Mission impossible? Routinizing the anticipation of emergent collaboration in disaster management networks: A study of emergence in the COVID-19 pandemic

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ACADEMIC ABSTRACT

When disasters occur, new or informal groups often emerge to assist with the response or have resources that can aid professional disaster managers involved in the crisis. Historically, incorporating these groups into the formal disaster response system under conditions of urgency and uncertainty has been difficult. This mixed-methods, three-article dissertation explores two cases of interorganizational collaboration in which public administrators working to manage the COVID-19 pandemic facilitated and integrated emergent actor participation in the response. The findings of the study point to the potential for disaster managers to routinize the anticipation of emergence by considering those organizations that may be best positioned to facilitate different emergent actors, ways of engaging them before crises occur, and mechanisms that might break down barriers to formal/informal responder collaboration during an acute response. The results of this study have implications for public administration, interorganizational collaboration, and disaster management.

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GENERAL AUDIENCE ABSTRACT

Large-scale disasters involve acute dangers to human and environmental health, and often property, creating significant disruption to society. This disruption may challenge public administrators' abilities to manage the size and scope of the impacts, creating an opportunity to work with groups not normally involved in managing disasters but that have unexpected but needed resources. As these new groups may not have the background or knowledge of formal disaster response systems and processes, they may not know how to identify or work with the officials managing the disaster. The COVID-19 pandemic, a complex and relatively uncommon disaster, provides an opportunity to explore the ways in which disaster managers incorporated novel resources and groups as they reacted to the ever-changing demands of the crisis. This dissertation explored two examples of groups of organizations working together in the state of Virginia to manage aspects of the COVID-19 pandemic in order to understand the ways in which disaster managers may be better able to plan for, facilitate, and incorporate new groups into disaster management efforts. The results of this study indicate several ways in which new groups might be integrated into disaster management efforts, including differential implementation of disaster policy, the use of community liaisons to external groups, and technological innovations that reduce barriers to collaboration. Though we can never predict where the next major disaster will strike or what type of hazard it might involve, we can predict that first, it will happen and second, it will bring new groups into the response effort, as well as the need for disaster

managers to collaborate with those new groups. As the findings from this project suggest, by considering the ways in which new groups might be better integrated during a disaster, it might be possible to better leverage critical resources to help communities better respond to a disaster.

DEDICATION

This, like everything, is for Danny, Grant, and Lynley.

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ATTRIBUTION

I would like to acknowledge the contributions of Sophie Wenzel and her team to the data collection process for the first case analyzed in chapters two and three, as well as the assistance of Robin Lemaire in the theoretical development of the third chapter.

CHAPTER ONE: INTRODUCTION

"…disaster managers should take the appearance of [emergent] phenomena for granted and incorporate the probability of its occurrence into their thinking and acting…there is no good reason for not anticipating the very probable, such as the appearance of emergence."

(E. L. Quarantelli, 1998, p. 27)

Introduction

Complex disasters are those unpredictable hazard events so disruptive to society as to necessitate the participation of a multitude of actors to manage them, including both public disaster response organizations and informal actors who often converge to assist in the response (Twigg & Mosel, 2017). In the U.S., the legal responsibility for coordinating effort across these diverse groups falls to public administrators working in the disaster management context, particularly at the local level (Silvia & McGuire, 2010; Waugh & Streib, 2006). Thus, successful disaster response relies on public officials' successful coordination of effort across these diverse groups. However, previous research indicates that formal disaster response systems do not always effectively incorporate informal individual volunteers and groups, suggesting the potential for underutilization of their potential contributions (Majchrzak et al., 2007; Roth & Prior, 2019; Waldman et al., 2019). Given the certainty of future disaster events and the important role spontaneous actors play during disaster response, this problem of formal/informal actor collaboration is a particularly persistent and pressing challenge for public administrators involved in disaster management (Roth & Prior, 2019).

Adding to this challenge is the relative predictability of the convergence of informal actors in large-scale crises (for example, see Majchrzak et al., 2007 and Simo and Bies, 2007)

(Dynes, 1970; Stallings & Quarantelli, 1985). Previous research on disaster response indicates a long history of the convergence of spontaneous volunteers and groups during disasters to undertake disaster response activities particularly when there is a wide perception of unmet response needs (see, for example, Dynes, 1970 and Stallings & Quarantelli, 1985). This phenomenon is known as *emergence* and refers broadly to the "informal voluntary action" commonly undertaken by individuals or groups during disasters, such as ad-hoc search and rescue efforts or medical care provision (Twigg & Mosel, 2017).

One emphasis within the body of scholarship on emergence is on the voluntary collaborative behaviors that develop between actors to manage acute problems during crises. Previous studies indicate that when citizens or groups perceive inadequacy on the part of the formal disaster response structures, they will spontaneously self-organize and work together to address unmet needs (Neal & Phillips, 1995; Kim et al., 2022). This collaboration is typically temporary and spontaneous, and because there is no central authority guiding these collaborative arrangements, they can result in significant trial-and-error as interdependent groups attempt to meet changing environmental demands (Beck & Plowman, 2014). Much of the literature on emergent collaboration in disasters is drawn from sudden-onset crises in urban settings and suggests that the greater the scale or impact of the crisis, the more emergent collaboration will occur (Twigg & Mosel, 2017; Wachtendorf, 2013; Tierney & Trainor, 2004; Stallings & Quarantelli, 1985). Thus, at least in the context of the U.S., the appearance of emergent collaboration in large disaster situations is relatively predictable, even if the specific makeup of participants and actions to be taken are not (Twigg & Mosel, 2017; Quarantelli, 1998).

Despite the predictable and often beneficial contributions of emergent collaboration to disaster management efforts, emergent collaboration presents a challenge to the U.S. formal

disaster management system that is largely grounded in a command-and-control paradigm reliant upon standard operating procedures (Twigg & Mosel, 2017; Drabek & McEntire, 2003; Whitaker et al., 2015; Nowell & Steelman, 2019). A centralized disaster management system prioritizes decision making and participation by formal, trained organizations with legal authority for disaster response, leaving little room for contributions from untrained, informal, and "unheralded" groups (Waugh, 2006; Waldman et al., 2018; Brudney & Gazley, 2009). If emergent groups cannot access or interface with the formal response system, disaster managers may not fully identify and leverage the diverse resources and surge capacity they may bring to bear during acute responses (Twigg & Mosel, 2017). Given the predictability of emergence and the inevitability of uncertainty with future crises, the disconnect between the informal and formal elements of the disaster response system is dangerously problematic. Therefore, the overarching research question guiding this dissertation is: *how is emergent collaboration facilitated in disasters?*

As noted above, emergent collaboration is most common in large-scale crises due to the perception of widespread unmet needs. As a long-running, large-scale crisis that impacted nearly every aspect of society (Nicola et al., 2020), the COVID-19 pandemic offered an opportunity to explore emergent collaboration in real time, as it unfolded. As such, I approached this overarching research question through an exploratory, multi-case mixed methods research study focused on two cases of emergent interorganizational collaboratives that formed to manage aspects of the COVID-19 pandemic in the state of Virginia. These collaborative arrangements may be described as emergent, multiorganizational networks, or EMONs (Drabek, 1985), that consisted of both formal and informal responding organizations working collectively to meet the demands of a novel and large-scale crisis. Using a three-article dissertation format, I explored

three different elements of emergent collaboration to understand how disaster managers may better plan for and incorporate emergent collaboration during disaster situations. The remainder of this chapter more fully describes the concept of emergence and emergent collaboration, the study's research setting and design, and the outline of the dissertation.

Understanding Emergence in Disasters

Large or novel disasters often overwhelm preexisting disaster response plans as they may impact greater geographical areas than anticipated or they may involve entirely new hazards that were unforeseen prior to the hazard impact. As such, formal disaster management planning may be inadequate or break down in unexpected or unforeseeable ways, regardless of the quality of the planning efforts (Majchrzak et al., 2007). In these situations, uninvolved individuals and groups may engage in spontaneous and voluntary unplanned action to ameliorate the perceived unmet needs (Stallings & Quarantelli, 1985). In fact, Wachtendorf et al. (2018) argue that emergence is the manifestation of innovation that is necessary for communities to adapt to environmental changes caused by disasters. Because these novel groups are not part of the formal plan, they are considered to be emergent.

Much of what is known about emergence in disaster events evolved from early literature on disaster sociology, dating back to the 1950s (Twigg & Mosel, 2017) (see, for example, Dynes & Aguirre, 1977; Stallings & Quarantelli, 1985; and Drabek & McEntire, 2003). As such, previous scholarship on emergence explores emergent human behavior, or the novel actions of people or groups of people to respond to what are perceived as unmet crisis demands (see, for example, Drabek, 1986; and Drabek, 1987). From this behavioral perspective, it might be argued that emergence can be understood from three different lenses: as emergent individual behavior,

emergent group or organizational behavior, or emergent interorganizational behavior (that is, the creation of new ties between groups).

First, previous studies on emergent individual behavior have emphasized the characteristics of disaster volunteers (Rotolo & Berg, 2011; Twigg & Mosel, 2017), their contributions (Twigg & Mosel, 2017), and purposes for converging (Kendra & Wachtendorf, 2001). Emergent volunteers typically possess local knowledge of the community, provide acute surge capacity on scene, and can help link survivors to community resources (Douglas et al., 2018; Waugh & Streib, 2006).

Secondly, individual volunteers may come together in novel groups that have "no preexisting structures such as group membership, tasks, roles, or expertise that can be specified ex ante" (Majchrzak et al., 2007, p. 147). Instead, these are completely voluntary groups that did not exist prior to the disaster and emerge primarily to carry out response tasks or coordinate other group participation when existing organizations or structures appear inadequate (Kim et al., 2022). Though they may range from groups of local bystanders to members of formal organizations (Twigg & Mosel, 2017), these grassroots groups are considered emergent because of the new relationships among participating individuals, and the new tasks undertaken in pursuit of their common goals (Stallings & Quarantelli, 1985).[1]

Finally, groups of organizations (both preexisting or formally involved and those that form to meet novel crisis needs) may create emergent interorganizational collaborative patterns and may also engage in novel activities. These networks are known as emergent, multi-

[1] It is important to note that organizational emergence may also occur in those groups that exist prior to a disaster occurrence. In these cases, these organizations may take on new structures or tasks to meet the new demands of the crisis and may or may not return to normal following the end of the disaster (Douglas et al., 2018; Tierney, 2014; Dynes, 1970).

organizational networks or EMONs (Drabek, 1996; Tierney & Trainor, 2004; Butts et al., 2012). EMONs consist of different organizational entities that "collaborate in order to pool resources, resolve task interdependencies, or leverage complementary capabilities" (Butts et al., 2012). The entities making up EMONs may include formal responding organizations with a state-sanctioned disaster response mission, novel informal organizations created during the current crisis (including individual volunteers), and pre-existing, non-disaster response entities that participate because they happen to be in the area (Petrescu-Prahova & Butts, 2005). For example, following the Oklahoma City bombing in 1995, hundreds of organizations and individual volunteers formed an EMON when they converged on-scene to engage in response activities, requiring significant coordination across different jurisdictions and groups (Waugh & Streib, 2006). It has been argued that EMONs are a source of resilience because they offer diverse resources that can be leveraged to quickly respond to conditions of environmental turbulence (Tierney & Trainor, 2004).

Despite the beneficial and often vital role emergent organizations and networks play in disaster response, formal disaster response structures typically struggle to effectively engage or incorporate them in collaborative action during a disaster response for several reasons (Twigg & Mosel, 2017; Drabek & McEntire, 2003; Waugh & Streib, 2006). First, the convergence of spontaneous volunteers or groups at an active disaster site can present an additional managerial challenge for responders, particularly if the scene has not been secured, such as in a bioterrorism event (Clizbe, 2004; Twigg & Mosel, 2017). Formal responders may be hesitant to incorporate untrained volunteers or groups into a response due to concerns for their safety, unfamiliarity with their potential contributions, and concerns for responder liability (Waldman et al., 2018; Whittaker et al. 2015; Twigg & Mosel, 2017). Conversely, emergent groups may also struggle to

interface with the formal response structure due to their inexperience with formal protocols and technical jargon, or because of a lack of existing coordination structures or mechanisms (Clizbe, 2005; Pipa, 2006). Thus, despite the important contribution emergent actors and groups may play in disaster response, the challenge remains as how to incorporate them into the formal infrastructure under conditions of urgency and uncertainty.

COVID-19 as a Setting for Understanding Emergent Collaboration

Twigg and Mosel (2017) note that, "emergence is most likely to occur when people believe that existing emergency management organizations cannot cope with all the problems and needs generated by a disaster, or their structures and capacities are insufficient to respond adequately…" (p. 446). Stallings and Quarantelli (1985) argue that large-scale disasters will foster emergence particularly if there are perceived problems with interorganizational coordination, lapses in assumption of authority, or when disaster demands overwhelm key response organizations. The COVID-19 pandemic was a large-scale public health crisis with significant perceived management challenges (see, for example, Kapucu et al., 2022), that quickly went beyond a public health emergency and created challenges for nearly every aspect of society (Nicola et al., 2020; Alcantara-Ayala et al., 2021). In the U.S., the fields of public health and emergency management share an overlapping goal of protecting health and well-being of the community (Wolf-Fordham, 2020). Emergency managers must consider all types of hazards (including those that threaten the public's health), whereas public health officials must consider all issues related to community health (including acute public health emergencies). During acute public health crises, emergency managers and public health officials must work together to manage the crisis, particularly at the local level. Thus, the COVID-19 pandemic triggered both emergency management and public health response structures, with varying levels of success

(see, for example, Kapucu & Hu, 2022). Because there are few recent pandemics from which to draw experience and due to collaborative failures at the federal level, preexisting pandemic management plans were found to be inadequate for many localities (Kapucu & Hu, 2022; Kim et al., 2022; Mallinson, 2020). Based on findings from previous studies on large-scale disasters with perceived management challenges, the COVID-19 pandemic, therefore, suggested the potential for and likelihood of emergent collaboration and served as the research setting for this project.

Research Design

To explore the potential ways in which emergent collaboration might be better incorporated into existing disaster management systems, I employed a mixed-methods, multiple case study research design consisting of two emergent, interorganizational collaborative networks (or EMONs) formed during the COVID-19 pandemic in the state of Virginia (Creswell & Creswell, 2018; Yin, 2014). As this project was exploratory in nature, I selected two networks that were comparable on some dimensions but were also dissimilar enough in their organizational makeup and purpose as to facilitate comparison and ideally, more generalizable conclusions about the phenomenon of emergent collaboration. The first case, the Be Well Task Force, was selected because it formed specifically to deal with the impacts of the pandemic in a single region. As such, this network represents the type of emergent networks most often studied in previous disaster research, or those that form to provide tangible resources and services "on scene" (see, for example, Tierney & Trainor, 2004). As a complement, I selected a second case, the COVID Finance Network, that served the whole state of Virginia, and formed specifically as a virtual information-sharing network between municipal finance officials rather than as an interorganizational resource-provision collaborative. Thus, these two cases provide examples of

the variation in EMON formation and purpose, but also are similar enough by event and location as to allow for comparison. Figure 1 depicts the research design for this dissertation project.

Figure 1. Dissertation research design

Mission Impossible? Routinizing the anticipation of emergent collaboration in disaster management networks: A study of emergence in the COVID-19 pandemic			
	Chapter 2	**Chapter 3**	**Chapter 4**
Title	ICS lite? Novel crises, emergent actors, and the potential for partial Incident Command System implementation	Brokering to manage the ripples in the pond: Network structures for balancing the stability/flexibility paradox of disaster management	COVID-19, local government disaster coordination, and the silver linings of virtual engagement
Research Question	How do communities employ a response framework that requires pre-existing conditions of training and responder familiarity during novel events when such preconditions might not be present?	How do disaster managers structure a network that requires both a stable cadre of participants to carry out routine disaster management functions over time, as well as a flexible structure that can adapt as necessary to address the unforeseen tasks?	Did the necessity of virtual engagement create barriers to collaboration or did this transition to virtual engagement offer unforeseen benefits?
Data Collection	Qualitative and quantitative	Qualitative and quantitative	Quantitative
Methods of Analysis	Qualitative analysis and organizational network analysis	Qualitative analysis and organizational network analysis	Organizational network analysis

Positionality Statement

Any research undertaking is inherently influenced by the researcher's lived experiences, epistemology, and subsequent perspectives and assumptions, regardless of efforts to control the study environment or mitigate potential bias stemming from those perspectives (Scharp & Thomas, 2019). Postpositivist and interpretivist paradigms of inquiry assert that there is no single objective truth, and recognize that the complexity of life and social experience might lead researchers to different interpretations based on their own epistemologies and assumptions

(Ryan, 2006). In other words, “we have experiences only within a prior discourse” (Bevir & Rhodes, 2003, p. 23, as cited in Orr & Bennett, 2009). It is in this spirit of self-reflection that I acknowledge my positionality as both a researcher and a former practitioner living in the geographic community that acts as the research setting for two of the three manuscripts contained in this dissertation. I reflect on the influence my lived experiences might have had upon the research design of this study as well as the interpretation of findings.

I worked for several years as a state-level public administrator in the field of disaster management and have first-hand knowledge of the systems and processes used to standardize disaster response across the country. As part of my professional experience in this arena, I previously identified as an integral member of the disaster response system and experienced numerous small- and large-scale crises as part of the team of responders legally authorized to manage disasters. However, I do not share identical experiences with those interviewed for this project, as I have never been part of a team working collective to manage the impacts of a global pandemic to a local community, and specifically, have never worked professionally with any of those included in this study. Therefore, I fall somewhere in the middle of the insider/outsider duality and am acutely aware of my status as both insider and outsider (Kerstetter, 2012; Dwyer & Buckle, 2009).

As an “insider” with previous experience in disaster management (Dwyer & Buckle, 2009), my familiarity with the technical jargon and previous understanding of the institutional logics often espoused by those organizations charged with disaster response may have influenced both the research design and construction of data collection instruments that were intended to gather perspectives from respondents similarly engaged with the formal disaster response system. It is also possible that my professional background may have encouraged a sense of

camaraderie with those interviewed in this project because of our similar professional experiences. The perception of similarity between myself and those interviewed may have impacted the information shared by the respondents. Thus, my approach to the qualitative data collection process, the development of semi-structured interview instruments and the subsequent information shared by respondents were all likely influenced by my positionality as someone who has a similar professional background.

However, as an "outsider" no longer affiliated with the disaster management community (Dwyer & Buckle, 2009), I am also not acquainted with all the nuances involved in the day-to-day lived experiences of those interviewees included in this study. There may have been aspects of their experiences that were not captured by my data collection instruments simply because I was unaware that I should ask about them. Though I did encourage interviewees to volunteer information I might have failed to capture, it is likely that a different researcher with a different lived experience would have sought alternative information from respondents.

In addition to my positionality as a former disaster management practitioner, at the time in which this study was conducted, I physically resided in the community within southwestern Virginia that provided the research setting for two of the three manuscripts contained in this dissertation. As a resident of this region, I experienced the COVID-19 pandemic as an individual resident unaffiliated with formal management efforts for nearly two years prior to engaging in research to study the ways in which it was managed in my own community. During this period of time, I was aware of the efforts to manage the pandemic's impacts to my community, and was, at times, directly impacted by these efforts. As such, I cannot fully separate my personal lived experience under this system of management and as a member of this geographical community from my role as a researcher. It is possible, for instance, that as a resident of this community, I

may have been more inclined to highlight the contributions of this network, rather than to focus on its shortcomings. By reflecting on my personal experience as both an "insider" and an "outsider" throughout the project (Dwyer & Buckle, 2009), I aimed to illuminate any potential bias that might have been introduced in the data collection process and subsequent findings.

Outline of Dissertation

Manuscript 1:

ICS lite? Novel crises, emergent actors, and the potential for partial Incident Command System implementation[2]

In the first manuscript, I explore the Be Well Task Force, an emergent network in southwestern Virginia that formed to manage the COVID-19 pandemic. This network purported to employ the federally mandated[3] incident response framework in the U.S., the Incident Command System (ICS). Prior research indicates ICS is most effective in managing a response when at least four preconditions are present in a community prior to a disaster: that responders are technically trained, there is a shared vision for how to manage crises, responders are familiar to each other and with their expected roles, and they operate under a trusted leader prior to a disaster event (Buck et al., 2006). The COVID-19 pandemic offered an opportunity to explore the implementation of ICS when all four preconditions were unlikely to be present, due to the unforeseeable, emergent actors and tasks required to manage a novel disaster. To understand the potential for ICS implementation under less-than-ideal conditions, I collected qualitative and quantitative data through 20 interviews with task force members. Using qualitative analysis and organizational network analysis, I found that despite the presence of only two of the four

[2] Though this overarching project was a collaboration with several colleagues, I conducted the analysis and wrote this manuscript as a solo piece. Future iterations, however, may include these collaborators.
[3] The Department of Homeland Security issued the National Incident Management System in 2004, which requires all responding organizations receiving federal preparedness funding to utilize the Incident Command System for all hazard responses (HSPD-5; FEMA, 2004).

required preconditions for ICS effectiveness in the community prior to the COVID-19 pandemic, the network successfully utilized some elements of ICS, while also allowing for emergent interorganizational structures. While this study was exploratory in nature, it suggests the potential for successful partial ICS implementation in the absence of some of the necessary preconditions and offers future directions for understanding whether and how emergent structures may complement formal disaster management systems to better facilitate emergent collaboration.

Manuscript 2: Brokering to Manage the Ripples in the Pond: Network Structures for Balancing the Stability/Flexibility Paradox of Disaster Management[4]

The second manuscript uses the same network case, the Be Well Task Force, to explore a paradox of disaster management: the need for both stability and flexibility in organizing for disaster response. On one hand, any type of crisis will inevitably involve routine, predictable tasks best managed through stable structures common to bureaucratic ways of organizing (Buck et al., 2006). On the other hand, by their very nature, disasters create a significant amount of uncertainty (related to the type of the incident itself or to unanticipated managerial challenges) which require more flexible approaches to organizing (Webb & Chavreau, 2006). Previous research suggests that a core/periphery structural configuration might balance both stability and flexibility, with routine tasks accomplished by the core and emergent tasks managed via the periphery (Robinson et al., 2013; Nowell et al., 2018). The COVID-19 pandemic was a novel disaster that required the management of both routine and novel tasks. As such, it offered a chance to explore emergent ways of organizing that might have balanced the stability/flexibility

[4] Though I conducted the analysis and drafted the manuscript, this piece involved significant guidance from two co-authors, Robin Lemaire and Sophie Wenzel, who are noted as co-authors in the dissertation version of this manuscript.

tension. For this manuscript, we drew on qualitative and quantitative data collected from 23 semi-structured interviews with Be Well Task Force members and key partners, using a combination of qualitative analysis and organizational network analysis. We found that the Be Well Task Force structure consisted of a densely connected core group of organizations as predicted by previous research, but also throughout the different phases of the pandemic, utilized different types of organizational brokers with different methods for brokering to peripheral and external groups. These findings suggest that community brokers may have previously been undervalued as important mechanisms for integrating emergent or informal groups and importantly, that they utilize different processes of brokering during different disaster stages. This study has implications for future research into the ways communities might identify and incorporate community brokers prior to future crises, as well as which types and processes of brokering might be relevant during each phase of the disaster management lifecycle.

Manuscript 3: COVID-19, local government disaster coordination, and the silver linings of virtual engagement[5]

The final manuscript of this dissertation explores a different emergent multiorganizational network that also formed in the state of Virginia, the COVID Finance Network. This information-sharing network emerged to assist local government financial managers with navigating the emergent fiscal task demands created by the pandemic, and unlike the first case, functioned entirely via virtual software platforms, offering a novel opportunity for exploring how a virtual medium might facilitate emergent collaboration. Using publicly available data and social network analysis, I found that the virtual nature of their interactions facilitated a

[5] Though this overarching project was a collaboration with several colleagues, I conducted the analysis and wrote this manuscript as a solo piece. Future iterations, however, may include these collaborators.

large number and broad distribution of network participants, as well as differentiated ways of member participation. These findings suggest a silver lining amid the COVID-19 pandemic: the potential for emergent mediums, such as online virtual software, to facilitate emergent interorganizational network formation by reducing barriers to participation for informal, emergent actors. The study also has implications for local government collaboration, network formation, and future disaster response.

Implications

It is impossible to predict exactly when the next major disaster will occur, or which actors or tasks might be required to manage it. Thus, emergence is an inevitable phenomenon that is not necessarily an indication of a failure of planning, but rather represents an innovative or adaptative response to environmental uncertainty (Majchrzak et al., 2007; Quarantelli, 1998). The who or the what of emergency may not be predictable, but the appearance of emergent behavior and collaboration is predictable in large-scale crises (Stallings & Quarantelli, 1985; Twigg & Mosel, 2017), like the COVID-19 pandemic. This dissertation explored two emergent networks that formed in the state of Virginia to manage the COVID-19 pandemic in order to understand the ways in which communities may be better able to plan for, facilitate, and incorporate inevitable emergent collaboration in future disasters. Despite an inability to predict the who or the what of emergence in future disasters, this dissertation demonstrates the need for shifting the preparedness lens toward the how, or the ways in which emergent groups might be better integrated into existing disaster management structures regardless of the scale or type of future hazard. Rather than trying to foresee and plan for every single crisis, this study points to the potential for community disaster managers to routinize the anticipation of emergence by considering those organizations within their communities that may be best positioned to facilitate

different emergent actors, ways of engaging them before crises occur, and mechanisms that might break down barriers to formal/informal responder collaboration during an acute response.

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CHAPTER TWO

ICS-Lite? Novel crises, emergent actors, and the potential for partial Incident Command System implementation

ABSTRACT

In the U.S., community disaster managers utilize the federal Incident Command System (ICS) framework to manage all disasters, regardless of the type of hazard. Though little empirical evidence exists to suggest that ICS is an effective tool for disaster managers, previous research suggests that there are several preconditions that facilitate ICS success, including previously trained technical responders and familiarity built over time within a consistent response community. The COVID-19 pandemic offered an opportunity to explore the implementation of ICS when all four preconditions were unlikely to be present, due to the unforeseeable, emergent actors and tasks required to manage a novel disaster. To understand the potential for ICS implementation under less-than-ideal conditions, I collected qualitative and quantitative data through 20 interviews with members of an emergent public health task force that formed to deal with the COVID-19 pandemic in a community within southwestern Virginia. Using qualitative analysis and organizational network analysis, I found that despite the presence of only two of the four required preconditions for ICS effectiveness in the community prior to the COVID-19 pandemic, the network successfully utilized some elements of ICS, while also allowing for emergent interorganizational structures. While this study was exploratory in nature, it suggests the potential for successful partial ICS implementation in the absence of some of the necessary preconditions and offers future directions for understanding whether and how emergent structures may complement formal disaster management systems to better facilitate emergent collaboration.

Introduction

Complex disasters are those events so disruptive to society that managing them generally necessitates multiorganizational collaboration (Moynihan, 2009). Coordinating this multiorganizational collaboration is a key challenge for public disaster managers (Abbasi & Kapucu, 2012) because it requires streamlining decision making and action across multiple interdependent organizational actors under dynamic and uncertain conditions (Moynihan, 2009; Steelman et al., 2021). In the U.S., community disaster managers are mandated to use the National Incident Management System to coordinate on-scene multiorganizational disaster response, a major component of which is the Incident Command System (ICS). This policy is intended to provide a framework for streamlining and standardizing all types of hazard responses across various participating organizations and jurisdictions and has historically been well regarded by disaster management professionals for its effectiveness in managing routine disasters like wildfire response (Moynihan, 2009; Jensen & Thompson, 2016).

Though scant empirical research exists on the effectiveness of ICS (Jensen & Thompson, 2016), one foundational study on real-world ICS implementation complements practitioner assertions of effectiveness in managing routine disasters, but when certain preconditions are met prior to the crisis. In their systematic qualitative review of nine major crises, Buck, Trainor, and Aguirre (2006) found that four preconditions aided ICS success: when there were previously agreed upon technical tactics and task demands that coincided with responder training; when there was a shared vision of the response through planning, practice, and experience; when the community had a familiar responder group; and when the ICS leaders were technically knowledgeable and trusted by the community. Problematically, despite its pervasiveness as a response management framework in the U.S., little empirical research exists on the use of ICS in

nonroutine crises, or those with which community disaster managers have little previous experience to learn from and that which may involve new actors (Waugh & Streib, 2006; Jensen & Thompson, 2016). Nonroutine crises are those for which effective planning and training is difficult because they do not occur often, and which generally require the participation of new actors and the management of new tasks that were unforeseeable or unpredictable prior to the acute crisis. Indeed, some scholars have argued that ICS fails to incorporate spontaneous volunteers and emergent organizations into the formal response effort and questioned its appropriateness in nonroutine crises (Schneider, 1992; Neal & Phillips, 1995; Lutz & Lindell, 2008). Thus, the question emerges as to how communities manage nonroutine crises using a formal response management framework that depends on the presence of preconditions of technical responder training and familiarity, when nonroutine crises inherently involve new tasks and actors unforeseeable prior to the event?

