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Understanding public emergency preparedness before and during the coronavirus outbreak: implications for effective public health and risk communication.

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UNDERSTANDING PUBLIC EMERGENCY PREPAREDNESS BEFORE AND DURING THE CORONAVIRUS OUTBREAK: IMPLICATIONS FOR EFFECTIVE PUBLIC HEALTH AND RISK COMMUNICATION

By

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B.Sc., University for Development Studies, 2010
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DEDICATION

To

My beloved family

For constantly believing in me, supporting me financially,

mentally, and in prayers.

To

Every taxpayer in Ghana for their taxes which supported my

education through the GETFUND

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My first and immense appreciation goes to God, for his divine favor and blessings and for giving me the opportunity and guidance to achieve my goal.

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ABSTRACT

UNDERSTANDING PUBLIC EMERGENCY PREPAREDNESS BEFORE AND DURING THE CORONAVIRUS OUTBREAK: IMPLICATIONS FOR EFFECTIVE PUBLIC HEALTH AND RISK COMMUNICATION

Raphael A. Fumey

April 19, 2022

The COVID-19 pandemic has resulted in a dramatic loss of human lives globally and presents an unprecedented challenge to public health, the world of work, and our food systems. The social and economic disruption caused by the COVID-19 pandemic is devastating, putting several millions of people at risk of falling into extreme poverty, with over 500 million people being undernourished. It is evident from the data on COVID-19 cases, deaths, and hospitalizations that the United States is the worse hit country, which can be attributed to the lack of preparedness at the individual, environmental, and government levels. This study applied the Social Cognitive Theory to understand the factors that influenced the COVID-19 preparedness among United States residents. It tested the mediation effects of the primary constructs of the SCT (i.e., personal cognitive, environmental, and behavioral factors) on the effects of media activities and government policies/laws/mandates on COVID-19 preparedness among United States residents. A non-experimental cross-sectional quantitative research survey design was used to obtain data from 3383 study participants. A hierarchical regression

model and a parallel multiple mediation analysis were conducted in SPSS to analyze study data.

The study findings suggest that the primary constructs of the Social Cognitive Theory explained approximately 49% of the variance in COVID-19 preparedness among United States residents. Additional findings of the study confirmed that all three primary constructs of the Social Cognitive Theory (i.e., personal cognitive, environmental, and behavioral factors) significantly and positively mediated (influenced) the association between media activities and COVID-19 preparedness as well as laws/policies/mandates on COVID-19 and COVID-19 preparedness among United States residents. The study provides data to assist public health practitioners in designing interventions to ensure COVID-19 preparedness. In addition, it provides guidance for policymakers to develop and execute effective policies & laws to mitigate the severe impacts of future pandemics and other public health emergencies.

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1.0 INTRODUCTION

Overview of Chapter

This chapter begins with a background of COVID-19 disease, focusing on the epidemiology of the disease and the burden of COVID-19 in the United States and the world. Next, the COVID-19 pandemic as is public health emergency is discussed, followed by the significance and factors that contribute to public health emergency preparedness. The subsequent sections in this chapter talk about the problem statement, the purpose of the study, study aims, and objectives, including the hypothesis and the study's conceptual framework.

1.1 Epidemiology of Coronavirus Disease 2019

1.11 COVID-19 as a Pandemic

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), commonly known as Coronavirus Disease 2019 (COVID-19), is an infectious disease initially discovered in Wuhan, Hubei Province, China, in December 2019, and later declared a pandemic by the World Health Organization (WHO) on March 11, 2020, after it had crossed geographical boundaries into other countries (WHO, 2020). A pandemic is an epidemic that shows a

sudden increase in the number of cases of a disease above the normal expectation among a population and has spread over several countries or continents, affecting a large number of people (CDC, 2012). Aside from COVID-19, some other recent pandemics include Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), H1N1 Flu (Swine Flu), HIV/AIDS, and Ebola Virus Disease (CDC, 2020; 2018). Most of these pandemics are caused by coronaviruses, influenza, or viral hemorrhagic fevers (CDC, 2020, 2018; WHO, 2020).

