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Learning before and during the COVID-19 outbreak: A comparative analysis of crisis learning in South Korea and the US

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Learning before and during the COVID-19 outbreak: a comparative analysis of crisis learning in South Korea and the US

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ABSTRACT

Learning is imperative in government responses to crises like the COVID-19 pandemic. This study examines the South Korean and United States governments' responses to COVID-19 from a comparative perspective. The analysis focuses on crisis learning conducted before and during the COVID-19 outbreak, using the conceptual categories of intercrisis/intracrisis learning and single-/double-loop learning. The findings suggest that double-loop, intercrisis learning allows for more effective crisis management by (re)developing a common operating framework. The efficacy of learning is enhanced when double-loop learning is followed by single-loop learning that embeds new structures and operational procedures. The findings also suggest that intercrisis learning facilitates intracrisis learning and that political support is critical for inducing crisis learning. The paper concludes with theoretical and practical implications for crisis learning.

Introduction

The novel coronavirus disease 2019 (COVID-19) emerged in December 2019 in China and quickly spread across the globe. With its high transmissibility and unique clinical features, COVID-19 has presented an unprecedented challenge. As of mid-August 2020, over twenty million people have been infected with the disease, with nearly eight hundred thousand deaths. Governments across the world have developed their own strategies to respond to the public health crisis, yet to this point, no clear, conceivable path for controlling the COVID-19 pandemic has emerged. The related policy challenges are multifaceted and entangled, and the disease context constantly evolves as incidents such as mass-cluster-infections and social distancing violations continue to occur. In this sense, the COVID-19 outbreak has required critical learning and adaptation in governmental responses (Dunlop et al., 2020; Lee et al., 2020).

Crisis learning refers to 'the collective identification and embedding of practices and behaviors that improve crisis response' (Moynihan, 2009, p. 189). It may enable policy actors and stakeholders to reflect on past experiences, redesign their work structures and

processes, and update existing norms and assumptions (Boin & 'T Hart, 2003; Comfort, 1988). Crisis learning involves both learning from the past crisis responses (intercrisis learning) and learning during the present crisis (intracrisis learning). Research has suggested that both types of crisis learning are critical for enhancing the state's capacity to manage crisis situations and to take adaptive actions in the face of ever-changing situations (Moynihan, 2008, 2009). Still largely missing from the literature, however, is a clear understanding of what determines the efficacy of crisis learning and how it varies across different contexts (Carley & Harrald, 1997; Dunlop & Radaelli, 2020).

This study analyzes crisis learning conducted before and during the COVID-19 outbreak in South Korea and the US. The two countries provide an appropriate context to comparatively explore crisis learning. Both countries have developed their own public health system for pandemics based on prior experiences with infectious disease outbreaks; the H1N1 pandemic affected both countries in 2009, while South Korea confronted the 2015 MERS-CoV outbreak and the US experienced Ebola in 2014. Furthermore, both countries were considered to have a robust state capacity to prevent and mitigate infectious diseases prior to the COVID pandemic (Cameron et al., 2019). When the COVID-19 arrived, the first confirmed case was found on the same day in the two countries. Despite these similarities, however, the two countries have adopted different national pandemic responses, and their performances have also diverged. While South Korea has flattened the infectious curve in the initial stage and implemented swift, decisive measures, the US response was delayed and lacked coordinated planning, failing to control the outbreak.

Comparative analysis of learning has the potential to explain the causal mechanisms in a learning process and provide transferrable policy design implications (Bennett & Howlett, 1992; Dunlop & Radaelli, 2020). By taking a comparative perspective, this study aims to explain the two countries' distinct approaches to the COVID-19 with a focus on crisis learning. Specifically, we identify different types of learning in the two cases and explore what drives the efficacy of learning that is critical for effective crisis management.

This paper begins by reviewing the literature on crisis learning, specifically the conceptual categories of intercrisis/intracrisis learning and single-/double-loop learning. Next, we present our cases and describe the data collection and analysis methods. In the findings, we examine crisis learning in the South Korean and the US governments' responses to COVID-19. The study concludes with theoretical connections to the crisis management literature and implications for managing potential additional waves of COVID-19 and a future public health crisis.

Theoretical background

The challenges of crisis learning

Organizational learning, in general, aims to identify and correct mismatches between expectations and outcomes (Argyris & Schon, 1996). However, it is often regarded as incomplete (Etheredge, 1985; Simon, 1991). Learners have limited capacity to assess all aspects of problem situations or collect and process all the relevant emerging information (Simon, 1991). Information from problem situations may overwhelm learners' cognitive capacity or behavioral capabilities.