The question of how public disaster managers utilize the predominant response management framework to manage nonroutine crises with new actors and tasks is a persistent one in crisis management literature (see, for example, Quarantelli, 1989; Majchrzak et al. 2007; and Kim et al., 2022). I explore this question through the lens of the COVID-19 pandemic, which was a nonroutine and novel public health disaster for which there was very little previous management experience, and which involved a large number of emergent actors unfamiliar with formal disaster response (Kapucu and Hu, 2022). To understand how a community might have utilized ICS to manage this novel crisis, I conducted a mixed methods case study of an emergent, multiorganizational network that formed to manage the COVID-19 pandemic in southwestern Virginia. The study consisted of both qualitative and quantitative data collected through 20 semi-structured interviews with network members, analyzed thematically and with organizational

network analysis, respectively. I find that despite the fact that the four preconditions Buck et al. (2006) found to be important for successful ICS implementation were not all present in the community prior to the start of the pandemic, the emergent network still implemented some elements of the ICS framework to manage the COVID-19 pandemic, alongside adaptations and emergent structures that leveraged preexisting community capacity. These findings suggest the potential for looking past the rigidity of a one-size-fits-all approach to disaster management that assumes all communities have equal capacity to sustain the necessary preconditions for successful ICS implementation. Instead, the findings from this study suggest that depending on preexisting community capacity, ICS may still be an effective tool if implemented in part, and in combination with other emergent structures and processes. Despite the novelty of the COVID-19 pandemic as a type of hazard, the findings herein also suggest generalizability to other future novel crises which involve unforeseen new tasks and actors.

The Incident Command System as a Network Governance Tool

Successful response to disasters has long been recognized as a multiorganizational endeavor (Boin & t'Hart, 2010; Kapucu, 2010). By definition, disasters are hazardous events that overwhelm single jurisdictions (as opposed to localized traffic accidents or other isolated, minor threats), pose immediate threats to human life, property, or the environment and require a coordinated multiorganizational response to contain (Scott & Nowell, 2020; Comfort & Kapucu, 2006; Moynihan, 2009; Kapucu, 2010). At the same time, the predominant paradigm for managing the uncertainty created by disasters is a command-and-control approach, which prioritizes the need for clear lines of authority and leadership that enable rapid action, similar to a traditional military command structure (Waugh, 2009). A hierarchical approach is intended to centralize decision making and resource distribution when effective crisis response requires

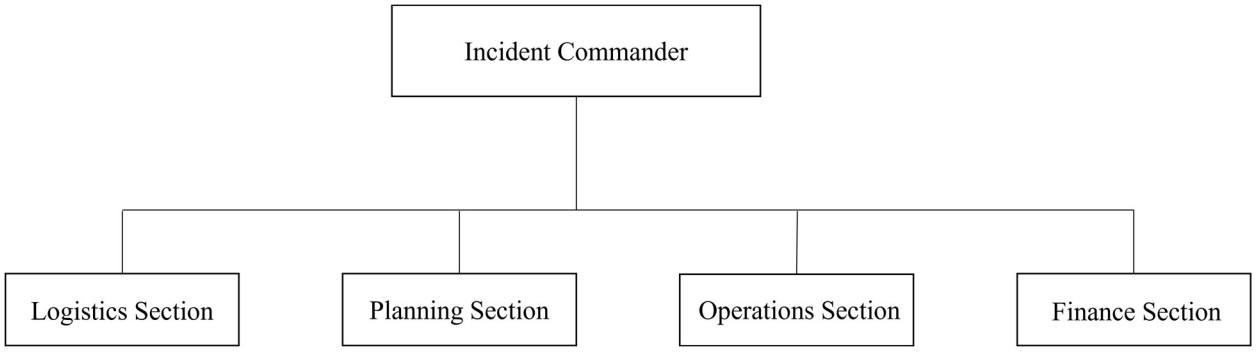
urgency and there is not enough time to build consensus across independent organizations (Moynihan, 2008). The dual need for both lateral, multiorganizational collaboration across autonomous groups and hierarchical, centralized decision making in times of urgency creates a significant management challenge for designing effective disaster response systems (Steelman et al., 2021).

At present, the federally mandated framework for responding to disasters in the U.S. is the National Incident Management System (NIMS) and is intended to balance these two simultaneous demands. One of the central components of NIMS is the Incident Command System (ICS), which began as a way to standardize multijurisdictional wildfire responses in California (Stambler & Barbera, 2011). Moynihan (2008) describes ICS as a "formal mechanism to foster network coordination"[6] (p. 898) for on-scene responses, as it uses a combination of different managerial elements to allow for the coordination of "multiple lateral actors while preserving a hierarchical command control structure" (Steelman et al., 2021, p. 725). The system consists of 14 managerial elements (Lutz & Lindell, 2008), some of which are intended to foster interorganizational collaboration, whereas others are aimed at enabling centralized action. For instance, under the ICS system, all responding organizations operate under common terminology and with integrated communications to avoid barriers to rapid information and situational awareness sharing across different organizations. In contrast, the chain of command feature clarifies the way authority is meant to flow through the hierarchy to ensure orders come down from only one supervisor (EMSI, 2018). One of the structural manifestations of the command-

[6] Moynihan (2009) likens ICS to the mode of network governance (Provan & Kenis, 2008) known as a Network Administrative Organization (NAO), as when a disaster strikes, a specific configuration of organizations making up the ICS forms for the sole purpose of governing the network necessary for managing that specific disaster. In other words, without a disaster to respond to, there is no need for governing a disaster response network and therefore no need for an ICS.

and-control aspect of the ICS is the structure in which authority for governing the broader system is consolidated. Under what Nowell and Steelman (2019) call the "command organizational structure" (or COS), normally autonomous organizations temporarily yield authority for decision making to a central actor, the incident commander (IC), who oversees four functional areas, or sections: operations, logistics, planning, and finance/administration (Moynihan, 2009; Nowell & Steelman, 2019). The IC has temporary and ultimate responsibility for all activities involved in managing an incident, with all section chiefs reporting to the IC (Bigley & Roberts, 2001). In this way, there are lines of authority that run as "a structured chain of command from the specialist on the ground to up to the incident commander" (Buck et al., 2006, p. 1). Figure 1 depicts the command aspect of the ICS system.

Figure 1. The Command Element of the Incident Command System



Because disasters often impact more than one geographical jurisdiction at the same time, the ICS also specifies mechanisms for incident command-sharing between multiple organizations central to the response. Depending on the size of the disaster impact and the resources to be coordinated, ICS specifies arrangements like Unified Command and Area Command that are intended to balance both the multiorganizational collaboration and streamlined decision making necessary for effective disaster response.

Conditions for ICS Success

Despite nearly unanimous support for the ICS framework from the practitioner community (predominantly and perhaps unsurprisingly, from wildfire responders) (Jensen & Thompson, 2016), there has been little empirical evidence for the conditions under which ICS might be most appropriate and successful as a mechanism of network coordination (Lutz & Lindell, 2008; Jensen & Waugh, 2014; Jensen & Thompson, 2016). Much of the academic literature on ICS consists of theoretical assessments stemming from classic organizational theories of the bureaucratic approach to organizing (Jensen & Thompson, 2016). For instance, Waugh (2009) argues, "such systems, by their very nature, are inflexible, slow, and cumbersome and would be much less adaptable in task environments characterized by uncertainty and rapid change" (p. 172). From this theoretical perspective, therefore, ICS (or the command-and-control approach in general) may work best only under environmental conditions of predictability and stability (Neal & Phillips, 1995; Buck et al., 2006; Nowell & Steelman, 2019).

Yet there remains a dearth of empirical studies of ICS effectiveness in real-life scenarios to confirm these academic critiques (Jensen & Thompson, 2016). The research that does exist indicates that ICS is a policy like any other and therefore subject to all the complexities and conditions of any policy implementation scenario (Jensen & Young, 2014). This includes implementation-related independent variables like policy characteristics, local structural and situation conditions, and implementer views, as well as leadership-related variables and those variables produced by the nature of the incident (Jensen & Young, 2015, p. 364). While ICS is a policy, it is also a framework intended to act as a mechanism of network coordination, and therefore its success is predicated on common antecedents necessary for interorganizational collaboration (Moynihan, 2009). In other words, successful ICS implementation requires both

the technical policy knowledge required for a rational approach to disaster management as well as the preconditions necessary for successful interorganizational collaboration (Buck et al., 2006). These factors may be described as four general preconditions.

First, successful implementation of ICS requires the presence of agreed-upon technical tactics and the differential expertise necessary to carry out functional tasks. This includes common ICS terminology, operational concepts, and system procedures (Buck et al., 2006). Additionally, responders' tactical training and expertise must match the specific functional demands created by a disaster (Buck et al., 2006). Lutz and Lindell (2008) expound upon the importance of responder pre-event training in ICS and compare it to broader organizational training research on the importance of applicability of training to actual job duties. They note, "…transfer of training to the job must be based on an effectively designed program of practice…drills, exercises and incidents allow personnel to develop skill in performing their emergency response duties in a timely and effective manner" (p. 125). Thus, in practical terms, this precondition implies that responders have previously been successfully trained in ICS procedures specific to the disaster at hand.

A second prerequisite for successful implementation of the ICS framework relates to the interdependence of response organizations and the need for a shared operational representation of the situation and how it must be managed (Bigley & Roberts, 2001). This finding coincides with teams and collaboration literature, which suggest the importance of a shared vision between partners in facilitating successful collaboration (Chen, 2010; Behn, 2010; Li, 2005). Practically, this precondition implies that successful ICS implementation requires a shared expectation of a "workable plan" for how to respond, developed through collective planning, practice, and experience prior to an event (Buck et al., 2006). Such a plan is developed over time as

participants work through responses together and converge on how to best manage an incident. This assessment is supported by Thomas et al. (2004)'s analysis of a hospital-based disaster situation. From their analysis, they argue for the importance of a pre-event ICS implementation plan in overall disaster response success. Together with the first precondition, this translates to the need for a formal and shared response plan carried out by those with ICS training specific to the disaster at hand.

The third prerequisite necessary for ICS success is the presence of a cohesive response community, wherein responders feel a sense of belonging to a larger group tasked with community interagency disaster response who have built interpersonal connections over time (Buck et al., 2006; Klein, 1999). This finding is echoed in Jensen and Waugh (2014), who also point to several studies indicating the importance that "the entities in the [response] network have pre-incident working relationships with one another," (p. 10) (see Branum, Dietz, and Black, 2010; Crichton, Lauche, and Flin, 2005; and Moynihan, 2009). Preexisting relationships help responders trust each other, help to minimize interpersonal conflict during response situations and can lead to faster collective action in crisis situations (Moynihan, 2009; Simo & Bies, 2006). In fact, the 9/11 Commission credited the success of the Pentagon terrorist response to the fact that there were "strong professional relationships and trust established among emergency responders" (9/11 Commission, 2004, p. 314).

In addition to trust between members, trust in a leader is the fourth and final precondition for ICS success. Leaders must not only be technically knowledgeable, but also willing to defer to the member of the group with the most expertise in the task at hand (Buck et al., 2006; Bigley & Roberts, 2001). To unpack the notion of a trusted leader more thoroughly, the first requirement of this precondition implies that there is a clear designated leader, or incident commander.

Nowell and Steelman (2019) argue that the command organizational structure (in which the incident commander is structurally situated) is likely applicable to disaster response only when there is a superordinate entity with legal authority to assume incident command. Bigley and Roberts (2001) add that it is important that this overarching leader be recognized by the network as having authority, but as Buck et al. (2006) note, the leader must also be willing to delegate authority to the actor best capable of handling a specific task, or what Bigley and Roberts (2001) refer to as "authority migrating." Additionally, this precondition implies that the rest of the response network must trust the leader. The importance of trust between network members is a common theme in interorganizational collaboration research and previous research indicates that it does not develop overnight (Provan & Kenis, 2008). Instead, establishing and maintaining trust occurs only when actors are stable participants in a network over time (Provan & Kenis, 2008), including disaster management networks (McLennan et al., 2006).

Together, these prerequisite factors indicate the need for responder (and incident commander) training and experience with the technical elements of the ICS system and specific disaster response demands, but also indicate a need for pre-existing social relationships and responder cohesion and trust developed over time. In this way, it might be argued that to successfully implement ICS, jurisdictions need experience with both the hierarchical, formal rules and structure of the command-and-control system and the preexisting lateral connections created over time between response organizations. Combined, these preconditions theoretically serve to help facilitate the implementation of both hierarchical and network features of ICS.

Yet all four preconditions, while thought to be required, may not always be present in all jurisdictions prior to disaster events, whether by the nature of the community's capacity or by nature of the disaster event itself. For instance, some fiscally constrained communities that don't

often experience disasters may lack the capacity to sustain robust disaster management systems under normal conditions. Therefore, consistent technical training and responder lived experience with ICS may be nonexistent in these communities, making it impossible to facilitate an environment conducive to standing up a relatively new framework among organizations unfamiliar to each other under conditions of extreme urgency. Such was the case during the destructive 2003 wildfire season in California, when local agencies lacking ICS training were underappreciated and underutilized in response efforts (Moynihan, 2009; MCS 2003).

Another plausible scenario where all four preconditions may not be present might be in the case of a completely novel crisis. Novel or unprecedented disasters are those for which there is very little previous experience or training, and that often require the participation of normally uninvolved organizations (Quarantelli et al., 2007). The COVID-19 pandemic for example, is a novel disaster where the responsibility for managing the crisis fell to public health systems generally unaccustomed to or undertrained in disaster response (Wolf-Fordham, 2020). It might be argued that at least some of the preconditions thought to be necessary for successful ICS implementation might have been lacking prior to the COVID-19 pandemic, as few responders had any training in pandemic response or likely, relationships with the myriad organizations that, in hindsight, were involved in the response. Yet there are reported cases of successful implementation of ICS during the COVID-19 pandemic (see, for example, Cook, 2020), thereby raising the question, how do public disaster managers utilize the predominant response management framework to manage nonroutine crises with new actors and tasks, when such preconditions may not be present?

Research Setting

To address this research question, I explore a case study of a proactive, ad-hoc task force that formed during a novel crisis in which the presence of all four preconditions was unlikely. The Be Well Task Force may be described as an emergent, serendipitous interorganizational network that formed to manage the impacts of the COVID-19 pandemic in a community located within the region of southwest Virginia[7]. This primarily rural community is nestled in the Blue Ridge and Appalachian mountains, and consists of four counties and one city with a total population of around 200,000 people. Additionally, the community is home to two universities and one community college and offers abundant outdoor recreation opportunities within the 1,500 square miles it encompasses.

In February of 2020 and in the absence of clear plans and procedures for addressing a complex, public health crisis, a local law enforcement chief engaged the leadership of one of the community's hospital systems to discuss the potential implications for the area's trauma capacity should the novel coronavirus arrive. During this first discussion, attendees considered critical infrastructure needs and vulnerabilities, with emphasis on the need for surge protection at local hospitals. They also identified necessary stakeholders and partners that would be required to assist with these protective efforts, including county law enforcement groups, emergency services, hospital systems, state department of health representatives, public school leadership, local university representatives, and municipal public information officers. From there, the task force was convened for an initial meeting consisting of voluntary participants from a single county jurisdiction. However, the group quickly recognized that due to the challenges with rural emergency management and public health provision, a regional, collaborative approach would be more appropriate to better leverage and coordinate finite resources. The group then invited key

[7] The name of this network has been masked to protect anonymity of the community and the network participants.

governmental and health entities from three adjacent counties and a city in southwestern Virginia to participate. Thus, the early task force consisted of a diverse group of organizations, including representatives from four small county governments and one municipal government (with populations ranging from 15,000 to 100,000), the law enforcement and emergency services organizations within those jurisdictions, public health organizations, the two local hospitals, a community behavioral health services provider, three local higher education institutes, and local affiliates from two state-level organizations.

Once the task force incorporated leaders from multiple geographical jurisdictions, the group organized anticipated managerial functions based on a modified version of the comprehensive emergency management lifecycle of preparedness, response, and recovery/return to pre-pandemic conditions. Additionally, according to the task force's earliest documentation, the group initially adopted an Incident Command System (ICS) approach wherein the command staff was made up of local emergency services agencies and were assigned to the four sections outlined in the ICS structure above (Task Force Internal Briefing Memo).[8] As the pandemic unfolded, the task force assimilated additional community partners to address the various emergent logistical and managerial tasks associated with the changing demands of the pandemic. Over the course of two years, the group met regularly in the major, most populated county within the community of southwestern Virginia. They first met daily to begin with and then weekly as the pandemic became less of an acute public health disaster and more of an economic crisis.[9] Participants had the option to join remotely via teleconference software or attend in person with special precautions taken to prevent person-to-person viral transmission. Each meeting consisted

[8] The task force shared this documentation with the research team, which was dated early 2020 and represented the first attempt to record the structure and processes of the emergent network.
[9] The group first met in early 2020, and this study was conducted between September 2021 and February 2022, at which point the task force was still meeting regularly to address new variant threats.

of a status report from key entities such as the health district, hospitals, and emergency responders, followed by an open forum where participants could share resource needs or coordinate response efforts. Outside of the regular meetings, participants were connected via an email listserv to share updated information or resource needs and coordinate activities. As of the time this study was undertaken, the group was still meeting weekly to address the challenges associated with managing new variant waves.

The Be Well Task Force was selected for study because it was believed to be an exemplary case of a successful community-based attempt to address an issue of national significance that purported to utilize the ICS management framework (Yin, 2014; Byrd, 2020; Nowell & Steelman, 2019).[10] However, it was also an emergent interorganizational network formed to address a new type of disaster (at least for this area of the country). Therefore, it was unclear as to whether the members possessed the tactical training and preexisting responder relationships thought to be necessary for the success of the ICS framework in managing this crisis. Additionally, as the Be Well Task Force constituted a regional approach to managing the pandemic, no legal superordinate authority was clearly identified to delegate regional responsibility to the task force for managing the pandemic. Instead, the task force consisted of bottom-up agreements and proactive collaborative arrangements that were unlikely to have any basis in formal law as statutes generally support local, not regional, disaster management in the U.S. (Roberts, 2008). This suggests a final missing necessary element proposed by Nowell & Steelman (2019), that successful a COS approach only works "in operational domains wherein a superordinate authority exists to delegate commands to an incident commander" (p. 3). When

[10] Yin (2014) argues for five essential components for an exemplary case study: the case must be of significance, it must be complete, it must consider alternative perspectives, it must display sufficient evidence, and it must be composed in an engaging manner.

taken together, the Be Well Task Force presented as a case of purported ICS implementation that was recognized as successful (Byrd, 2020), but based on previous research on the importance of pre-existing tactical training and community responder relationships, suggested the potential for missing necessary preconditions for ICS success.

Data Collection

This study was part of a bigger exploratory research project undertaken by a team of researchers, aimed at fully understanding the task force's formation, structures, and processes of task force group collaboration, as well as the structures of interorganizational collaboration with outside community organizations. As such, we employed an overall convergent, mixed methods research design that consisted of both qualitative and quantitative data collected through interviews with task force members, partners, and external organizations within the community of southwestern Virginia. As the focus of this paper is specifically on the task force's use of ICS and the presence or absence of the four necessary preconditions, I draw from only a subset of this data, from that which was collected from task force members only.[11]

The first step in the overall data collection process was to obtain administrative documentation on the task force's formation from the task force itself, which was written by one task force member in early 2020 as a way to document the task force's overall structure, process for convening, formal membership list and evolution. I have dubbed this document the "Task Force Internal Briefing Memo," referenced above. This document provided the basis for the qualitative and quantitative data collection processes, as described below.

[11] Because ICS is a tool for coordinating a disaster response network (Moynihan, 2009), and as the command organizational structure is the foundation for ICS (Nowell & Steelman, 2019), it's likely that task force members were more likely than partners or external groups to have knowledge of and experience with potential ICS implementation or administration.

Qualitative Data Collection

The administrative documentation provided by task force leadership included a formal membership list of 20 organizations and described the task force as structured by the Incident Command System (ICS). I therefore approached the qualitative data collection process under the assumption that this information was accurate, and initially targeted those 20 organizations for qualitative semi-structured interviews.[12] Because this was part of a larger project aimed at understanding both the task force itself as well as its collaboration with external community partners and based on the understanding that the task force utilized ICS, I identified 24 other likely organizations to interview that, given their formal mission or role in disaster management, were thought to be potential external partners, or those organizations that played some traditional role in community disaster management and likely had resources or information necessary for the response, but who were not directly involved in the task force as members according to the task force documentation. However, through the course of the data collection process, it became apparent that some organizations initially listed as members were more accurately described as partners, and vice versa. Additionally, some of the partners assumed to be involved due to their formal mission in disaster management were not actually found to be key partners.[13] Lastly, through the course of the interviews, interviewees repeatedly noted the vital role of two additional organizations, the public affairs office of the state health department and the regional planning commission. Neither of these groups were originally listed as formal task force members, likely due to the fact that the formal member roster included other organizational units

[12] Participants were fully informed of the research project and consented before participating in this study. This project was approved as exempt by Virginia Tech's Institutional Review Board (IRB Number 21-1015).
[13] For example, the National Guard is included in most disaster management plans, and though they were noted on the task force documentation as a key member, in reality were found to be involved briefly in one phase of the pandemic, and therefore unlikely to have insight into the task force's operations.

associated with both organizations.[14] Therefore, these two organizations were also targeted for interviews due to their determined role as members.

Overall, representatives from the 24 task force member organizations were targeted for this study on ICS implementation.[15] Interviews averaged between one and two hours and were conducted either in person or via Zoom, based on interviewees' preference. Interviews were recorded and transcribed with online transcription software, and then reviewed by the research team for accuracy. As this was part of a larger study, in addition to questions about task force structure and processes, interviewees were asked questions pertaining to their professional backgrounds, their perceptions of task force's formation, membership, way of organizing, overall goals, leadership, successes and challenges, and finally, their perceptions on any potential for future continuation of the task force.[16] The data collection process resulted in interviews with 20 of 24 task force members for a qualitative interview response rate of 83%. Missing respondents included representatives from three county administrations and one municipality. Any time there is missing data, there is a potential for non-response bias, in that the uncollected data may have changed the outcomes of the study in a meaningful way. In this case, the fact that the missing respondents represented most of the county jurisdictions included in this community suggests that county-level perspectives were derived predominantly from the one county that did participate in the study. Those nonparticipating administrators may have had different and important perceptions as to the task force's structure or operations, or their role as task force members. However, the participating organizations were either similarly jurisdictionally

[14]An emergent organization was created by the regional commission during the response phase to help meet the business community's unique needs and this was listed on the roster. In addition, while the local health district was included on the roster, the state parent organization was not. Respondents repeatedly noted that these groups were different and therefore played different but important roles on the task force.
[15] The full anonymized list of Be Well Task Force member organizations is provided in Appendix A.
[16] The semi-structured interview guide is provided in Appendix B.

positioned or subunits of the missing respondents. Additionally, data collected from participating organizations indicated that the missing respondents were not heavily involved in the task force. Therefore, it is likely this missing qualitative interviews would not have changed the outcomes of this study in a meaningful way.

Quantitative Data Collection

As the goal of the quantitative data collection was to obtain relational data to be used to conduct an organizational network analysis, the first step was to clearly delineate the boundaries of the network, or in this case, which organizations constituted the task force's members and partners. To ensure I appropriately captured and bounded the task force (as the network under consideration), I used a combination of bounding strategies, starting with a nominalist strategy using the formal membership list of 20 organizations provided by the task force (Lemaire & Raab, 2020; Knoke & Yang, 2019). I then combined the nominalist strategy with a relational strategy wherein, during the course of the semi-structured interviews, I also asked task force members to provide the names of any additional individuals or organizations not listed in initial documentation from the task force, but who were key to its efforts in managing the different phases of the COVID-19 pandemic. This secondary strategy resulted in an adjusted list of 24 total organizations or organizational subunits identified as task force members and 18 task force partners.[17] All 24 task force members were pursued for quantitative data collection, resulting in data collected from 20 of 24 task force member organizations, for a response rate of 83%. These

[17] In some cases with the larger organizations, several organizational sub-units sat on the task force, each working on a different aspect of pandemic management. For example, one county had three sub-units represented on the task force: the county administration, the public information office, and the emergency services group. We included all the sub-units on the survey roster to capture the differential engagement across the broader organization. We also interviewed multiple members of the same organization as it was unlikely that a single individual could account for the entire organization's level of involvement with the groups listed in the survey (Lemaire & Provan, 2018). We outline below the process for aggregating some of these responses.

20 organizations were the same as those from which qualitative data were collected, with no data collected from three counties and one municipality.

The quantitative relational data were gathered from respondents in the form of a short, two-part questionnaire administered during the course of the semi-structured interviews. The questionnaire was intended to numerically capture the extent of each organization's relationships with other task force members and partners both before and during the COVID-19 pandemic. The first part of the questionnaire asked respondents to evaluate their organization's relationship with a list of other organizations. These organizations included the 24 task force member organizations as well as 24 additional organizations identified as partners or major community actors, who, by nature of their organizational mission or legal authority, would be expected to play at least a minor role in disaster or public health response (such as local government units, elected officials, public health organizations or educational groups that were not task force members).[18] In total, respondents were asked to assess the extent of their organizations' working relationships with 48 organizations. To ensure we left space for interviewees to volunteer the names of any key partners who were not included on the list, we also asked respondents to identify any other organizations with whom they worked closely for the purposes of managing the pandemic. Respondents were asked to evaluate their organization's relationship with each organization on the list, on an ordinal scale from 0 to 3, where 0 meant no working relationship, 1 indicated low-intensity involvement, 2 indicated moderate-intensity involvement, and 3 indicated high-intensity involvement. Participants were asked to use this scale to evaluate their

[18] As this data collection effort was part of a larger project looking at the pandemic management system in the region as a whole, we also collected quantitative relational data from task force members and partners regarding their relationships with organizations not selected for data collection.

organization's relationship with each organization on the list for each of the four pandemic management phases: pre-pandemic, early preparedness, initial response, and recovery/return.[19]

Analysis

As part of the broader overall research project, prior to qualitative data collection, the research team developed a list of a priori themes or those topics we expected to emerge regarding the interviewees' perceptions of task force formation, membership, way of organizing, overall goals, leadership processes, structure, successes and challenges, and the task force's future.[20] For example, I anticipated that interviewees would discuss both the roles of trust and leadership in within the task force, two common themes in interorganizational collaboration research (see, for example, Vangen & Huxham, 2003 and Muller-Seitz, 2012). Throughout the qualitative data collection process, the list of themes was updated to reflect new or unanticipated themes that emerged. Following the conclusion of the data collection process, transcripts were systematically coded for major themes by two members of the research team, with any resulting discrepancies or questions resolved through research team discussion.

As the purpose of the quantitative data, in contrast, was to understand the structural manifestations of the interorganizational collaborative arrangements, I used organizational network analysis to analyze this data. Questionnaire responses were first compiled into square matrix form for each of the four pandemic phases, which resulted in four different networks of directed, valued data (Knoke & Yang, 2019). As the focus of this manuscript is on the interorganizational arrangements between members of this emergent task force, the network

[19] A description of this scale and pandemic management phases as was defined for respondents is provided in Appendix C.
[20] I draw on the data collected related to evidence for ICS preconditions and task force structure only in this paper.

analysis centered on those 24 organizational nodes.[21] Because several representatives from the same overarching organizations were included on the task force, individual responses were aggregated to the organizational level (Wasserman & Faust, 1994). Dyadic ties were also reduced to their minimum confirmed tie intensity level using the minimization technique, meaning that if both nodes indicated a relationship, the intensity was recorded at the lowest common level (Wasserman & Faust, 1994). From there, minimum confirmed ties were then converted to dichotomous data, such that if any tie between nodes was confirmed by both parties, it was recorded as a 1, rather than the lowest intensity level at which it was confirmed above 1. For example, if both members of a dyad reported any tie intensity above 0, this was analyzed as a present tie (or a 1 in the analysis). If either member reported no tie or only one member reported the presence of a tie, this was analyzed as an absent tie (or a 0 in the analysis). I chose to analyze dichotomous data because if task force members reported very strong relationships, this tie intensity could inflate the measure of network density which is the "measure of the extent to which all network organizations are interconnected, or linked to one another…" (Provan & Milward, 1995, p. 10). Within the context of this study, inflated density might suggest stronger relationships among task force members than actually existed, lending potentially false support for the third precondition, a familiar response community. The four networks were analyzed with various statistical measures using UCINet and visualized in NetDraw (Borgatti et al., 2002). The findings of the analysis are presented below.

[21] As noted above, completed questionnaires were collected from 20 of 24 task force members and as such, it was not possible to confirm ties for the missing four respondents, all of which consisted of local government-affiliated organizations representing different jurisdictions. As the overall number of nonrespondent members was very low and the scores for these missing respondents were relatively consistent across the collected data, I chose to utilize unconfirmed data for those nodes (Kossinets, 2006; Knoke & Yang, 2019). Because the data collected from the 20 participating organizations were consistent with regard to the level of involvement of the missing respondents, it is unlikely the missing data changed the outcomes or findings from this study.

Findings

Analysis of Preconditions

As noted in the review of ICS conditions for success, there are four primary prerequisites thought to be necessary for successful ICS implementation, which include previously agreed upon technical tactics and task demands that coincide with responder training; a shared vision of the response through planning, practice, and experience; a familiar response community wherein members have trust in each other; and technically knowledgeable and trusted leaders who have legal authority to manage a crisis (Buck et al., 2006; Nowell & Steelman, 2019; Bigley & Roberts, 2001; Moynihan, 2009).

