Effectiveness&lt;sub&gt;2&lt;/sub&gt;</th>
<th>Effectiveness&lt;sub&gt;3&lt;/sub&gt;</th>
<th>Effectiveness&lt;sub&gt;4&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>2.043**</td>
<td>-.211</td>
<td>2.150*</td>
<td>6.330**</td>
</tr>
<tr>
<td>Trust</td>
<td>.006</td>
<td>.002*</td>
<td>.003</td>
<td>.014*</td>
</tr>
<tr>
<td>NAO*Trust</td>
<td>-.019</td>
<td>.005</td>
<td>-.028*</td>
<td>-.072**</td>
</tr>
<tr>
<td>Model F value</td>
<td>3.535</td>
<td>5.024</td>
<td>1.077</td>
<td>4.114</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.021</td>
<td>.004</td>
<td>.367</td>
<td>.011</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.123</td>
<td>.183</td>
<td>.060</td>
<td>.147</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

The adjusted $R^2$ demonstrates that NAO, Trust, and their interaction explain considerable variability in Effectiveness:

- For Effectiveness<sub>1</sub>, NAO governance, Trust, and their interaction explain 12.3% of the variability in Effectiveness. The analysis is statistically significant at the $p < .05$ threshold.

- For Effectiveness<sub>2</sub>, NAO governance, Trust, and their interaction explain 18.3% of the variability in Effectiveness. The analysis is statistically significant at the $p < .05$ threshold.

- For Effectiveness<sub>3</sub>, NAO governance, Trust, and their interaction explain 6.0% of the variability in Effectiveness. The analysis is not statistically significant.

- For Effectiveness<sub>4</sub>, NAO governance, Trust, and their interaction explain 14.7% of the variability in Effectiveness. The analysis is statistically significant at the $p < .05$ threshold.
The results are somewhat consistent, but show a wide range across the analysis in the percentage of variability explained by NAO governance, Trust, and their interaction.

The coefficients from the mode are interpreted as:

- For Effectiveness$_1$, a one-unit increase in Trust is associated with a .013 decrease in Effectiveness in the presence of an NAO governance structure. The NAO structure is associated with a 2.024 increase in Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_2$, a one-unit increase is Trust is associated with a .007 increase in Effectiveness the presence of an NAO governance structure. The NAO structure is associated with a .206 decrease in effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_3$, a one-unit increase is Trust is associated with a .025 decrease in Effectiveness in the presence of an NAO governance structure. The NAO structure is associated with a 2.122 increase in Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_4$, a one-unit increase is Trust is associated with a .058 decrease in Effectiveness in the presence of an NAO governance structure. The NAO structure is associated with a 6.258 increase in Effectiveness, compared to Share and Lead structures, when holding Trust constant at its mean.

The relationship between Trust and Effectiveness, in the presence of an NAO structure, was somewhat consistent having the same direction in three of four analyses. The relationship between an NAO structure and Effectiveness was somewhat consistent, having the same direction in three of four analyses.
Model 3 was also run as two separate, sequential models in order to determine the statistical significance of each of the individual terms. The results from this analysis are found in Table 36 and 37:

**Table 36: Regression Results for Model11, Sequential Analysis Part I (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>.569**</td>
<td>.171**</td>
<td>-.036</td>
<td>.667</td>
</tr>
<tr>
<td>Trust</td>
<td>.005</td>
<td>.003**</td>
<td>.001</td>
<td>.007</td>
</tr>
<tr>
<td>Model F value</td>
<td>4.076</td>
<td>6.568</td>
<td>.013</td>
<td>1.549</td>
</tr>
<tr>
<td>Model significance level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>.102</td>
<td>.171</td>
<td>-.038</td>
<td>.020</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.**

**Table 37: Regression Results for Model 11, Sequential Analysis Part II (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO*Trust</td>
<td>.084**</td>
<td>.003**</td>
<td>-.002</td>
<td>.005</td>
</tr>
<tr>
<td>Model F value</td>
<td>4.866</td>
<td>9.569</td>
<td>.250</td>
<td>.766</td>
</tr>
<tr>
<td>Model significance level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>.067</td>
<td>.137</td>
<td>-.014</td>
<td>-.004</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.**

For each analysis, the presence of an NAO governance structure resulted in an increase in Effectiveness, compared to Shared and Lead structures. The statistical significance of the individual terms is:
For Effectiveness1, both NAO and the interaction of NAO and Trust are statistically significant predictors of Effectiveness at the $p < .05$ threshold. However, Trust itself is not statistically significant.

For Effectiveness2, NAO, Trust, and their interaction are all statistically significant predictors of Effectiveness at the $p < .05$ threshold.

For Effectiveness3, none of the variables were statistically significant predictors of Effectiveness.

For Effectiveness4, NAO, Trust, and their interaction had a statistically significant relationship with Effectiveness.

**Model 12**

Model 12 tested the impacts of NAO, Size, and their interaction on Effectiveness. Model 4 was represented by the following equation:

$$\text{Effectiveness} = f (\text{NAO} + \text{Size} + \text{NAO*Size})$$

The results from the analysis can be found in Table 38:

**Table 38: Regression Results for Model 12 (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness$_1$</th>
<th>Effectiveness$_2$</th>
<th>Effectiveness$_3$</th>
<th>Effectiveness$_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>.573</td>
<td>.567**</td>
<td>.357</td>
<td>.271</td>
</tr>
<tr>
<td>Size</td>
<td>.000</td>
<td>-.001**</td>
<td>.002</td>
<td>-.009*</td>
</tr>
<tr>
<td>NAO*Size</td>
<td>.003</td>
<td>-.049**</td>
<td>-.041</td>
<td>.028</td>
</tr>
<tr>
<td>Model $F$ value</td>
<td>2.105</td>
<td>6.846</td>
<td>.248</td>
<td>1.952</td>
</tr>
<tr>
<td>Model significance</td>
<td>.111</td>
<td>.001</td>
<td>.862</td>
<td>.133</td>
</tr>
<tr>
<td>level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$N$</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.058</td>
<td>.245</td>
<td>-.044</td>
<td>.050</td>
</tr>
</tbody>
</table>

$**p < .05; *p < .10.$
The results from the analyses demonstrate that NAO governance, Size, and their interaction explain some degree of variability in Effectiveness. However, the degree of variability for each model is something different, particularly for Effectiveness2. The results are interpreted as:

- NAO governance, Size, and their interaction explained 5.8% of the variability in Effectiveness1. The results were not statistically significant.
- NAO governance, Size, and their interaction explained 24.5% of the variability in Effectiveness2. The results are statistically significant at the $p < .05$ threshold.
- NAO governance, Size, and their interaction were not significant predictors of Effectiveness3.
- NAO governance, size, and their interaction explained 5.0% of the variability in Effectiveness4. The results were not statistically significant.

The results are inconsistent across the four analyses, with the percentage of variability explained being high for Effectiveness2 and nonexistent for Effectiveness3.

The coefficients from the analysis are interpreted as:

- For Effectiveness1, a one-unit increase in Size is associated with a .003 increase in Effectiveness in the presence of an NAO governance structure. An NAO structure is associated with a .576 increase in Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.
- For Effectiveness2, a one-unit increase in Size is associated with a negligible impact on Effectiveness in the presence of an NOA governance structure. An NAO structure is associated with a .518 increase in Effectiveness, compared to Shared and Lead Structures, when holding Trust constant at its mean.
• For Effectiveness\textsubscript{3}, a one-unit increase in Size is associated with a .039 decrease in Effectiveness in the presence of an NAO structure. An NAO structure is associated with a .316 increase in Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

• For Effectiveness\textsubscript{4}, a one-unit increase in Size is associated with a .019 increase in Effectiveness in the presence of an NAO governance structure. An NAO structure is associated with a .299 increase in Effectiveness, compared to Shared and Lead Structures, when holding Trust constant at its mean.