COVID-19 is part of the coronavirus family, a group of pathogens that mainly attacks the human respiratory system. Coronaviruses are named for the crown-like spikes on the surface and are categorized into four main subgroups of coronaviruses: alpha, beta, gamma, and delta (CDC, 2020). SARS and MERS are examples of other pandemics that belong to the coronavirus family discovered in 2003 and 2012, respectively (CDC, 2019, 2017; Caldar et al., 2020). COVID-19 disease was discovered in late December 2019 when some patients in Wuhan, Hubei Province in China, were admitted to hospitals with an initial diagnosis of pneumonia of an unknown etiology (Bogouch et al., 2020; Rothan & Byrareddy, 2020). Like the SARS outbreak in 2002, these patients were also epidemiologically linked to a wet animal and seafood wholesale market in Wuhan (Bogouch et al., 2020, Lu et al., 2020). Initial reports from the hospitals in Wuhan predicted the onset of a potential coronavirus outbreak. The WHO later confirmed the outbreak and named it COVID-19 on February 11, 2020 (WHO, 2020).

The first cases were believed to have occurred in Wuhan, China, in December 2019 (Du Toit, 2020). There were five hospitalizations of patients with acute respiratory distress syndrome, with one patient later dying between December 18, 2019, and

December 29, 2019 (Ren-LL et al., 2020). Forty-one hospital admissions were identified as having laboratory-confirmed COVID-19 infections by January 2, 2020, with less than half of these patients having underlying conditions of hypertension, diabetes, and cardiovascular disease (Huang et al., 2020). It was presumed these patients had nosocomial infections, which might have come from the hospital. At the initial stages of the outbreak, the belief COVID-19 was not considered a "*super-hot*" spreading virus that spread from one patient to another (Rothan & Byrareddy, 2020). They tested only clinically ill patients during that period, thus missing out on other potential asymptomatic patients. By January 22, 2020, 25 Chinese provinces reported a total of 571 cases of the COVID-19 with 17 deaths (Lu, 2020; Rothan & Byrareddy, 2020).

By January 25, 2020, the COVID-19 outbreak had crossed the geographical boundaries of China to countries such as Thailand, Taiwan, Nepal, Japan, Cambodia, Vietnam, Malaysia, Sri Lanka, Singapore, United Arab Emirates, Republic of Korea, United States, India, Australia, The Philippines, Canada, Finland, France, and Germany (Rothan & Byrareddy, 2020). The spread of COVID-19 was faster than other pandemics such as SARS, MERS, Ebola Virus Disease (EVD), and some influenza outbreaks due to the quick transmission of the COVID-19 virus as early as 24-48 hours before symptoms onset (WHO, 2020; Johansson, 2021). About 35% and 24% of COVID-19 transmissions came from presymptomatic and asymptomatic persons, respectively (CDC, 2021). The spread of a virus by asymptomatic individuals makes it challenging to identify and isolate infected people to reduce the transmission (Potasman, 2017). COVID-19 cases grew worldwide, and the disease was declared a pandemic by the WHO on March 11, 2020 (WHO, 2020; Cucinotta et al., 2020).

Although the rate of transmission of the COVID-19 disease was higher than most pandemics, it had a lower-case fatality ratio than other pandemics. The case fatality of the COVID-19 is between 1%-3% depending on the country (Nishiura et al., 2020; Ioannidis, 2021), which is lower compared to SARS (10.8%) (Cladaria, 2020; CDC, 2013), MERS (35%) (Lu, 2020) and Ebola (EVD) (25%-90% depending on the virus species) (Kadanali & Karagoz, 2015; WHO, 2021).

1.12 COVID-19 United States

United States reported its first COVID-19 case on January 20, 2020. A 35-year-old man went to an urgent care facility in Snohomish County, Washington, with a four-day fever and cough, later diagnosed as COVID-19 (Holshue et al., 2020). After the first case, the person-to-person transmission was confirmed in Chicago between a woman who returned from China and her husband (Ghinai et al., 2020). Cases of COVID-19 continued spreading in the United States, and the first death happened on February 6, 2020. The number of COVID-19 cases in the United States reached 100 on March 2, 2020, which included 48 repatriated US citizens from Wuhan, China (CNN, March 2, 2020). By March 26, 2020, the United States surpassed China with the highest COVID19 cases (over 85,000 confirmed cases) (BBC, March 27, 2020). The Health and Human Service Secretary Alex Azar declared COVID-19 a public health emergency on January 31, 2020, but it was made retroactive to January 27, 2020 (CDC, 2020; HHS, 2020). Confirmed COVID-19 cases and deaths continued to increase throughout the summer of 2020 and winter of 2020/2021.