Precondition 1

As noted in the description of the preconditions above, the first precondition consists of both the need for responders to be technically trained in ICS, and for them to have training that is specific to the disaster at hand (in this case, a pandemic). Qualitative findings derived from the semi-structured interviews indicate this precondition was only partially present prior to the COVID-19 pandemic. When respondents were asked whether their organization played any formal role in disaster management, 70% of interviewees indicated they believed their organization played some formal role.[22] As such, it was assumed that those groups with formal authority or mission in disaster response likely had some level of experience with or understanding of ICS. Indeed, at some point during the semi-structured interviews, eight of the 20 interviewees reported having previous ICS training based on their professional organizational

[22] Of the six task force members who responded that their organization does not play a formal role in disaster management, two were emergent groups, two were university organizations, one was from the public health domain, and the other was a private organization.

affiliation. However, three of these eight respondents (a local law enforcement chief, a higher education representative, and a public-school representative) directly contradicted the assumption that those organizations reporting a role in disaster response would have training in ICS. For example, a local law enforcement leader pointed to the fact that the region does not tend to experience large-scale disasters where he would assume ICS was necessary:

> …you know, you very rarely see an ICS system, you know, because you're, in most small places, short of hurricane-type things, you're not in long-term disaster management mode… (Interviewee 11, law enforcement domain).

A higher education representative cast doubt on whether other members of the task force had ICS training:

> I'd be surprised if most – if hardly any of [the task force members] had any of that type of training (Interviewee 31, university domain)

Further, a public-school representative with background in ICS suggested the task force members were engaged in ICS without even knowing it:

> So I think it's been really interesting to see ICS kind of play with folks who probably aren't even aware that they're playing in ICS (Interviewee 14, public school domain).

Lastly, an interviewee from one of the emergent groups specifically noted that they did not have any personal background in ICS, nor did they feel it was necessary for their participation in the task force (Interviewee 2). Thus, it was clear that some members of the task force did, indeed, have background and formal training with the ICS framework, but many of them did not.

With regard to the second component of this precondition, training specific to the disaster at hand, no evidence was found that any member of the task force had ever specifically trained for managing the impacts of a pandemic in this region of southwestern Virginia. In fact, one member from law enforcement directly pointed to a lack of thorough training in pandemic management:

> …you know, everybody goes through – if you do disaster management stuff, you go through the pandemic slide as part of one of your ICS things, and you're like, yeah, whatever, go to the next phase (Interviewee 11, law enforcement domain).

Other respondents indicated the newness of the crisis, and the region's overall lack of experience in managing a pandemic. For example, one interviewee representing a private organizational task force member noted the need for trial and error:

> And, you know, we were building the plane as we were flying it, so you just have to do something and then try that (Interviewee 7, other organization).

The local law enforcement member also noted the lack of pandemic management training:

> I mean, none of us knew how to do a pandemic. None of us cared. But we all we all knew that there was going to be a problem and we had to fix a problem (Interviewee 11, law enforcement domain)

Thus, while some of the task force members did have previous experience and training in the ICS framework, they did not, as a group, have pandemic-specific training to the extent that they could draw on it for managing the COVID-19 pandemic.

Precondition 2

Unsurprisingly, given this lack of training in pandemic management, evidence was not found for the presence of the second precondition, a shared vision for a response plan based on previous shared planning and experience. Buck et al. (2006) argue that this precondition allows participants to "gain an understanding of and trust in one another; they become comfortable working with one another in an ICS environment" (p. 12). Instead, 15 percent of respondents (representing both the emergency management and public health domains, arguably, the two groups best positioned to speak to previous pandemic training), pointed directly to a lack of shared pandemic training, with one interviewee from the emergency management domain noting:

> There was so much time invested into planning [within the state government], and the plan didn't really consider what if this affects everyone? And so, until it affected everyone, there was never an opportunity to apply the plan and realize where it doesn't work and how we need to bring

> other partners in. And the partners that are on the task force never, ever that I can ever recall in any point in history, I don't believe pulled together to talk about how they how they would collaborate in a public health emergency (Interviewee 5, emergency management domain).

A member of a public health organization echoed this sentiment:

> We did our emergency planning, [other organizations in the area did] their emergency planning. There was never any lock together (Interviewee 20, public health domain).

Lastly, one local government respondent even lamented the lack of a shared plan, and the constant need for the task force to react to changing conditions:

> "Had there been more things in place, it probably wouldn't only probably make the job easier. We wouldn't have had to spend as many long sleepless nights, but the same amount of work would have probably been done" (Interviewee 10, local government domain).

These findings suggest that the second precondition was absent in this community prior to the COVID-19 pandemic.

Precondition 3

To ascertain the level of responder familiarity prior to the pandemic (the third precondition), respondents were asked the following questions: *What kinds of relationships existed between the organizational members of the Task Force before the COVID-19 pandemic brought the Task Force together? Do you know if any of the members had a history of working closely with each other?* Of the 20 respondents, all but one described the existence of relationships between some task force members prior to the COVID-19 pandemic, with nine interviewees specifically noting the strong relationships between members of the emergency services community in the region.[23] For example:

> I think emergency services historically, especially here in the [region], when something happens, you know, we actually step up and take care of each other. You know, emergency services, first responders are a different family. You know, I refer to us as a dysfunctional family sometimes.

[23] The one interviewee who did not indicate that they knew of preexisting relationships represented an emergent group that joined the task force well after it had formed. However, this respondent did speculate that there were likely relationships, but that they just could not speak directly to them.

> But when one of us need something, there's no questions asked (Interviewee 20, emergency management domain).

Though there were close working relationships between some organizations on the task force prior to the COVID-19 pandemic (expressed by one respondent as "pockets" of relationships), four interviewees also described missing connections across organizational domains. The following quote is indicative of these four responses:

> To a certain extent, certain people work together. But it wasn't – there wasn't no huge group like it is now of all these different entities that are working together on the task force. That wasn't the thing before (Interviewee 6, emergency management domain).

Results from the quantitative organizational network analysis support the qualitative findings that though there were some pre-existing relationships in the region prior to the COVID-19 pandemic, the relationships between organizations prior to the pandemic did not necessarily constitute a "familiar response community." The pre-COVID task force network density is presented below alongside the density calculated during the recovery phase only to provide a basis for understanding the relative number of collaborative relationships between task force members prior to the COVID-19 pandemic. Table 1 presents the density measures for both the pre-pandemic phase (defined as any collaboration between groups prior to the existence of the COVID-19 pandemic) as well as for the recovery phase (defined as any collaboration for the purposes of managing the COVID-19 pandemic after the time that vaccines were available).

Table 1. Density measures pre-pandemic vs. recovery phase

Phase	**Density (Dichotomous)**	**Number of Ties**
Pre-COVID	57.6%	318
Recovery	84.2%	462

As noted above, I used confirmed, dichotomous ties to ensure tie intensity did not obscure the

presence of relationships between members before the pandemic. During the pre-COVID phase, task force density was less than 60 percent, whereas by the recovery phase, task force density was over 80 percent. Additionally, prior to the COVID-19 pandemic, there were 318 confirmed ties between organizations. By the recovery phase, however, that number increased to 462, which is a 45% increase in ties between members. These measures suggest that while there were a number of relationships between certain task force members (like emergency services) prior to the COVID-19 pandemic, members made new ties with organizations they had not worked with prior to their participation in managing the COVID-19 pandemic. In other words, the third precondition was only partially met prior to this disaster..

Precondition 4

Finally, I found qualitative support for the presence of the fourth precondition, trusted and technically knowledgeable leaders, in the community of southwestern Virginia prior to the start of the COVID-19 pandemic. When asked to describe the leadership of the task force, all 20 interviewees offered the names of both co-leaders, one of whom was a local police chief with experience with incident command, and the other was a public health professional with subject-matter expertise. Specifically, five interviewees pointed to the fact that one or both co-leaders were trusted or respected in their community prior to the pandemic. As one interviewee from the emergency management domain summed up:

> Why is he in charge? I think he's in charge because he's respected. He has great relationships with other emergency services people, and he understands how to communicate and pull from others what they need (Interviewee 5, emergency management domain).

thus, the fourth precondition was present, given these respondents' belief that the community's pre-existing trust and respect for the co-leaders helped mobilize the task force in response to the COVID-19 pandemic.

Altogether, the findings from this study indicate that the first precondition was partially present, the second precondition was not present, the third was partially present, and the fourth was fully present within the community of southwestern Virginia prior to the COVID-19 pandemic. The following section reviews the findings with regard to the ways in which the task force utilized ICS as a mechanism for network coordination.

Evidence for ICS Implementation

As noted above, the documentation provided by task force leadership directly referenced the group's organization based on the ICS framework:

> The [Be Well Task Force] was structured around the Incident Command System (ICS) to help maintain an orderly direction for the activities of the task force and to help ensure that there was little or any duplication of efforts. This proved to be a valuable tool as the task force grew in size and scope (Be Well Task Force, 2020).

To understand whether and to what extent ICS was implemented, interviewees were asked to describe the structure of relationships among task force members, and then, to describe the leadership of the task force.[24] Between these two questions, seven interviewees described the task force using specific ICS terminology. For example:

> I guess you'd call [it] ICS like, right, there is those roles they want to play. It's not necessarily to the tee, but they're there. They play their role. So I can see that with unified command, logistics and PIO, your communications team and then all these other areas that are just supporting it as needed (Interviewee 31, university domain).

[24] These three questions were posed in this way to avoid directly using ICS language in an effort to ensure all respondent perceptions were captured related to the task force's structure without creating undue influence toward the use of ICS language.

Interestingly, four of the seven interviewees who used this language attributed the task force's use of the ICS framework directly to one task force member from the emergency services domain who was tasked by his organization with providing logistics support to the task force. The following quote is indicative of this theme:

> …early on, [task force member] had kind of drawn the structure out, and they really did try to make it more like an [emergency operations center] and have kind of, OK, this person is in charge of this group and this person is in charge of this group to try to give it some order (Interviewee 2, emergent organization).

Aside from the seven interviewees who directly noted that the task force's organizing approach was ICS, other task force members described additional elements of the ICS framework (often using non-ICS terminology), including the command organizational structure (COS), functional division of labor, and standard operating features. Specifically, when asked about the leadership of the task force, as noted above, all 20 respondents indicated that there were two individuals perceived as the leaders, with three referring to the leadership structure as "Unified Command". Other phrases used to describe the leadership structure included "military structure," "command group," and "co-leadership style." For instance:

> You had a couple people at the top who took advice from others, and they would listen, but they'd also make a decision. So that's probably a little like a military structure (Interviewee 10, local government domain).

In addition to the command organizational structure, four respondents described an ICS-style functional division of labor. For instance:

> [Task force member] kind of ran the [public information] stuff and [task force member] and [task force member] ran the business continuity stuff. And then [task force member] and [task force member] kind of ran the EM side and logistics and then whoever from [health department] would take care of their sides (Interviewee 6, emergency management domain).

Finally, qualitative data indicated that the Be Well Task Force created standard operating procedures to facilitate information sharing, including weekly meetings involving all task force

members and the creation of a listserv. For example, 100 percent of respondents mentioned weekly task force meetings during the course of the interviews. The following remark from a representative of a private organization summarizes many of the interviewees' descriptions of the meeting format:

> …there's a pattern, you know exactly how each meeting goes. First, [co-leader two] does her report, and then [co-leader one] would call through each of the counties, then the schools, then the communications team and then open up [for] does anyone else have a question? (Interviewee 7, other organization).

Six interviewees also noted the important role these meetings played in enabling the task force's success. For instance:

> So that's why I think meeting so frequently was helpful because it did keep us in the loop and help identify the needs and actually be proactive, which is something that we don't always get the opportunity to do in times like this… (Interviewee 21, local government domain).

Through these weekly meetings and routine information-sharing systems, task force members developed common terminology and created a system of shared resource management, both elements of the ICS (EMSI, 2018). This, combined with the evidence of ICS as structuring the command aspects of the task force, suggest that there were some elements of ICS employed, despite the lack of all four preconditions.

Connecting Preconditions with ICS Implementation

While this study's results indicate that the task force implemented some elements of ICS, both qualitative and quantitative evidence point to certain adaptations of the ICS framework as well as emergent structures that are organized below based on each of the four preconditions. By the word adaptation, I mean that the ICS framework was not implemented in the manner in which it is formally prescribed, but rather the task force has modified the intended implementation in some way that goes beyond just adjusting the scale and resources engaged

given the hazard at hand.[25] I also define emergent structures as unplanned interorganizational arrangements or mechanisms that are not part of the formal ICS framework, but which emerged spontaneously among task force members.

First, as noted above, qualitative data indicated that only some of the task force members had previous ICS training, but none of this training was directly focused on managing a pandemic (the first precondition thought necessary for ICS implementation). Therefore, I argue that that this precondition was, at best, partially met. However, I also found evidence for implementation of some components of the ICS framework, including the command organizational structure, functional division of labor, and standard operating procedures. Interestingly, four interviewees attributed this use of ICS directly to one early task force member, who, when asked how he became associated with the task force, noted:

> By being a…first response agency within a town and having my position as a paid position within a department, I think it allowed some leeway for [my boss] to take my experience, my training, my emergency management training and emergency services training and to put me in that role (Interviewee 20, emergency management domain).

In other words, this particular individual was involved early on in the task force specifically because of his professional response training, and he helped guide the group's formation based on his knowledge and experience. Thus, even though the task force as a whole did not have prior technical training, it appears that that because some of the early members did, it enabled the successful implementation of some ICS features, or what I have termed, "partial" implementation. The task force used those elements of the framework that were most appropriate given which members had previous ICS training (in particular, the recognized co-leader and the

[25] ICS is intended to be flexible in the sense that it may be grown or shrunk depending on the scale of the impact, and it can be applied to many different types of hazard events for which there is a "scene" that must be managed (FEMA, ICS-100, n.d.). However, as depicted in Figure 1, there are five major management functions (Incident Command, Operations, Planning, Logistics and Finance/Admin) that apply regardless of the scope or type of hazard.

member who helped guide the task force's formation). In this way, the task force was able to adapt the ICS framework to leverage the capacity that did exist within the community and used it to structure the aspects of the task force relevant to that capacity.

The second precondition, a shared vision for a workable response plan based on planning and experience, was not found to be present among task force members prior to the COVID-19 pandemic. In light of this missing precondition, the findings of this study point to evidence of emergent structures and mechanisms that respondents noted assisted the task force with managing unpredictable and dynamic task demands which, in routine disasters, would have been identified and planned for in response plans. Specifically, interviewees identified two factors they attributed to the task force's success in managing the unpredictable elements of the crisis: the diverse makeup of the group and the decentralized nature of group decision-making. First, two respondents pointed to the diverse makeup of the task force as aiding in the group's efforts to problem solve during the acute response phase. As one representative from an emergent group noted:

> And that's why it was so important to have so many people from different aspects of the community because usually, when there was a problem that was presented, we had someone who knew somebody who could solve the problem (Interviewee 3, emergent organization).

Thus, in the absence of a clear regional pandemic management plan, respondents pointed to the diversity of groups at the table as a strategy for creating collaborative action plans on the fly. In other words, by keeping an open membership, the task force was able to reduce the uncertainty of the novel crisis by quickly shifting gears and bringing in new partners as the task environment changed. Indeed, when asked if any organization was not part of the task force membership that should have been, forty percent of interviewees responded in the negative, that as task demands

evolved, the appropriate organizations needed to address those changing demands were included on the task force.[26] The following quote summarizes this perspective:

> I can't think of anyone [missing] because I think we added people as people saw a need change… it was constantly evolving and growing group – like as they saw a need, oh wait, we should probably have this person on the call. Let's add them in (Interviewee 26, university domain).

Thus, these findings suggest that the task force welcomed the participation of diverse organizations including, potentially, those necessary for meeting unanticipated pandemic management demands but also less likely to participate in routine disaster response based on formal authority or mission. In this way, the network was able to operate despite the presence of a clear preexisting or shared vision for a regional pandemic management approach because the group had the flexibility necessary for assimilating any potential partner they deemed a resource for the effort.

The other identified emergent element related to the second precondition was the task force's relatively decentralized structure. One interviewee pointed to the task force's "flat" hierarchical structure outside of the two recognized co-leads:

> So in terms of structure, I think it was it was very flat. You had [co-leader two] and [co-leader one] at the top and then the rest of us (Interviewee 17, university domain).

Another member pointed to this lack of formal structure as directly contributing to the task force's ability to adapt to new tasks:

> I think it works really well because it doesn't have a lot of structure. That's one of – one of the biggest problems with government, academic institutions. You know, they're so structured that they're not really nimble, can't react to situations very well. And what I saw was, you know, everybody gets a vote. Everybody's at the table (Interviewee 10, local government domain).

[26] The other sixty percent pointed to specific organizations that were not present among task force members, but most attributed this absence to a lack of capacity. One respondent characterized one county's absence at task force meetings as justified, given that the county consisted of a "one-man show."

Other related words respondents used to describe the task force's structure included: personal, comfortable, collaborative, trust, respectful, informal, fluid, reliable, and disorganized. In fact, one task force member went so far as to call the structure "too decentralized:"

> Sometimes it seemed a little too decentralized, you know when we would find, oh, wait, there's a clinic there that some other group did and didn't feed back the information (Interviewee 7, other organization.

The results of the network analysis confirm that the task force operated with a relatively decentralized collaborative structure throughout each of the four phases. As noted above, the qualitative data collection processes consisted of a questionnaire that asked respondents to evaluate their organization's collaboration with other organizations on a scale of 0 to 3 for each phase of the pandemic. Table 2 provides the centralization measures for the Be Well Task Force, with centralization defined as the degree to which a few members hold the most number of connections in the network" (Varda, 2017, p. 49). A network that is highly centralized would have a score closer to 1, with a score of 1 indicating that only one network member holds the most central position, whereas a score closer to zero would indicate a more egalitarian or democratic network (Varda, 2017; Knoke & Yang, 2019).

Table 2. Network member confirmed collaboration ties by phase (dichotomous)

Phase	Degree Centralization
Pre-COVID	0.225
Preparedness	0.31
Response	0.178
Recovery	0.178

Table 2 indicates that throughout all four phases, the task force may be described as relatively decentralized, with numerous collaborative ties between members, with ties dispersed and not concentrated around a small number of actors. If the COVID-19 pandemic had been a routine

disaster, like a wildfire or hurricane response, the community would arguably have had a preexisting plan that was regularly tested and implemented by a familiar response group. Previous scholars have found these traditional disaster response structures to be relatively centralized around a small number of lead nodes or legally authorized incident commanders (see, for example, Kapucu & Garayev, 2016 and Nowell et al., 2018). However, the results from the network analysis suggest this task force was not centralized and instead, members collaborated widely, especially during the later stages of the pandemic. In addition, degree centralization scores within this network did not fluctuate greatly across the phases. The highest degree centralization occurred during the preparedness phase, and then the task force became slightly less centralized, maintaining the same centralization score during response and recovery phases. These findings indicate that this emergent task force operated with less central actors during the two phases which arguably produced the most diverse and urgent task demands (the acute response and recovery phases). The decentralized structure of the task force, particularly in these two phases, facilitated direct task force member collaboration, whereas a highly centralized structure would mean a central actor or actors had the majority of the ties.

These findings contrast the fairly centralized ideal-type ICS-structured wildfire response network posited by Nowell et al. (2018). The Be Well Task Force's structure also contrasts with the highly centralized planned ICS network analyzed by Kapucu and Garayev (2016) which was found to have "a high level of relationships with only a few exceptionally important actors" (p. 950). The fact that this emergent task force was more decentralized than planned or ideal-type ICS structures is unsurprising, as previous research suggests ad-hoc or emergent groups tend to be relatively decentralized (Tierney & Trainor, 2004). The key point here is that this was an emergent group that did utilize some elements of ICS despite a lack of pre-designated and widely

practiced pandemic management planning in this region of Virginia. Instead of a step-by-step process for managing this disaster, these findings point to the potential for emergent elements, like diverse or unanticipated organizational participation and decentralized collaboration to compensate for the absence of the second precondition, enabling the group to quickly adapt and secure unpredictable resources during the COVID-19 pandemic.

The third precondition, a familiar response community, was found to be partially present in the region prior to the COVID-19 pandemic. While there were "pockets of relationships" within the community, the group as a whole had never worked together before the pandemic. Despite this lack of interconnection between groups, seven of the 20 respondents directly pointed to the region's history of collaboration which they perceived as contributing to the emergent task force's success (which, as noted above, might explain the presence of ties between task force members prior to the COVID-19 pandemic). For example, as one local government representative described the interdependency of the groups in the region:

> And it wasn't too hard when this was coming to say, OK, we need to be working as a group on this, and thankfully the region has a long history of working together. I look at kind of the organizational dynamics of the [region]. It's that we have enough people to get some things done, but not enough in any government to do them on their own exclusively. So they pretty much really need to work together, and they have for a long time (Interviewee 23, local government domain).

Thus, in the absence of direct familiarity between all task force members prior to the COVID-19 pandemic, the members of the Be Well Task Force adapted this requirement by leveraging the culture of collaboration and social capital built over time within the community to facilitate task force efforts before they had time to create that sense of familiarity within the group.

Lastly, as noted above, I found strong evidence for the presence of trusted and technically competent leaders. Interestingly, the emergent co-leader that had previous ICS experience did not have formal authority over the task force members and their efforts. As one member noted:

> There was no central authority to the task force in and of itself. So even though [co-leader one] was the official or unofficial leader, [co-leader two] the leader, she couldn't dictate anything… [co-leader one] was in charge but he had no authority over me. He doesn't do my performance evaluation, you know… (Interviewee 16, public health domain).

Previous research suggests the command organizational structure to be effective only when there is a superordinate entity with legal authority to assume incident command (Nowell & Steelman, 2019). In the case of the Be Well Task Force, however, the group used the command organizational structure despite a lack of formal authority, indicating an additional potential adaptation of the ICS framework. Given the widespread trust and respect for the co-leader with technical ICS training, these findings suggest that the task force adapted the need for legal delegation of authority by leveraging the community's respect for the co-leader as compensation for his lack of formal authority.

Discussion

This study explored how one community employed a standardized response framework despite a lack of certain preexisting conditions (Buck et al., 2006) in a case of novel crises that created unforeseen task demands and the need for emergent actors. The results of this study indicate that in this case, despite the absence of some of the four necessary preconditions, the Be Well Task Force still implemented several elements of ICS, suggesting the potential for partial implementation of ICS. I also found evidence for emergent interorganizational structures that served to leverage preexisting community capacity in order to meet new task demands. Therefore, based on the findings herein, it is possible that variations in ICS implementation may be influenced by the presence or absence of the four preconditions identified by Buck et al. (2006). Additionally, these findings suggest that it is possible for communities to adapt elements of the ICS framework or employ emergent interorganizational structures to complement or compensate for preexisting community capacity. Finally, I offer the notion of "partial

implementation" of ICS, not as an indication of poor, incomplete, or inaccurate implementation, but as a possible way to enhance the disaster management capacity that does exist in a community when a crisis occurs.

This study has implications that are generalizable outside of the context of the COVID-19 pandemic and the region of southwestern Virginia. The federal mandate of the use of the ICS framework arguably assumes uniform capacity across communities to create the robust technical response community necessary for successful ICS implementation prior to a disaster. In an ideal scenario, every responder involved in disaster management would have prior knowledge of and shared training with the ICS framework. It might even be argued that the task force examined in this study would have acted faster or with more cohesion had everyone been trained and involved in previous ICS responses. However, as Jensen and Waugh (2014) note, "it is impossible to ensure that all of the variables are in alignment pre- and per-incident at any given time much less over time and across the United States" (p. 12). Instead, it is likely that community capacity for creating those precondition variables necessary for successful ICS implementation varies by jurisdiction, particularly in situations of novel and unforeseeable crises. Therefore, the notion of partial ICS implementation may offer a new avenue for research into how to maintain the recognized benefits of this framework while still incorporating the inevitable emergence that will be necessary for future responses.

Local disaster managers are charged with protecting their communities from the physical, emotional, and social harms caused by disasters (Wolf-Fordham, 2020). As such, they are responsible for enhancing their communities' capacity to manage a crisis before it occurs. This first requires evaluating whether their community possesses the capacity to successfully implement ICS, as well as identifying other potential resources that might be brought to bear

outside of the formal disaster response system. By exploring the combination of resources and preconditions present within a community before an acute crisis occurs, local disaster managers may be better able to strategically shore up missing components or create new relationships, as necessary. Additionally, disaster managers might consider the elements of ICS that would work best if implemented in their communities, while remaining open to other ways of coordinating multiorganizational collaboration in those situations in which ICS is not feasible or advisable.

There are, of course, drawbacks and tradeoffs to the notion of variation in ICS implementation. Though there is little empirical research on cases of partial ICS implementation, scholars point to the dangerous potential for a situation in which a transboundary crisis occurs across jurisdictions that implement ICS differently, resulting in failed cross-jurisdictional collaboration (Jensen & Waugh, 2014; Jensen, 2011). This is a valid concern, and certainly something worthy of future research. Yet given the results of this study, I argue that it is possible that emergent structures and processes might compensate for or complement ICS implementation in ways that allow for multi-jurisdictional disaster response despite variations in ICS implementation.

There were also several limitations to this study. For one, as an exploratory study, just one set of potential variables that might influence ICS implementation was examined. As such, I did not nor could not endeavor to identify any causality between the presence or absence of preconditions and subsequent ICS manifestation. Instead, this project sought to understand whether and how ICS might be implemented in the absence of those elements thought necessary for ICS to be successful, particularly in novel crises. I also did not set out to examine the way these preconditions might impact network performance, nor did I examine them in relation to the myriad other variables identified by previous work as possible influencers on ICS

implementation (see, for example, Jensen & Waugh, 2014). Instead, this study responds to the call for more empirical contributions on ICS implementation in real-world settings (Jensen & Waugh, 2014). Additionally, the study contributes to the growing body of literature on possible alternatives or hybrid approaches to disaster response that combine the centralizing elements of ICS with more network-like elements (Nowell & Steelman, 2019). As such, these findings offer some unpacking as to the potential for successful partial ICS implementation in combination with other emergent structures, when community conditions are not perfect for full implementation of all ICS elements.

The results of this study also point to several avenues worthy of additional research. Future work should explore unresolved questions as to the potential for different configurations of preconditions, event-specific hazards, and variations in ICS implementation. Moreover, how these configurations might influence the effectiveness of disaster management networks in responding to both routine and novel crises. Finally, while this was one example of an emergent network, the COVID-19 challenged communities all over the U.S. to respond, suggesting the potential for comparisons of jurisdictional implementation of ICS and the connection to community capacity for disaster response.

Though it is impossible to anticipate what future crises loom around the next corner and therefore, what actors and tasks might be necessary to respond to them, this study suggests that there might be some emergent structures and processes that can help integrate the formal disaster response system mandated in the U.S. with those emergent actors. Importantly, while such emergent networks are nearly impossible to predict and design, as Siciliano et al. (2021) note, they may be subject to influence "by well-intentioned interventions" from policymakers (p. 905). Thus, if emergency managers can recognize the limitations of their communities to meet these

preconditions thought necessary for ICS success, as well as the capacity that does exist to respond to crises, they may be able to anticipate the types of emergent structures that might be necessary for successful future disaster response. Given the prediction of increasingly severe and nonroutine crises for which there is little prior experience to learn from (Jasanoff, 2010), it will only become more important to identify effective structures and processes for coordinating the multiagency collaboration required to respond.

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CHAPTER THREE

Brokering to Manage the Ripples in the Pond: Network Structures for Balancing the Stability/Flexibility Paradox of Disaster Management

ABSTRACT

Complex disasters require both stable, predictable tasks to be managed that are common in many types of complex events, as well as novel, unforeseen tasks that challenge existing response infrastructure and necessitate flexibility in organizing and structure to accomplish. This stability/flexibility paradox of disaster management creates a challenge for public managers tasked with disaster response to build a system that is simultaneously both stable and flexible. The COVID-19 pandemic was a novel disaster that required communities to manage both routine and novel tasks, providing an opportunity to explore emergent ways of organizing that might have balanced the stability/flexibility paradox. To understand how communities may have organized to manage this tension, we analyze a community-based emergent network formed to manage the pandemic in a community within southwestern Virginia. Drawing on both qualitative and quantitative data collected from 23 semi-structured interviews with network organizational members and partners, we found that the network structure consisted of a densely connected core group of organizations with different types of organizational brokers that employed different methods of brokering between core and peripheral members throughout the pandemic. These findings suggest the vital role that community brokers play in integrating emergent or informal peripheral groups and importantly, that they utilize different processes of brokering during different disaster stages. This study has implications for future research into the ways communities might identify and incorporate community brokers prior to future crises, as well as

which types and processes of brokering might be relevant during each phase of the disaster management lifecycle.

Introduction

One of the consistent tensions identified in interorganizational network scholarship is the tension between the need for networks to be both stable and flexible (Provan & Kenis, 2008). On one hand, interorganizational networks need a consistent cadre of participants to sustain long-term collective action, but on the other, one of the main benefits of networks over bureaucratic structures is their flexibility and ability to adapt both structure and membership to changing environments (Provan & Kenis, 2008). One might describe these seemingly opposing directives as paradoxical. Smith and Lewis (2011) define a paradox as "contradictory yet interrelated elements that exist simultaneously and persist over time" (p. 382). Like inherent tensions paradoxes cannot be solved, only managed, because there will always be a simultaneous need for some combination of both elements (Vangen, 2012).