The relationship between Size and Effectiveness, in the presence of an NAO structure, was not consistent across the different analyses. However, the relationship between an NAO structure and Effectiveness was consistent across all analyses, showing the same direction in each.

Model 12 was also run as two separate, sequential models in order to determine the statistical significance of each of the individual terms. The results from this analysis are found in Table 39 40, with the interpretation of the results below.

**Table 39: Regression Results for Model 12, Sequential Analysis Part I (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness\textsubscript{1}</th>
<th>Effectiveness\textsubscript{2}</th>
<th>Effectiveness\textsubscript{3}</th>
<th>Effectiveness\textsubscript{4}</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>.597**</td>
<td>.154**</td>
<td>.017</td>
<td>.509</td>
</tr>
<tr>
<td>Size</td>
<td>.000</td>
<td>-.002**</td>
<td>.002</td>
<td>-.009*</td>
</tr>
<tr>
<td>Model F value</td>
<td>3.218</td>
<td>6.092</td>
<td>.260</td>
<td>2.960</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.048</td>
<td>.004</td>
<td>.772</td>
<td>.061</td>
</tr>
<tr>
<td>(N)</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>.076</td>
<td>.159</td>
<td>-.028</td>
<td>.068</td>
</tr>
</tbody>
</table>

**\(p < .05; \ast p < .10.\)
The results are somewhat consistent. For each analysis, the presence of an NAO governance structure resulted in an increase in Effectiveness, compared to Shared and Lead structures. In two of the three analyses, an increase in Size was associated with a decrease in Effectiveness. The statistical significance of the individual terms is:

- For Effectiveness\(_1\), both NAO and the interaction of NAO and Size are statistically significant predictors of Effectiveness at the \(p < .05\) threshold. However, Size itself is not statistically significant.
- For Effectiveness\(_2\), both NAO and Size are statistically significant predictors of Effectiveness at the \(p < .05\) threshold. However, their interaction is not statistically significant.
- For Effectiveness\(_3\), none of the predictor variables had a statistically significant relationship with Effectiveness.
- For Effectiveness\(_4\), only Size had a statistically significant relationship with effectiveness, at the \(p < .10\) threshold.
Model 13

Model 13 investigates NAO, NNLC, and their interactions’ impact on Effectiveness. The model is represented by the following equation:

\[ \text{Effectiveness} = f(\text{NAO + NNLC + NAO*NNLC}) \]

Results from the analysis are found in Table 41:

**Table 41: Regression Results from Model 13 (Displaying Unstandardized Betas)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness(_1)</th>
<th>Effectiveness(_2)</th>
<th>Effectiveness(_3)</th>
<th>Effectiveness(_4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>.107</td>
<td>1.195**</td>
<td>-.875</td>
<td>-2.938</td>
</tr>
<tr>
<td>NNLC</td>
<td>.095</td>
<td>.005</td>
<td>-3.296E-16</td>
<td>-.086</td>
</tr>
<tr>
<td>NAO*NNLC</td>
<td>.320</td>
<td>-.605**</td>
<td>.500</td>
<td>2.086*</td>
</tr>
<tr>
<td>Model F value</td>
<td>3.744</td>
<td>13.461</td>
<td>.226</td>
<td>1.812</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.019</td>
<td>.000</td>
<td>.878</td>
<td>.161</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Adjusted (R^2)</td>
<td>.164</td>
<td>.471</td>
<td>-.059</td>
<td>.054</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.**

The results demonstrate a large difference in the degree of variability of Effectiveness explained by NAO governance structures, NNLC, and their interaction.

They are interpreted as:

- NAO governance, NNLC, and their interaction account for 16.4% of the variability in Effectiveness\(_1\), significant at the \(p < .05\) threshold.
- NAO governance, NNLC, and their interaction account for 41.1% of the variability in Effectiveness\(_2\), significant at the \(p < .05\) threshold.
- NAO governance, NNLC, and their interaction were not significant predictors of Effectiveness\(_3\).
NAO governance, NNLC, and their interaction account for 8.2% of the variability in Effectiveness. The results are not statistically significant.

The results from the analyses also show considerable differences in the degree to which each variable impacts effectiveness:

- For Effectiveness\(_1\), a one-unit increase in NNLC is associated with a .415 increase in Effectiveness in the presence of an NAO governance structure. An NAO structure is associated with a .427 increase in Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

- For Effectiveness\(_2\), a one-unit increase in NNLC is associated with a .600 decrease in Effectiveness in the presence of an NOA governance structure. An NAO structure is associated with a .590 increase in Effectiveness, compared to Shared and Lead Structures, when holding Trust constant at its mean.

- For Effectiveness\(_3\), a one-unit increase in NNLC is associated with a negligible impact on Effectiveness in the presence of an NAO structure. An NAO structure is associated with a .375 decrease in Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

- For Effectiveness\(_4\), a one-unit increase in NNLC is associated with a 2 unit increase in Effectiveness in the presence of an NAO governance structure. An NAO structure is associated with a .852 decrease in Effectiveness, compared to Shared and Lead Structures, when holding Trust constant at its mean.

The relationship between Effectiveness and NNLC, in the presence of an NAO structure, is inconsistent across the analyses, having the same direction in only two of four.
relationship between an NAO structure and Effectiveness is also inconsistent, being positive in two and negative in two.

To determine the statistical significance of the independent variables, the analyses were re-run as two sequential models. The results are presented in Tables 42 and 43, with an interpretation that follows:

Table 42: Regression Results for Model 13, Sequential Analysis Part I (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Effectiveness1</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>.642**</td>
<td>.184**</td>
<td>-.039</td>
<td>.551</td>
<td></td>
</tr>
<tr>
<td>NNLC</td>
<td>.108</td>
<td>-.019</td>
<td>.020</td>
<td>-.011</td>
<td></td>
</tr>
<tr>
<td>Model F value</td>
<td>5.408</td>
<td>3.696</td>
<td>.023</td>
<td>.592</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>.008</td>
<td>.034</td>
<td>.978</td>
<td>.558</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>.173</td>
<td>.114</td>
<td>-.049</td>
<td>-.019</td>
<td></td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

Table 43: Regression Results for Model 13, Sequential Analysis Part II (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Effectiveness1</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO*NNLC</td>
<td>.379**</td>
<td>.056</td>
<td>.017</td>
<td>.464</td>
<td></td>
</tr>
<tr>
<td>Model F value</td>
<td>10.194</td>
<td>1.677</td>
<td>.009</td>
<td>2.649</td>
<td></td>
</tr>
<tr>
<td>Model significance level</td>
<td>.003</td>
<td>.203</td>
<td>.923</td>
<td>.111</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>.180</td>
<td>.016</td>
<td>.923</td>
<td>.037</td>
<td></td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

The results are somewhat consistent, with NNLC not being statistically significant in any analysis. However, an NAO structure was significant in two of four analyses and their
interaction was significant in one of four analyses. The statistical significance of each
variable, per analysis was:

- For Effectiveness1, NAO governance and the interaction of NAO governance
  with NNLC had a statistically significant relationship with Effectiveness at the $p < .05$ threshold. NNLC by itself was not statistically significant.