1.2 Burden of COVID-19

As of April 12, 2021, the total number of confirmed COVID-19 cases globally was 135,646,617, with 2,930,732 deaths (WHO, 2021). The extent of the pandemic by WHO Region showed that the Americas had the highest number of confirmed cases/deaths (58,179,645/1,411,418), followed by Europe (47,723,272/1,010,684), South-East Asia (16,358,405/229,458), Eastern Mediterranean (8,112,093/165,757), Africa (3,176,707/79,694), and Western Pacific (2, 095,750/33,708) (WHO, 2021). Situation by country, as reported by the WHO on April 12, 2021, showed that the United States of America had the highest number of confirmed cases (30,772,857/555,712), with India and Brazil in the second and third with confirmed cases of 13,527,717 and 13,445,006, respectively (WHO, 2021). France leads the number of confirmed cases among European countries with 4,980,133 confirmed cases, with South Africa leading the number of confirmed COVID-19 cases (1,560,000) on the African Continent (WHO, 2021).

In the United States, data from the Centre for Disease Control and Prevention (CDC) on April 13, 2021, shows a gradual decline in the daily confirmed cases of COVID-19 (CDC, 2021). COVID-19 cases and deaths had dropped in most states since the beginning of January 2021, when the country had a record number of cases and fatalities (CDC, 2021). New York, which used to be the COVID-19 Epicenter of the world, now has declining daily confirmed cases and deaths. As of April 13, 2021, New York State had a 7-day average of 3,258 compared to over 6000 cases in the first week of January 2020. Except for Florida State, cases in other large states such as Texas, California, and Georgia have seen a steep decline since the first week of January 2021

(CDC, 2021). Also, the cases in less populated states, i.e., Vermont, Hawaii, and Maine, continue to be very low (CDC, 2021).

1.3 Impact of COVID-19

Despite the several warning signs after the COVID-19 virus was discovered in China in late December 2019, the pandemic's impact on countries worldwide is massive. The impacts of previous pandemics, i.e., H1N1, MERS, SARS, and Ebola, foreshadowed what was coming. The COVID-19 pandemic affected the health, economies, and societies of several populations globally, with underdeveloped and developing countries the worst affected (WHO, 2020). According to the WHO survey on the impact of COVID-19 on health systems in 105 countries between March and June 2020, almost every country (90%) experienced disruption to its health services, with low- and middle-income countries reporting the most significant difficulties (WHO, 2020). Most countries reported that routine and elective services had been suspended while critical, i.e., HIV therapy and cancer screenings seeing high-risk interruptions in low-income countries (WHO, 2020). In the United States, over 3,500 healthcare workers, mostly frontline workers under 60 years, have died from the COVID-19 pandemic (Wang et al., 2020). The pandemic significantly undermined health insurance coverage in the country. Most Americans lost their employer-sponsored insurance due to the country's surge in unemployment, thus restricting their healthcare access (Blumenthal et al., 2020). Also, due to the COVID-19 pandemic, an estimated 41% of United States adults were delayed or avoided medical care, including routine care (32%) and emergency or urgent care (12%) (Czeisler et al., 2020).

Beyond the impact on public health and other health systems, countries' economies were negatively affected. The Congressional Research Service report on the global economic effects of COVID-19 on February 10, 2021, showed that the virus could reduce global economic growth to an annualized rate of -4.5 to -6.0% in 2020 (Congressional Research Service, 2021). The report further noted a possibility of high unemployment levels due to the continuous labor dislocations resulting from the pandemic. Also, the International Monetary Fund (IMF) estimated that the global economy reduced by 4.4% in 2020 due to the COVID-19 pandemic, with only advanced economies having a 2.3% projected growth in the second quarter of the year (IMF, 2020). The story is different in less advanced economies, where the pandemic is expected to worsen poverty in forty-seven predominantly African countries (UN, 2020; Gregson & Updike, 2017). According to the World Bank's biannual analysis of the financial, macroeconomic, and welfare outlooks for Sub-Saharan Africa, the COVID-19 pandemic has triggered the region's first recession in 25 years, thus resulting in a projected decline in economic growth from 2.4% in 2019 to between -2.1—5.1% (World Bank, 2020).

The impact of the COVID-19 pandemic on the American economy and other sectors is more significant than any pandemic in recent times. Estimating the economic effects of the COVID-19 pandemic is not limited to the conventional scope, i.e., the direct cost of healthcare, infrastructure, and government financial assistance but, more extensively, the loss of productivity and local companies. The estimated cumulative financial costs of the COVID-19 pandemic to the United States economy relative to the lost output and health reduction are more than 16 trillion, or 90% of the country's annual GDP (Cutler & Summers, 2020). The financial loss includes premature death, long-term

and mental health impairment, and government expenditure on families (Cutler & Summers, 2020). Cutler and Summers argued that the economic loss due to the COVID-19 is more than double the monetary outlay for all the United States wars since September 11, 2001, including Iraq, Afghanistan, and Syria. In comparison, the impact on the economy during the Great Recession was only a quarter as large.