One influence on whether interorganizational networks lean toward one or the other element of this paradox is the environment in which a network operates (Tatarynowicz, Stych, & Gulati, 2016). If a network operates in a dynamic environment, the network may be more likely to be structured to pursue new opportunities outside of the network to bring in novel information and resources to the network. In contrast, if a network operates in a relatively static environment, participants may be incentivized to build bonds within the network, favoring the benefits of closed-group membership, rather than creating new external relationships (Tatarynowicz, Stych, & Gulati, 2016). Therefore, different networks may be structured to prioritize stability over flexibility (or vice versa) based on the demands of the external environment.

For those interorganizational networks formed to manage disasters, the interorganizational network environment is particularly dynamic and uncertain (Comfort & Kapucu, 2006), especially in novel crises with which there is little previous experience to learn

from. Thus, disaster management networks must be structured in a way as to facilitate adaptation and foster creativity to address emerging threats and new task demands unforeseen prior to the event. We liken these emergent task demands to the metaphor of ripples in a pond once a stone has been thrown. In this way, the ripples flow out as consequences produced by a specific disaster event (the metaphorical stone) though likely unforeseeable, must still be managed for effective disaster response. Although flexibility is necessary for managing these ripples, disaster management networks must also possess the stability necessary to carry out routine disaster management tasks and sustain collective action and institutional knowledge for the duration of the event (Grothe-Hammer & Berthod, 2017; Kapucu & Garayev, 2011). Thus, the paradox of stability versus flexibility is particularly acute in disaster management networks, with very high stakes if it is not balanced appropriately.

An important question for public administrators charged with disaster response is therefore, how to effectively structure a network that requires both a stable cadre of participants to carry out routine disaster management functions over time, as well as a flexible structure that can adapt as necessary to address the unforeseen tasks or "ripples" produced by a crisis, especially when the location and nature of the next disaster event is inherently unpredictable. Previous interorganizational network scholarship points to potential structural configurations and elements that may facilitate stability and flexibility, respectively (Provan & Kenis, 2008). However, the same scholarly application of the stability/flexibility paradox has not thoroughly been applied to disaster management networks (with some exception, Jung & Song, 2015; Robinson, 2012; and Grothe-Hammer & Berthod, 2017).

To explore the network structural elements that might manage this paradox, we conducted a convergent, mixed-methods study that consisted of both qualitative and quantitative

data collected on an emergent, interorganizational network that formed to help the region of southwestern Virginia manage the COVID-19 pandemic. The pandemic is a particularly relevant setting in which to explore how the paradox might be managed, as it involved both the routine public health disaster task demands, as well as the numerous unforeseen ripples that came with a novel crisis. Using a combination of qualitative analysis and social network analysis, we found that the emergent interorganizational arrangements suggested a core/periphery structure, with many core members acting in different brokerage roles during different phases of managing the pandemic. Additionally, we found that not only did some groups take on different types of brokerage roles, but they also used different processes for brokering across groups. These findings point to the potential for a combination of both macro-level network structure and micro-level structural elements (like brokerage) to help manage the paradox of stability and flexibility in disaster management networks. The results of this study have implications for future disaster management network formation as well as interorganizational network scholarship, broadly.

The Stability/Flexibility Paradox of Disaster Management

In any disaster situation, there are aspects that are both predictable (that can be planned for) and unforeseen (that cannot be planned for) (Robinson et al., 2013). Predictable disaster management tasks are those that are common to most types of hazards and scales of events, from the smallest localized emergency, like a traffic accident, to the extensive catastrophe, such as Hurricane Katrina. For instance, search and rescue, mass sheltering, and medical care provision are common managerial functions required for many different types of crises. Previous research indicates that routine tasks are best addressed via traditional bureaucratic structures and systems (Perrow, 1986) including a division of labor between functional response areas, vertical

hierarchy, and rules about how participants interact. Indeed, Comfort and Kapucu (2006) note, "routine environments assume a complete knowledge base with all relevant information available, so that organized hierarchy can apply known information efficient to known problems" (p. 312). These types of structures are thought to create predictable, stable, systems capable of routinizing and conducting standard functions.

Many everyday events fall under the category of "routine emergencies" in that they involve predictable hazards that conform to prior expectations (Schneider, 1992) and for which the response system is designed to handle (Nohrstedt, 2016; Comfort, Boin, & Demchak, 2010). Disasters are events that go beyond routine emergencies and as Quarantelli (2000) argues, are qualitatively and quantitatively distinct. Though routine emergencies are distinct from disasters, there may be some overlap in the tasks required for managing routine emergencies and those required for disasters. Indeed, the U.S. disaster response framework is predicated on an "all-hazards" model that is intended to be adaptable to a wide range of hazards responses (Waugh, 2004). And for these routine response requirements that may be anticipated, bureaucratic structures and processes may be preferrable over other, less structured approaches.

Despite these somewhat predictable aspects of managing disasters, historically, the most devastating events have been those that are not entirely predictable; they involve those "unknown unknowns" that fundamentally disrupt the social patterns of life. Unlike routine emergencies, disasters contain and produce of a great deal of environmental uncertainty (Ansell, Boin, & Keller, 2010). This uncertainty might come in the form of previously unanticipated (and therefore unplanned for) hazards such as novel terrorist threats, or new configurations of known hazards like an earthquake that triggers a mudslide. While either of these scenarios would be expected to involve traditional functions like search and rescue, shelter and medical care

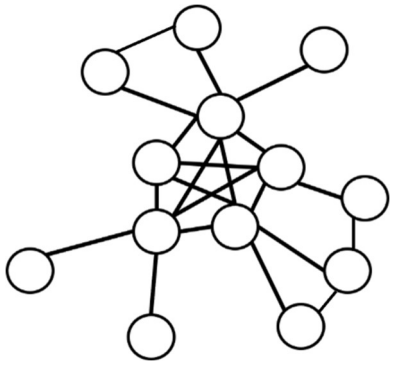
provision, and recovery support, there is a certain level of unpredictability in these nonroutine events (such as their location, timing, number of impacted jurisdictions and severity) that challenges the efficacy of existing plans and policies (Comfort & Kapucu, 2006). For those interorganizational networks aimed at managing disasters, therefore, the structure must allow for flexibility and rapid adaptation to meet new demands under conditions of urgency and inevitable uncertainty (Comfort & Kapucu, 2006). For these types of tasks, bureaucratic structures may be inappropriate (Provan & Lemaire, 2012) because they may be too rigid to allow for rapid adaptation (Waugh & Streib, 2006). Instead, these networks must have alternative ways of achieving the flexibility necessary for meeting urgent crisis needs that fall outside of those that were predicted by the formal response system.

Paradoxically, flexibility, though important, must not be the only goal for disaster management networks because flexibility often comes at the cost of stability (Provan & Kenis, 2008). Networks that are extremely flexible may also be volatile to the extent that they are ineffective (Provan & Lemaire, 2012), as volatile networks may lack the basic stability and consistency needed to retain institutional knowledge and sustain collective action over time. Disaster management networks, therefore, must be both stable and flexible, without being only stable or only flexible. Therein lies the paradox: how might the same system be structured to foster both stability and flexibility, when these are seeming opposing concepts? Additionally, how can public managers balance these competing structural demands when the exact nature of the network and extent of the uncertainty within the task environment is obscured until the actual disaster strikes?

Network Structures for Balancing the Stability/Flexibility Paradox

Because the flexibility/stability paradox is not inherently unique to disaster management networks (see, for example, Provan & Kenis, 2008), we draw from literature on interorganizational networks in general to ascertain whether there are certain structural characteristics that might help in managing this paradox. Provan and Lemaire (2012) assess the extant literature on this tension between stability and flexibility and conclude that whole networks (as opposed to ego networks) must be stable at their core while maintaining necessary flexibility within the periphery. This description might be classified as a core/periphery whole network structure.[27] In a network with a core/periphery structure, there are two basic types of nodes. Core nodes "are connected to each other in some maximal sense," whereas periphery nodes "lack maximal cohesion with the core" and connect sparsely or do not connect at all with other peripheral nodes (Knoke & Yang, 2019, pp. 118-119; Borgatti & Everett, 2000; Tang et al., 2019). In interorganizational networks, a core/periphery structure is thought to combine the benefits of both the stability of a consistent and predictable group of network actors with the flexibility from a less-involved group of organizations that can enter or leave the network as the situation necessitates (Robinson et al., 2013). Figure 1 presents a classic core/periphery structure.

Figure 1. Classic core/periphery whole network structure



[27] This is in contrast to other types of whole network structures. For a review, see Nowell et al. (2017).

Several recent studies point to the presence of core/periphery structures in disaster management networks. Robinson et al. (2013) tracked the evolution of two planned emergency management networks over time (or those consisting of the known actors with legal responsibility for managing a disaster in a community) and found that the core groups of these networks consisted mostly of governmental actors, while the periphery actors did not have a consistent presence and were often informal participants. In their study on wildfire management network structure, Nowell et al. (2017) also found that their study participants perceived an effective disaster response network as consisting of a moderate core/periphery structure, with Incident Commanders (those with recognized authority to manage the interorganizational effort) holding the most central positions within the core. These findings are not surprising given the formal structure of disaster response in the U.S. centers on a small core group of actors authorized to manage the crisis, with a scalable periphery of other actors that may be brought in as needed.[28] Previous findings therefore suggest that the core/periphery type of network structure may enable routine tasks to be accomplished by a stable core, leaving room for flexibility and adaptation to novel task demands via the periphery.

Even though a core/periphery structure is a network-level structural feature thought to contribute to the balance of the need for both stability and flexibility, a micro-level or nodal structural element has also been theorized as contributing to managing this paradox. Structurally speaking, brokers are those nodes that sit on the path between two otherwise unconnected nodes. In this way, broker organizations are able to "maintain contact between groups of organizations not otherwise able to share information or resources" (Butts et al., 2012, p. 19). In practical terms, brokers serve to bridge across two different groups (Robinson, 2012), creating a

[28] In the U.S., disasters are managed with the National Incident Management System.

connection that can provide both sides of the bridge with access to diverse information and resources. Through their role as intermediary, brokers can connect network members when regular channels of communication have failed (Lind et al., 2008), or they can connect members within the network with resources external to the network (Robinson, 2012) as needed to manage the response. These bridges are especially essential for acute disaster response, "as both the need for coordination and the costs of direct interaction are high" (Spiro et al., 2013, p. 131).

Previous research indicates that not all brokers play the same type of mediating role (Gould & Fernandez, 1989; Lind et al., 2008; Spiro et al., 2013). Gould and Fernandez (1989) theorize five different types of brokerage roles an actor might play, each of which are structurally distinct: coordinator, consultant (previously called an itinerant broker), representative, gatekeeper, and liaison. Wukich et al. (2019) argue that coordinators facilitate bonding between similar actors, facilitating information flow between actors of the same group. In contrast, a consultant might act as a bridge, connecting one organization with a different organization from the same group. Representative brokers receive information from actors in the same group and pass it along to actors in a different group. Conversely, gatekeepers receive information from other types of actors and then pass it along to actors in their same group. Finally, liaisons receive information from one group (not their own) and pass it along to an entirely different group (Wukich et al., 2019). Both bridging and bonding strategies are important for creating resilient networks (Islam & Walkerden, 2014), and each require different skillsets and communication channels. As such, different organizations may be better positioned to coordinate across different types of groups. Yet the core/periphery and brokerage findings are just a first step toward understanding how the stability/flexibility paradox might be managed. The question remains as

to how these two structural elements might work in tandem to contribute toward managing the paradox. The aim of this study is to address this question.

Research Setting

To understand the ways in which the flexibility/stability paradox might be managed in a crisis, we analyze a case study of an emergent interorganizational network that formed to manage a community's response to the COVID-19 pandemic. The COVID-19 pandemic was a novel crisis for which there was very little recent historical experience from which to draw (Peleg et al., 2021). However, national pandemic management plans did anticipate the need for widespread social distancing efforts and intermittent quarantining (DHHS, 2006), suggesting that some pandemic management tasks were foreseeable. Yet the "creeping" nature of this crisis created surprises for public administrators tasked with managing a public health crisis, as the situation morphed over time (Boin, Lodge, & Luesink, 2020). The long-term duration of an event with such unclear "end date" produced ripples outside of just the immediacy of the medical crisis. For example, widespread lockdowns drastically reduced economic activity, creating challenges for governments at all levels to sustain day-to-day operations under conditions of fiscal uncertainty (Hürtgen, 2021). In this way, the COVID-19 pandemic provides an opportunity to explore the stability/flexibility paradox of disaster management because it created both predictable, routine management tasks as well as unforeseen and unpredictable demands that had to be addressed by public administrators in real time. Additionally, the stability/flexibility paradox is not limited to just the COVID-19 pandemic; rather, many other disasters require managers to carry out both consistent, routine tasks as well as respond to emergent and unforeseen tasks. The findings of this study, therefore, are generalizable outside of this single

research setting and could shed light on the ways public administrators might manage the stability/flexibility paradox in future disasters.

The Be Well Task Force came together in March of 2020 after a local law enforcement chief recognized the need for response coordination across the county and invited a small group of known actors in the public health community to attend an exploratory coordination meeting.[29] Early meeting participants included those groups involved in surge protection for critical infrastructure, including law enforcement, hospital organizations, state department of health representatives, and emergency managers. Soon into the formation of the task force, however, the group recognized the need to expand efforts for better community resource coordination and decided to take a more regional approach to managing this complex crisis. Thus, what started as a local collaboration quickly expanded to include surrounding counties and municipalities, with the initial goal of protecting the region's hospital capacity. The group began with regular meetings (in person or via teleconference software as dictated by public health and social distancing guidelines), ranging from daily to weekly as dictated by the ever-evolving coronavirus situation. Over time, a consistent group of participants emerged, and the task force formalized their efforts by way of an internal briefing document that outlined the task force's initial structure, intent, and processes, which was provided to the research team. As of the completion of this study in spring 2022, the task force continued to meet weekly or biweekly to address the new waves of variants as they emerged.

The Be Well Task Force was selected for this study because it meets the required components of Yin's (2014) description of an exemplary case. First, it typified a community-

[29] The name of this task force has been changed to protect the anonymity of those involved.

level attempt to address a major world challenge. The case was also geographically and temporally bound, and it presented alternative perspectives via comprehensive evidence. In addition, the research team found it to be a particularly engaging and exciting example of a way of organizing that appeared to address the routine, more predictable tasks associated with public health crises as well as the unexpected and unforeseen issues that arose during this pandemic.

Data Collection

The research presented in this manuscript was part of a larger study that focused on the formation of this emergent network, as well as its structure, processes, and interorganizational arrangements. As such, we employed a convergent, mixed-methods research design that consisted of both qualitative and quantitative data collected from task force members and partners between December 2021 and February 2022. This process is described below.

Quantitative Data Collection

As the goal of this particular manuscript was to understand the potential for network structural arrangements to balance the stability/flexibility paradox of disaster management, the first step was to identify all the organizations involved in the effort – that is, the boundary of this interorganizational network. We first utilized a nominalist bounding strategy (Lemaire & Raab, 2020; Knoke & Yang, 2019), beginning with the 20 organizations formally listed as task force members on the task force's own briefing document that was provided to the research team at the start of the study (referenced above). We also compiled a list of other community and state organizations known to have a formal role in disaster management but not listed as members, such as the local chapter of the Volunteer Organizations Active in Disasters (VOAD) group and other local emergency management-affiliated organizations. When combined with the list of 20

member organizations, the initial list of organizations thought to be involved in the network totaled 48. As a secondary relational bounding strategy (Lemaire & Raab, 2020; Knoke & Yang, 2019), however, we also shared this list of 48 organizations with two task force participants known to be strongly involved with the task force and asked them to identify any omissions or errors in our categorization of task force members and partners. After incorporating their adjustments, we were left with a list of 24 task force members and 24 other less-involved groups (whom we have dubbed "partners") thought to have played an important role in managing the pandemic in southwestern Virginia.

Under different, less urgent circumstances, the research team would have aspired to collect data from all 48 organizations involved in the network. Due to the nature of disaster response research and the potential for time-sensitive data to disappear, however, we chose to collect data only from those organizations likely to be actively engaged in the task force and best positioned to speak to the task force's interorganizational arrangements. Thus, we selected all 24 task force members, and a subset of six partners for study participation. Our efforts resulted in the collection of quantitative data from 20 of 24 task force members and from five of the six targeted partners, for response rates of 83% for each group. As we chose only a subsample of task force partners for inclusion in this study, there is the potential for nonrespondent bias. In particular, it is possible that nonrespondents were positioned structurally to contribute to the stability/flexibility paradox in a way that was not captured in the data that was collected. However, as we focused primarily on the groups most involved with the task force's day-to-day operations, it is unlikely that the results of this study would have changed significantly with the collection of data from additional organizations. Those organizations not selected for involvement were deemed by task force leaders as less engaged and therefore less likely to report

relationships with other task force organizations during the three phases of pandemic management.

Finally, we also sought a completed questionnaire from a community organization not formally connected with the task force or community disaster management but known to provide support to local social service and nonprofit organizations. As many of the organizations included in the task force were associated with either local nonprofits or social service providers, we chose to include this organization in the network analysis to understand how the emergent task force might fit in with preexisting social structures embedded in the community.

For those respondents also targeted for qualitative data collection, we administered a brief questionnaire at the start of the semi-structured interviews. For those partners targeted for just quantitative data collection, we distributed these questionnaires and received their responses electronically. The questionnaire asked respondents to evaluate their organization's relationships with the list of 48 other organizations thought to be active in pandemic management. While all 48 organizations were not targeted for quantitative data collection, we chose to include them on the questionnaire to ascertain the structure of the broader system, and how the task force members maybe connected to tangential organizations. We also asked respondents to nominate any groups not listed on the questionnaire, but with whom their organization worked with to manage the COVID-19 pandemic.

Respondents were asked to evaluate their organizational connections to the 48 other organizations through each of the four pandemic management phases: the period of time prior to the discovery of the COVID-19 virus, the period between the discovery and the onset of the pandemic, the acute response period, and lastly, the recovery and return-to-normal stage wherein vaccines became widely available and most public health restrictions were removed.

Respondents were asked to evaluate their organizations' relationships with each other organization on a scale of 0 to 3. A score of 0 meant no working relationship between the groups, 1 indicated a low-intensity tie, 2 indicted a moderate-intensity tie, and a score of 3 indicated a high-intensity relationship, or an organization with which their organization collaborated or coordinated frequently. The description of the scale and phases as provided to respondents is presented in Appendix C.

Qualitative Data Collection

As noted above, both qualitative and quantitative data were collected through semi-structured interviews conducted between December 2021 and February 2022. As the focus of the qualitative data collection effort was on capturing the perceptions of the task force's formation, structure, and development, we primarily targeted for semi-structured interviews those organizations most closely involved in the task force and best able to speak to the task force's operations. Thus, we targeted all 24 task force members and three key partners for semi-structured interviews. In addition, in an effort to obtain an external perspective on the task force, we obtained qualitative data from one group not listed as a task force member or nominated as a partner but known to play an active support role for community nonprofits and social service agencies. Qualitative data collection resulted in 26 semi-structured interviews, including 20 of 24 task force members, two of the three key partners targeted for interviews, and one external community group. The group response rates were 83%, 67%, and 100% respectively.

As this was part of a larger study, interviewees were asked questions related to their professional backgrounds, their perceptions on the task force's formation and structure, membership, operating processes, goals, leadership, accomplishments, areas for improvement, and lastly, their feelings on where the task force might go once the acute pandemic management

needs were over. Interviews averaged between one to two hours and were conducted either in person or via Zoom, at the interviewees' preference. The interviews were recorded and transcribed using online transcription software and were reviewed by the research team for accuracy.

Analysis

The quantitative data collection process resulted in 89 organizations that were included in the organizational network analysis, consisting of either task force members, partners, nominated groups, or uninvolved community groups.[30] Table 1 provides a breakdown of these organizations.

Table 1. Organizations included in the network analysis

Organizations Included in Network Analysis	Count
Task Force Members	24
Other Anticipated Actors/Partners	27
Nominated Groups	37
Uninvolved Community Groups	1
Total	89

To analyze this quantitative data, we first compiled the 26 received questionnaire responses into square matrix form for each phase of the pandemic, resulting in four different networks of directed, valued data (Knoke & Yang, 2020). As in some cases, several individuals from the same organization participated in this study, we aggregated individual responses to the organizational level (Wasserman & Faust, 1994). Additionally, because we included numerous organizations on the questionnaire from which we did not attempt to gather data, we utilized

[30] The breakdown of organizations by member and partner is provided in Appendix D.

unconfirmed ties. In other words, if one organization said they had a relationship with another organization, we marked that assertion as a tie regardless as to whether the other organization confirmed this relationship because in many cases, it was not possible to confirm.

We analyzed the four square matrices for various statistical measures in the UCINet network analysis software (Borgatti et al., 2002). As described in the literature review, previous research on disaster management networks suggests that they may structurally manifest as a core/periphery network structure. Due to capacity constraints, as noted in the data collection section, we gathered relational data from only 26 of the 89 organizations or groups included in the network analysis, and most of those groups were identified either by the task force's internal briefing document or through interviews with task force leadership as primary task force members. Without gathering more data from the less-involved organizations, therefore, we cannot confirm the presence of a core/periphery structure. We argue, however, that the fact that the task force itself delineated between members and partners in both the internal briefing document and interview responses, suggests the presence of a densely connected core and less connected group of partners. Additionally, given that we did collect data from the organizations most involved in the task force and thus best positioned to speak to the participation of other groups outside of the members, we analyzed the collected quantitative data using core/periphery measure in UCINet (Borgatti et al., 2002). The core/periphery measure is a measure of correlation of the extent to which the network data fits a network that has ideal core/periphery structure (Soyyigit & Eren, 2020). This measure produces a coefficient that is between 0 and 1, with those networks scoring closer to one representing closer ideal core/periphery fits. In addition, as other studies have suggested the important role of brokers in disaster management networks, we also ran the Gould and Fernandez (1989) brokerage measure in UCINet.

To analyze the qualitative data, we compiled a list of a priori codes based on previous interorganizational network research, consisting of the themes we anticipated would be discussed by respondents related to their perceptions on the network's formation, structure, processes, and operations. While we relied on this initial list of a priori codes, we also left room for emergent themes to be added to the codebook. Once interviews were completed, transcripts were reviewed for accuracy and then systematically double-coded for major themes, first by the member of the research team responsible for conducting the interview and then by an additional research team member, with discrepancies addressed prior to the analysis. As the focus of this manuscript is primarily on the structure of interorganizational relationships between organizations involved with the task force, we draw only on those themes that relate to network structure and interorganizational coordination arrangements.

Findings

Evidence for Core/Periphery Structure

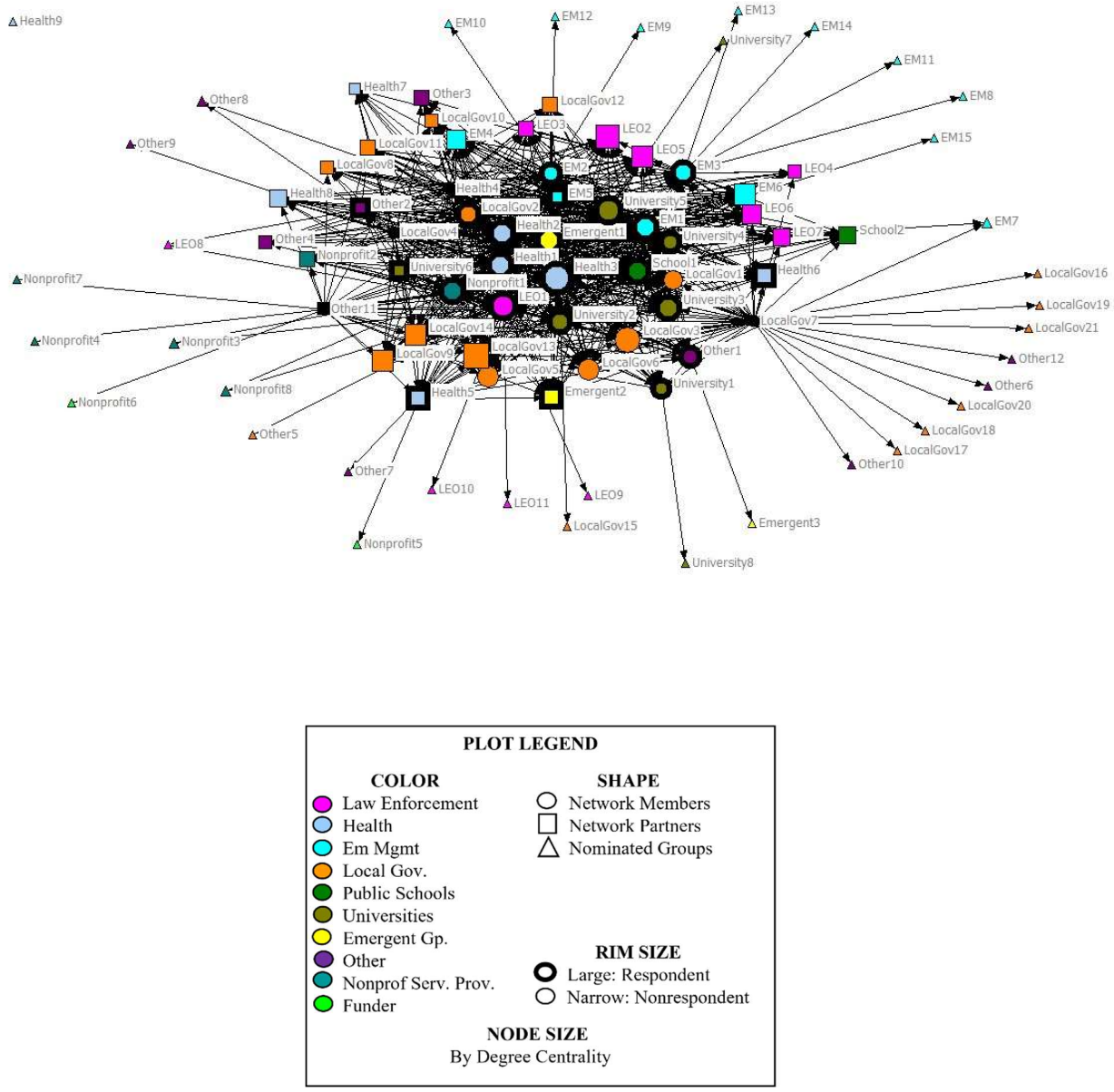
As noted in the brief review of literature on disaster management network structure above, the core/periphery network structure is thought to offer the benefits of both the stability of a consistent and predictable group of network actors with the flexibility from a less-involved group of organizations that can participate as necessitated by the task demands (Robinson et al., 2013). Though our data prevented us from fully confirming the presence of this whole network structure, the visualization of the whole network (by which we mean all 89 organizations found to be either task force members or partners) suggests that the task force members were more tightly connected to each other with sparser connections to different groups of actors outside of the task force members. Figure 2 depicts the visualization of the Be Well Task Force's structure of interorganizational collaboration during the response phase. Organizational domain is

depicted by node color, while type of participant (network member, partner and nominated group) is depicted by node shape.[31] Nodes are sized by degree centrality, a nodal-level measure that measures "the extent to which a specific node is connected with other nodes in the network" (Knoke & Yang, 2019, p. 62).[32] Organizations with high degree centrality usually play a more prominent role in the network than organizations with relatively lower degree centrality (Harris & Doerfel, 2017).

Figure 2. The Be Well Task Force structure of interorganizational relationships during the response phase

[31] I distinguish here between task force member, partner, and nominated group. Task force members are those organizations that have been identified as formal members, either through task force internal documentation or by those members recognized as regular participants or leaders. I define task force partners as those groups mentioned as involved in the task force's efforts but specifically not found to be regular participants or formal members as defined by task force leadership. Finally, I delineate "nominated groups" as a subset of the partner organizations not specifically identified as regular task force members or partners, but which were nominated by at least one respondent as having some relationship with their organization either prior to or during at least one stage of the pandemic. Because qualitative data indicated that nominated groups were not vital or regular players in the network, I mark them differently in the visualization to clearly distinguish which groups were most consistently identified as involved in the response.

[32] I was unable to use in-degree centrality scores for three nodes depicted in this plot (LocalGov7, LocalGov4, and Health4) as they were not included in the network roster on the questionnaire provided to respondents. Subunits of these nodes were listed on the roster questionnaire; however, through the course of the data collection process it became clear that these nodes were important actors in the network as well. They were targeted for data collection but only their out-going ties and not their in-coming ties could be included. Therefore, it is likely they were more central actors than what is depicted in this plot.