- For Effectiveness2, NAO governance had a statistically significant relationship
  with Effectiveness, at the $p < .05$ threshold. Neither NNLC nor the interaction
  between NAO and NNLC were statistically significant.

- For Effectiveness3, none of the independent variables had a statistically
  significant relationship with Effectiveness.

- For Effectiveness4, none of the independent variables had a statistically
  significant relationship with Effectiveness.

**Model 14**

Model 14 investigates Effectiveness as the dependent variable, with NAO, Goal
Consensus, and their interaction as explanatory variables. Model 6 is represented by the
following equation:

$$\text{Effectiveness} = f (\text{NAO} + \text{Goal Consensus} + \text{NAO} \ast \text{Goal Consensus})$$

Results from the analysis are contained in Table 44.

The results demonstrate a large difference in the degree of variability of
Effectiveness explained by NAO governance structures, NNLC, and their interaction.
Table 44: Regression Results for Model 14 (Displaying Unstandardized Coefficients)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness₁</th>
<th>Effectiveness₂</th>
<th>Effectiveness₃</th>
<th>Effectiveness₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>.437</td>
<td>.542**</td>
<td>-.007</td>
<td>.359</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>-.056</td>
<td>.101</td>
<td>.408</td>
<td>1.424*</td>
</tr>
<tr>
<td>NAO*Goal Consensus</td>
<td>.827</td>
<td>-1.782</td>
<td>.018</td>
<td>2.370</td>
</tr>
<tr>
<td>Model F value</td>
<td>2.200</td>
<td>8.959</td>
<td>.253</td>
<td>2.389</td>
</tr>
<tr>
<td>Model significance level</td>
<td>0.099</td>
<td>.000</td>
<td>.859</td>
<td>.080</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.062</td>
<td>.307</td>
<td>-.043</td>
<td>.072</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

They are interpreted as:

- NAO governance, Goal Consensus, and their interaction account for 6.2% of the variability in Effectiveness₁, significant at the $p < .10$ threshold.
- NAO governance, Goal Consensus, and their interaction account for 30.7% of the variability in Effectiveness₂, significant at the $p < .05$ threshold.
- NAO governance, Goal Consensus, and their interaction were not significant predictors of Effectiveness₃.
- NAO governance, Goal Consensus, and their interaction account for 7.2% of the variability in Effectiveness₄, significant at the $p < .10$ threshold.

The results are inconsistent amongst the different proxies for Effectiveness, demonstrate a wide range in the percentage of Effectiveness explained by the model’s independent variables.

The individual coefficients can be interpreted as:

- For Effectiveness₁, a one-unit increase in Goal Consensus is associated with a .771 increase in Effectiveness in the presence of an NAO governance structure.
An NAO structure is associated with a .1.264 increase in Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_2$, a one-unit increase in Goal Consensus is associated with a 1.681 decrease in Effectiveness in the presence of an NOA governance structure.
- An NAO structure is associated with a 1.24 decrease in Effectiveness, compared to Shared and Lead Structures, when holding Trust constant at its mean.

- For Effectiveness$_3$, a one-unit increase in Goal Consensus is associated with a .426 increase on Effectiveness in the presence of an NAO structure. An NAO structure is associated with a .011 increase on Effectiveness, compared to Shared and Lead structures, when holding Trust constant at its mean.

- For Effectiveness$_4$, a one-unit increase in Goal Consensus is associated with a .729 unit increase in Effectiveness in the presence of an NAO governance structure. An NAO structure is associated with a 3.794 increase in Effectiveness, compared to Shared and Lead Structures, when holding Trust constant at its mean.

The relationship between Trust and Effectiveness is somewhat consistent across the different proxy measures, having the same direction in three of four analyses. The relationship between an NAO structure and Effectiveness is also somewhat consistent, have the same direction in three of four analyses.

To determine the statistical significance of the independent variables, the analyses were re-run as two sequential models. The results are presented in Tables 45 and 46:
Table 45: Regression Results for Model14, Sequential Analysis Part I (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>.601**</td>
<td>.189**</td>
<td>-.003</td>
<td>.829*</td>
</tr>
<tr>
<td>Goal Consensus</td>
<td>-.006</td>
<td>-.006</td>
<td>.409</td>
<td>1.568**</td>
</tr>
<tr>
<td>Model F value</td>
<td>3.214</td>
<td>3.460</td>
<td>.387</td>
<td>3.333</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.048</td>
<td>.039</td>
<td>.681</td>
<td>.043</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.076</td>
<td>.084</td>
<td>-.023</td>
<td>.080</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

Table 46: Regression Results for Model14, Sequential Analysis Part II (Displaying Unstandardized Betas)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Effectiveness1</th>
<th>Effectiveness2</th>
<th>Effectiveness3</th>
<th>Effectiveness4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO*Goal Consensus</td>
<td>2.212**</td>
<td>-.039</td>
<td>.007</td>
<td>3.736*</td>
</tr>
<tr>
<td>Model F value</td>
<td>5.275</td>
<td>.016</td>
<td>.003</td>
<td>3.756</td>
</tr>
<tr>
<td>Model significance level</td>
<td>.026</td>
<td>.899</td>
<td>.959</td>
<td>.058</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.073</td>
<td>-.19</td>
<td>.061</td>
<td>.049</td>
</tr>
</tbody>
</table>

**p < .05; *p < .10.

The results are somewhat consistent, with NAO governance being statistically significant in three of four analyses. Further, Goal Consensus and their interaction are each significant in only one of four analyses. The statistical significance of each variable, per analysis was:

- For Effectiveness1, NAO governance and the interaction of NAO governance and Goal Consensus had a statistically significant impact on Effectiveness at the $p < .05$ threshold. Goal Consensus, on its own, did not have a statistically significant impact on Effectiveness.
For Effectiveness\textsubscript{2}, only NAO governance had a statistically significant impact on Effectives, at the $p < .05$ threshold. Neither Goal Consensus nor their interaction was statistically significant.

Effectiveness\textsubscript{3}, not of the variables were statistically significant.

Effectiveness\textsubscript{4}, NAO governance had a statistically significant impact on Effectiveness at the $p < .10$ threshold. Goal Congruence had a statistically significant impact on Effectiveness at the $p < .05$ threshold.