The economic impacts of the COVID-19 pandemic can be associated with the massive decline in industrial production (manufacturing, mining, utility sectors), transportation, agriculture, and other essential services worldwide. One of the worst-hit sectors is travel and tourism, which depends mainly on people's movement to survive. The cancelation of flights and the closure of borders worldwide negatively affected the transportation business. This further affected the tourism sector as both sectors depend on each other to operate; transportation links tourists to tourist attraction sites, and tourism expands with better transportation systems (Mdusm, 2016). In the United States, the COVID-19 pandemic resulted in an unprecedented 42% annual decline in revenue (nearly USD 500 billion) from 2019, with international and business travel being the worst affected, with a drop of 70% and 76%, respectively, and over 100 million job losses (United States Travel Association, 2021).

The decline in agriculture due to the COVID-19 pandemic has also affected several agrarian economies, such as India, Vietnam, and Bangladesh, where agriculture supports 12-16% of their GDP (Research and Markets, 2020). In the United States, the impacts of the COVID-19 pandemic on the farmers, consumers, food assistance program participants, and rural American residents affected the agriculture sector economically (Department of Agriculture (2021). There was a drop in productivity due to job losses

and COVID-19 social distance restrictions (CDC, 2021). The decline in productivity led to increased food prices and the constant shortage of foodstuff, which resulted in food insecurity in most low-income households (Molitor, 2021).

Aside from negatively affecting the financial sector and productivity, the COVID-19 pandemic also affected individuals and communities. The panic and movement restrictions during the COVID-19 pandemic have impacted individuals and communities' psychosocial, economic, and political lives worldwide and can be challenging to assess (Ali et al., 2015). Tasnim et al. (2020) noted that the COVID-19 pandemic fueled the surge of numerous hoaxes, rumors, and misinformation regarding the etiology, prevention, outcomes, and possible cure of the disease. This false information promoted erroneous practices that increased the spread of the virus and ultimately resulted in poor mental and physical health outcomes among individuals (Tasnim et al., 2020). Some of the effects of poor mental and physical outcomes due to pandemics can lead to social consequences, i.e., psychological distress, food insecurity, gender-based violence, and diminished access to healthcare, among others (Chu et al., 2020).

Finally, the COVID-19 pandemic had both positive and negative impacts on the environment. The pandemic significantly improved the air quality in several cities worldwide, lessened water and noise pollution, reduced Green House Gas (GHGs) emissions, and the pressure on tourist destinations (Rume & Islam, 2020). These positive impacts are fundamental to restoring the ecological system (Feng et al., 2013; Rume & Islam, 2020). On the contrary, the pandemic led to increased medical waste, haphazard use, and disposal of gloves, masks, and disinfectants in the United States and the world

(Rume & Islam, 2020). In the United States, waste levels have been increasing due to increased PPEs use at the domestic level (Calma, 2020).

1.13 Symptoms of COVID-19

The symptoms of COVID-19 infection range from mild to severe illness and may appear 2-14 days after exposure to the virus (CDC, 2020). The most common symptoms at the onset of COVID-19 infection are tiredness, fever, and dry cough (WHO, 2021, CDC, 2021). Other symptoms include aches and pains, sore throat, conjunctiva, headache, skin rash, or discoloration of fingers or toes. (WHO, 2021, CDC, 2021). Some severe symptoms noted by the WHO include difficulty breathing or shortness of breath and chest pain. People with COVID-19 can also experience gastrointestinal, neurological symptoms, or both (Pan et al., 2020; CDC, 2021; Harvard Health, 2021). The gastrointestinal symptoms include diarrhea, loss of appetite, nausea, and abdominal pain or discomfort, while loss of smell, muscle weakness, inability to taste, confusion, and delirium are some of the neurological symptoms (Pan et al., 2020; Harvard Health, 2021). Older adults and individuals with underlying medical conditions, i.e., heart disease, diabetes, or lung disease, seem to be at higher risk for developing more severe complications from COVID-19 illness (CDC, 2021).