Learning is even more incomplete in crises than in routine situations. The nature of crises, such as uncertainty, high consequentiality, and ambiguity, creates multiple barriers to learning (Dekker & Hansén, 2004). During crises, clear equations for causes, learning, interventions, and consequences are often absent. Multifaceted problems are either embedded in or emerged from the situations, generating too complex information and demands to process quickly. It is important to note, furthermore, that the locus of learning is not exclusive to governments. Diverse stakeholders' interests and actions either overlap or clash in crises given the multifaceted nature of problems and issues. Conflicting interests often bring tensions, which further inhibits the evaluation and sense-making of the situations (Weick, 2012). Situations evolve constantly, often resulting in unprecedented consequences from a simple intervention based on trial and error. This high consequentiality of crises makes experiential learning extremely costly (La Porte & Consolini, 1991)

In addition, crises often accompany urgency with diminishing certainty, which further limits learners' bounded rationality. Given the uncertainty, plans and heuristics built based on past trials and errors may not be relevant to current situations (Moynihan, 2009), and decisions and actions based on past experiences can misguide contemporary efforts (Boin et al., 2005). Furthermore, crises may open up blame games that often encourage decision-makers or responders' defensiveness or resistance to learning (Comfort et al., 2019). Confronting potential blames, they may take inflexible approaches to new threats and focus only on rationalizing their actions rather than correcting mistakes or errors and identifying useful lessons (Argyris & Schon, 1996; Boin & 'T Hart, 2003). Crises may also turn into credit games that provoke opportunistic behaviors, which can distract responders from fixing the gaps between expectations and outcomes in crisis responses (Moynihan, 2008).

Despite these challenges, crises also provide numerous learning opportunities (Birkland, 2009; Jasanoff, 1990; Moynihan, 2008; Stern, 1997). The complex situations that arise may evoke greater accountability among decision-makers and responders, prompting them to respond more effectively (Tetlock, 1992). The catalytic events also draw public and political attention to the crisis (Yeo & Knox, 2019), leading to distributed cognition (Lee et al., 2020) and better leveraging of political power, which can spur necessary policy and structural changes (Boin et al., 2005; Sulitzeanu-Kenan, 2010).

Crisis learning: intercrisis and intracrisis learning

Crisis learning is imperative for improving crisis management performance (Moynihan, 2009). Through crisis learning, decision-makers and responders can 'reflect upon actions taken, retain the procedures that proved effective, and discard those that were not' (Comfort, 1988, p. 5). Crisis learning fosters informed choices and timely commitment to action, which may improve responses to current and upcoming incidents (Hillyard, 2000; Moynihan, 2009).

Researchers often categorize crisis learning as intercrisis learning and intracrisis learning based on differences in the time frame (Boin et al., 2005; Moynihan, 2008, 2009). Intercrisis learning refers to learning from past crisis experiences and drawing lessons to be prepared for future incidents. Intracrisis learning is the learning that occurs during a crisis, including assessments of current performance and efforts to improve

responses to the current incident. Often, intercrisis learning receives more attention from scholars than intracrisis learning since learning is a naturally retrospective process that requires an adequate amount of time to identify problems and make necessary changes (Jasanoff, 1990; Moynihan, 2008, 2009). Yet, studies have reported that either improvised or contingent learning emerges in the context of an ongoing crisis (Kamkhaji & Radaelli, 2017; Moynihan, 2008, 2009).

Despite the distinctiveness, we treat intercrisis and intracrisis learning as part of a continuum in the learning process. Lessons from the past guides responders to make sense of the situation, anticipate some uncertainties, and deal with emerging pressures (Comfort, 1989). In addition, outcomes from intercrisis learning, such as updated versions of incident command systems, can add clarity to role expectations and allow responders to adapt their behaviors to emerging needs during the acute phase on an ongoing crisis (Moynihan, 2008, 2009).

We approach such learning between and during crises as collective processes. While individuals are playing important parts between and during crises, a crisis response system operates as collective action among diverse actors across sectors and jurisdictions (Yeo & Comfort, 2017). Diverse organizations and their networks, bringing knowledge and skills embedded in each organization, exchange information, and act collectively and adaptively when responding to a crisis (Brass et al., 2004; Yeo, 2020). In addition, lessons from past crisis experiences are stored in the institutional memory of organizations and their networks, which can add support to future crisis responses despite attritions or changes in the members within the organizations or the networks (Moynihan, 2008).