**Summary of Models 3-14**

A summary of the interaction analyses is found in Tables 47 and 48. Table 47 contains the relationship between the critical contingency variables and Effectiveness for each analysis. Table 48 contains the relationship between each governance form and Effectiveness for each analysis:

**Table 47: Impacts of Critical Contingencies on Effectives for Each Analysis**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Critical Contingency Variables</th>
<th>Effectiveness \textsuperscript{1}</th>
<th>Effectiveness \textsuperscript{2}</th>
<th>Effectiveness \textsuperscript{3}</th>
<th>Effectiveness \textsuperscript{4}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>Trust</td>
<td>-0.002</td>
<td>0.002</td>
<td>-0.013</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Size</td>
<td>0.004</td>
<td>-0.001</td>
<td>0.003</td>
<td>-0.006</td>
</tr>
<tr>
<td></td>
<td>NNLC</td>
<td>0.918</td>
<td>0.027</td>
<td>-0.02</td>
<td>0.259</td>
</tr>
<tr>
<td></td>
<td>Goal Consensus</td>
<td>-0.686</td>
<td>0.271</td>
<td>-1.283</td>
<td>0.238</td>
</tr>
<tr>
<td>Lead</td>
<td>Trust</td>
<td>0.009</td>
<td>0.002</td>
<td>0.007</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>Size</td>
<td>-0.004</td>
<td>-0.001</td>
<td>-0.004</td>
<td>-0.095</td>
</tr>
<tr>
<td></td>
<td>NNLC</td>
<td>0.130</td>
<td>-0.002</td>
<td>0.038</td>
<td>-0.2</td>
</tr>
<tr>
<td></td>
<td>Goal Consensus</td>
<td>-0.117</td>
<td>-0.029</td>
<td>0.463</td>
<td>1.264</td>
</tr>
<tr>
<td>NAO</td>
<td>Trust</td>
<td>-0.013</td>
<td>0.007</td>
<td>-0.025</td>
<td>-0.058</td>
</tr>
<tr>
<td></td>
<td>Size</td>
<td>0.003</td>
<td>-0.050</td>
<td>-0.039</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>NNLC</td>
<td>0.415</td>
<td>-0.600</td>
<td>0.500</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Goal Consensus</td>
<td>0.771</td>
<td>-1.681</td>
<td>0.426</td>
<td>3.794</td>
</tr>
</tbody>
</table>
As discussed throughout the chapter, for the results of some of the analyses are consistent across all proxies for Effectiveness$_2$. In contrast, the results of the analyses for some models are only somewhat consistent, with others having no consistency. For example, Trust has a positive relationship with Effectiveness (in the presence of a Lead structure) across all four proxies, while the relationship between Trust and Effectiveness (in the presence of a Shared structure) is positive in half of the analyses and negative in half. In total, there is not consistency across Effectiveness proxies for the critical contingencies and Effectiveness in five instances, moderate consistency between five, and complete consistency in two instance. The relationship between a governance structure and Effectiveness is consistent across all proxies in three instances, somewhat consistent in seven instances, and not consistent in two instances.

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As a reminder, the magnitude of the relationship is difficult to compare across proxies, as the scales for each proxy are different.
Conclusion

This chapter contained a detailed account of all analysis used to answer the study’s two research question. The descriptive analysis used to answer Research Question 1 demonstrated that Lead Organization was the dominant network governance structure found in public networks \((n = 46)\), followed by Lead Governance \((n = 21)\), and then NAO \((n = 5)\). Research Question 2 was answered by running 152 simple analyses, each of which investigated the relationship between a governance structure variable, a critical contingency variable, and their interaction against four different proxy measures of Effectiveness.

The results for Model 1, which used governance structures as explanatory variables, were somewhat consistent, showing that NAO structures had a higher mean Effectiveness than Lead or Shared Governance structure in three of four instances. The results for Model 2’s analysis were consistent across all measures of Effectiveness, demonstrating that a decrease in Consistency was associated with an increase in Effectiveness.

Models 2-14 investigated the interaction of Governance with the critical contingency variables to explain Effectiveness. Each model investigated a portion of Propositions from Provan and Kenis (2008). While the results tended to be somewhat consistent across different proxies of Effectiveness, inconsistencies could possibly demonstrate a bias in measuring Effectiveness in one way over. This also limits the reliability (and therefore generalizability) of the findings. These will be discussed in Chapter VI. Chapter VI also discusses the findings from this analysis further, and then relates the findings back to Provan and Kenis’s (2008) theory.
CHAPTER VI
DISCUSSION

Overview

This chapter discusses the research findings presented in Chapter V. The findings are interpreted in relation to the research question and Provan and Kenis’s (2008) theory on network effectiveness. After the discussion, the study’s limitations are identified. Finally, a set of recommendations for the application of this study is provided, along with directions for future research.

Exploring Research Question One

Research Question 1 asked what type of governance structures exist in public health. From the data, it is clear that all types of structures identified by Provan and Kenis (2008) exist in public health; however their distribution was uneven. The responses demonstrate that the most common governance structure was Lead Organization (n= 46), followed by Shared (n = 21), and then NAO (n=5). This is somewhat surprising for a number of reasons. First Provan and Kenis identify Shard Governance as the most common form found in networks. Similarly, Provan et al. (2008) found that networks in health and human services most often utilize an NAO form of governance. Although health and human services do not provide a direct comparison with public health, there is some overlap between the two fields. This is also surprising given the attention that NAO forms of governance receive within the extant literature and by CI practitioners: NAOs are lauded as the most effective way to govern networks (Kania & Kramer, 2011; Raab, Mannak, & Caubre, 2013).
There are several factors that could explain the lack of NAO presence in this study. For one, an NAO requires substantial resources to form and maintain. As an independent organization, NAOs have independent finances which require budgeting, budget execution, financial controls, and regular reporting. An NAOs budget usually relies on members contributions for it operating expenses (Douglas, Morgan, Stratchota, & Hough, 2015). Therefore, NAO governance is an unlikely governance structure for many networks, especially community-based efforts that don’t have separate funding for the network as a whole. Evidence from the PARTNER Manager’s Survey supports this: only about half of the networks (n =55) examined in this study indicated that they had funding.

The context of public health could also be a reason by NAO structures were not as prevalent as other forms of governance. Prior to the collective impact movement, the idea that an outside organization could govern a network was novel. Further, the concept of an NAO is a bit strange when taken at face value: if the value of networks lies within collaboration and the work done between organizations, it seems odd that an outside organization could manage and enhance these relationships. In other words, while much of the value of networks is based in relationships between organizations, an NAO lessens the need for some of these interactions to exist: by establishing an organization to govern the network, you destroy what makes them so effective. Finally, the model of NAO Governance may be an unfamiliar concept to public health practitioners as much of the original data from the PARTNER was collected just as the CI framework began to gain popularity (Kania & Kramer, 2011).
Related to this, another possible explanation could be rooted in member organization’s rationale for forming a network in the first place and whether or not that formation was organic or established through policy requirements. For example, Goldsmith and Eggers (2004) found that government run NAOs were generally set up during network formation, in order to stimulate the growth of the network through targeting funding and facilitation and to ensure that network goals were met. Therefore, one could hypothesize that networks that come together organically (instead of government led collaboration) are more likely to have Shared Governance structures than networks that are formed through policy or other formal mechanisms. The networks contained within the PARTNER dataset lend some support to this assertion. While the networks with the dataset are normally purpose-driven, the networks chosen to participate in the PARTNER Manager’s Survey were community initiatives (vs. research directed).

The extant literature provides support for the differences between informal and formal networks, and there is a growing body of research in this area. While formal networks are consciously created and generally have a contractual or binding agreement for participation, informal networks generally come together more spontaneously as an outgrowth of organizational exigencies that multiple actors are attempting to address (Isett et al., 2011). Examining the way in which these networks were formed could demonstrate a link (or lack thereof) between formation, governance type, and effectiveness. For example, as some networks are not legal entities, the imperative for governance is not always present (Networks Leadership Symposium, 2013). This could lead one to hypothesize that Shared or Lead governance structures are more likely to be present in informal scenarios, while NAOs may be found in more formal scenarios.
There is also the possibility that the vignette presented within the survey had construct validity error and resulted in networks that chose a governance structure that did not accurately represent the actual governance structure of their network. Other data from the PARTNER Manager provides evidence that this may be the case. Respondents were asked whether or not their network used a CI Framework, with 16 networks identifying that they did. A key tenant of the CI Framework is a backbone organization that manages the network from the outside. And yet, only five networks identified having an NAO Governance Structure. Therefore, while this is not definitive proof of a construct validity problem with the governance structure vignette, it certainly indicates it as a possibility.