There are some similarities in the symptoms between the COVID-19 pandemic and other pandemics such as MERS and SARS, i.e., dry cough, fever, dyspnea, and chest CT scans showing bilateral ground-glass opacities (Rothan & Byrareddy, 2020). However, some of these symptoms vary with the state of the illness and how the disease progresses (Hu, 2020). The majority of COVID-19 infectious present with less severe symptoms [fever (98%0, cough (765), and myalgia or fatigue (44%)] compared to the

MERS and SARS disease, where acute renal damage is a common symptom (Cha, 2015; Hu, 2020). The less severe nature of the symptoms of COVID-19 is similar to other Flu pandemics, i.e., H1N1, but COVID-19 seems to spread more quickly than the Flu (CDC, 2021). Furthermore, people infected with COVID-19 can be asymptomatic for a more extended period and can be contagious for longer than the Flu. Nevertheless the clinical features of the COVID-19 are unique, with the virus targeting the lower airway, as evident by upper respiratory tract symptoms such as sneezing, rhinorrhea, and sore throat (Asiri et al., 2013).

1.14 Pathogenesis: The Manner of Development of COVID-19

Patients infected with COVID-19 show increased levels of plasma pro-inflammatory cytokines, higher leukocyte numbers, and other abnormal respiratory findings (Rothan & Byrareddy, 2020). The principal pathogenesis of COVID-19 infection as a virus that targets the respiratory system was pneumonia, RNAaemia, combined with the incidence of ground-glass opacities, and acute cardia injury (Huang et al., 2020). The COVID-19 virus can also be found in the epithelium of other organs such as the intestines, kidney, and liver which may explain the gastrointestinal symptoms and the observation of lymphocytic endotheliitis (inflammations of endothelial cells) in postmortem pathology in these organs (Varga et al., 2020; Cevik et al., 2020). This confirms that the COVID-19 virus directly affects many organs, as seen in the SARS and Influenza pandemics.

1.15 Transmission of COVID-19

COVID-19 can be spread in three ways: contact transmission, droplet transmission, and airborne transmission (CDC, 2021). Contact transmission means an

infection is spread through direct contact with an infectious person (touching, i.e., handshaking) or from a contaminated article or surface (fomite transmission). Other pandemics with this transmission mode include EVD, SARS, Flu, and H1N1 (CDC, 2021). Droplet transmission means an infection is spread through direct exposure to virus-containing respiratory droplets exhaled from an infectious person (CDC, 2021). This form of transmission is most likely to occur within 6 feet of the infected person and was a common transmission mode for SARS, Flu, and H1N1 pandemics (Marks et al., 2021, CDC, 2017, 2012). Lastly, airborne transmission occurs through exposure to respiratory droplets containing the virus (CDC, 2021; WHO, 2021). These droplets range from small invisible droplets that fall off rapidly within seconds while close to the source to large visible ones that can remain suspended for several minutes to hours and travel usually greater than 6 feet from the source on air currents. (CDC, 2021; Rothan & Byrareddy, 2020; Marks et al., 2021). The majority of COVID-19 spread through close contact rather than airborne (Klompas et al., 2020; CDC, 2021).

1.16 Therapeutics/Treatment Options

Before the COVID-19 vaccines were available, various countries adopted a series of preventive measures to contain the virus (Kabir et al., 2020; Wang et al., 2020). Researchers and healthcare workers focused on preventing, mitigating, and managing SARS-CoV-2-infected patients due to the absence of specific antiviral therapeutics (Jean et al., 2020). These COVID-19 treatments and management helped in the fight against the pandemic. As of the time of this study, supportive management was/is done using Chemoprophylaxis (Hydroxychloroquine) and recently Velkury (remdesvivir) (FDA, 2020). Hydroxychloroquine is a potent broad-spectrum antiviral agent commonly used to

treat malaria and autoimmune diseases (Ben et al., 2012; Yan et al., 2016). Hydroxychloroquine increases the endosomal pH, thus inhibiting the fusion of severe acute respiratory of the SARS-CoV-2 and the host cell membranes. Velkury (remdesvivir) is also a SARS-CoV-2 nucleotide analog RNA polymerase inhibitor that blocks an enzyme needed for replicating viruses. This mechanism of blocking enzymes required for replicating viruses was also used in developing Ebanga (Ansuvimab-zykl) medication to treat Ebola disease during the Ebola pandemic (FDA, 2020). Other clinical management of COVID-19 consists of supplemental oxygen and mechanical ventilatory support when indicated (CDC, 2020).