What drives the efficacy of crisis learning?

Learning outcomes emerge in varying domains. Crisis learning may facilitate planning, such as the development of standard operational procedures, which prepares collective actors and guides their responses to future incidents. It may lead to revisions of assumptions, culture, norms, rules, and policies, which can support decision-making capacities and problem-solving capabilities of collective learners in the face of crisis. Crisis learning can also influence some structural changes, such as the emergence of effective communication structures. Furthermore, crisis learning encourages collective learners' understanding of shared responsibilities and sense-making of crisis situations. Results of crisis learning may appear as multiple training opportunities that aim to enhance response skills and technologies, in addition to advancing crisis learning per se.

The learning outcomes produce different impacts for subsequent crises, and their efficacy varies across situations and contexts (Carley & Harrald, 1997; Dunlop & Radaelli, 2020); however, few studies explore what makes the difference. Importantly, the organizational learning literature offers learning types that can serve as a useful tool to examine if and how the efficacy of crisis learning results may vary depending on the fitness between types of learning and characteristics of crises. That literature treats learning as an iterative process that includes single-loop and double-loop learning (Argyris & Schon, 1996). Single-loop learning is a simple and instrumental process (Argyris & Schon, 1996). It focuses on reinforcing stimuli that help to follow theories-in-use, such as missions, rules, plans, policies or protocols. Double-loop learning is a more reflective process that involves questioning the legitimacy of existing theories-in-use. It focuses on assessing

and updating the values and assumptions underlying extant policies in light of new situations and seeking new solutions if necessary.

During the routine or reoccurring crises, such as seasonal floods, storms, or forest fires, the efficacy of single-loop learning is high (Bigley & Roberts, 2001). Standard protocols built based on past experiences help responders' timely decision-making and rapid responses to the situation. However, crises are often unexpected, generating non-routine situations. In addition, known crises may be coupled with many other factors resulting in unprecedented damages (Yeo & Comfort, 2017). Given the potential dis-juncture between theories-in-use and emerging situations, the efficacy of single-loop learning is often very limited (Moynihan, 2008). Plans and protocols may create cognitive prisons or blind spots that may become constraints to effective responses to emerging threats (Brandstrom et al., 2004). In such non-routine situations, the efficacy of double-loop learning is much higher. However, Moynihan (2009) suggests that double-loop learning during a crisis is likely to be rare. Existing methods and processes need to be unlearned (Comfort, 1988), while proactive searching for new methods that fit the emerging situations needs to be encouraged.

Building on the existing literature, we examine crisis learning in the South Korean and US governments' responses to the COVID-19 outbreak. Using the conceptual categories of intercrisis/intracrisis learning and single-/double-loop learning, we focus on the following questions: (1) what type of learning has emerged in the governmental responses to COVID-19 in South Korea and the US?, and (2) what drives the efficacy of crisis learning, which is critical for effective crisis management?

Methods

While governments at different levels have responded to the crisis, this comparative analysis focuses on the national/federal-level response to COVID-19 in South Korea and the US. The two cases were selected for several reasons. First, both countries had experienced infectious disease outbreaks before COVID-19. They both experienced the H1N1 pandemic in 2009, and more recently, South Korea faced MERS-CoV in 2015 and the US experienced cases of Ebola in 2014. The literature suggests that past crises allow policy actors to engage in sensemaking, to frame the problem, and to develop possible trajectories of action for future crises (Moynihan, 2008, 2009). We assume that the experience of prior public health crises would have provided both countries with learning opportunities to prepare for future pandemics. Secondly, the two countries ranked high on the Global Health Security (GHS) index published in October 2019.[1] The GHS index, developed by the Johns Hopkins Center for Health Security and the Nuclear Threat Initiative, is an assessment of a state's capacity to prevent and mitigate epidemics and pandemics across 195 countries. The US ranked first and South Korea ranked ninth on the average overall score. Thirdly, despite their similarities in terms of public health crisis preparedness and prior experience with health crises, South Korea and the US diverged significantly in their performance during the COVID-19 pandemic: South Korea has emerged as a notable example to emulate for other countries, while the US federal government's failure has been widely criticized (Normile, 2020; Solinas-Saunders, 2020; Tulenko & Vervoort, 2020). These similarities and differences between the two countries, allowing for a Most Similar Systems Design (MSSD; Anckar, 2008), provide

Table 1. Basic characteristics of cases.