A final and related explanation for the lack of NAO governance structures within the dataset could rest on the networks within the dataset themselves. As networks opt to utilize the PARTNER Tool to measure their collaboration, there is the possibility that the networks themselves are significantly different than networks as a whole. For example, networks that utilize an NAO may not opt to use the PARTNER Tool to measure their collaboration because they already have developed alternate ways of measuring their effectiveness. For example, as Goldsmith and Eggers discuss, government established NAOs are usually established to ensure that the network is meeting its goals. Similarly, networks that have a Shared Governance structure could be less formal, and therefore, could be less likely to try to evaluate their outcomes than networks with a NAO or Lead Organization structures.
Exploring Research Question 2

Research Question 2 investigated how network governance was related to effectiveness, by addressing the following research question:

R2: What type of network governance structures lead to effective outcomes?
   a. How does governance interact with certain critical contingencies to explain effectiveness?

To answer this research question, 152 simple statistical analyses were conducted that tested the relationship between governance, critical contingency variables, and their interactions on four difference measures of Effectiveness.

Model 1 answered the first part of the question: which type of governance structures lead to effective outcomes? The results (presented in Table 9) demonstrate that for three of the four measures of Effectiveness, NAO structures had a higher mean Effectiveness than Shared or Lead Governance Structures (statistically significant). Only in the case of Effectiveness3 (the dichotomous measure of Effectiveness), Shared Structures were most effective, followed by Lead Structures, and then NAO structures. However, this model was not statistically significant.

The lack of consistency needs to be taken into consideration when interpreting the results. For example, an extrapolation of results is limited given that of the networks within the dataset, only five had an NAO governance structure. Of these five, only three were included in the statistical analyses, as two did not utilize similar measures of success and could not be compared. Therefore, any generalizations about NAO Governance made from this study are based on the observations of only three networks.

Further, because no control variables were used to in the analysis, it is possible that an additional confounding variable could explain the differences between group
means found in the analysis. In other words, there may be other structural or relational
differences between networks that utilize NAO structures, Lead, or Shared governance
structures that explain the differences in effectiveness that are not accounted for within
this analysis.

The comparison across different measures of Effectiveness provides an additional
avenue for scrutinizing the finding that NAOs are more effective. Which governance
structures is most effective changes across each measure of Effectiveness (found in Table
48), calling into question the reliability of any one measure of Effectiveness:

**Table 49: Effectiveness of Each Governance Structure per Measure of Effectiveness,**

<table>
<thead>
<tr>
<th>Governance Structure</th>
<th>Effectiveness$_1$</th>
<th>Effectiveness$_2$</th>
<th>Effectiveness$_3$</th>
<th>Effectiveness$_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAO</td>
<td>Most Effective</td>
<td>Most Effective</td>
<td>Least Effective</td>
<td>Most Effective</td>
</tr>
<tr>
<td>Lead</td>
<td>Moderately Effective</td>
<td>Lest Effective</td>
<td>Moderately Effective</td>
<td>Least Effective</td>
</tr>
<tr>
<td>Shared</td>
<td>Least Effective</td>
<td>Moderately Effective</td>
<td>Most Effective</td>
<td>Moderately Effective</td>
</tr>
</tbody>
</table>

For example, there a large difference in Effectiveness between structures was found using
Effectiveness$_1$ that is not found in Effectiveness$_2$. The results from the regression that
utilize Effectiveness$_4$ also show a large difference between Lead Organization
Governance and NAO Governance. However, when using Effectiveness$_3$, Shared
Governance was found to be most Effective, followed by Lead, and then NAO
governance. In the least, the results demonstrate that there is difficulty in capturing
Effectiveness within networks: effectiveness is multi-faceted and any single measure
necessarily neglects other facets (to be discussed farther below).
While the data do demonstrate that NAO Governance results in a higher mean Effectiveness in three of four instances, those findings need to be taken into considered further. What is particularly interesting is that the one analysis that does not find NAO structures to be most effective uses a dichotomous measure of Effectiveness (Effectiveness$_3$). The coefficients for OLS regression reflect expected change on the dependent variable associated with changes in an explanatory variable. Therefore, the changes in Effectiveness in the analyses for Effectiveness$_1$, Effectiveness$_2$, and Effectiveness$_4$, while reflecting changes in the scale, do not necessarily coincide with a change from ineffective to effective. The results from this analysis further demonstrate that utilizing different measures of Effectiveness can result in significantly different outcomes: these differences can have a large impact on whether a particular network will be perceived as effective or not. In other words, while NAO structures are related to improvements in Effectiveness, Shared and Lead governance structures have a larger number of networks that are considered Effective (vs. not effective). This further indicates that a singular measure of Effectiveness, which only reflects one facet of Effectiveness, may not be appropriate.

The finding also needs to be considered for what they mean in practice. Particularly, while there is a statistically significant difference in mean effectiveness in some of the analyses, the magnitude of these differences may not be enough to justify the costs of NAO governance. For example, for Effectiveness$_1$ the difference in means is -.664 for Shared Governance and -.572 for Lead Governance, compared to NAO Governance. These numbers reflect the actual difference between the mean Effectiveness of Shared structures and NAO structures and Lead and NAO structures. In other words,
NAO structures are found to have a .664 point higher mean Effectiveness than Shared structures and a .572 point higher mean Effectiveness for Effectiveness\textsubscript{1}. However, on a 1-4 scale, this may not represent a large enough improvement in Effectiveness to justify implementing costly NAO structures. Therefore, with any network, the choice of Governance will still be context specific: networks will need to do a cost-benefit analysis of implementing certain forms of governance over others, considering what other type of interventions could improve Effectiveness that may yield higher returns on investment (such as relationship building, for example).

Given the limitations of these findings, along with their practical implications, it is important to note that just as networks themselves should not be seen as a panacea, neither should NAO governance. While NAO governance may overcome some of the inherent difficulties of collaboration, it is not without its own limitations, particularly high costs.

**Research Propositions**

Models 2-14 examined the relationship between critical contingencies and network governance type. Rather than arguing that one network governance structure was more effective than others, Provan and Kenis (2008) argued that one governance type is more likely to be effective than others given the level of trust, size, need for network level competencies, and goal consensus in the network. To investigate this theory, an empirical test of Provan and Kenis’s (2008) propositions was completed. These propositions were (p.241):

\[ P_1: \text{The greater the inconsistency between critical contingency factors and a particular governance form (both in terms of the number of inconsistent factors} \]
and the extent to which these factors are inconsistent with characteristics of the governance form), the less likely that the particular form will be effective, leading either to overall network ineffectiveness, dissolution, or change in governance form.

P2: Shared network governance will be most effective for achieving network-level outcomes when trust is widely shared among network participants (high density, decentralized trust), when there are relatively few network participants, when network-level goal consensus is high, and when the need for network-level competencies is low.

P3: Lead organization network governance will be most effective for achieving network-level outcomes when trust is narrowly shared among network participants (low density, high-centralized trust), when there are a relatively moderate number of network participants, when network-level goal consensus is moderately low, and when the need for network-level competencies is moderate.