PLOT LEGEND

COLOR	SHAPE
Law Enforcement	Network Members
Health	Network Partners
Em Mgmt	Nominated Groups
Local Gov.	
Public Schools	
Universities	
Emergent Gp.	
Other	
Nonprof Serv. Prov.	
Funder	

RIM SIZE
Large: Respondent
Narrow: Nonrespondent

NODE SIZE
By Degree Centrality

As visualized in Figure 2, the Be Well Task Force whole network structure consisted of a tightly connected group of organizations in the center (depicted as circular nodes) and a less tightly connected group of partner organizations (depicted as square nodes). Additionally, nominated groups made up the perimeter of the visualization, as depicted by triangular node shape. The position of the square and triangular nodes towards the exterior of the dense cluster of tightly connected circular nodes suggests the presence of a periphery. Given the indication of both a

core and a periphery, we analyzed this network using the core/periphery measure in UCINet (Borgatti et al., 2002). As a reminder, core/periphery coefficient values fall between zero and one, with those greater to one representing better fits to the ideal core/periphery structure (Soyyigit & Eren, 2020). As shown in table 2, we found that in each of the three active pandemic management phases, the core/periphery coefficients were greater than 0.7, indicating a strong correlation to an ideal core/periphery model. Notably, the core/periphery fit grew stronger over the course of the pandemic, until it reached its highest fit during the response phase which had a coefficient of 0.8059. It is important to note that these high core/periphery scores were likely influenced by the data collection methods. We gathered data from the majority of organizations identified in the core, but not from the majority of organizations that were found to be peripheral. Despite this limitation, the results of the core/periphery measure do confirm a densely connected core working with many other actors across the network.

Table 2. Core/periphery measures by pandemic management phase

Phase	**Core/Periphery Measure Fit**	**Number of Groups in the Core**
Pre-COVID	0.6943	19
Preparedness	0.7305	18
Response	0.8059	19
Recovery	0.7975	21

Unsurprisingly, this type of network structure was also described by respondents, though not directly in core/periphery structural terms. For example, when asked to describe the structure of the task force, one respondent described the combination of both regular participating organizations and those that were only involved on an as-needed basis:

> People step in when they're needed, when it applies to them, where they're needed, but then when it's not so much, they kind of fade back and we had that core group and when we needed to pull people in, we pulled people in (Interviewee 22, public health domain).

This suggestion of a core/periphery structure is consistent with the findings of both Robinson et al. (2013) and Nowell et al. (2017) with regard to the structure of effective disaster management networks. The ad-hoc, collaborative system that serendipitously emerged to address the COVID-19 pandemic in southwestern Virginia, however, had an even stronger core/periphery measure fit than that found by Nowell et al. (2017) in their study on the ideal-type prescribed response network envisioned by wildfire Incident Commanders.[33] Additionally, the makeup of the core consisted primarily of public organizations, throughout all four phases. This supports the findings of Robinson et al. (2013) that the core players in disaster management networks typically include those organizations with the legal authority and responsibility for managing disasters. Interestingly, the core/periphery measure calculated three organizations that were part of the core but were not found by this study to be members, only partners. This finding lends support to Nowell et al. (2017)'s finding that the core may not be limited to only members of groups with recognized authority to manage disasters.

To sum, the pandemic management system that emerged in southwestern Virginia suggests the presence of a core/periphery structure, supporting previous studies on disaster management network structure. Building on previous studies, this finding suggests that at least in this novel crisis with both routine and unanticipated and dynamic management demands, this type of whole network structure may have provided network members with both the stability to handle routine disaster management tasks often carried out by public administrators authorized to

[33] Nowell et al. (2017) calculated a core/periphery fit of .56 during a response, whereas the Be Well Task Force core/periphery fit was above 0.7 in all four phases.

manage disasters, as well as the flexibility to engage with peripheral players less often involved in disaster management in order to accomplish unforeseen or novel tasks. This macro-level finding, however, only tells part of the story as to how this network might have managed the paradox. It is not clear how a core/periphery structure alone might foster engagement between the core and periphery as needed to achieve both stability and flexibility.

Multiple Types of Brokers

While the evidence for a core/periphery structure supported previous research on the structure of disaster management networks, the major findings from this study relate to the key and complex role that different brokers played in connecting disparate parts of the network – both within and outside of the core. As depicted in Figure 2 above, we found that several core organizations (circular nodes towards the center of the figure) were structurally positioned to connect the network to partner or nominated groups outside of the densely connected core. For example, LocalGov7, the area's regional commission, was the only organization to report connections to other municipal government organizations in the area. In this way, the LocalGov7 organization was positioned as a structural broker to municipal agencies otherwise unconnected to the task force.

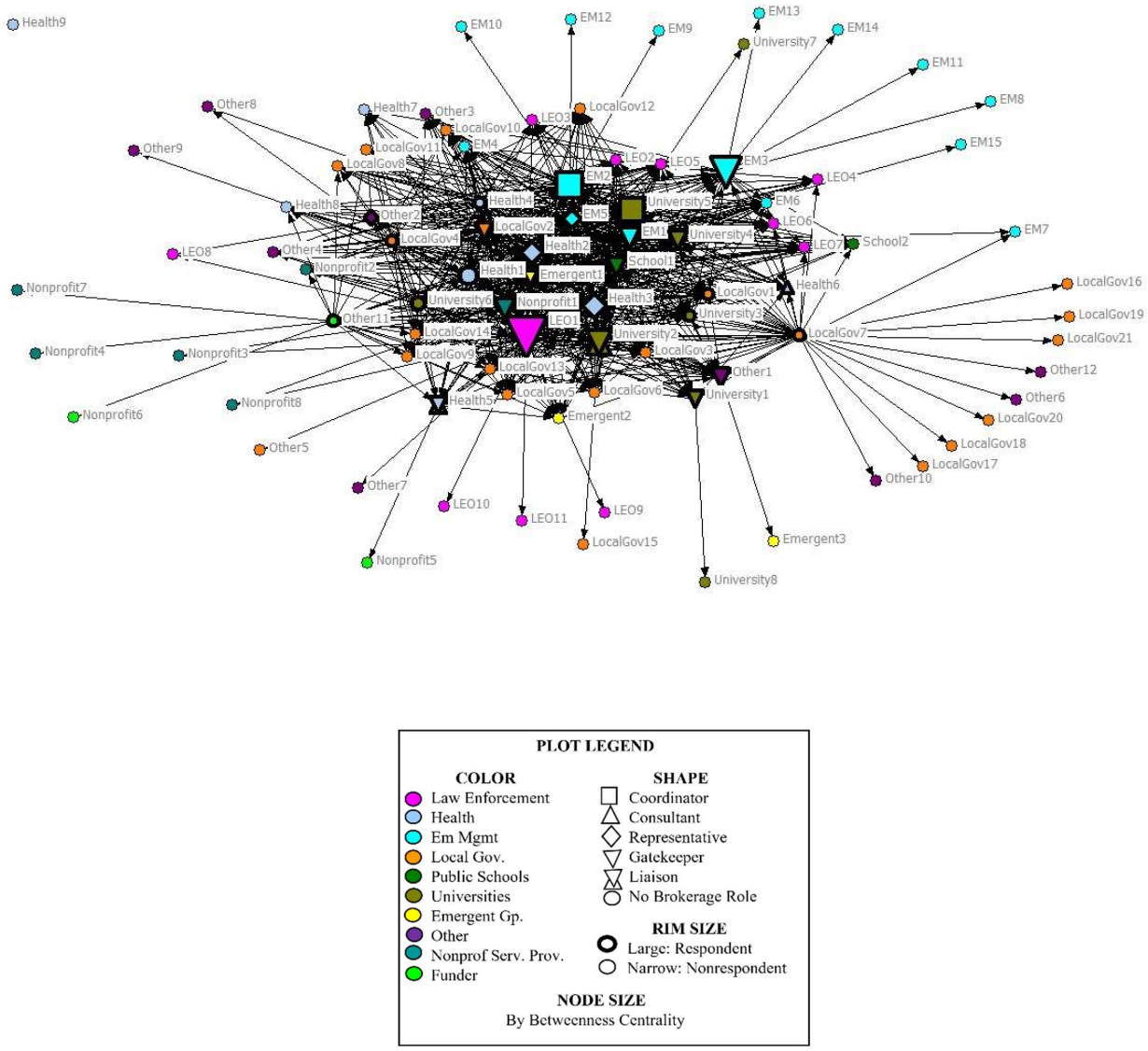
To evaluate the role of brokers in this whole network, therefore, we calculated the normalized Gould and Fernandez (1989) brokerage measures in UCINet (Borgatti et al., 2002) for each phase of the pandemic, determining, if applicable, the predominant brokerage role each organization played in each phase.[34] We found that outside of the preparedness phase, all five roles except the consultant were present in each of the four pandemic management phases either through task force members or partners. Additionally, in many cases, organizations played

[34] The full table of results is provided in Appendix E.

different brokerage roles in different phases. Figure 3 visualizes the structure of the relationships of the organizations involved in managing the pandemic in southwestern Virginia during the response phase.[35] Nodes are shaped by the most prominent relative brokerage role each organization played during the response, if any. Relative brokerage scores take into account the size of the network and normalize the raw values based on expected values given the size of the group (Borgatti et al., 2002). Nodes are sized by betweenness centrality, a measure of the extent to which a node lies on the path to other nodes and is therefore a measure of how much control an actor has over the flow of information or resources between nodes (Newman, 2005). We utilize the betweenness centrality measure in this instance to identify those organizations most likely to connect the task force members with external partners. Those organizations with the highest betweenness centrality are often the best positioned to play the role of brokers, so the larger the size of the node, the greater the likelihood that that organization can connect with other groups that are otherwise unconnected.

[35] Previous research on the role of brokers in disaster management also focuses on the response phase, making this study easier to compare with those findings (see, for example, Spiro et al., 2013; Robinson et al., 2013; and Nowell et al., 2017).

Figure 3. Task force members and partners' relative brokerage roles during response phase, depicted by node shape



While the quantitative findings from the network analysis indicate the presence of these different brokers, qualitative findings from the semi-structured interviews provide more nuance into the important role different types of brokers played in connecting members of the task force with necessary resources. While we found evidence for all five types of broker roles in the response phase, we briefly highlight the qualitative findings related to a coordinator and liaison

to emphasize the unique contributions different types of brokers made to this network. As noted in Figure 3, EM2 (the central light blue square node) was a core member of the task force and played a coordinator role in the response phase, connecting members of the same domain (in this case, emergency management/services organizations). Qualitative findings indicate that this organization became the key conduit between the task force and core county-level emergency management/services organizations, many of whom were stretched thin in managing both the pandemic and day-to-day responsibilities. In fact, the interviewee representing the EM2 organization confirmed this important coordinator role, noting:

> I call [emergency management coordinator from another county] all the time, but it's not that daily. Hey, what do you have? Are you good? He knows that if he needs something from us, we're here for…And I'll just use him as an example because it's a one man show. He is the emergency services coordinator. He handles all fire and EMS plus their dispatch center and all that stuff. So for him to drive to [task force meeting location] for a meeting wasn't always practical (Interviewee 20, emergency management domain).

As suggested by this quote, the coordinator role played by the EM2 organization allowed the county emergency manager to maintain his organizational responsibilities while ensuring he had access to task force resources without having to spend finite time and energy in engaging with the task force directly.

In contrast, liaison brokers, such as the Emergent1 organization (a core organization that was intentionally created to coordinate between domains and is depicted by the central yellow triangle), connected three separate types of actors. One representative from this group described their role as a "conduit," particularly acting as a go-between connecting the health domain with other domains:

> I think early on and how it was described to me when I got hired was that I was going to kind of be the conduit between the Health Department and the businesses and local government, and it has expanded more of being the conduit between the Health Department and everybody (Interviewee 1, emergent organization).

The liaison broker in this example was intentionally installed to mediate between actors in different groups, without an allegiance to either of them (Gould & Fernandez, 1989). During the response phase, this role served to ensure essential information flowed from those who had on-the-ground knowledge of an ever-evolving situation (such as primary care providers or school officials) to those administrators who were responsible for making policy decisions, reducing the need for direct ties between these groups. One representative from this emergent organization pointed to a key structural hole filled by their organization within this network:

> And I think there isn't a school nurse now who doesn't have a connection to the [health district] or through me to the [health district] in a way that I think should have been happening before (Interviewee 2, emergent organization).

It is not a coincidence that the two examples highlighted here both depict a core member acting as a broker to other groups, both in the core and externally. As noted in Appendix C, many of those organizations found to be brokers were also members of the core as defined by the UCINet core/periphery algorithm (Borgatti et al., 2002). In this way, different brokerage roles provided different resources and services to this network, connecting both organizations inside the core with each other, and with peripheral partners as necessitated by pandemic management demands. One respondent spoke directly to the importance of these brokered connections in facilitating the flexibility necessary for the task force to rapidly shift gears as the task environment changed:

> And that was kind of the cool part of bringing this whole regional thing together is we all brought our Rolodexes. And so when we needed to change and we needed morph, we needed to move the circus, we're going to go now test in [county name], [county name], [county name]. You know, we quickly shifted over and - and our contacts over there had their Rolodex and say, and if we ran into a logistical problem or something, we could flip like in a course of hours, we could move from one section to another (Interviewee 11, law enforcement domain).

Thus, the presence of brokers in the core combined the stability of core members' consistent participation with the flexibility needed to reach outside of the day-to-day participants to access resources not always necessary for routine crisis management.

Multiple Ways of Brokering

Though we found that multiple types of brokers were important to this task force, their roles were more nuanced than that which may be gleaned from the Gould and Fernandez (1989) measure alone. Spiro et al. (2013) points out that the Gould and Fernandez (1989) measure of brokerage captures the different types of brokers at only a single point in time. This limitation, they argue, may obscure the temporal order in which the brokering activity occurs leading to false positives as well as false negatives in identifying brokerage opportunities. From a management standpoint, this potential for misleading brokerage identification is important as a greater understanding of the organizations best positioned to act as brokers and the ways in which they might accomplish this brokerage could help achieve more timely disaster response (Spiro et al., 2013). Thus, as a complement to the static Gould and Fernandez (1989) measure, they posit that a dynamic approach considers the temporal aspects of brokerage, illuminating the nuances of the mechanisms and processes brokers use to mediate between nodes as the mediation unfolds.

Spiro et al. (2013) theorize three different processes for brokering: transfer, matchmaking, and coordination brokerage. Transfer brokerage processes occur when the broker conducts information or resources from one node to another over time, which are not otherwise directly able to connect. Matchmaking brokerage occurs when a broker introduces or creates a tie between two other nodes that were previously unconnected. Lastly, coordination brokerage occurs when one node directs the actions of two other nodes in a way that resolves their dependencies without directly connecting them. They argue that a dynamic complement to the static standard measure of brokerage can help better identify brokerage opportunities and those organizations well positioned to act as brokers.

We build on this dynamic theoretical approach by complementing the quantitative data with qualitative data to ascertain a richer understanding of how brokers utilized different ways of brokering in different stages of the pandemic. In analyzing our qualitative data through the lens of the three dynamic brokerage processes theorized by Spiro et al. (2013), we found that not only were there multiple types of brokers in this network, but the brokers also had multiple ways of brokering across different organizations. Moreover, we found evidence that the same well-positioned organization utilized multiple processes of brokerage over the course of the pandemic. We highlight two of these processes below to illustrate how going beyond the static conception of brokerage and combining qualitative data to a more dynamic theoretical lens can lend insights into the efforts of brokers to connect disaster management networks with diverse resources.

One of the most central actors throughout all four phases of the pandemic was a municipal law enforcement agency, coded as LEO1 (in figure 2 above, this organization is depicted by the large purple upside-down triangle).[36] Prior to the COVID-19 pandemic, the LEO1 organization indicated a relationship with the local women's resource center (a nonprofit service provider coded as Nonprofit8), but no relationship with the local regional planning commission (a local government-affiliated organization coded as LocalGov7). Once the region began planning for the onset of the pandemic, however, LEO1 reported a relationship with both the women's resource center and the regional planning commission for the purposes of preparing for the COVID-19 pandemic. Quantitative data also indicate that at no point during the pandemic

[36] Though the Gould and Fernandez (1989) measure indicated the LEO1 organization was predominantly a gatekeeper during each of the pandemic management phases, the organization scored second highest as a liaison. We draw on the group's liaison brokerage efforts here to highlight how two different processes (transfer and matchmaking) were used by the same organization playing the same brokerage role (liaison).

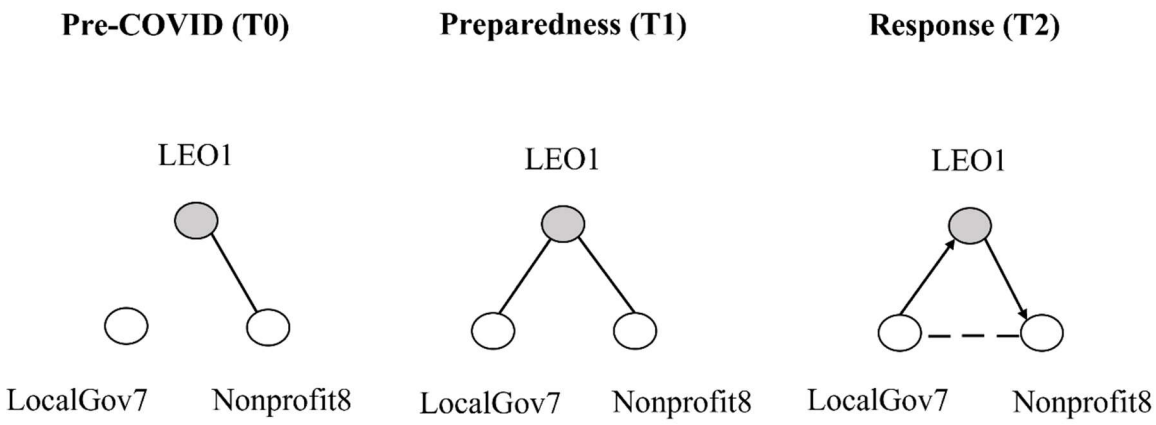
did a tie exist directly between the women's resource center and the regional planning commission.

Qualitative interview data, however, depict a far richer story of how the LEO1 utilized transfer brokerage over time to connect two otherwise unconnected groups to the benefit of the community's pandemic management efforts. The following quote from the representative from the LEO1 organization highlights how this organization transferred resources from one group (the regional planning commission responsible for managing regional federal pandemic management grant funding) to another group in need (the local women's resource center that struggled to keep up with increased community domestic violence sheltering needs) during the response phase because of their pre-existing relationships with the second group:

> We reached out to our women's resource center like funny, you called because, you know, COVID restrictions have cut our space and our volume has tripled. So we were able to take funding and got them a hotel, which we managed, which we now have through July. But it's - so but it was just, it was that kind of - we reached out to them and they were floundering… (Interviewee 11, law enforcement domain).

As the above quote depicts, the LEO1 organization had a relationship with the women's resource center prior to the COVID-19 pandemic (in T0), created a relationship with the regional planning commission during the preparedness phase (T1), and brokered between these two groups in the response phase (T2). Figure 4 illustrates this example of this liaison broker utilizing the process of transfer brokerage over three phases.

Figure 4. Transfer brokerage process over the phases of the pandemic



Importantly, this transfer process resulted in a one-time transfer of resources from a local-government affiliated organization through a municipal police department to a nonprofit organization. Additionally, we found evidence that the same broker (LEO1) employed a different process of matchmaking brokerage to connect two completely different alters for different community needs. Prior to the start of the COVID-19 pandemic, quantitative data indicated that the LEO1 organization had a strong relationship with a local faith organization, coded here as Other3. The LEO1 organization also indicated a relationship with Health3, the local health district, though qualitative data collected indicated this was a low-intensity tie.[37] No tie existed prior to the pandemic between the Other3 and Health3 organizations. After the first phase of the pandemic, the LEO1 maintained strong relationships with both the Other3 and Health3, and only in the last phase (recovery, or T3), did the quantitative data indicate a direct relationship between the two previously unconnected organizations. Thus, as Spiro et al. (2013) demonstrate, these three time periods represented potential brokerage opportunities for LEO1 to connect these two unconnected alters. Qualitative data fills in the nuances of

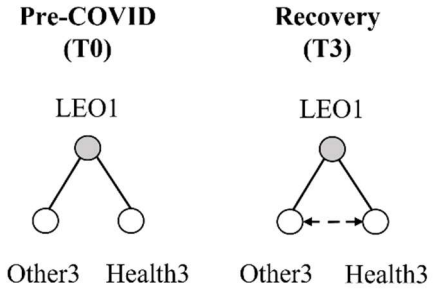
[37] Both the respondent from LEO1 and Health3 reported they had met each other only once previously, several years prior, and had not needed to maintain any relationship after that initial meeting.

this new tie creation, and the role that LEO1 played in connecting these organizations. As described below by the representative of LEO1, the organization had a pre-existing relationship with the Other3 that they could leverage for the purposes of the pandemic (and in this case, for hosting large vaccination sites):

> [Chaplain's name] is our chaplain here…I talk to him daily. We also went to high school together…I have a working relationship – we have a working relationship with [chaplain's name], the pastor. We've used [Other3] as a training place where we've done police training and stuff…Because of the relationship we had, we said alright, you know, if we start identifying centers where we're going to be able to do things, we obviously look at municipal, you know, property we already own and control. And we look at schools. And then the [Other3] would have been in the earliest discussions that this is a place that we could use for one thing or another…just because of that relationship (Interviewee 11, law enforcement domain).

The local health district (Health3) was responsible for the rollout of the vaccine administration program. Therefore, to ensure smooth site administration and coordination, the LEO1 organization brokered a connection between Health3 and Other3, that lasted for the duration of the vaccine administration program. Therefore, the LEO1 organization (a law enforcement organization) directly connected Other3 (a faith-based organization) with Health3 (a public health organization) through the process of matchmaking brokerage, for the purposes of coordinating a long-term vaccine administration process. Figure 5 depicts this process over time.

Figure 5. Matchmaking brokerage process over the phases of the pandemic



In this way, the LEO1 organization helped broker a new tie between two groups, and this new tie helped meet the community's emergent need for a mass vaccine administration site. Other3 was not engaged in disaster response prior to the pandemic, despite the organization's long-running relationship with the local law enforcement agency. Therefore, the brokerage role played by LEO1 (a formal member of the disaster response system) helped to incorporate the much-needed resource from an informal, voluntary actor outside of the formal disaster management system.

To reiterate the findings from this study, we found indication of a core/periphery structure for the emergent Be Well Task Force (and broader pandemic management system in the region of southwest Virginia), as predicted by previous research on planned disaster management networks. However, we also found that this emergent network relied on both different types of brokers (predominantly located within the core) and different processes of brokering in order to accomplish novel tasks under dynamic conditions of uncertainty. The presence of a consistent group of participants who brokered both within the task force and outside to access external resources helped meet the needs of both the stable, day-to-day efforts of managing a crisis with the flexibility to access diverse resources to address the novel and unpredictable task demands that came with an unprecedented disaster.

Discussion

The stability/flexibility paradox is a persistent challenge for public administrators charged with responding to and managing complex disasters. Previous research on disaster management networks points to the role of both a core/periphery structure and the presence of interorganizational brokers as ways to create both stability and flexibility (Robinson et al., 2013; Nowell et al, 2017; Spiro et al., 2013; Lind et al., 2008). In our study on an emergent COVID-19 pandemic management network in the region of southwestern Virginia, we found support for

both of these previous findings. However, we delved further into the role of organizational brokers, combining quantitative and qualitative data to illuminate the complexity and necessity of crisis brokerage to manage complex disasters. We found that not only can organizations act as different types of brokers depending on the configuration of brokered alters, but they may also play different brokerage roles in different phases of a disaster. We also found that the same organization may employ different processes for brokering across those groups in the same period of time. Importantly, many of these key brokers were members of the core, participating regularly in managing the day-to-day disaster response tasks. We argue, therefore, that it is this combination of a strong core/periphery structure with the complex role of brokers within the core connecting organizations both within the core and the periphery that helps balance the stability/flexibility paradox in disaster management.

The findings from this study have important implications for future disaster management and interorganizational network scholarship in general. First, while the contributions brokers might play within a network are well documented, the findings herein point to the importance of context. Different organizations might play different brokerage roles or utilize different processes for brokering depending on the groups being brokered, the type of tie or resource being exchanged and the period of time in which the brokerage occurs. Thus, the same organization might play one role or connect organizations for one purpose through one process at one point in time, but broker between different organizations differently, for a different purpose and at a different point in time. For example, the LEO1 organization acted as a liaison between two sets of alters but used different processes of brokering: first, transfer brokerage to connect the regional commission and the women's resource center (a core organization with a peripheral organization), and second, matchmaking brokerage to connect the local health district with a

faith-based organization (a core organization with a peripheral organization). In this way, the LEO1 organization utilized different roles and processes for brokering given who (which organizations) and what (which type of resources) are being connected and the best interests of those involved.

This potential for contextual variation suggests that the concept of brokerage is more nuanced and complicated than previous studies might suggest. These findings imply that is not just the presence of brokers that is necessary for connecting the core with the periphery, but rather that these brokers must act differently under different environmental circumstances. Moreover, as the network evolves and the demands of the environment change, it is likely that brokerage roles and processes must evolve as well to ensure the appropriate connections are created and maintained between the core and periphery.

A second important implication from this study is the role that brokers might play in connecting core members (or those most intensely involved in a disaster management network) with peripheral or emergent actors, facilitating flexibility to adjust and quickly access new resources as the task environment changes.[38] Emergent actors are nearly always present in disaster response; they consist of those informal, spontaneous, and voluntary individuals or groups that show up to lend a hand where there is perceived need (Tierney & Trainor, 2004). These groups are often those that are unaffiliated with formal disaster management systems but who may have some resources to offer in different stages of the response (Majchrzak et al., 2007). However, emergent actors may also struggle to engage with the formal network directly (Waugh & Streib, 2006). Depending on the context and the resources needed by the network, different organizations may be better positioned within the core to broker emergent group

[38] The potential for the core/periphery structure to facilitate emergent actor participation was also posited by Robinson et al. (2013).

involvement. In the case of the Be Well Task Force examples presented herein, the Other3 organization might be described as an emergent actor without a traditional role in formal disaster response but emerged as pivotal to the community's pandemic management success. This organization, as an emergent actor, did not have formal disaster management training (like experience in running large vaccine distribution sites), but was able to participate through the connection with a core member (again, the LEO1 organization) that did have expertise in disaster management. The brokerage role played by the LEO1 organization ensured that members of the Other3 organization did not have to spend time learning how to engage in this formal response, but rather, could lend the capacity and resources it did possess for the benefit of the community under time-sensitive conditions.

By understanding the complex nature of brokerage more deeply, it may be possible for public officials in disaster management to intentionally orchestrate ties to emergent or underrepresented actors into the network. Vulnerable populations are often those most negatively impacted by disasters (Flanagan et al., 2011). Incorporating underrepresented groups in disaster management is notoriously difficult, however due to the "tyranny of the urgent" with regard to immediate decisions that must be made (IRP, 2012), institutional and cultural differences (Andrulis et al., 2011; Robinson & Gerber, 2007), as well as budgetary and time constraints, and an overall lack of interest from the general public in such a technocratic area (Berke et al., 2014; Gerber, 2006). For example, the results of the network analysis conducted for this study indicate that although there was participation from groups representing 10 different domains (many of whom serve vulnerable clients in some capacity like public schools and law enforcement), there was no group specifically representing the interests of any vulnerable populations contained within the network or the system, as identified by respondents. Qualitative data support this

finding, with several interviewees noting the dearth of representation and the need for greater community organizational involvement, particularly those organizations representing vulnerable populations. For example:

> It took until this summer for us to do more mobile clinics to more vulnerable populations. But I think it should be considered – I think it needs to be folded into the plan and not as an afterthought (Interviewee 1, emergent organization).

> I definitely think the nonprofit community in a lot of was sort of left out [of the task force]…and I think that to a certain extent was absolutely understandable in earlier phases…In the recovery portion, I honestly don't understand why there's not more of a focus on a broader set of organizations that are delivering some of the human services that are needed. So, you know, counseling, food, access, education, some of them are kind of involved, but not nearly to the extent it seems to me like it would be good (Interviewee 9, uninvolved community organization).

If members of the Be Well Task Force had recognized or anticipated this lack of inclusion, they may have been able to identify a key broker within the community that could have been brought into the network to properly engage with those underrepresented groups. By identifying those organizations that may be best positioned to act as brokers to underrepresented groups in different contexts and engaging them in the core, network managers might intentionally orchestrate those structural positions to facilitate representation.

This study had several limitations. First, the data collected was based on participants' recollections of the nature of interorganizational relationships from previous time periods. As such, we relied on the perspective and knowledge of (in most cases) a single organizational representative to accurately reflect back on their organization's relationships with other organizations over time. It is possible that these individuals lacked complete knowledge or that their perspectives may have differed from fellow organizational members, such that by simply choosing a different representative from the same organization, the networks may have looked slightly different. However, this is a common problem in network studies as with organizational research in general (Lemaire & Raab, 2020), and we mitigated it to the greatest extent possible by selecting those individuals we felt had the broadest perspectives on their organizations over

time. In most cases, we selected interviewees on the basis of their long tenure with their organizations, their positions in leadership roles, and their active involvement with the day-to-day Task Force operations. A second limitation to this study was that though we asked survey respondents to evaluate their organizational involvement with other organizations in different time periods, this was not a longitudinal study. Instead, respondents had to rely on their own memories of the organizations they worked with during each phase. In some cases, this meant remembering organizational interactions nearly two years prior. As human memory is not infallible, we recognize this as a limitation in our data and note that studying network dynamics across time (particularly in emergency management) is a problem well established in disaster network scholarship (Robinson et al., 2013).