	South Korea	United States
First COVID-19 case confirmed	20 January 2020	
National emergency declared	23 February 2020*	13 March 2020
Past infectious disease outbreaks	2015 MERS-CoV	2014 Ebola
	2009 H1N1	2009 H1N1
	2003 SARS	
Timeframe of intercrisis analyzed in this study	December 2015	December 2014
	– December 2019	– December 2019
Timeframe of intracrisis analyzed in this study	January – July 2020	

* The highest infectious disease alert level in South Korea

an opportunity to explore crisis learning before and during the COVID-19 pandemic across contexts and to make theoretical contributions.

In both South Korea and the US, the first COVID-19 case was confirmed on the same day, 20 January 2020. In this study, we focus on the first 6 months of the COVID-19 outbreak to explore intracrisis learning, based on the availability of relevant data. For intercrisis learning, we pay attention to the most recent infectious disease outbreak in the two countries: Middle East respiratory syndrome-coronavirus (MERS-CoV) in South Korea and Ebola in the US. Although the two diseases differ in their scale, transmissibility, and clinical features, we assume that those outbreaks significantly influenced the governmental infectious disease response system prior to COVID-19. We recognize that the impact of prior crises is cumulative in the sense that crisis management is built on the accumulation of experiences of multiple policy actors. For the purpose of this study, however, we focus on the subsequent crisis that affected both countries. Specifically, we examine what happened between the prior infectious disease outbreak chosen and COVID-19 to analyze intercrisis learning (Table 1).

We conducted a systematic content analysis and documentation review of government situation reports, official briefings, relevant legislation, and news articles. We collected multiple sources of secondary data using a keyword search of online databases, news media platforms, and agency websites. For example, we included internal and external review reports (e.g., government white papers, WHO review reports) and CDC guidelines published before and during COVID-19 in the analysis.

Coding represented the main analytical tool. We coded data using the categories of learning described earlier (intercrisis/intracrisis and single-/double-loop learning) but remained open to new, grounded codes (Strauss & Corbin, 1998). Based on the codes and recurring themes, we compared the responses of South Korea and the US drawing on the existing literature on crisis learning. The data illustrates many policy changes before and during COVID-19 in both countries, but we focus exclusively on the primary changes at the national level. The findings are described in the next section.

Findings: a comparison of South Korea and the United States

Crisis learning in South Korea

Learning from MERS-CoV

South Korea experienced an outbreak of MERS-CoV in 2015. After the first case of a traveler returning from the Arabian Peninsula was confirmed on May 11, the

coronavirus spread quickly. It infected 186 patients, resulting in 38 deaths, over a seven-month period, representing the largest outbreak of MERS-Cov outside of the Middle East. The Korean government's response to the disease was recognized as a failed response, primarily due to its failure to contain the pathogen in the initial stage (Chang, 2017; Ki, 2015; Y. Kim et al., 2020). Critical problems related to testing, patient isolation, quarantining, contact tracing, risk communication, and coordination were found (The Ministry of Health and Welfare (MOHW), 2016). Simply put, the MERS-CoV outbreak starkly revealed the cracks in the Korean public health crisis management system. Political pressure, media attention, and a public outcry prompted a set of learning opportunities and led government organizations to engage in both internal and external evaluations (Lee et al., 2020). The evaluations produced recommendations for the revision of relevant laws, changes to standard operating procedures (SOPs), and updates to policy actors' norms and cultures, to name a few.

One of the main learning outcomes was the reestablishment of an Incident Command System (ICS) for an infectious disease crisis. During the MERS-CoV response, confusion around the ICS was pronounced, especially in terms of which agency would direct and coordinate multiple organizations' efforts to manage a crisis (Y. Kim et al., 2020). The refined idea was to give more authority to the Korea Centers for Disease Control and Prevention (KCDC) and to introduce a unified command and centralized governance structure to guide government organizations across departments and from different levels of government. The KCDC was promoted to a vice-ministerial level agency and the Standard Manuals for Crisis Management were revised to specify the ICS at each crisis alert level (Level Blue, Yellow, Orange, Red).

The creation of a new unified command system can be described as double-loop learning where actors challenged their theory-in-use and changed the assumptions that underpinned the existing response system. For example, there might have been assumptions that infectious diseases could be managed by a loosely affiliated network of government organizations and that the KCDC could not be an Incident Commander to direct multiple organizations across the government due to its hierarchical level in the bureaucracy. To embed the new norms and practices developed from the failed response to MERS-CoV, the government specified detailed procedures and actions to be taken by each government organization at each crisis alert level. Using the updated manuals, government organizations conducted multiple training sessions and simulation drills. It is notable that the most recent simulation drill before COVID-19, conducted on 17 December 2019, used a scenario of an infectious disease associated with unknown pneumonia, without knowing of the emerging COVID-19 threat. Based on the feedback from those learning forums, the manuals were revised annually. This illustrates that double-loop learning was followed by single-loop learning so that the learning outcomes could be fully integrated to the system.