P4: NAO network governance will be most effective for achieving network-level outcomes when trust is moderately to widely shared among network participants (moderate density trust), when there are a moderate number to many network participants, when network-level goal consensus is moderately high, and when the need for network-level competencies is high.

The findings demonstrate little support for the propositions. While the governance structure variables were statistically significant and critical contingency variables were statistically significant in some instances, there was an overall lack of support for the interaction of critical contingency variables, network Governance, and
Effectiveness. Further, the inclusion of the interaction term within each analysis improved the model specifications only 50% of the time (demonstrated by changes in the adjusted R² between the models which contained all variables and those that only contained individual variables). And despite improvements in some analyses from the inclusion of interaction variables, the models themselves were often not statistically significant. Therefore, support for the study’s propositions is extremely limited. This summarized in Table 49, with a more lengthy discussion of each to follow:

Table 50: Summary of Findings in Relation to Study Propositions

<table>
<thead>
<tr>
<th>Propositions</th>
<th>Empirical Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>P₁</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>Decreases in Consistency are associated with increases in Effectiveness.</td>
</tr>
<tr>
<td>P₂</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>No statistically significant relationship between the interaction of Shared governance with each critical contingency on Effectiveness.</td>
</tr>
<tr>
<td>P₃</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>No statistically significant relationship between the interactions of Lead Organization governance with each critical contingency on Effectiveness.</td>
</tr>
<tr>
<td>P₄</td>
<td>Limited Support</td>
</tr>
<tr>
<td></td>
<td>Statistically significant relationship between the interaction of NAO and Trust, NAO and Size, and NAO and NNLC for Effectiveness₁. Results not replicated in Effectiveness₂, Effectiveness₃, or Effectiveness₄.</td>
</tr>
</tbody>
</table>

Starting with Model 2, the regression results begin to leave doubt that governance structures and critical contingencies interact to explain Effectiveness in the way that is predicted. Consistency, the explanatory variable in the analysis, was operationalized to capture how close the levels of each critical contingency variable of each network matched Provan and Kenis’s theory. The theory also suggests that increases in consistency are associated with increases in effectiveness. The results demonstrate the
opposite relationship than that predicted: decreases in consistency are associated with increases in Effectiveness for all four measures of Effectiveness. Although the strength of relationship is different across the different measures of effectiveness, similar findings from each increase their reliability despite the small sample size.

The results from Models 3-14 also demonstrate a lack of support for Provan and Kenis’s propositions. A summary of how the critical contingency variables interact with Effectiveness, per network governance structure is found in Table 50:

**Table 51: Summary of Interaction Analyses: Impacts of Critical Contingencies on Effectives for Each Governance Structure**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Critical Contingency Variables</th>
<th>Effectiveness s1</th>
<th>Effectiveness s2</th>
<th>Effectiveness s3</th>
<th>Effectiveness s4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared</td>
<td>Trust</td>
<td>-0.002</td>
<td>0.002</td>
<td>-0.013</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Size</td>
<td>0.004</td>
<td>-0.001</td>
<td>0.003</td>
<td>-0.006</td>
</tr>
<tr>
<td></td>
<td>NNLC</td>
<td>0.918</td>
<td>0.027</td>
<td>-0.02</td>
<td>0.259</td>
</tr>
<tr>
<td></td>
<td>Goal Consensus</td>
<td>-0.686</td>
<td>0.271</td>
<td>-1.283</td>
<td>0.238</td>
</tr>
<tr>
<td>Lead</td>
<td>Trust</td>
<td>0.009</td>
<td>0.002</td>
<td>0.007</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>Size</td>
<td>-0.004</td>
<td>-0.001</td>
<td>-0.004</td>
<td>-0.095</td>
</tr>
<tr>
<td></td>
<td>NNLC</td>
<td>0.130</td>
<td>-0.002</td>
<td>0.038</td>
<td>-0.2</td>
</tr>
<tr>
<td></td>
<td>Goal Consensus</td>
<td>-0.117</td>
<td>-0.029</td>
<td>0.463</td>
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</tr>
<tr>
<td>NAO</td>
<td>Trust</td>
<td>-0.013</td>
<td>0.007</td>
<td>-0.025</td>
<td>-0.058</td>
</tr>
<tr>
<td></td>
<td>Size</td>
<td>0.003</td>
<td>-0.050</td>
<td>-0.039</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>NNLC</td>
<td>0.415</td>
<td>-0.600</td>
<td>0.500</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Goal Consensus</td>
<td>0.771</td>
<td>-1.681</td>
<td>0.426</td>
<td>3.794</td>
</tr>
</tbody>
</table>

From this table, a comparison can be made between theory and results. However, prior to this, the general inconsistencies between different measures of Effectiveness should be noted. For example Trust has a negative relationship with Effectiveness in the presence of Shared structures for Effectiveness₁ and Effectiveness₃.
In contrast, it has a positive relationship with Effectiveness in the presence of Shared structures for Effectiveness\textsubscript{2} and Effectiveness\textsubscript{4}. In fact, there are only two instances in which the relationship between a critical contingency and Effectiveness are consistent across all measures of Effectiveness: the relationship between Trust and Effectiveness and Size and Effectiveness in the presence of Lead Governance structures. The differences in the magnitude and direction of the relationship could indicate a number of things. For example, it could just indicate the sample size is too small to capture the relationship. Or, it could indicate that these variables do not behave as expected to predict Effectiveness. Finally, it could be indicating that measuring Effectiveness in networks is complex and cannot be captured by a simple measure.

As stated earlier, what the numbers also demonstrate is limited support for Provan and Kenis’s theory. For example, the theory predicts Shared Governance to have the strongest relationship with Trust, followed by NAO, and then Lead Organization structures. The results from the analysis show that this in only the case for Effectiveness\textsubscript{3}. In contrast, the smallest relationship between Size and Effectiveness is predicted in Shared structures, followed by Lead, and lastly NAO. However, this is only the case for Effectiveness\textsubscript{4}. Finally, the relationship between NNLC and Effectiveness does not occur in the way predicted by the theory for any measures of Effectiveness.

While the analyses do not demonstrate support for the study propositions, there is some support for the interaction between the critical contingencies and Effectiveness on their own. For Effectiveness\textsubscript{1} and Effectiveness\textsubscript{3}, none of the critical contingency variables were found to have a statistically significant relationship with Effectiveness. However, for Effectiveness\textsubscript{2}, Trust had a positive, statistically significant relationship
with Effectiveness in the presence of all three structures. For Effectiveness\(_4\), size had a negative, statistically significant relationship with Effectiveness in the presence of all three governance structures. The relationship between Goal Consensus and Effectiveness\(_4\) was positive and statistically significant.

While the critical contingencies are only statistically significant in twelve of the individual models that does not mean that they do not contribute to Effective outcomes in networks: there is already considerable evidence in the extant literature that trust, size, and goal consensus are related to effectiveness. This study analyzes effectiveness at the network level. However, Provan and Milward (2001) argue that there are three different levels from which to analyze networks: community, network, and organization. Similarly, Hill (2002) identifies four levels by breaking organizations into two levels: organization and individual. Therefore, there is the potential that the critical contingency variables are more effective at other levels of analysis other than the whole-network.