Despite these limitations, this study adds to the current literature and takes one more step forward in identifying the types of structural elements that might help public administrators balance the stability/flexibility paradox in interorganizational networks. There is very little research on why certain organizations play different brokerage roles, and why their members might utilize different brokerage processes at different times. Our findings suggest that there is more to be learned about the nuances of brokerage, including which organizations might be best positioned to play different brokerage roles in a community, why some brokers may choose to utilize different types of brokerage processes, and, in the case of disaster management networks, whether organizations may choose to utilize the same role and processes across different disasters. Without a greater understanding of how brokers might be situated within and interface with the greater network structure (whether that be a core/periphery or other type of macro-level network structure), it will be difficult for public managers to intentionally incorporate these elements into planning to better manage for the stability/flexibility paradox.

The stability/flexibility paradox of disaster management, like all paradoxes, is not something that can be solved. Instead, it must be managed to the extent that successful disaster response inevitably requires the presence of both stable and flexible systems, despite their seemingly mutual exclusivity. The findings from this study indicate that even for emergent disaster management networks, a core/periphery structure may provide the dual stability and flexibility necessary for handling the routine crisis management functions as well as the "ripples," or those emergent, novel task demands common in complex disasters – when combined with complex brokers located within the core. Moreover, the study's findings point to the previously overlooked complexity involved in the concept of brokerage, and the need for understanding the nuances of this concept in order to better manage interorganizational connections and leverage crucial resources during acute crises. As disasters are only predicted to increase in frequency and severity, it is essential that more research be devoted to ways of organizing that manage this paradox.

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CHAPTER FOUR

COVID-19, Local Government Disaster Coordination, and the Silver Linings of Virtual Engagement

ABSTRACT

Cross-jurisdictional collaboration has long been shown to increase the efficiency and effectiveness of disaster response. Much of the coordination and collaboration between jurisdictions during crises takes place between adjacent communities and in person, or face-to-face. Yet public health guidance like social distancing and stay-at-home orders during the COVID-19 pandemic significantly reduced the potential for in-person interorganizational collaboration. This novel disaster management environment, therefore, raises questions as to whether the virtual nature of interorganizational arrangements during the pandemic may have created barriers to collaboration and coordination, or whether the use of virtual meeting technology offered unforeseen benefits that could improve disaster management collaboration efforts for future disasters. Using publicly available data and social network analysis, I found that the virtual nature of network member interactions facilitated a large number and broad distribution of network participants, as well as differentiated ways of member participation. These findings suggest a silver lining amid the COVID-19 pandemic: the potential for emergent mediums, such as online virtual software, to facilitate emergent interorganizational network formation by reducing barriers to participation for informal, emergent actors. The study also has implications for local government collaboration, network formation, and future disaster response.

Introduction

The COVID-19 pandemic disrupted much of the fabric of social life worldwide (Nicola et al. 2020). One of the most significant disruptions this pandemic caused to daily life was the near-immediate cessation of in-person gatherings and large group meetings (both for social and business purposes). As an outcome, much of this activity became virtual, as evidenced by the dramatic increase in use of cloud technology and virtual meeting platforms such as Zoom and Microsoft Teams (Anderson, 2020; Bary, 2020). This forced "digitization" (Akpan et al., 2020, p. 2) affected nearly every societal domain; scholars have already begun to identify the initial impacts of the transition in several fields, including higher education (Lowenthal et al., 2020), medicine (Jhaveri et al., 2020), health-related service provision (Yao et al., 2020), business (Akpan et al., 2020) and recreational and leisure opportunities (Son et al., 2020). The COVID-19 pandemic similarly disrupted normal government operations around the world, forcing governments at all levels to adapt innovative, virtual ways of both combatting the pandemic and continuing regular operations (Mallinson, 2020).

In the United States, local governments have repeatedly emerged as innovators, creating novel and outside-the-box solutions to the challenges posed by disasters (Dzigbede et al., 2020). To manage the impacts of the COVID-19 pandemic, many local governments created collaborative arrangements with other jurisdictions to share resources and information (Mallinson, 2020). Previous research has identified a positive relationship between geographic proximity, or "local co-presence" (Schamp et al., 2004), and the likelihood of interjurisdictional collaboration. Close geographic proximity allows for face-to-face interactions, which facilitate tacit knowledge transfer and innovation (Knoben & Oerlemans, 2006). While previous disasters generally allowed for emergency managers to hold emergency briefings and operations center

activities in person, creating face-to-face opportunities for information sharing, joint planning/coordination and relationship building across jurisdictions, stay-at-home orders and social distancing requirements during the pandemic "complicated the process of meeting" (Grizzle et al., 2020, p. 12). Instead, participating organizations had to communicate and collaborate virtually. While interorganizational collaboration during disasters certainly is not new (Kapucu & Hu, 2016), what was unique to the COVID-19 pandemic was the makeup of collaborative partners required and nearly entirely virtual nature of this collaboration (Grizzle et al., 2020). Because the pandemic affected so many areas of society for such a long period of time (in comparison with most natural disasters), the range of organizations required to address response and recovery needs was quite broad for most communities (Grizzle et al., 2020). Given that broad range of actors and collaborations implicated in the COVID-19 response, the recent experience with this novel crisis raises the question: did the necessity of virtual engagement create barriers to collaboration or did this transition to virtual engagement offer unforeseen benefits?

To address this question, I analyze the emergence of an information-sharing network comprised of local government managers and finance officials in the state of Virginia. Data were collected from a publicly available website and analyzed with organizational network analysis. I find that the virtual nature of the collaborative activity led to both a large number and broad distribution of network participants, as well as multiple ways of member participation, allowing for rich and deep information sharing across geographically distinct and diverse jurisdictions from around the state of Virginia. The findings from this study have implications for scholarship on local government collaboration, barriers to network participation, and emergent, multi-organizational disaster networks. Practically, these findings suggest a silver lining amid the

COVID-19 pandemic: the potential for emergent mediums, such as online virtual software, to facilitate emergent interorganizational network formation by reducing barriers to participation for informal, emergent actors.

COVID-19 and the Impacts to Local Government Finances

The novelty and speed of the spread of COVID-19 has created immense policy and management challenges for all levels of government, in every country in the world (Moon, 2020). In the United States, it is at the local or municipal level where the pandemic has been exceptionally disruptive (Dzigbede et al., 2020). This disruption is due to the fact that local governments are on the front lines of the pandemic. It is at the local level that citizens receive direct essential services such as public safety, fire, and emergency management services, garbage pickup, education, utility provision and wastewater services. Continued service provision became increasingly difficult during this pandemic response for multiple reasons. For instance, at the onset of the pandemic in some localities, patients suffering with COVID-19 overwhelmed local hospital capacity, leading to reduced capacity to treat non-COVID-19 illness (Ornstein & Hixenbaugh, 2020), while stay-at-home recommendations increased demand for law enforcement and social service response systems (Usher et al., 2020), strained wastewater management systems (Sharma et al., 2020), trash collection (Calvert, 2020), and created mental health challenges for local employees working from home while juggling other responsibilities like childcare (DeHart-Davis, 2020). All the while, local government efforts were also hampered by outbreaks of COVID-19, creating reduced staff capacity to continue government business as usual in areas like the postal service (Brock, 2020), law enforcement (Feuer, 2020) and public education (Shepherd, 2020).

Local governments, however, are also communities' first responders during disasters (Becker, 2009) due to the U.S.'s decentralized emergency management system (Gerber & Robinson, 2009). In a biological disaster such as a pandemic, the local public health systems are also tasked with primary disaster management activities such as recommending policy actions (like stay-at-home orders and school closures), coordinating the acquisition and distribution of personal protective equipment, and actively managing and tracking infected individuals to slow outbreaks. During the COVID-19 pandemic, local governmental units were challenged to both actively respond to the novel disaster and find innovative ways to continue providing essential public services and respond to emerging constituent needs as usual (Switzer et al., 2020). Multiplying the difficulties the pandemic created for local governments, these challenges came while most municipalities were simultaneously deprived of some of the normal revenue streams derived from daily economic activity that would have funded these efforts under normal, short-term disaster circumstances (Maher et al., 2020; Dzigbede et al., 2020; DiNapoli, 2020). These financial hardships resulted from the stay-at-home orders and social distancing requirements that lasted, in some places, for years and that greatly reduced consumer expenditures at local brick-and-mortar retail outlets and restaurants, reduced personal income, and increased unemployment - depriving local governments of vital tax revenues to fund day-to-day government operations (DiNapoli, 2020; Bonds News, 2020). Thus, local government officials struggled to simultaneously respond to the pandemic, shift day-to-day operations online, and continue paying their employees.

Local, Interjurisdictional Disaster Management Collaboration

Local governments responded to the numerous challenges created by COVID-19 with various innovative solutions across the United States (for one review, see Dzigbede et al., 2020).

One such way some local governments chose to deal with the emergent challenges of the pandemic was to collaborate with other jurisdictions. Following Kapucu et al. (2010), I use Bardach's (1998) definition of collaboration as "any joint activity by two or more agencies that is intended to increase public value by their working together rather than separately" (p. 8). Types of local, interjurisdictional collaboration during the pandemic included information sharing, resource sharing, coordination, joint planning, and advocacy (for examples of city-to-city collaboration efforts, see Pipa and Bouchet, 2020). This type of multiorganizational collaboration is not new: interjurisdictional collaborative arrangements (including regional mutual aid agreements and shared memoranda of understanding) have been recognized as best practices for local emergency managers since 1993 after the state of Florida struggled to respond to Hurricane Andrew in 1992 (EMAC, 2022). These agreements are frequently established between immediately proximate jurisdictions, specifying intentions to collaborate and provide resource assistance, should their communities become overwhelmed by future response requirements. This is understandable, as those jurisdictions most closely located to an impacted locality have the greatest ability to provide timely aid should a disaster occur.

Jurisdictions that are geographically proximate have an increased likelihood of achieving collaboration for other reasons, as well. Geographically proximate jurisdictions, or those that have "local co-presence" (Schamp et al., 2004) in a region have more opportunities to interact and develop trust through face-to-face interactions (Long et al., 2014).[39] In fact, research has shown that much of the interjurisdictional disaster collaboration occurs via face-to-face interaction through in-person planning or response meetings (Lee & Fleming, 2015; Yao et al.,

[39] In addition to jurisdictions, previous research indicates that individuals are also more likely to interact with those most physically proximate (Lui & Srivastava, 2015).

2010). Face-to-face interaction has been shown to be an important factor for successful collaboration, as it facilitates the building of trust, shared understanding, mutual respect, and commitment to the process (Ansell & Gash, 2007, p. 558). To sum, geographically proximate organizations are more likely to seek interjurisdictional collaboration arrangements and achieve successful collaboration efforts than non-geographically proximate organizations, due to their ability to hold face-to-face meetings that help facilitate trust, reciprocity, and mutual commitment to disaster management activities.

COVID-19 and "Virtual Proximity"

What was novel about the COVID-19 pandemic response was that many of the tenets of traditional interjurisdictional disaster collaboration, such as face-to-face interactions, had to be adapted to meet the public health mandates like social distancing and stay-at-home orders. Thus, much of the face-to-face interjurisdictional collaboration occurred via virtual platforms, raising questions as to whether collaborative success might have been impaired. There is a long-standing body of research on the benefits and challenges of virtual meeting platforms and engagement within the business management literature (for a review, see Ahuja et al., 2020).

Schamp et al. (2004) use the term "virtual proximity" to refer to organizations that share a common information and communication technology based on common standards, and that is used in the transfer of codified knowledge (p. 619). In this way, it may be argued that the use of virtual meeting platforms such as Zoom to share information could be construed as virtual proximity: organizations utilizing a shared technology can communicate and share information without the need for face-to-face meetings, but still be considered "proximate." Additionally, it is possible that face-to-face interactions via cameras and computer screens act in the same or similar manner as face-to-face interactions via in-person meetings, thereby still facilitating trust,

shared understanding, mutual respect, and commitment to the process (Ansell & Gash, 2007, p. 558).

Other studies on the use of virtual meeting technology during the pandemic suggest that in comparison with previous in-person academic conference events, virtual platforms increased participation (Fulcher et al., 2020) and reduced barriers for attending (Wu et al., 2022). Thus, the use of this type of cloud technology might also have allowed for increased participation in the COVID Finance Network with regard to those jurisdictions not considered geographically proximate. Traveling to jurisdictions outside of one's own region induces transaction costs like travel expenses and time lost in transit, and likely acts as a prohibitive deterrent to jurisdictions already unlikely to provide mutual aid so far outside of their own region. Yet by enabling non-geographically proximate jurisdictions to participate in collaborative activities from the comfort of their own localities, virtual COVID-19 interorganizational collaboration might have invited the participation of a range of different jurisdictions and types of organizations representing different geographic areas, thereby strengthening the resilience of the entire collaborative system. These arguments are grounded in research suggesting ways in which the Internet has increased civic participation in government activities by reducing the social and political costs of engaging in political issues (Skoric et al., 2009), increasing the ability for policymakers to communicate quickly and widely with the public (Nabatchi & Leighninger, 2015), and promoting openness in the flow of ideas and information (Rose, 2005) in a more convenient format with regard to time and place, eliminating the need for physical travel (Gajendra, 2012). Thus, while local governments faced unprecedented fiscal and operational challenges during the COVID-19 pandemic, at the same time some traditional barriers to achieving interjurisdictional

disaster collaboration might have been eased due to the changing expectations of connecting virtually.

Data and Methods

Research Setting

To understand how forced virtual engagement impacted interjurisdictional collaboration, I examine a local government finance information-sharing network that emerged to help local government officials address the fiscal and policy uncertainty created by the COVID-19 pandemic. Wide-ranging disasters such as the COVID-19 pandemic often witness the emergence of new or ad-hoc groups to address the unmet needs created by the disaster. This network might be classified as an emergent, multi-organizational network (EMON), which Tierney (2014) defines as "the manifestation of new organizational interconnections that reflect collective efforts to manage crisis events" (p. 204). EMONs may consist of organizations with predesignated disaster response roles, other organizations not included in pre-disaster planning but that join response activities, and emergent groups (Tierney, 2014).

The Virginia local government finance network began as a serendipitous, virtual effort by one organization to bring together other geographically proximate jurisdictions to share information as to how they were tackling the major revenue shortages that stay-at-home and social distancing orders created. In this way, it was formed to fill an unmet crisis management need, meeting the basic definition of an EMON. The impetus for this initiative began with a small municipality in Southwest Virginia struggling to meet the new response challenges created by COVID-19. The municipality had recently enlisted the aid of a local university faculty member with expertise in local government finance to assist them through this time period, and it

was actually this consultant who initially convened the group. The university representative then contacted other neighboring jurisdictions within the Southwest Virginia area to invite them to join a virtual meeting in April of 2020 where they discussed their various experiences and efforts in meeting the fiscal needs of their governments during this time. At the first meeting (held via Zoom), there were 41 participants who were primarily local government finance officials such as finance directors and administrators. At the conclusion of the meeting, participants agreed that such an effort was so worthwhile for information-sharing that weekly virtual meetings would be beneficial. Over the course of the next five months, the group grew via word-of-mouth from the small, localized group of towns and counties to include over 100 unique organizational participants from across the state of Virginia, with representation from town, city, county, state, federal, and nongovernmental organizations.[40]

The group held weekly meetings through July 2020, at which point they transitioned to biweekly meetings as the fiscal response to COVID-19 became less acute. The convening organization sought input from other participants at each session as to the important elements that should be included in the proceeding week's meeting. Meetings consisted of pre-distributed agendas, speakers from outside the network with expertise or information on topics important to participants, and question-and-answer sessions following individual presentations. These meetings also included a written communication portion, contained in the "Chat" feature of the Zoom virtual meeting platform. Therefore, participants could engage both vocally via video in response to the meeting materials presented and/or via the Chat feature, without speaking during the meeting. Additionally, participants had the choice of connecting via a computer or their

[40] The roster of participants was gleaned through the list of organizations that registered to attend any of the Zoom meetings from April through July 2020. While meeting-by-meeting participation varied, the overall list includes all those unique participants over the course of the period of study.

phone, as Zoom provides options for both. Thus, if members were participating from areas without strong internet service, they had the option of utilizing a mobile data plan instead of broadband internet to participate. Following the meeting, the convening organization provided the recording, meeting materials, and Chat transcript for all members to view on a publicly accessible website.

Data Collection and Coding

The data for this study were derived from two sources on the convening organization's publicly available website: the recorded, published Zoom meeting videos and the captured chat discussions from each meeting.[41] This study is part of a larger research project that examines the long-term impacts of this network, including potential policy outcomes, relationship dynamics, evolution of network meeting content and discussion, and the potential for formalization and institutionalization of the group. This initial paper, however, focuses on the mechanics of online collaboration between the two different formats (video meeting and written chat), and how the virtual nature influences participation. As the focus of this study was on how forced virtual engagement impacted interorganizational engagement, I chose a sample of three Zoom meetings and three chat transcripts (from separate meetings) from the early stage of the pandemic management, when it might be argued that interorganizational ties created from the COVID-19 pandemic were still new. Meetings included in the study were selected at random between April 1, 2020, and July 1, 2020, totaling data from six different meetings. I intentionally selected chats and videos that were not from the same meeting in an effort to ensure the data were not interrelated and to capture different early chronological stages of collaboration.

[41] This study does not meet the definition of human subject research, as verified by the authors' IRB.

There are two specific elements of the network meetings that are particularly relevant to this study: first, the geographic distribution of participants (to understand whether the need for geographic proximity is overcome by the "virtual proximity" of the participants), and whether the types of collaborative exchanges differ between video and chat mediums. This second element is important as it might be argued that the on-camera, face-to-face nature of the video screen mimics the in-person, face-to-face communication that occurs during traditional, pre-COVID-19 disaster meetings. Thanks to the cameras, participants were able to view each other's faces, expressions, and body language in a similar way as if they were all sitting in the same room. Thus, one would expect the verbal dialogue via Zoom to contain similar collaborative exchanges as it would if the participants were in person. The chat medium, however, is a completely novel form of communication that is nonexistent in the in-person, collaborative meetings common in disaster management. Instead of having to speak up in front of the larger group, Zoom participants have the option to communicate in writing, thereby avoiding disrupting the vocal discussion occurring on the video, but still being provided with a mechanism for participating and creating dyadic exchanges with other members. In sum, the chat provides another medium through which members might collaborate.

The use of recorded Zoom meetings and transcripts as interorganizational network data is a relatively novel approach, and as of the writing of this manuscript, no similar studies were known to exist. Therefore, to code the video and chat formats, I began with a schema based on previous studies on both virtual engagement and interorganizational networks, whereby I defined codes I anticipated would be applicable to the data due to the clear information-sharing purpose of the network. For example, previous work on information-sharing exchanges in virtual teams suggests that there are three major types of information typically exchanged: task-related

information involving how a task might be carried out, social information about participants and their relationships with each other, and contextual information related to the organizational environment (Cramton & Orvis, 2003). Given that the purpose of this virtual network was specifically to share information related to how different jurisdictions were carrying out COVID-related tasks, I included three types of information-sharing codes: general information sharing, advice-provision exchanges, and advice-request exchanges. Additionally, as the COVID Finance Network, while virtual, was still an interorganizational network, I also included codes related to the types of exchanges commonly found among interorganizational network participants, including exchanges related to the sharing of resources and meeting facilitation (see, for example, Sedgwick et al., 2022 and Yang & Lemaire, 2022). I then added emergent codes as necessary to best represent the actual nature of the exchanges.

In the end, for each meeting format, three major types of exchanges were coded: information-sharing (broken into general information sharing, advice-seeking exchanges, and advice-provision exchanges), facilitation exchanges (separated into general facilitation behavior, greeting other members, and expressing gratitude), and more tangible exchanges including requests for resource provision and offers or agreements to share resources with other members. If a particular exchange involved multiple codes, all relevant codes were recorded. For example, if a member informed the group as to a particular situation occurring in their jurisdiction, then asked for advice for how to handle it, it was coded as both "general information sharing" and "advice-seeking." The coding instrument is provided in Appendix F.

For each video or chat medium, exchanges were coded in two separate formats. First, a general tally depicted the number of times each code was denoted for each jurisdiction. Thus, once the data were fully coded for that type of medium (either video or chat), there was an

aggregated tally for how many times each jurisdiction participated in each type of exchange. To capture dyadic exchanges, however, I also coded the data in a square matrix format. The data were then analyzed as dyadic ties using UCInet (Borgatti, et al., 2002). Thus, if a particular jurisdiction asked another individual jurisdiction to share a resource, this exchange was captured as a directional tie (and coded as a 1) from the requesting organization to the requestee. Absent ties were recorded as 0 in the square matrix. Once again, many exchanges consisted of multiple codes and were thus captured in both types of formats. For instance, if a member requested advice from another participant, it was marked as both a tally for the respective organization for that type of exchange (in this case, "advice-seeking"), and as an instance of directional advice seeking from the requesting organization to the organization from whom they were requesting advice.

Analysis and Findings

Issues that Emerged Through the Coding Process

Through the course of the data coding process, several key elements emerged. First, the process of coding the video mediums was far less time-consuming than the process for coding the chat mediums. The video meetings generally consisted of long presentations from various speakers (which tended to be coded as a single instance of "general information sharing"), and there was very little back-and-forth between participants to be denoted on the coding instrument. In contrast, the chat medium was rich with dyadic exchanges, many of which went back and forth repeatedly and referenced the ongoing dialogue occurring in the video medium, creating connections across these two forms of participation. The tallies for each medium demonstrate this phenomenon, with 396 of the total 638 exchanges (or 62% of the total exchanges) occurring via the chat medium.

Secondly, soon into the coding process, it became obvious that there were many exchanges directed at the entire group, particularly in the chat medium. For example, members often asked whether any participants were using a particular type of funding to cover a certain type of expense, opening the door for all participants to opine as to how their jurisdictions were handling (or often, not handling) the expense in question. In this way, all members benefited from information shared with or provided to the requestor. Therefore, I created a new participant named "All Group" to depict the exchanges shared with the entire group. The exchanges directed at the entire group were far more common in the chat than in the video medium: 160 of the 221 exchanges (or 72%) directed to the entire group occurred via the chat medium.

Jurisdictional Type and Geographic Distribution

Participants in this network represented several different types of organizations, including counties, towns, independent cities, state agencies, and non-governmental organizations. Table 1 provides the breakdown of the organizational types present in the network. Notably, there was representation from the majority of the state's independent cities and nearly half of its counties. The town-level representation, however, was much lower.[42] Of Virginia's 38 independent cities, 21 of these cities participated in this network over this time period (or 55%). Of the 95 counties, 40 were represented by this network (or 42%). However, of Virginia's 190 towns, only 23 were participants in the network (or 12%).

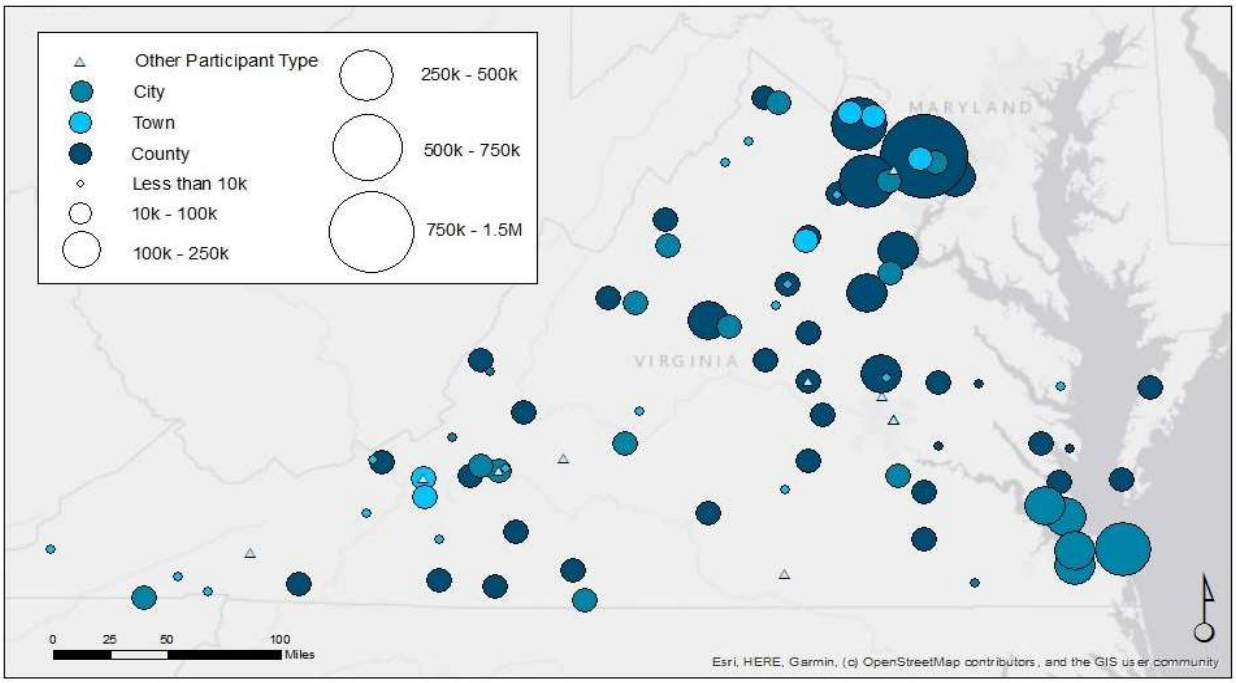
[42] The state of Virginia specifies three different types of sub-governments below the state level: counties, towns and cities. Towns are generally subordinate to the county within which the town is located, while cities are independent and operate more like counties (Virginia Constitution, Article VII.).

Table 1. COVID-19 local government finance participants by type of organization

Breakdown of Organizational Participants		
Type of Organization	**Number**	**% of VA Total**
Towns	23	**12%**
Cities	21	**55%**
Counties	40	**42%**
State Government Institutions	2	n/a
Non-Governmental Organizations	4	n/a
Other	11	n/a
Total Organizations	101	n/a

The participants were also distributed widely across the state. This broad geographic representation becomes apparent when the longitude and latitude of each participating jurisdiction is mapped using ArcGIS. Figure 1 depicts the organizational distribution across the state of Virginia. Each type of organizational entity is represented by color, while point size depicts the population of that locality (large circles denote municipalities with large populations, as outlined in the legend). As noted earlier, the convening organization is located in rural Southwest Virginia, so based on the established relationship between geographic distribution and likelihood of disaster collaboration, it makes sense that there is a clear cluster of varied participation in this area. However, what is also depicted by this map are the other clusters across the state that emerge – notably in the DC region and coastal Virginia. Incidentally, there are wide sections of non-represented jurisdictions, particularly in central and Southeast Virginia. Finally, the types of participating jurisdictions included large and small counties, small towns, big cities, and other entities, including state agencies, nonprofit associations, and even private-sector organizations.

Figure 1. Participants by geographic location and organizational type



Different Types of Exchanges in Video and Chat Mediums

The findings indicate various differences in video versus chat exchanges. Table 2 shows the breakdown of organizational participation by medium.

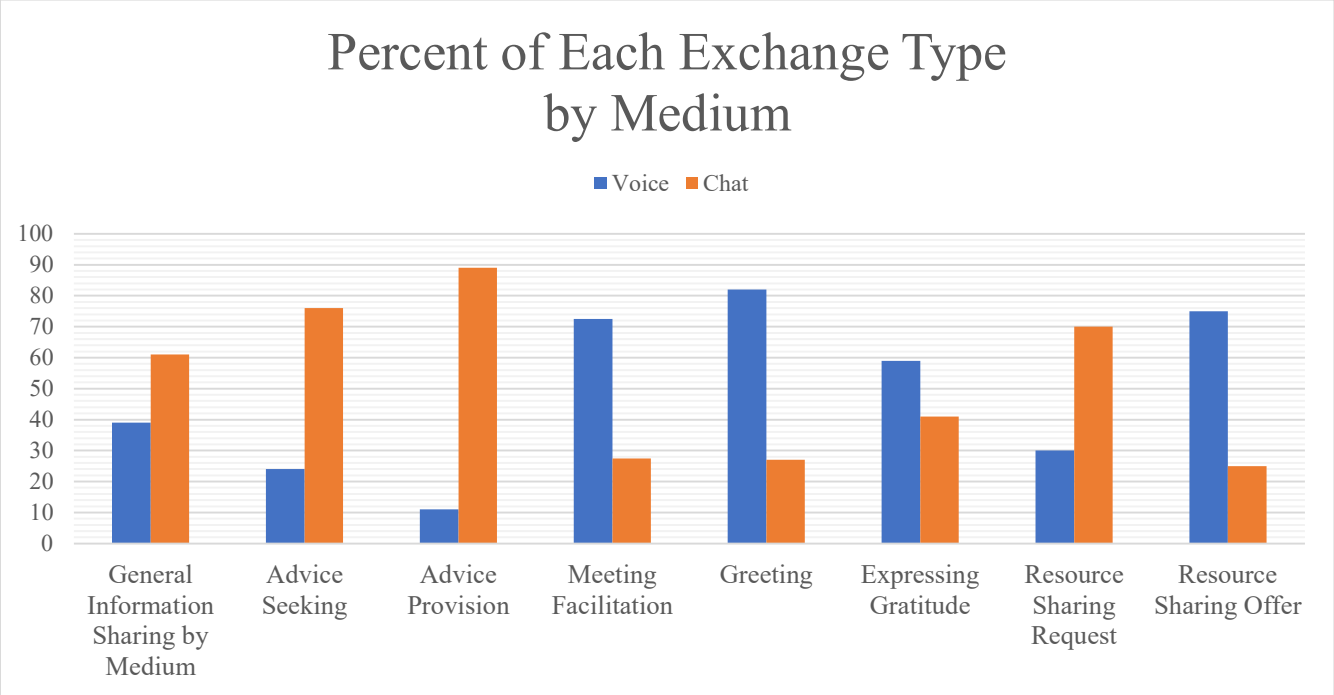
Table 2. Organizational participation by medium

Organizational Participation by Medium Type	
Video Only	6
Chat Only	46
Both Video and Chat	13
Total Video	19
Total Chat	59
Total Participants	65
Neither	37
Total	101

The majority of jurisdictions that did participate chose to use the chat feature, rather than verbally exchange information on the video Zoom meetings. Of the 59 total different organizations that participated via the chat in the time period studied, only 13 also participated in the video medium. It might be argued, therefore, that at least a significant proportion of the 69% of the active network participants (meaning, they participated in collaborative exchanges via video or chat mediums) would not have contributed without the chat option. In contrast, only six individual organizations participated only in the video medium. Additionally, there were 37 participants who did not engage in any kind of collaborative exchange during the period of study.