Another painful lesson from the MERS-CoV experience was that testing and contact tracing in the initial stage are critical for effective virus containment. This was made clear both in the internal reviews conducted by the The Ministry of Health and Welfare (MOHW) (2016) and in an external evaluation by the World Health Organization (WHO, 2017). The Korean government thus revised the Infectious Disease Control and Prevention Act to provide legal grounds for thorough contract tracing and

quarantine. Specifically, the law requires central and local governments to increase staffing in the epidemiological investigation and to conduct training for them. In addition, the government introduced Emergency Use Authorization (EUA) to speed up the approval process of medical products, such as a diagnostic tool for infectious disease, in March 2017 (Hur & Kim, 2020). This was the result of reflection on the prior crisis and health authorities' learning from other countries like the US and Europe.

Many other learning outcomes were accommodated in the infectious disease response system. The KCDC launched a risk assessment system in 2016 to recognize and systematically evaluate the risk of an emerging infectious disease. It established the Emergency Operation Center to collect real-time disease information, which turned out to play a critical role in the response to COVID-19. Collaborations between public and private organizations and across different levels of government were further strengthened based on structural and cultural changes (e.g., the establishment of the Public-Private Alliance on Infectious Disease Testing in 2017; empowering private professionals in policy-making, enhancing the role of local governments).

The South Korean case of intercrisis learning illustrates that policy actors not just tinkered with their practices, but reflected on the actions taken in response to MERS-CoV, identified root causes of the problems, and engaged in thorough double-loop learning. Double-loop learning preceded single-loop learning, and the updated structures and practices from double-loop learning were embedded through single-loop learning, which together impacted learning during COVID-19.

Learning during COVID-19
In response to COVID-19, South Korea took swift and decisive actions, drawing on the learning outcomes from the 2015 MERS-CoV. The KCDC's risk assessment system developed after MERS-CoV allowed for early cognition of the emerging risk of the disease. On 3 January 2020, the infectious disease alert level BLUE (Level I) was announced and the official infectious disease response system was activated. The Standards Manuals have guided government organizations' actions and the KCDC led the national response. Contact tracing, combined with widespread testing and solid isolation, was effective in containing the virus.

The role of the KCDC as an incident commander was evident. The KCDC facilitated the timely approval of testing kits using the EUA process and collaborated with private firms to build a massive testing capacity (M-H. Kim et al. 2020). This allowed for a testing capacity of 15,000 tests per day in the early stage (The Korean Centers for Disease Control, 2020). It conducted rigorous contact tracing and made the patients' movement data public in their daily briefings. Its open and transparent risk communication helped to mitigate the fear and anxiety of citizens and build trust in government's capacity for managing the crisis (Moon, 2020). This set of actions in the early phase was informed by the lesson learned from the prior crisis that early detection based on widespread testing and epidemiological investigation is critical to contain the pathogen.

While the Korean government's response to COVID-19 has relied heavily on the learning outcomes from MERS-CoV, diverse policy actors continued to engage in learning and adaptation during the crisis. Regular Central Disaster and Safety Countermeasures Headquarters (CDSCH) meetings, presided over by the prime

minister, served as one of the main learning forums where government officials and stakeholders received updates and made policy decisions. Public health authorities have modified the standard operating procedures multiple times, incorporating recent data and newly identified features of the virus. The manuals specify detailed guidelines and instructions for diverse actors, including central/local governments and hospitals. The Infectious Disease Control and Prevention Act was revised in March, 2020 to strengthen government actions proven to be effective for containing the virus. For example, the revised law specifies penalties for suspicious patients who refuse to get a diagnostic test and to be treated. In addition, after experiencing several surges of infections with unknown sources, the government introduced a Quick Response code system to conduct a rigorous epidemiological investigation. These policy changes during the crisis represent a form of single-loop learning that leads to modification of and improvements in the existing response system.