So, what does the lack of support for the study propositions indicate? In other words, does a relationship really not exist, or could the lack of findings be explained in some other way? One possible explanation is that there is a lack of variance among many of the variables within the dataset which limits their explanatory power. In addition, there is also the possibility that the relationship between critical contingencies, governance, and Effectiveness is non-linear. Similarly, there could also be an endogeneity problem: perhaps governance structures result in certain levels of Trust, for example, instead of certain levels of Trust implicating which structure would work best.
Similarly, one could hypothesize that instead of an interaction between the governance and critical contingency (multiplicative), another combination of variables is sufficient.

The models could also be missing a potentially important additional explanatory, confounding, or control variable. For example, there isn’t a variable within the PARTNER Dataset that captures the demand on the network. It could be assumed, however, that public health networks in areas with higher poverty will have more demand on their resources than in areas of lower poverty. Even with high levels of Trust and Goal Consensus, if the level of demand on a network is more than its resources can handle, it is unlikely that it will be effective (Milward and Provan, 1998). As Popp et al. (2014) argue: “No matter which governance model is chosen, it is important that it be adequately resourced if its effectives is to be maximized because networks have a finite carrying capacity” (p. 40). Similarly, network management and leadership are considered important to effective network implementation, and yet, are not included as explanatory variables in this study. Like governance, network leadership and management are two areas that have only begun to be explored. As Silvia and McGuire argue: “The research question that is the 800 lb. gorilla in the room remains largely unaddressed: What is leadership is a multi-actor setting?” (2010, p.365).

Finally, there is also the possibility that the relationships between critical contingencies and governance structures do not explain effectiveness in networks. Provan and Kenis’s (2008) theory on network governance as it relates to effectiveness was the first to identify forms of governance that exist, develop a rationale for adopting one form over another, and posit how each impacts outcomes. While empirical support for component parts of their theory exists (such as their network typology and the critical
contingencies alone), there has not been an empirical testing of their theory as a whole to date. So, while governance or the critical contingencies have been found to explain variability in Effectiveness on their own, it is possible that their interaction is not significant for explaining Effectiveness.

**Contributions to Theory**

This study leaves many more questions than it answers. However, the absence of findings is still significant. Adequate network governance is seen as necessary in the extant literature, in order to ensure that “participants engage in in collective and mutually supportive action, that conflict is addressed, and that network resources are acquired and utilized effectively and efficiently” (Provan & Kenis, 2008, p. 230). Further, the extant literature suggests that it is essential that network managers make a conscience choice between difference governance forms, matching the form to the context of their network (Bryson et al., 2006; Provan and Kenis, 2008). Provan and Kenis’s (2008) theory suggests that the contextual figures that need to be considered are Trust, Size, Goal Consensus, and the Need for Network Level Competencies. However, the lack of support for Provan and Kenis’s theory in this study suggests that a network cannot choose their governance structure based on the levels of the critical contingency variables alone: the relationship between all of these variables is more dynamic that can be captured by their interaction. Perhaps this is because there is no simple solution to determining what network governance structure will work best.

An important conclusion of this study is that, while governance is an important contributor to network effectiveness, it is only one of the many variables that contribute to effectiveness. In other words, the investigation of network governance alone has not
resulted in a vetted theory of network effectiveness: network effectiveness is much more complex.

Given this conclusion, another important conclusion of this study is that a more eclectic, multi-theoretical approach is needed when investigating network effectiveness: the findings from this study, along with fractured and somewhat contradictory findings of other network studies, make it likely that a general theory of network effectiveness is not possible. In other words, the theory tested in this study along with other theories of network effectiveness are not, by themselves, powerful enough to explain large portions of the variations in network effectiveness. Consequently, an integrative, multi-theoretical approach is worth exploring (Monge and Contractor, 2003).

In this approach, several theories are used simultaneously to predict network outcomes. A multi-theoretical approach relies on different theories to account for different aspects of network effectiveness. Different theories are blended together to create a more unified theoretical framework. The focus is to promote theory building by drawing on salient concepts from many different theories and then test these for new theories (Cairney, 2013).

There is some precedence for using a multi-theoretical approach to understand complex phenomenon. For example, Galey (2015) uses an integrated, multi-theoretical approach to examine state-level policy change in U.S. subsystems. Similarly, John (2012) uses five theoretical perspectives to explain the policy process. Watson and Hewett (2006) use a multi-theoretical approach to explain knowledge transfer in organizations. A multi-theoretical approach has also been used to examine networks. Specifically, Monge and Contractor (2003) use a multi-theoretical, multilevel model
framework to identify network properties and then show how these explain the evolution of communication networks. Similarly, Contractor, Wasserman, and Faust (2006) use a multi-theoretical, multilevel approach to test hypotheses about the structural tendencies of organizational networks.

Given the usefulness of a multi-theoretical approach, consideration should be given as to what theories (and therefore, variables) should be included. As described in Chapter III, there are many network studies that consider the structural characteristics of a network as a proxy for effectiveness, including network centralization and density. Therefore, these would be an important addition to a multi-theoretical model. Further, three of the variables included in this study (Trust, Size, and Goal Consensus) have considerable support in the extant literature and were found statistically significant within some analyses presented here. Therefore, these should also be included in a multi-theoretical model. The NNLC variable within this study was not statistically significant, but could be useful in explaining differences in outcomes; however, the variable should be parsed out into its two component parts (interdependence and external pressure) in order to capture more complexity. Further, a multi-theoretical approach should focus on process variables as well, because networks rely on relationships, and thrive “through the quality and reach” of these relationships: knowledge about these and how they can be nurtured, repaired, and shared is critical (Gilchrist, 2006, p.29). Finally, as this study indicates, network governance should also be considered in a multi-theoretical model.

Understanding Analysis Inconsistencies for Different Measures of Effectiveness

A final conclusion of this study is that any one measure of effectiveness is necessarily a normative choice between one aspect of effectiveness or another. This
conclusion rests in the large differences found between the different measures for effectiveness utilized in this study. While similarities between the models would have bolstered the construct validity of all, the differences indicate that each proxy captures a different aspect of effectiveness and these cannot be used interchangeably. Therefore, the use of one proxy over another will need to be carefully considered in order to ensure that future research is capturing what it intends. Further, different proxies may be more or less appropriate in certain scenarios.

While the intent of this study was to investigate the relationship between governance and effectiveness, the use of different proxy measures of effectiveness was included to bolster the reliability of the results given the small sample size. However, the results from each model demonstrated few instances in which the relationship between critical contingency, governance structure, and effectiveness had the same type of relationship across all proxies. This leads to the question of whether or not the results can be considered reliable. However, while there is cause to question the results, given some of the limitation of the study (discussed both in relation to the study’s theory and in the Limitations section below), the inconsistencies between results do have an important contribution of their own to the study of networks and effectiveness: they show that the study of network effectiveness is not just complex because different variables have been found to be related to effectiveness, but also because measuring effectiveness itself is complex and cannot be captured by any single measure.

The inconsistencies in results reflect the position articulated by Thacker et. al (2006) that any particular choice of measure reflects a certain set of values or perspectives, which implies that these are more important than other values or
perspective. For example, utilizing a mean perception of success demonstrates a different aspect of effectiveness than agreement of success. In contrast, one individual’s perception of success for the network is not necessarily representative of the whole. Instead a more accurate, or at least more inclusive, measure of effectiveness would combine the different proxy variables into one, versatile measure.