Not only did the number of exchanges differ between video and chat mediums, but the types of exchanges differed as well. Figure 2 depicts the results of aggregated meeting tallies.

Figure 2. Aggregated tallies of exchange types by video and chat



The first three types of exchanges are related to information sharing. As evidenced by Figure 2, all three categories of information-sharing exchanges were more common in the chat

medium than the video medium. In contrast, those three codes related to meeting facilitation were more frequently found in video meetings. Finally, the last two codes, resource sharing requests and resource sharing offers were mixed: participants were more likely to request other jurisdictions share resources via the chat, but they were more likely to share or offer to share resources in the video medium. This finding is discussed at greater length in the discussion section.

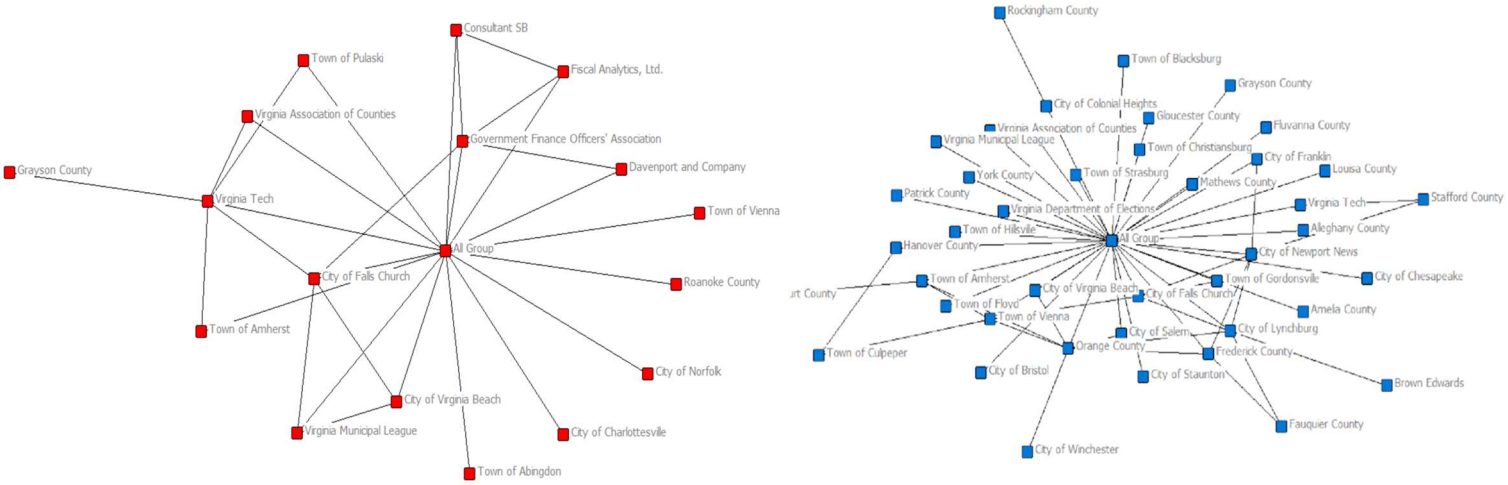
Network Analysis[43]

As noted above, the data were also coded in square matrix form. After reviewing the major differences in the types of exchanges between video and chat, the data were aggregated by medium (video or chat) for several of the codes, including information-sharing, advice-seeking, and advice-provision exchanges. In this way, a single matrix was created for all of the general information-sharing exchanges that occurred in the chat medium, one for the general information sharing exchanges that occurred in the video medium, one for all the advice seeking exchanges that occurred in each medium, and so on. This process resulted in six different matrices: three matrices for the video medium and three for the chat medium. Each matrix was then visualized using NetDraw in UCINet (Borgatti et al., 2002) to allow for a side-by-side comparison between video and chat. The results are presented below in several forms. The first plots for each code are the initial network plots (with isolates removed) including the "all group" node described above. The second version of each figure, however, shows what the structure of the chat and video networks would look like without this node. By removing the "all group" node, it allowed for the structure of actual dyadic exchanges to emerge. Isolates were removed from each plot and basic

[43] An updated version of this original manuscript incorporated contributions from two other co-authors, including an expanded analysis that included Quadratic Assignment Procedure (QAP) to compare the differences between these two networks. The original single-authored manuscript is presented here for the purposes of the dissertation.

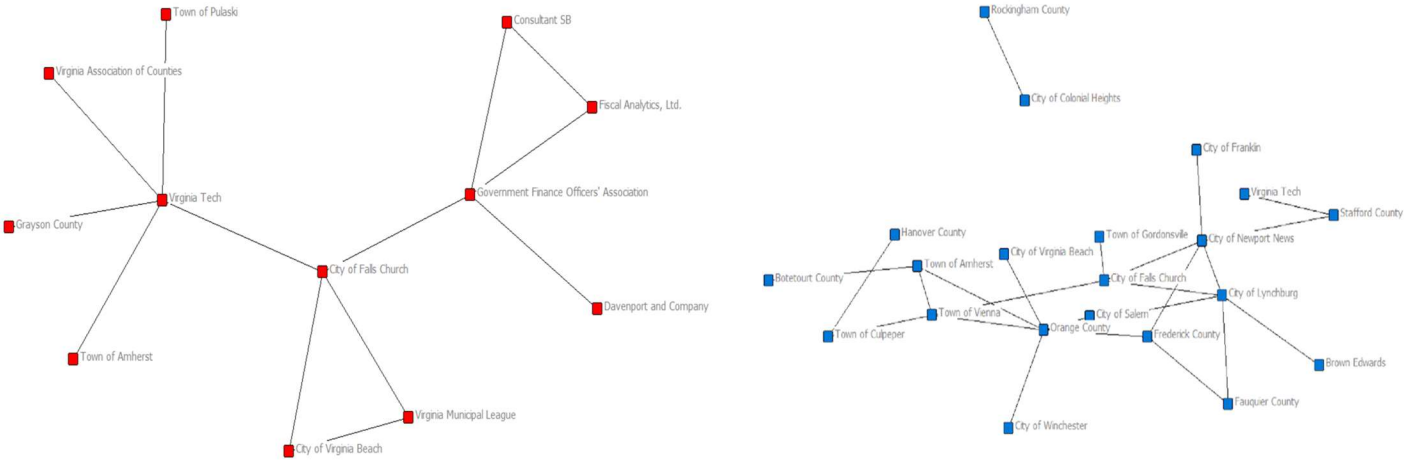
network analysis measures were run for each of the versions. These measures are provided in the tables following each comparative plot.

Figure 3. Video versus chat general information-sharing exchanges with All Group



Video Chat

Figure 4. Video versus chat general information-sharing exchanges without All Group



Video Chat

Table 3. Summary statistics for information-sharing network analysis

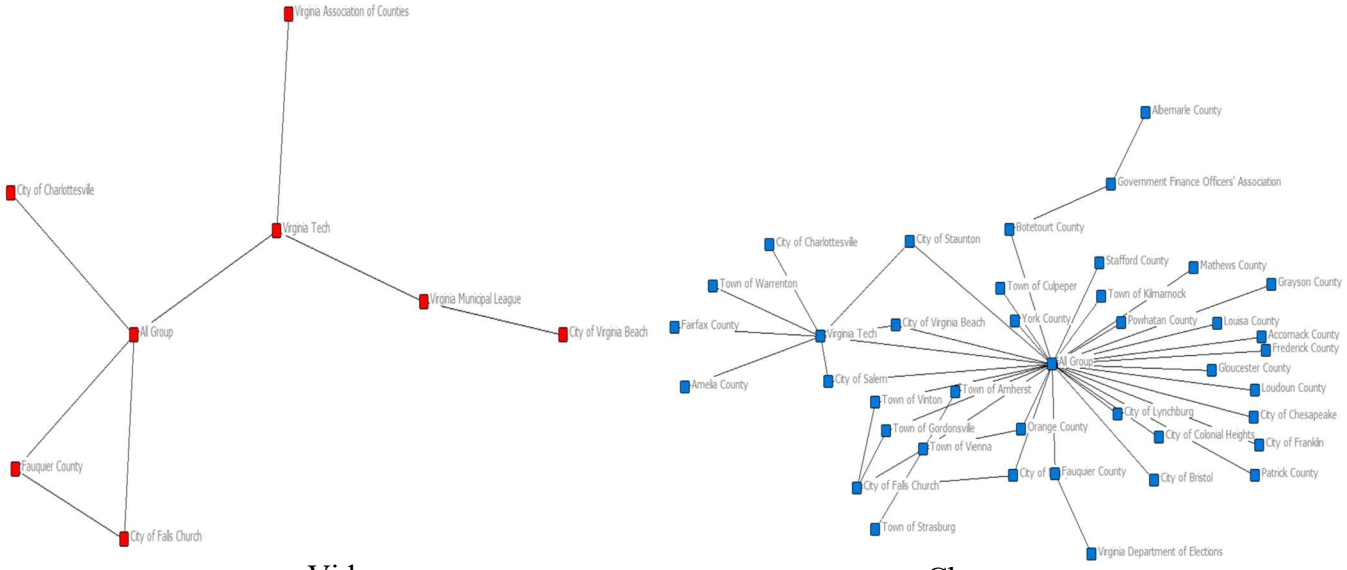
Information-Sharing Ties				
	Video	**Video – No All Group**	**Chat**	**Chat – No All Group**
Degree Centralization	0.037	0.029	0.044	0.038
In-Degree Centrality	0.156	0.029	0.340	0.067
Out-Degree Centrality	0.037	0.029	0.043	0.037
Density	0.003	0.001	0.006	0.003
Average Degree	0.291	0.137	0.612	0.275

In both the network plots and summary statistics, the centralizing force of the "all group" node is evident. When it is removed, the degree centralization for video drops from 0.037 to 0.029, and for the chat medium, it falls from 0.044 to 0.038. This is unsurprising, as much of the information-sharing exchanges in both mediums occur between a single organizational participant to the group at large. Once the "all group" node is removed, the inherently decentralized nature of participation (especially in the chat medium) emerges. Additionally, the structure of information sharing via video network shifts from a more centralized network (with the "all group" node connecting most of the other nodes) to more of a small-world structure, comprised of several brokers which connect otherwise unconnected actors.

The second set of plots depict the advice-seeking ties in both video and chat mediums. This type of exchange differs somewhat from the general information-sharing plots in that both the structures of video and chat networks are less dense and less centralized than the general information-sharing plots. The chat plot shows similar centralization around the "all group" node

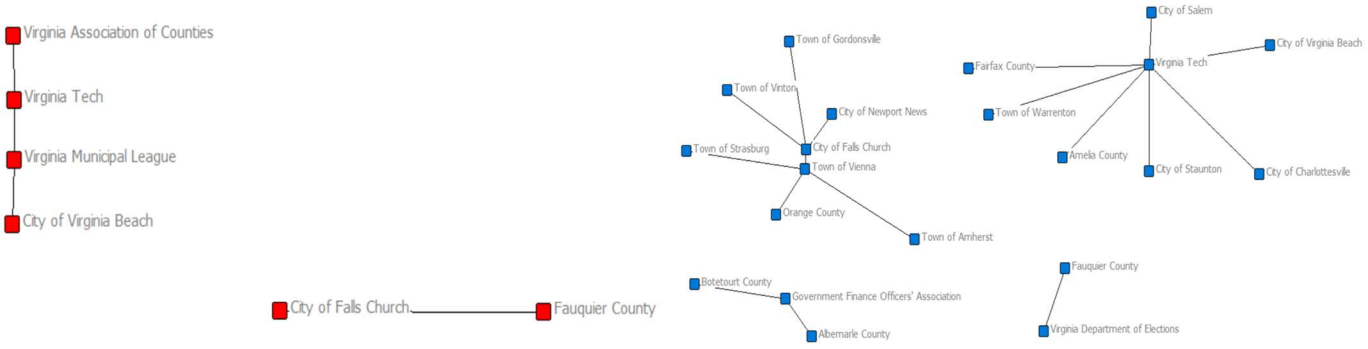
as was evidenced by the information-sharing tie plot. However, when this node is removed for both mediums, density and centralization both drop in the video and chat analyses. Again, the majority of exchanges in both mediums were aimed at the group as a whole, rather than individual members. However, the chat medium still shows more dyadic exchanges than the video medium even without the "all group" node, suggesting that even without the comments for the good of the group, collaboration was still occurring at a greater rate through the chat than through the video format.

Figure 5. Video versus chat advice-seeking exchanges with the All Group node



Video Chat

Figure 6. Video versus chat advice-seeking exchanges without the All Group node



Video Chat

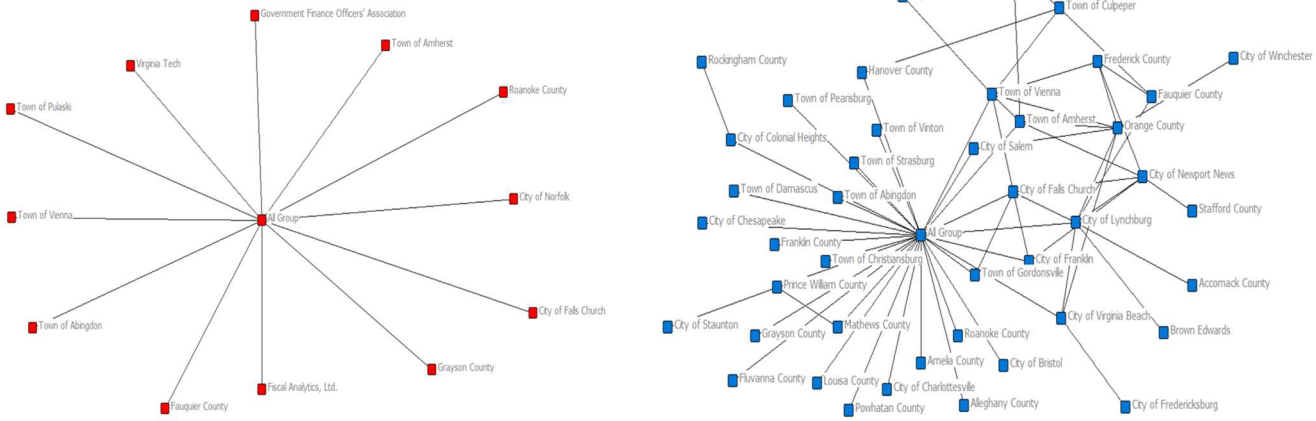
Table 4. Summary statistics for advice-seeking network analysis

Advice-Seeking Ties				
	Video	**Video – No All Group**	**Chat**	**Chat – No All Group**
Degree Centralization	0.029	0.020	0.025	0.019
In-Degree Centrality	0.039	0.020	0.292	0.068
Out-Degree Centrality	0.029	0.020	0.025	0.018
Density	0.001	0.000	0.004	0.002
Average Degree	0.078	0.039	0.456	0.167

The last set of plots show advice-provision exchanges across both mediums. This exchange is marked by 100% centralization in the video network, which may be understood as the only exchange occurring during this meeting was between individual members and the entire group. Thus, when the “all group” node is removed, there are no dyadic ties present. In contrast,

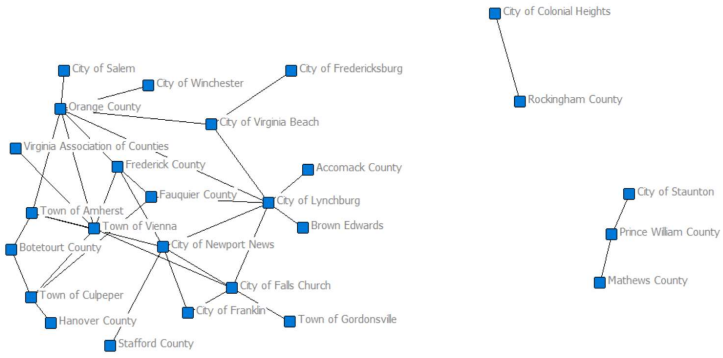
while density and centralization do drop in the chat format, it is still rich with dyadic exchanges even without the “all group” node.

Figure 7. Video versus chat advice-provision exchanges



Video Chat

Figure 8. Video versus chat advice provision exchanges without the All Group node



Video Chat

Table 5. Summary statistics for advice-provision network analysis

Advice-Provision Ties				
	Video	**Video – No All Group**	**Chat**	**Chat – No All Group**
Degree Centralization	0.009	0	0.054	0.047
In-Degree Centrality	0.118	0	0.281	0.066
Out-Degree Centrality	0.009	0	0.053	0.046
Density	0.001	0	0.006	0.003
Average Degree	0.117	0	0.631	0.353

Discussion

This study analyzed a local government finance network that emerged to address unmet fiscal and policy response needs created by the COVID-19 pandemic to understand how the forced virtual nature engagement impacted interjurisdictional collaboration in the early stages of the pandemic. Specifically, it examined the ways in which the virtual nature of the collaboration facilitated both geographic participation and modes or ways of participating. The results of this study suggest several important findings relevant to both disaster collaboration and network participation.

First, it is clear that this network encompassed jurisdictions far outside of what would be considered geographically proximate locations to the convening jurisdiction. Not only did the network include participation from nearly all corners of the state, but it also included a mix of large and small municipalities, counties, towns, independent cities, and non-governmental organizations. While different from some tangible resource-sharing networks that emerge during

disasters, this information-sharing network was able to capitalize on the virtual nature of collaboration, and its enduring nature indicates that participants found value in engaging through this medium. This finding suggests that virtual proximity might make up for or act as a proxy for geographic proximity when it comes to providing face-to-face interactions that facilitate trust, shared understanding, mutual respect, and commitment to the process (Ansell & Gash, 2007). A study published in the same early stage of the pandemic by Govtech (2020) interviewed local managers and found similar sentiments. Several local government officials noted that even though the pandemic had disrupted government operations, many of the virtual solutions will endure into the future.

A related finding is that the geographic distribution of network participants indicates several geographical areas were not engaged with this network during the period of study. Particularly, jurisdictions representing coastal Virginia, far western Virginia, and the southern border with North Carolina are not depicted as participating in this network. The question emerges as to how these missing areas might have impacted the substantive nature of the COVID Finance Network, including the network's priorities, topics of discussion, and exchanges of information. Though the network was open to any jurisdiction or organization that wished to participate, it is possible that the areas not engaged would have benefited from involvement and that the members of the network would have benefitted from these missing perspectives as well. By visualizing the geographic distribution of statewide networks such as the COVID Finance Network, managers may better identify those underrepresented areas, pursue ways of engagement, and consider the implications of this lack of representation to the network's goals, priorities, and outcomes.

A third important finding from this study is that participation varied between video and chat formats. The majority of collaborative exchanges overall occurred through the chat feature provided by the Zoom platform. More specifically, in information-sharing exchanges (including general information sharing, advice-seeking and advice-provision exchanges), participants utilized the chat feature far more often than the video format. This finding suggests that either participants felt more comfortable firing off a quick written note to an individual or the group at large, or they felt less barriers to participating via this format than to participating in the video dialogue. Either way, it is apparent that without this chat feature, much of the rich engagement between jurisdictions would have likely been absent.

It is possible that these findings are interrelated. For instance, it is possible that the diversity and number of organizations representing a wide geographic area have continued their participation in this network due to the ease of virtual participation, as well as the feelings of efficacy and belonging that come with having ways to participate that suit all organizational or individual participant needs. Rather than having to speak up in front of a large group of professionals, more reticent or less confident network participants may pose their questions, share information, or offer advice through another, less personal medium. Therefore, over time, it is likely that this network's participants recognized the benefits of a collaborative environment that does not require large transaction costs to participate.

One last outcome of interest was the discrepancy between requests for resource provision, which occurred primarily through the chat feature, and offers or agreements to share resources, which occurred primarily through the video format. A possible explanation for this finding may be that executing requests for resource sharing does not constitute great effort; such exchanges are similar to requests for advice which can be accomplished quite efficiently with a

simple, one-sentence message in the chat feature. Indeed, recent research on virtual resource requests during the 2017 Hurricane Harvey found that individuals were sharing information and requesting rescue and other tangible resources via social media rather than using the overloaded 911 phone system (Zou et al., 2021).

In contrast, actual resource provision may require additional effort such as the gathering of said resources, offline follow-up, or, in the case of sensitive plans or files, the obtaining of higher-level permission prior to sharing. In such cases, it makes sense that a quick verbal commitment to providing resources at a later date was less effort than actually writing something in the chat medium. Therefore, it is unsurprising that requests for resource sharing occurred more often in the informal chat box, where it was not a great expense of effort on the requestor but promises or offers to provide said resources primarily occurred verbally.

This study was not without its limitations. The data were publicly available but consisted of secondary data, and coding relied on the effective recording and timely posting of meeting materials. Additionally, due to capacity limitations, not every single meeting was included in this study. Future work will expand upon this exploratory study by analyzing additional meetings throughout the pandemic management lifecycle and will follow the evolution of this network in order to explore the statewide policy implications, and the propensity for members to continue collaborating once the fiscal and policy challenges created by COVID-19 have been addressed. Despite these limitations, however, the findings from this study point to the potential for emergent mediums, such as online virtual software, to facilitate emergent interorganizational network formation by reducing barriers to participation for informal, emergent actors. The findings also point to the potential for future work to better identify ways in which emergent networks, like this finance network, might interact or engage with pre-existing formal disaster

management systems. For instance, how does this local government finance network relate to the established emergency management system? Are there overlapping members, information-sharing, or collaborative activities occurring between this network and other established or emergent networks in this disaster? Such a "network of networks" (Nowell et al., 2019) perspective is valuable in understanding the full complexities of responding to large-scale, multijurisdictional incidents.

The COVID-19 pandemic altered nearly every aspect of society for an extended period of time, and the governmental domain was no exception. One of the silver linings to emerge from this disaster, however, was the recognition that virtual cloud technology may reduce barriers and transaction costs to participation and collaboration to a greater extent than previously understood. While there are likely to be many best practices adopted based on the collective experience of this disaster, greater use of virtual meeting and collaboration technology is here to stay, which bodes well for future capacity to respond to novel disasters.

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CHAPTER FIVE

Conclusion

Introduction

Disasters events, both natural and human caused, have increased dramatically worldwide over the last two decades and are only expected to continue on this upward trajectory (Perrow, 2007; Dolan & Messen, 2012; UNDRR, 2022). Though it is impossible to predict where or when the next disaster will occur, as Quarantelli (1998) pointed out, we can nearly always anticipate the on-scene convergence of informal individuals and groups to assist with the response. Moreover, those emergent individuals and groups often collaborate to either supplement or complement the formal response effort (Neal & Phillips, 1995; Kim et al., 2022). For those public administrators charged with disaster management, the question of how to plan for these emergent groups, and importantly, how to integrate them and their potential contributions into the formal response system during an acute crisis is a persistent challenge.

The COVID-19 pandemic, though a public health-related event, has been recognized as a global disaster due to its long-running and wide-ranging impacts to nearly every aspect of society (Alcantara-Ayala et al., 2021; Nicola et al., 2020). In many ways, the pandemic presented novel challenges for managers, particularly with regard to the scale of the impact and the type of hazard. Indeed, the pandemic represented the first simultaneously declared disaster in all 50 states (Dowell, 2021), and constituted a rare event for disaster managers experienced in dealing with more common hazard events (Sharma et al., 2021). As such, there are many lessons to be learned from the collective global experience in managing this novel event as to how to better manage the next pandemic. Simultaneously, however, the COVID-19 pandemic shared aspects with other major complex disasters, including the necessity of multijurisdictional collaboration, the presence of both predictable management tasks as well as emergent unforeseen demands, and

the appearance of new actors and emergent interorganizational structures and collaboration. As such, the findings from this project are applicable to other types of hazards and other complex disaster contexts that contain these shared elements. For instance, community disaster managers dealing with a large hurricane will likely encounter unexpected resource needs not contained within the formal disaster management system and thus requiring collaboration with an external group possessing those resources. As it is their responsibility to engage and facilitate those emergent arrangements to manage the disaster in the most efficient and effective way possible, the findings from this project are very applicable and shed light on potential mechanisms for facilitating that emergent collaboration.

This three-article dissertation project explored two examples of emergent interorganizational collaboration to understand how disaster managers may better facilitate emergent group participation in the formal disaster management system. Through an exploratory, multi-case mixed methods study, I analyzed two cases of emergent interorganizational networks formed to manage the COVID-19 pandemic. The first network focused on broad management of the pandemic's ramifications in the region of southwestern Virginia, while the second network formed to assist statewide local government financial officials specifically with the fiscal challenge created by the pandemic. These collaborative arrangements constitute emergent, multiorganizational networks (EMONs) (Drabek, 1985) that consisted of both those organizations formally tasked with responding to disasters as well as new or informal groups not normally involved in disaster management. As disaster management networks are in essence, a type of interorganizational network, the findings presented herein have implications for both disaster management networks and interorganizational networks broadly.

Overview of Findings by Manuscript

Each of the three manuscripts presented herein contribute to the overarching research question of how public disaster managers might better plan for facilitating emergent collaboration in disasters. The first two manuscripts focus on the Be Well Task Force, an emergent network formed to manage the broader impacts of the COVID-19 pandemic in the region of southwestern Virginia. The third manuscript focuses on the COVID Finance network formed to assist local government officials across the state of Virginia address the fiscal and policy uncertainty created by the COVID-19 pandemic. These two interorganizational arrangements were both emergent, multiorganizational networks (EMONs) (Drabek, 1985), but aside from that shared network classification, they were quite different in scope and purpose. The Be Well Task Force aimed to broadly manage all of the pandemic's impacts to the region of southwestern Virginia. The COVID Finance Network included members from across the state of Virginia, but participants were narrowly focused on managing the pandemic's financial impacts on local governments.

The first case, the Be Well Task Force formed in March 2020 with the initial goal of coordinating multiagency efforts to protect hospital surge capacity. Over the following few months, however, it expanded to encompass organizations involved in managing a public health disaster across the whole region of southwestern Virginia. Over the course of two years, other organizations became involved in the task force that did not have any prior role in disaster management and/or public health, including groups from the private and nonprofit sectors.

Despite the fact that not all actors involved in the task force had previous experience with disaster management processes and protocols, the network purported to employ the federally mandated incident response framework, the Incident Command System (ICS), to coordinate the multiagency collaborative efforts. Previous research indicates that certain preconditions are

important for ICS implementation success, including that responders are technically trained on the type of incident at hand, that there is a shared vision across the responders for how to manage an incident, that responders are familiar with each other and their expected roles, and that they operate under a trusted leader prior to a disaster event (Buck et al., 2006; Bigley & Roberts, 2001; Jensen & Waugh, 2014). The first study from this case explored how ICS might still be implemented when preconditions are less than ideal. This study involved qualitative and quantitative data collected from 20 semi-structured interviews with task force members and analyzed with qualitative and organizational network analysis. I found that despite the presence of only two of the four required prerequisites for ICS effectiveness (Buck et al., 2006) in the community prior to the onset of the COVID-19 pandemic, the Be Well Task Force still utilized some of the elements of ICS, while also allowing for emergent interorganizational structures. While this study was exploratory in nature, the findings suggest the potential for successful partial ICS implementation in the absence of some of the necessary preconditions and offers future directions for understanding whether and how emergent structures may complement formal disaster management systems to better facilitate emergent collaboration.

For the second manuscript, I again examined the Be Well Task Force network case to explore a paradox of disaster management: the simultaneous need for both stability and flexibility in organizing for disaster response. This paradox is a common tension recognized throughout the interorganizational literature, and specifically in the context of disasters it describes the seemingly contradictory mutual demand for both structures that promote stability and those that foster network flexibility. In any disaster situation, there will be both routine disaster management tasks that must be managed (such as public information provision or mass care provision), and previous studies indicate these routine tasks are best accomplished through

stable, bureaucratic ways of organizing (Buck et al., 2006). Simultaneously, disasters create environments of uncertainty, challenging public disaster managers with novel tasks that were unplanned or unforeseen but must be accomplished under conditions of urgency (Comfort & Kapucu, 2006). Scholars argue that to manage these new demands, a disaster management system must also foster flexibility to shift gears or access novel resources during crises (Webb & Chavreau, 2006). How to structure disaster management networks to facilitate both stability and flexibility is a persistent challenge for public administrators.