Yet, the underlying assumptions and strategies of the government response system have been challenged with several unexpected mass-cluster-infections. In addition, the virus's distinctive features, including its high transmission rate and asymptotic infection, required new approaches to tackle the infectious disease. These factors have cast doubt on the efficacy of previous assumptions upon which policy actors and stakeholders have relied, encouraging a process of double-loop learning. For example, in response to the shortage of face masks and panic buying, the South Korean government intervened in production and distribution of masks (Kim, 2020). Other examples of double-loop learning during the crisis include the implementation of social distancing and facial mask wearing.

Crisis learning in the US

Learning from Ebola

The West African Ebola virus epidemic in 2014 presented a global public health risk. On 8 August 2014, the WHO declared the outbreak a Public Health Emergency of International Concern (PHEIC). The first case of the Ebola virus disease (EVD) in the US was confirmed on 30 September 2014. The patient from Liberia, the country hardest hit by Ebola, was tested and treated in Dallas, Texas. During treatment, two nurses treating the first Ebola patient were infected. An additional case of Ebola associated with a physician who had treated Ebola patients in West Africa and returned to New York was diagnosed in October. Hundreds of suspected cases were identified and tested. A total four cases of Ebola were reported, with seven additional cases evacuated from other countries. While the scale of the outbreak in the US was relatively small, its impact was considerable. The outbreak resulted in political debates over and intense media attention regarding the government's response. The high fatality rate of around 50% caused a public fear of contagion, aggravated by misinformation and a lack of scientific evidence.

The Ebola outbreak raised concerns about national public health preparedness, including the issues of misdiagnosis, border control, entry and exit rights of the people infected with the disease, and mandatory quarantine, to name a few (Gostin et al., 2014; Hageman et al., 2016). In particular, the delayed treatment of the first EVD patient and disease transmission in the hospital revealed a lack of guidelines and training for healthcare workers (Le et al., 2018). Based on the experience of Ebola, the Centers for

Disease Control and Prevention (CDC) revised its guidelines for frontline healthcare facilities and Ebola assessment/treatment hospitals. For example, the guidelines on personal protective equipment (PPE) were updated to add extensive and detailed instructions for full coverage gear required for healthcare workers. The WHO and CDC together published guidelines for implementation and management of contact tracing for Ebola virus disease in 2015 (World Health Organization (WHO), 2015). Training courses and resources were provided for healthcare workers for both working in the US health care facilities and traveling to and from West Africa (Hageman et al., 2016). In July 2015, the National Ebola Training and Education Center was established based on the collaboration between the CDC and the Department of Health and Human Services office of the Assistant Secretary for Preparedness and Response. The center, transitioned to the National Emerging Special Pathogens Training and Education Center in April 2020, aims to improve the national public health capability in managing special pathogens.

The US government continued to put its efforts into pandemic preparedness by implementing border and travel measures and strengthening surveillance and detection capacity. President Obama created a pandemic response team in the National Security Council in 2016 and expanded the role of the CDC. The CDC's activities to prevent the spread of EVD were not limited to the domestic context; the center also deployed staff and established offices in Guinea, Liberia, and Sierra Leone to support the incident management systems in those countries (Centers for Disease Control and Prevention (CDC), 2016). It worked closely with the affected countries' health authorities and international partners to prevent the international spread of Ebola. Training sessions and risk communication guidelines were also provided to healthcare workers in affected countries in West Africa (Dahl et al., 2016). The experiences of the EVD outbreak in different contexts were thus stored in the institutional memory of the organization, providing opportunities to better prepare for future disease outbreaks.

However, the trajectory of preparedness for pandemics was reversed with the Trump administration. In January 2017, the joint Obama-Trump transition teams conducted an exercise for public health crisis management using a series of pandemic scenarios to help the incoming team understand the response structures and policies (Goodman & Schulkin, 2020). Despite the knowledge transfer efforts, however, the Trump administration downgraded the importance of pandemic preparedness. The CDC budget has been cut continually (e.g., the CDC global disease outbreak prevention budget was cut by 80%), and consequently many positions were removed (Tulenko & Vervoort, 2020). This pattern represents a loss of organizational knowledge and experiences. In addition, the National Security Council removed the top official position responsible for pandemic response and disbanded the Directorate for Global Health Security and Biodefense unit in May 2018 (Rutledge, 2020). These changes resulted in ignorance and denial of the emerging risks of COVID-19.

Learning during COVID-19

The initial response by the US government to COVID-19 was marked by a lack of cognition of the infectious disease risk. Since the first case was confirmed on January 20, it took almost two months for the federal government to acknowledge the risk of COVID-19 and implement decisive measures. Despite the increasing number of

infections, President Trump downplayed the threat of the disease in January and February, stating that the coronavirus is 'under control' (Goodman & Schulkin, 2020). A national emergency was finally declared on March 13. During this delay in the national response, the virus spread through the cracks in the public health system. There were existing guidelines and practices for airport screening, contact tracing, and quarantine, which were developed or revised after the Ebola outbreak, but they were discarded or not utilized during the initial stage.