Given the inconsistencies between proxies within the analyses, a consideration of different approaches to network evaluation may be worthwhile. Rather than focus on a single aspect or perspective of effectiveness, there may be a need for greater flexibility to capture the nuances and complexity of networks. Like the preceding section discusses, it is likely that this flexibility could come from a multi-theoretical model of network effectiveness: a multi-theoretical model may solve some of the problems in conceptualizing effectiveness in one way or another. However, a multi-theoretical model does not necessarily mean that a dependent variable will reflect will reflect the different facets of effectiveness represented by different proxy measures. Therefore, in addition to a multi-theoretical model, the findings indicate a need to develop new measures of effectiveness that are multi-faceted and inclusive.

**Limitations**

It is important to acknowledge the limitations of this study. First, while the study has the potential to aid public health practitioners in making data-driven decisions about appropriate governance structures, the applicability of findings to other substantive areas may be limited. Collaborative approaches to public health have not only been shown to be embraced both practically and theoretically, but have formalized through legislation and other policy means. Further, public health networks are goal-drive and purposeful,
while more serendipitous networks have been shown to exist in other fields (Kilduff & Tsai, 2003). Given that all networks within the study operate within the context of public health, applying findings to other types of networks is cautionary. For example, although the data demonstrate a relationship between NAO Governance structures and Effectiveness in this study, this may not be true for other types of networks.

The largest limitation of this study is the limited generalizability of the findings. There are several causes for limited ability to extrapolate. The first concern that limits generalizability is sample size. While the sample size is large for research on networks (Provan and Milward, 1995; Provan and Kenis, 2008), it is considered to be small for conducting statistical analysis. However, many network studies utilize a case study methodology, making generalizations from a handful of networks. So, while the sample size is considered small for statistical analysis, the study itself has more networks from which to make generalizations than is usually the case. Despite its size within network studies, a small sample size still increases sampling bias concerns, reducing the potential of extrapolation, as the sample is less likely to be representative of the population as a whole. Further, a small sample size increases the likelihood of a Type II error: it reduces the likelihood of detecting an actual significant relationship (Fields, 2009).

As discussed in the Methods chapter, while there is no hard or fast rule for the number of cases necessary for a statistical analysis, there are many heuristics available. For example, Green (1991) provides two rules for minimum acceptable sample size, depending on whether you are investigating the model as a whole or the predictors within the model. For testing a model overall, he recommends a minimum sample size of 50 +
where \( k \) is the number of predictors. In contrast, if the researcher is more interested in the predictor variables, a minimum of \( 104 + k \) is needed. If the research is interested in both, as this dissertation is, the larger of the two would be more appropriate. In this case, the minimum number of cases is not met, limiting the generalizability of the findings.

In addition to and related to the small sample size, control variables were not included in the analysis. Adding additional variables to any of the models within the study would have further limited their explanatory power. However, not including them is a concern because they can potentially alter the way that one of the models within this study interacts with Effectiveness.

In addition to other theoretical and statistical limitations of the study, another limitation of this study is that the data represent a “snap-shot” of each network, when in reality, interorganizational relationships are constantly evolving. In other words, data are collected at just one point in time from the networks. However, like organizations, networks change over time. Network governance may be a more important explanatory variable at one stage in a network or another. Therefore, the findings could be strengthened by time-series analysis, but that is beyond the scope of this study.

The final limitation to the study is that the methods utilized may be inappropriate for capturing the complexity of network data. Networks consist of data nested data, meaning that there are various levels from which to examine networks and their effectiveness: effectiveness can be measured at the individual, organizational, network, and community levels (2002). Given the various levels of analysis, along with the different levels at which the data within this study was collected (individual and network), a multi-level model may
ultimately be a better and more appropriate method of analysis (Osborne, 2000). Multilevel modeling (such as hierarchical linear modeling) allows researchers to explore relationships across nested structures (Klein and Kozlowski, 2000; Ludtke, Marsh, Robitzsch, Trautwein, Asparouhov, & Muthén, 2008). Further, a multilevel model allows researchers to develop and test hypotheses at each level of analysis and across each level of analysis, to identify variation across each level (Raudenbush & Bryk, 2002). As Kozlowski and Klein (2002) argue: the objective of HLM is to “enable a more integrating understanding of phenomenon that unfold across levels” (p.7). Therefore, confirming the results of this study with a multi-level model would improve the reliability of its findings.

**Directions for Future Research**

Interorganizational networks will most likely continue to dominate scholarly research in public administration and the practice of public health. Given this, more evidence is necessary to ensure that networks continue to be the best vehicle for addressing the complex issues that face society. In the discussion of findings thus far, several future areas of research have been identified including network processes, network management, and potential differences between different network governance structures. While all of these issues are particularly salient, the first direction for future research that this study points to is a need to continue to conduct empirical, large-n studies on variables associated with network effectiveness. Until recently, network data was difficult to identify and collect. The growth of datasets such as PARTNER provides unprecedented opportunities for testing the link between different network characteristics
and effectiveness. In addition, the growth of datasets and the advancement of statistical tools will further enable more complex analysis.

Given the discrepancy between past studies on network and effectiveness, it seems that future research needs to be conducted at different levels of analysis and using a multi-theoretical approach to ensure that the complexity of network effectiveness is captured. The assertion that more nuanced methods of analysis, rather than a hard or fast rule of network effectiveness, is increasingly present within the network evaluation literature and is a conclusion of this study. Further, either new measures of Effectiveness that capture its complexity need to be utilized or researchers need to acknowledge the biases in measuring Effectiveness in one way over another. As Popp et al. (2014) discuss:

Networks are complex entities that, because of their very nature, will have an impact at a number of levels of social engagement. Also, given the many different stakeholders, with potentially differing ideas about a good outcome, who are involved in networks (e.g. network members, service recipients, funders, and decision-makers), it is important to be able to show the impact of networks in areas that matter to varying groups (p.90). Because networks will continue to be important, this approach provides the highest potential for developing a standard set of network evaluation practices.

In addition to the need for a multi-theoretical approach, this study demonstrates a need for more nuanced understanding of network governance structures. While network governance, particularly NAO governance, was found to significantly impact network effectiveness, no control variables were introduced into the analysis which enabled the
researcher to isolate governance. Therefore, significant differences between governance structures may exist which explain the differences in network effectiveness rather than just the network structure itself. In other words, future research will need to be conducted to identify whether each form of network governance has distinguishing structural characteristics.

Finally, it is clear that the gap between research and practice needs to be addressed further. Research and practice have operated in silos in this area for some time. As Varda (2011), Isett et al., (2011) and Varda and Retrum (2012) argue, network practitioners have sprinted ahead of academic research with regards to networks, often working without the benefit of data to drive their collaborative processes. For example, there has been a recent surge in implementing the Collective Impact Framework within networks, and yet, the framework has not been empirically tested. The framework is fairly costly to implement, and yet, many networks have been implementing it without data that demonstrate its success. Therefore, a large-N study of the framework should be conducted.

While scholars have debated the merits of practical vs. theoretical driven research, research on networks continues to be problem-oriented: scholarship in this area should not only advance the discipline, but also enlighten practice in a professional domain (Simon, 1976). The practical implications of this study are somewhat limited; however, the study can contribute to data-driven decisions in networks. Specifically, network governance is important and can contribute significantly to network outcomes. However, the study also demonstrates that the effectiveness differences between structures may not be as large as originally theorized and that network practitioners can evaluate the costs of
implementing one form over another in line with the costs of other activities that could also contribute to network effectiveness. In other words, network governance is not a panacea for network effectiveness. Rather, it is one variable among many that can be used as a tool for improving network outcomes.
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