To understand the potential structural elements that might help manage this paradox, we conducted 26 semi-structured interviews with both task force members (or those actively engaged in managing the pandemic on a daily basis) and organizational partners (or those groups engaged periodically on an as-needed basis). Drawing on both qualitative and quantitative data collected, we used a combination of qualitative analysis and organizational network analysis to understand the structural elements that might have helped the Be Well Task Force be both stable and flexible during this crisis. We found that task force's interorganizational network structure consisted of a densely connected core group of organizations that relied on key brokers and dynamic ways of brokering to connect with peripheral resources (including emergent actors) as necessary to manage the evolving task environment. These findings suggest that community brokers may have been previously undervalued as important mechanisms for integrating emergent or informal groups and importantly, that they utilize different processes of brokering during different disaster stages. This study has implications for future research into the ways communities might identify and incorporate community brokers prior to future crises, as well as which types and processes of brokering might be relevant during each phase of the disaster management lifecycle.

For the final manuscript, I explored interjurisdictional collaboration between local government finance officials in the state of Virginia during the pandemic. Previous research suggests that interjurisdictional collaboration during disasters often occurs between adjacent jurisdictions, or those that are geographically proximate (Gerber & Robinson, 2009). Proximate jurisdictions have more opportunities to interact and develop trust through repeated face-to-face interactions (Long et al., 2014). In fact, research has shown that much of the interjurisdictional disaster collaboration occurs via face-to-face interaction through in-person planning or response meetings (Lee & Fleming, 2015; Yao et al., 2010). What was novel about the COVID-19 pandemic response was that many of the tenets of traditional interjurisdictional disaster collaboration, such as face-to-face interactions, had to be adapted to meet the public health mandates like social distancing and stay-at-home orders.

To explore how forced virtual engagement might influence interjurisdictional engagement during a disaster, I examined a local government finance information-sharing network that emerged to help local government officials in the state of Virginia address the fiscal and policy uncertainty created by the COVID-19 pandemic. The COVID Finance Network was convened in April 2020 and operated entirely virtually, through the use of cloud technology. At the time of this study, the network consisted of representatives from more than 100 public, private, and nonprofit organizations across the state of Virginia. Using publicly available data and organizational network analysis, I found that the virtual nature of the network's engagement allowed for broad and diverse participation that facilitated both verbal and written communication between organizations. I also found that organizational participation varied by mode of participation, with the majority of interorganizational exchanges occurring through the chat feature. This finding suggests that either participants felt more comfortable firing off a quick

written note to an individual or the group at large, or they felt less barriers to participating via this format than to participating in the video format. Either way, it is likely that without this chat option, much of the rich engagement between jurisdictions would not likely have occurred.

These findings suggest a silver lining amid the COVID-19 pandemic: the potential for emergent mediums, such as cloud-based communication platforms, to facilitate emergent interorganizational network formation by reducing common barriers to participation for informal, emergent actors. The findings have implications for not only future disaster management networks, but also interorganizational networks as a whole in that the choice of alternative or differentiated ways of engaging might provide less-inclined organizations with an opportunity to participate with less transaction costs or network investment.

Implications

Previous scholarship on emergent collaboration in disasters emphasizes the predictability that some unofficial or informal actors will collectively engage in disaster management tasks, depending on the perceived unmet needs, and with or without government approval (Stallings & Quarantelli, 1985; Twigg & Mosel, 2017; Eikenberry et al., 2007). Despite the near guarantee of emergent collaboration, however, public managers have historically struggled to effectively anticipate and incorporate these novel interorganizational arrangements (Twigg & Mosel, 2017; Drabek & McEntire, 2003; Waugh & Streib, 2006). The findings from each of the manuscripts presented herein offer insight into ways of facilitating emergent collaboration in disasters.

In the first manuscript, I found that despite the absence of some of the four necessary preconditions for effective implementation of ICS, the Be Well Task Force still implemented several elements of ICS, suggesting the potential for partial implementation. I also found evidence for emergent interorganizational structures that served to leverage preexisting

community capacity in order to meet new task demands. Therefore, these findings suggest that effective use of ICS may occur under varying conditions, and may be facilitated or influenced by preexisting community capacity. Importantly, by adapting the ICS policy to meet the unique demands of a disaster situation and the impacted community, it may be possible for disaster managers to better accommodate new actors and facilitate emergent collaboration. If new, informal actors can still participate in the response without any previous background with the formal disaster management system, their resources and contributions may be better leveraged in acute crises.

In the second manuscript, we found that the Be Well Task Force consisted of a densely connected core connected to different groups of actors outside of the core, suggesting a core/periphery structure. Additionally, the task force relied on the role of organizational brokers located within the core group of participants to engage emergent actors outside of the core. These brokers took on different mediating roles, and utilized different processes for brokering between groups to help connect the formal disaster management players with novel organizations unaffiliated with disaster response in a way that allowed for efficient leveraging of resources. Importantly, the results from this study point to the potential for disaster managers to strategically engage organizations well positioned to act as brokers in order to connect with groups outside of the formal disaster management system but who may be useful or important to the response effort.

Finally, with regard to the third manuscript, I found that the virtual COVID Finance Network consisted of broad and diverse organizational participation, with groups engaging via the chat or video feature of Zoom outside of merely those jurisdictions that were considered to be geographically proximate. These findings suggest a silver lining amid the COVID-19 pandemic,

in that the use of virtual meeting software may have allowed for interorganizational engagement (and potentially even collaboration) outside of those organizations considered to be jurisdictionally proximate, going geographically further than a traditional Emergency Management Assistance Compact or mutual aid agreement. By offering different mediums for participation, the network facilitated widespread geographic and diverse organizational participation, including those organizations without formal disaster response missions. The findings from this third manuscript suggest the potential for virtual cloud technology to reduce barriers and transaction costs to participation and multiorganizational collaboration to a greater extent than previously understood. If public disaster managers embraced virtual meeting technology as a primary platform for interorganizational collaboration, it might enable the participation of groups not normally engaged in disaster response, such as social service-providing nonprofits or emergent voluntary groups.

The findings from these three manuscripts, therefore, suggest at least three different mechanisms for facilitating emergent collaboration in disaster management networks: policy adaptations, structural elements, and differentiated mediums of exchange. First, the predominant policy for managing multiorganizational disaster responses in the U.S. is the National Incident Management System. I found that in the case of the Be Well Task Force, task force leadership adapted this policy to adjust to the particular circumstances and community capacity that existed in the community of southwestern Virginia during the COVID-19 pandemic. By implementing only some elements of the policy (alongside emergent adaptations), the Be Well Task Force helped informal or emergent organizations engage with the task force to provide vital resources to the response. Second, the Be Well Task Force also utilized the structural elements of a densely connected core group of organizations and a less involved peripheral group, alongside different

types of organizational brokers located within the core. These structural elements facilitated engagement between groups formally involved in disaster management and groups that despite having no previous roles in disasters, had vital resources to provide during this disaster. Lastly, participants involved in the virtual COVID Finance Network had the option of participating through different mediums (via video or chat), depending on their personal preferences. These findings suggest a silver lining amid the COVID-19 pandemic: the potential for emergent mediums, such as online virtual software, to facilitate emergent interorganizational network formation by reducing barriers to participation for informal, emergent actors.

Historical disaster response experiences suggest that while it is impossible to predict the *who* (which groups or actors) will convene for *what* purpose (which disaster task might summon emergent actors), it might be possible for public administrators to consider the *how*, or the ways in which emergent actors might be better integrated into the formal disaster management system before a disaster strikes. As the types of organizations that fall under the category of "emergent" may differ widely (including for-profit, nonprofit, and/or other public entities that do not have a traditional role in disaster management but spontaneously participate in a response), it is possible that different groups might be better integrated into the formal disaster management system in different ways, and for different purposes. For example, during a disaster response, formal disaster managers recognize the need for a long-term collaboration with multiple emergent groups, they might choose to adapt disaster response policy in a such a way as to ensure the sustained participation of those groups without having to facilitate retroactive training on formal processes and procedures. This was the case with the Be Well Task Force, which consisted of a large number of informal or new-to-disaster-management organizations that were vital to the community's efforts in managing the pandemic over time. With such a large group of new

organizations, the Be Well Task Force only utilized the elements of ICS that involved the actors with previous training and disaster management experience, enabling the new organizations to participate in a crisis even though they lacked that previous experience.

In cases where only a short-term tie was necessary, the Be Well Task Force utilized a different strategy of relying on organizational brokers to engage short-term network participants. In these cases, it was arguably more efficient for one organization to act as the mediator between the core members of the task force and resources held by an organization outside of the task force than to envelope that novel organization into the day-to-day operations of the task force. Organizational brokers can utilize different strategies for brokering and can play different brokerage roles to tailor the tie mediation process to the nuances of the situation at hand.

Finally, the results of this dissertation suggest that there is a third alternative mechanism for facilitating emergent collaboration in disaster management networks. In situations where there is significant participation of emergent actors, like a novel pandemic, public officials charged with disaster management may also facilitate emergent collaboration by reducing the barriers to engagement through alternative mediums of participation. As was the case with the COVID Finance Network, the virtual nature of engagement provided different ways for actors unfamiliar with each other to engage in a manner that suited their individual needs. Emergent actors may find it easier to connect with the formal disaster management system if there are multiple ways of engaging that do not present high transaction costs that might act as barriers to entry. Thus, each manuscript presented herein suggests a different mechanism for engaging emergent actors and facilitating emergent collaboration in disaster management networks.

Positionality and Potential for Bias

As described in the introductory chapter, I position myself as someone with previous experience in professional disaster management activities and who, at the time this project occurred, was a resident of the geographical community that served as the research setting for two of the manuscripts in this dissertation. Personal experiences affect how individuals construct meaning, and researchers, no matter how objective they aspire to be, cannot stand outside of their previous experiences (Orr & Bennett, 2009). My personal experiences, therefore, shaped the analysis and findings from this project. In many ways, I identified with the subjects of my research and had pride in their successes in managing the pandemic in my local community. This positive orientation toward interviewees may have resulted in unintentional bias on their behalf in the analysis and findings. Throughout the dissertation process, I recognized this potential for bias and endeavored to continually reflect on the data I collected and subsequent findings to identify manifestations of partiality.

Limitations

Like all research projects, this dissertation had several limitations. The first two studies centered on a single network and relied on network data collected through in-person interviews. Rather than relying on observational data on interorganizational collaboration collected in real time, interviewees were asked to recall and evaluate their organization's relationships with other organizations in previous time periods. Studying disaster network dynamics over time is a recognized challenge in disaster management. We argue, however, that because the phases of the COVID-19 disaster management lifecycle as presented to respondents matched the task force's internal delineation between functional phases, it is likely that respondents were able to accurately distinguish relationships based on their experiences managing the pandemic in pre-

COVID, preparedness, response, and recovery phases. Thus, we have confidence that the data collected from interviewees was as accurate as possible given the fallibility of human memory.

A second limitation to this dissertation project was the limited data collected from the COVID Finance Network, the subject of the third manuscript. Because I collected the quantitative data in the early stages of the pandemic when the acute public health crisis was taxing public officials (between April and July of 2020), it was not feasible to schedule interviews with network participants to triangulate the findings of the quantitative analysis. Thus, I was unable to delve deeper into network participants' perceptions of the barriers to participation, how the COVID-19 pandemic might have compared with their previous disaster experience (if any), and whether their involvement in the network resulted in any new tie creations or lasting relationships. However, the COVID Finance Network study was meant to merely explore a novel interorganizational network operating in a nontraditional collaborative setting, and it was a first step in understanding the potential for virtual meeting platform technology to facilitate interorganizational and interjurisdictional collaboration in disasters.

Lastly, this dissertation project was subject to the same limitations of all case study research. The Be Well Task Force and COVID Finance Network are just two cases of emergent, multiorganizational networks that formed during the COVID-19 pandemic. As such, the findings presented herein are primarily exploratory and may be limited in generalizability outside of emergent COVID-19 management networks. However, exploratory case studies often provide valuable insight into a new concept, creating fodder for future studies (Yin, 2014), as discussed below.

Avenues for Future Research

The three manuscripts that make up this dissertation demonstrate three examples of the different ways in which public administrators might facilitate emergent collaboration, based on the particular circumstances involved in a disaster response. While these are likely not the only ways of facilitating emergent collaboration during disaster response, they do offer several paths forward for future research. One of the underlying themes that emerged to varying extent in each of these three manuscripts is the role that social capital played in facilitating interorganizational network arrangements. There is a long history of scholarship documenting the role that social capital plays in disasters, both at the individual and community levels (see, for example, Aldrich, 2019 and Dynes, 2005 respectively). One consensus within this body of work is that communities in which residents possess high levels of individual social capital are less likely to be severely affected by the negative impacts of disasters and additionally, they tend to bounce back faster after a disaster event (Aldrich & Meyer, 2015). Though the focus of this dissertation was not on the concept of social capital, future work might explore the way in which individual-level social capital between dyadic nodes serves to mobilize collective action between organizations. For example, there remains much we do not know about the processes and mechanisms that serve to elevate the social capital that exists between individuals to a group level. In the case of the Be Well Task Force, there were numerous documented instances of preexisting dyadic social capital among organizations prior to the COVID-19 pandemic. These connections helped mobilize members to participate and helped the task force acquire emergent resources, as was evidenced by the important role brokers played in the second manuscript. There was also evidence to suggest the network itself had social capital, as several members referred to the task force's perceived gravitas that they allege facilitated external resource

mobilization. Thus the question remains as to how social capital makes the jump between micro-level capital between individuals and macro-level between groups.

In addition, there is more to be unpacked about the relationship between social capital held between individuals and how individuals might leverage that capital on behalf of their organization. The third manuscript explored the important role that organizational brokers played in facilitating emergent collaboration and resource acquisition. While the quantitative social network analysis showed the organizations as the brokers, qualitative data suggest that the actual broker was often an individual within an organization, pointing to the question as to whether it is an individual or an organization that is best positioned to broker. Quite possibly, it is both, as organizations are made up of individuals, and it is those individuals and their actions that aggregate to constitute organizational behavior. Future research might explore this distinction, delving into the nuances of individual versus organizational brokers and the conditions under which each might be appropriate.

The results of this dissertation project also suggest the potential for more research to explore the influence of situational context in anticipating which mechanisms might work best under different scenarios. The COVID-19 pandemic was a novel public health disaster that had rippling effects throughout society (Alcantara-Ayala et al., 2021; Nicola et al., 2020). Future research should explore the ways in which emergent collaboration might differ in different disaster contexts. For instance, in a hurricane response, might some mechanisms facilitate emergent collaboration better, given the finite and short-term response phase? Or might the nature of the task dictate the best way to engage novel actors and leverage their resources? Moreover, could a single disaster management agency intentionally play different brokerage

roles or utilize different processes for brokering depending on the unique demands of the situation?

Additionally, future research should explore the potential for disaster managers to integrate these mechanisms of facilitation into disaster management planning efforts prior to a disaster event. For example, how might structural brokers be incorporated into disaster planning efforts such that they may be leveraged when disaster strikes to coordinate across novel participants? If the convergence of emergent groups and collaboration between formal and informal groups can be predicted, it may be possible for disaster managers to assess their community's particular capacity and circumstances and consider the best mechanisms for connecting with key community brokers under pre-disaster conditions. Building on this notion, it might also be possible for disaster managers to assess the shortcomings of previous community response efforts; for instance, by examining who was most adversely impacted or left out by the formal disaster management system. If disaster managers could anticipate vulnerabilities given their knowledge of the community and population, it may then be possible to create ties to those organizations best positioned to act as brokers, to ensure history is not repeated and important groups are engaged in the next crisis.

Conclusion

Though we can never predict where the next major disaster will strike or what type of hazard it might involve, we can predict that first, it will happen and second, it will bring emergent groups and collaboration to the response. As the results of this project suggest, by considering the ways in which this vital and inevitable emergent participation might be better integrated during a disaster, it might be possible to better leverage critical resources under conditions of urgency. The frequency and magnitude of disasters is only predicted to increase

across the world in the future (UNDRR, 2022). Therefore, it is essential for public administrators to identify and incorporate mechanisms for engaging novel or emergent actors into disaster response, as lives may literally depend on their efforts.

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Appendix A. Task force members and associated organizational domain, bounded in the network

	Task Force Members	Respondent ID	Org. Domain
1	Law Enforcement Group 1	LEO1	Law Enforcement
2	Emergent Group 1	Emergent1	Emergent Group Created during Pandemic
3	Public Health Group 1	Health1	Public Health
4	University Group 1	University1	University
5	Local Government Group 1	LocalGov1	Local/County Government
6	Local Government Group 2	LocalGov2	Local/County Government
7	Public Health Group 2	Health2	Public Health
8	Local Government Group 3	LocalGov3	Local/County Government
9	Emergency Management Group 1	EM1	Emergency Management/Services
10	Local Government Group 4	LocalGov4	Local/County Government
11	Public School Group 1	School1	Public School District
12	University Group 1	University2	University
13	Public Health Group 3	Health3	Public Health
14	Nonprofit Service Provider 1	Nonprofit1	Nonprofit Service Provider
15	Local Government Group 5	LocalGov5	Local/County Government
16	Local Government Group 6	LocalGov6	Local/County Government
17	University Group 2	University2	University
18	Local Government Group 7	LocalGov7	Local/County Government
19	Emergency Management Group 2	EM2	Emergency Management/Services
20	Other Organization 1	Other1	Other
21	University Group 3	University4	University
22	Emergency Management Group 3	EM3	Emergency Management/Services
23	Public Health Group 4	Health4	Public Health
24	University Group 4	University5	University

Appendix B. Sample interview questions

Semi-Structured Interview Guide
(Task Force Members and Partners)

1. What organization do you work for (volunteer for)? What is your current job title?
2. Please briefly describe your current job duties and responsibilities.
3. What role, if any, does your organization usually play in disaster management? What about your organization's role in public health?
4. Please describe your organization's relationship to the New River Valley Public Health Task Force. What prompted you (and your organization) to join or partner with the Task Force?
5. Tell us about how the Task Force came together.
6. What kinds of relationships existed between the organizational members of the Task Force before the COVID-19 pandemic brought the Task Force together? Do you know if any of the members had a history of working closely with each other?
7. Describe the overall goals of the Task Force. Have they changed over time? How has the Task Force shifted priorities through the different phases of the pandemic?
8. How does the Task Force work? How do different organizations participate, and what is the structure of the group?
9. How does information flow between the Task Force and its partners? Which non-Task Force partners do you partner with?
10. Tell me about the leadership of the Task Force - who is in charge and why? How are decisions made? Has this process changed over time?
11. What words come to mind if you were asked to describe the structure of relationships between the Task Force members and partners?

12. Has your organization's role with the Task Force changed over time?
13. How has your organization's experience with the Task Force changed your organization's relationships with the other involved organizations? Do you think of any of the organizations differently now and if so, how and why?
14. How would you characterize the Task Force's cohesion as a group? Do you see any interagency friction?
15. Do you think there was anyone else who should have been on the Task Force or partner who wasn't? If so, why do you think they were not included?
16. In what ways do you feel the Task Force succeeded?
17. In what ways do you feel the Task Force could have improved? What are some of the major challenges the Task Force faced during this process?
18. *For Task Force members only.* When do you feel like the Task Force will wind down and why?
19. What do you see as the role for this group going forward? Could you see it getting together for a different purpose in the future?

Appendix C. Questionnaire Definitions Provided to Respondents

Phase	Description	Examples
Pre-Pandemic	Your organization coordinated or collaborated with another organization prior to the start of the COVID-19 pandemic, or before February 2020.	Examples: collaborative activities that occurred as part of the regular mission or tasks of your organization (unrelated to COVID-19) that were conducted prior to the pandemic.
Early COVID-19 Preparedness	Your organization coordinated or collaborated with another organization to carry out activities related to preparing or planning for the COVID-19 pandemic between February and April 2020.	Examples: assessing hospital capacity, acquiring Personal Protective Equipment (PPE) or other public health supplies, drafting public preparedness messaging.
Initial Response	Interactions among organizations for the purpose of directly responding to the acute COVID-19 public health management challenges between April 2020 and January 2021	Examples: acquiring or administering COVID-19 testing or testing sites, enforcing public health restrictions like social distancing and masking policies, treating COVID-19 patients, or secondary response tasks like supporting local business or school communities during lockdowns or outbreaks.
Recovery and Return	Organizations working together to help the community return to normal after January 2021, when COVID-19 vaccines became available.	Examples: coordinating or administering vaccines or vaccine clinics, creating or disseminating public messaging to support vaccine administration, and Delta variant-related treatment or prevention efforts.

Organizational Involvement Ratings

0 No working relationship during this phase

1 Low intensity involvement (not an especially important or frequent link) during this phase

2 Moderate intensity involvement (on-going interactions or a link that is very important to your organization) during this phase

3 High intensity involvement (on-going interactions or a link that is very important to your organization)

Appendix D. The 89 organizations/groups included in the network analysis, by category of participation

Organizations/Groups Included in Network Analysis			
Task Force Members (n = 24)	**Partners/Anticipated Actors (n = 27)**	**Nominated Groups (n = 37)**	**Uninvolved Orgs (n = 1)**
LEO1	Other2	Nonprofit3	Other11
Emergent1	Other3	EM7	
Health1	Health5	Other5	
University1	Emergent2	LEO8	
LocalGov1	LocalGov8	Nonprofit4	
LocalGov2	University	EM8	
Health2	Nonprofit2	EM9	
LocalGov3	LocalGov9	LEO9	
EM1	Other4	EM10	
LocalGov4	EM4	LEO10	
School1	LEO2	Other6	
University2	Health6	Other7	
Health3	LEO3	Emergent3	
Nonprofit1	EM5	Other8	
LocalGov5	Health7	Other9	
LocalGov6	LEO4	Other10	
University3	School2	University7	
LocalGov7	Health8	EM11	
EM2	LocalGov10	EM12	
Other1	LocalGov11	LEO11	
University4	LocalGov12	EM13	
EM3	LocalGov13	LocalGov15	
Health4	LocalGov14	EM14	
University5	LEO5	Health9	
	LEO6	LocalGov16	
	EM6	LocalGov17	
	LEO7	LocalGov18	
		LocalGov19	
		LocalGov20	
		LocalGov21	
		Nonprofit5	
		Nonprofit6	
		Other12	
		Nonprofit7	
		University8	

		EM15	
		Nonprofit8	

Appendix E. Gould and Fernandez (1989) measures by pandemic management phase by highest role score

Normalized Role Averaged by Phase				
	PreCovid	**Preparedness**	**Response**	**Recovery**
Other2	Coordinator	Representative	Representative	Liaison*
LEO1	Gatekeeper*	Gatekeeper*	Gatekeeper*	Gatekeeper*
Other3	n/a	n/a	n/a	n/a
Emergent1	Liaison*	Liaison*	Liaison*	Liaison*
Emergent2	n/a	n/a	n/a	n/a
Health1	n/a*	n/a*	n/a*	n/a*
Other1	Gatekeeper	Gatekeeper	Gatekeeper*	Gatekeeper*
Health5	Coordinator*	Coordinator*	Liaison	Coordinator
University1	n/a	n/a	Gatekeeper	Gatekeeper*
Nonprofit2	n/a	n/a	n/a	n/a
LocalGov1	n/a	n/a	n/a	n/a
University6	n/a	n/a	n/a*	n/a*
LocalGov2	Gatekeeper*	Representative*	Gatekeeper*	Gatekeeper*
Health2	Representative*	Representative*	Representative*	Representative*
LocalGov9	n/a	n/a	n/a	n/a
Other4	n/a	n/a	n/a	n/a
EM1	Gatekeeper*	n/a	Gatekeeper*	Gatekeeper*
LocalGov3	n/a	n/a	n/a	n/a
LocalGov4	n/a*	n/a*	n/a	n/a
EM4	n/a	n/a	n/a	n/a
School1	Liaison*	Liaison*	Liaison*	Liaison*
LEO2	n/a	n/a	n/a	n/a
Health6	Consultant	Liaison	Consultant	Consultant
LEO3	n/a	n/a	n/a	n/a
EM5	Representative*	Representative*	Representative*	Representative*
University2	Liaison*	Representative*	Liaison*	Liaison*
Health3	Representative*	Representative*	Representative*	Representative*
Nonprofit1	Gatekeeper*	Liaison*	Gatekeeper*	Gatekeeper*
Health8	n/a	n/a	n/a	n/a
LocalGov5	n/a	n/a	n/a	n/a
LocalGov6	n/a	n/a	n/a	n/a
University3	n/a*	n/a	n/a	n/a
LocalGov7	n/a*	n/a*	n/a*	n/a*
LocalGov13	n/a	n/a	n/a	n/a
LocalGov14	n/a	n/a	n/a	n/a
EM2	Coordinator*	Gatekeeper*	Coordinator*	Gatekeeper*

LEO5	n/a	n/a	n/a	n/a
LocalGov8	n/a	n/a	n/a	n/a
LocalGov10	n/a	n/a	n/a	n/a
LocalGov11	n/a	n/a	n/a	n/a
LocalGov12	n/a	n/a	n/a	n/a
EM3	Gatekeeper*	Gatekeeper*	Gatekeeper*	Gatekeeper*
LEO6	n/a	n/a	n/a	n/a
University5	Gatekeeper*	Gatekeeper*	Coordinator*	Coordinator*
EM6	n/a	n/a	n/a	n/a
LEO7	n/a	n/a	n/a	n/a
University4	Liaison*	Liaison*	Liaison*	Representative*
Other11	n/a*	n/a	n/a	n/a
Health7	n/a	n/a	n/a	n/a
LEO4	n/a	n/a	n/a	n/a
School2	n/a	n/a	n/a	n/a
EM15	n/a	n/a	n/a	n/a
University8	n/a	n/a	n/a	n/a
EM8	n/a	n/a	n/a	n/a
EM11	n/a	n/a	n/a	n/a
EM13	n/a	n/a	n/a	n/a
EM14	n/a	n/a	n/a	n/a
Nonprofit4	n/a	n/a	n/a	n/a
Nonprofit7	n/a	n/a	n/a	n/a
Nonprofit6	n/a	n/a	n/a	n/a
Emergent3	n/a	n/a	n/a	n/a
Health4	n/a*	n/a*	n/a*	n/a*
EM7	n/a	n/a	n/a	n/a
Other7	n/a	n/a	n/a	n/a
LEO8	n/a	n/a	n/a	n/a
LEO10	n/a	n/a	n/a	n/a
LEO11	n/a	n/a	n/a	n/a
LEO9	n/a	n/a	n/a	n/a
Nonprofit3	n/a	n/a	n/a	n/a
Nonprofit8	n/a	n/a	n/a	n/a
Other5	n/a	n/a	n/a	n/a
Other9	n/a	n/a	n/a	n/a
Other8	n/a	n/a	n/a	n/a
Other10	n/a	n/a	n/a	n/a
LocalGov19	n/a	n/a	n/a	n/a

LocalGov20	n/a	n/a	n/a	n/a
LocalGov18	n/a	n/a	n/a	n/a
LocalGov16	n/a	n/a	n/a	n/a
LocalGov21	n/a	n/a	n/a	n/a
LocalGov17	n/a	n/a	n/a	n/a
Other6	n/a	n/a	n/a	n/a
Other12	n/a	n/a	n/a	n/a
LocalGov15	n/a	n/a	n/a	n/a
EM10	n/a	n/a	n/a	n/a
EM12	n/a	n/a	n/a	n/a
EM9	n/a	n/a	n/a	n/a
Nonprofit5	n/a	n/a	n/a	n/a
Health9	n/a	n/a	n/a	n/a
University7	n/a	n/a	n/a	n/a

* Indicates a member of the core during that phase, as calculated by the core/periphery measure in UCINet

Appendix F. Coding Instrument

COVID Local Government Finance Network Coding Scheme			
Code	**Title**	**Description**	**Example**
1	General Information Sharing	Participant shares general information with either another individual participant or the group at large.	"We don't have large businesses, so the predominant part of the city's businesses are all small retail, restaurants, service and then a lot of sole proprietors." (Participant 20, Video File 1)
2	Advice Seeking	Participant requests advice from either an individual participant or the group at large.	"Is anyone using CARES funding for ambulance and other public safety capital purchases?" (Participant 73, Chat File 3)
3	Advice Provision/Response	Participant provides advice or a response to either an individual participant or the group at large.	"I'd say yes if they are allowed for CARES." (Participant 91, Chat File 2)
6	Facilitation	General code for facilitating meetings, including introducing speakers and moving along the agenda.	"Please mute your mics as you arrive in the webinar." (Participant 100, Chat File 2).
7	Greeting	Participant greets another participant or the group at large.	"Good morning, everyone." (Participant 101, Video File 2).
8	Expressing Gratitude	Participant thanks an individual participant or the group at large.	"Thanks everyone - very helpful." (Participant 1, Chat File 3).
12	Request for Resource Sharing	Participant requests that another participant share a resource, such as a document or a link.	"Cindy, would you provide your criteria for water account assistance? We'd like to consider something similar." (Participant 82, Chat File 3).
13	Offer for Resource Sharing	Participant offers to provide or provides a resource to either an individual participant or the group at large.	"Yes, Leslie, I posted the link on the chat." (Participant 100, Chat File 2).