Testing capacity was one of the critical problems that produced cumulative effects on the response failure. The CDC declined to use the WHO COVID-19 test and attempted to develop its own test. However, a manufacturing defect in the CDC's testing kit was found and the test kits were recalled in late February, causing a long lag in meeting the growing testing demands. The rigid FDA rules prohibiting private labs from developing their own diagnosis kits further complicated the situation. This 'all eggs in one basket' approach illustrates that learning and adaptation were missing in the government's response (Tulenko & Vervoort, 2020). The shortage of personal protective equipment (PPE) and ventilators required federal-level action, with the rising infections in March. But the federal government's response was delayed in using presidential authorities to expand the medical equipment supply. The CDC guidelines on PPE were updated, but they were only a stopgap; a full plan to address the shortage didn't emerge.

The federal government's response during the acute phase of the COVID-19 pandemic was disjointed and chaotic, primarily due to the absence of a coordinated national operating framework. The national response strategies developed in the Obama administration (e.g., NSC's pandemic playbook on tackling pandemics) were not adopted or replaced. Some argue that the CDC's pandemic planning approach is influenza-centric, not suited for COVID-19 (Kirlin, 2020). Others suggest that President Trump's hostility toward administrative expertise lowered civil servants' morale and led to mass departures in the executive branch (Rutledge, 2020), both of which are critical factors to successful crisis learning. Consequently, institutional learning outcomes from previous pandemics and other kinds of crises were discarded and not utilized. While new strategies for social distancing and facial mask wearing were developed in March 2020, the governmental responses proved to be too slow to reverse the infection curve.

Discussion

Our findings echo the existing literature indicating that the experience of a crisis leads to policy learning and that crisis learning is imperative for effective crisis management. Table 2 summarizes crisis learning before and during COIVD-19 in our cases. Both countries engaged in learning after their experience of the prior infectious disease outbreak (intercrisis learning) and during the present crisis (intracrisis learning): some of the learning represents a form of double-loop learning while other aspects illustrate single-loop learning. However, the scope and process of learning differ across the countries, which in turn has influenced the effectiveness of the governments' responses to COVID-19.

In South Korea, after the MERS-CoV outbreak, policy actors focused on structural changes, including the creation of ICS and revisions to relevant laws, in order to change their existing norms and practices and thus adjust to the new demands and challenges.

Table 2. Crisis learning before and during COVID-19 in South Korea and the US.

	South Korea		US	
	Intercrisis learning	Intracrisis learning	Intercrisis learning	Intracrisis learning
Double-loop learning	Creation of the ICS for each crisis alert level Revision of laws to conduct rigorous contract tracing and quarantine Adoption of EUA	Social distancing measures Facial mask wearing Mask distribution system	Establishment of CDC offices in West Africa and provision of assistance	Social distancing measures Facial mask wearing
Single-loop learning	Revision of SOPs Training and simulation drills Launch of an official risk assessment system Establishment of the Emergency Operation Center Strengthening partnerships with private experts and local governments	Revision of SOPs Revision of laws to strengthen contact tracing and quarantine measures	Revision of CDC guidelines Provision of training for healthcare workers Establishment of the National Ebola Training and Education Center Collaboration with international partners	Revision of CDC guidelines

This form of double-loop, intercrisis learning was followed by single-loop learning, through which the new structures and practices were fully embedded. This series of learning produced a coordinated national response framework during COVID-19. The intercrisis learning outcomes, in turn, led to single-loop, intracrisis learning: revision of SOPs and laws during COVID-19. The literature suggests that intracrisis learning is difficult, due to the sense of urgency and high consequentiality. But in the case of South Korea, intercrisis learning outcomes lifted the barriers of intracrisis learning and allowed for agile, adaptive responses (Na et al., forthcoming). The scale and recency of the similar crisis (MERS-CoV) triggered wide distribution of the risk cognition across the board and development of state's core capabilities for dealing with COVID-19 (Lee et al., 2020). The cyclical learning process in the South Korean case sheds light on the relationship between intercrisis and intracrisis learning and when each type of learning (single-loop or double-loop) is more likely to occur between or during crises.

The experience of Ebola in the US produced many instances of learning; however, most of them represent a form of single-loop learning. Intercrisis/double loop learning rarely took place in the US after Ebola outbreak because both government officials and the general public did not question the capacity of their existing response framework and contemplate on how it should be adapted to new challenges. This might be also because existing response strategies and practices were already in place, ready for future infectious diseases, and the cracks found in the response to Ebola required only minor revisions. However, the national pandemic response framework and other institutional learning outcomes were not utilized during COVID-19. Planning strategies and bureaucratic expertise were lost primarily due to political factors. The US case examined in this study suggests that political leadership and support are vital to induce crisis learning, particularly for intracrisis learning that is more difficult due to time and resource constraints.

Our findings shed light on important factors that facilitate or hinder crisis learning. Across the two cases, it appears that political and public attention, heightened accountability, political leadership and support, first-hand or vicarious experience, and distributed cognition lead to crisis learning (Heikkila & Gerlak, 2013; Lee et al., 2020; Moynihan, 2008; Stern, 1997). One notable factor in our cases is the data management system. In response to COVID-19, South Korea used its data-analytic state capability to collect and analyze a variety of information and made the information public (e.g., Corona map presenting patients' movement data, apps showing real-time numbers of available masks in drugstores). The data and knowledge shared across government departments and different sectors triggered a mutual understanding of the problems and led to crisis learning. Data-analytic capability, one of the capabilities for problem-oriented governance (Mayne et al., 2020), allowed for evidence-based decisions and explanation-based learning (Stern, 1997) in South Korea (Na et al., Forthcoming). In contrast, federal agencies in the US had trouble collecting data in terms of testing, infections, and healthcare facilities and thus failed to provide the information needed for learning (Kirlin, 2020; Tulenko & Vervoort, 2020). Collecting timely and accurate data is important for diagnosing a crisis situation and designing steps to manage the situation, which is critical particularly in response to unprecedented, complex policy problems.

Conclusion

This study examined the processes of crisis learning associated with government response to COVID-19 in South Korea and the United States. By identifying different types of learning that emerged before and during the COVID-19 outbreak, the study improves our understanding of what drives the efficacy of crisis learning. Our analysis suggests that the following is critical: the precedence of double-loop learning over single-loop learning, the fitness between types of learning and the characteristics of crisis, and the interaction between intercrisis and intracrisis learning.

Our study provides important implications for practice. The findings suggest that policy actors should reflect on the existing crisis response strategies and critically assess the need for change and adaptation for future crisis situations. Our analysis highlights the importance of creating and updating a common operating framework for diverse policy actors from different levels of government and across public, private, and nonprofit sectors. It can involve an uncomfortable process of questioning basic protocols, norms, and assumptions and unlearning them, which may engender resistance to learning. Public managers can create culture that supports learning by developing structural learning mechanisms (e.g., learning forums and data management systems) and by shaping mission, values, and symbols (Moynihan, 2008). Changes from prior crisis experiences should then be fully embedded into practices by training and simulation drills. Throughout the continuum of learning processes, diverse actors across the boundaries need to recognize the facilitators or obstacles to crisis learning, such as political support, partnerships, data sharing and analytics, and distributed cognition (Lee et al., 2020; Moynihan, 2008; Stern, 1997).

An important limitation of this study is that we focused only on some key instances of crisis learning, not measuring the level of learning and scope of learning outcomes

comprehensively. Other factors, not fully considered in this study, may have influenced the efficacy of learning in the cases, such as healthcare infrastructure and political systems. In particular, the US federalism and intergovernmental relationships during crises require further examination (see Bowling et al., 2020; Kettl, 2020). Further studies would be needed to systematically compare crisis learning over time across contexts (Dunlop & Radaelli, 2020) and to explore other types of learning during crisis, such as triple-loop and quadruple learning (Lee et al., 2020; Tosey et al., 2012). Diverse methodological approaches, including qualitative comparative analysis (QCA) or mixed methods – for example, using social network analysis, survey and interviews – will provide an opportunity to better explore complex crisis learning processes. We hope this study spurs future research to deepen our understanding of crisis learning.

Note

1. The Global Health Security index framework involves six assessment categories: 1) prevention of the emergence or release of pathogens; 2) early detection and reporting for epidemics of potential international concern; 3) rapid response to and mitigation of the spread of an epidemic; 4) a sufficient and robust health system to treat the sick and protect health workers; 5) commitments to improving national capacity, financing and adherence to norms; and 6) overall risk environment and country vulnerability to biological threats (For more information, see https://www.ghsindex.org/).

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