1.4 COVID-19 as a Public Health Emergency

COVID-19 was declared an international PHE because it met the International Health Regulations (IHR) (2005), which requires countries to detect and report events that may lead to a potential Public Health Emergency of International Concern (PHEIC) (CDC, 2019). The purpose of the IHR (2005) is to prevent and manage public health risks emerging from the international spread of disease while circumventing "unnecessary interference with international traffic and trade" (WHO, 2020; Magnusson, 2017). Under the IHR (2005), the WHO can declare a PHEIC if the situation meets 2 of 4 criteria:

a. Is the public health impact of the event serious?

b. Is the event usual or unexpected?

c. Is there a significant risk of international spread?

d. Is there a significant risk of international travel or trade restrictions?

Diseases that have been declared as PHEIC since the IHR (2005) was signed include the 2009 H1N1 Flu ("Swine Flu"), Polio in 2014, Ebola disease in 2014, and Zika Virus in

2016 (CDC, 2019; WHO, 2020). Other potentially notifiable events may include SARS, yellow fever, cholera, pneumonic plague, viral hemorrhagic fever, West Nile fever, and other biological, chemical, or radiological events that meet the IHR criteria (CDC, 2019; WHO, 2020). It is recommended that once a WHO member country identifies an event of concern, all assessments of the event's public health risks must be done within 48 hours and reported to the WHO within 24 hours if the event is notifiable under the IHR (WHO, 2019). In the United States, the Department of Health and Human Services (DHHS) is responsible for reporting requirements for IHR (2005), whiles the CDC works with other Federal agencies to support the IHR (2005) implementation (CDC, 2019).

The COVID-19 outbreak was declared a Public Health Emergency (PHE) by the United States Department of Health and Human Services (DHHS) and WHO on January 31, 2020, and February 3, 2020, respectively (CDC, 2020; HHS, 2020; WHO, 2020). A PHE can be defined as "*an emergency need for health care [medical] services to respond to a disaster, a significant outbreak of an infectious disease (epidemic or pandemics), bioterrorist attack or other significant or catastrophic events*." *(*NDMS, 2005, p. 2). PHEs can arise from a wide range of causes, including natural disasters, outbreaks of infectious diseases, environmental chemical contamination, and the release of radiation (WHO, 2017), and are defined based on their consequences as well as by their causes and their precipitating events (Lindell & Perry, 1992; Nelson et al., 2007). Therefore, a situation is emergent when its scale, timing, or unpredictability threatens to swamp routine capabilities (Nelson et al., 2007).

1.5 Public Health Emergency Preparedness

Public Health Emergency Preparedness (PHEP) involves collective efforts from individuals, communities, and governments to prevent, quickly respond to, protect against, and recover from PHEs (Nelson et al., 2007). The Federal Emergency Management Agency (FEMA) defines preparedness as a "continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective actions to ensure effective coordination during incident response." Furthermore, emergency preparedness helps increase the mitigation level of communities, enables a timely and adequate response to disasters, and shortens the recovery periods of those affected (FEMA, 2011). PHEP is not limited to activities that enable responses to events but instead involves a full range of prevention, mitigation, and recovery activities. It involves operational capabilities, which allows the quick execution of preparedness tasks. The presence of infrastructure, personnel, and plans, among others, does not guarantee readiness or preparedness. Also, PHEP is not a steady-state but instead requires continuous improvement, frequent testing of plans and ideas through exercises and drills, and the formulation and execution of corrective action plans (Nelson et al., 2007; FEMA, 2011).

PHEP improves community resilience which intends to benefit disaster planners and community members alike (DHHS, 2015). Community resilience expands the traditional preparedness perspective by encouraging activities that build preparedness while encouraging community systems and addressing other health factors (DHHS, 2015). Since PHEP is a collective effort, it's the responsibility of government agencies and individuals, community groups, businesses, and non-governmental organizations.

The collaborative nature of PHEP explains why on-site civilians provide a large share of search-and-rescue activities, first aid, and other initial assistance during PHEs before government agencies' arrival (de Heide, 2006). All levels of PHEP are vital, but individual-level preparedness is crucial and can serve as the basis for preparedness.

1.51 Individual Level

At the individual level, people collect emergency supplies based on the particular PHE and create an emergency "go kit" for their family. In case of a pandemic, some emergency supplies might include personal needs (water, food, prescription medication, and at-home medical devices), first aid supplies (first aid reference, non-latex gloves, thermometers, antibiotic creams, and ointments), disinfectant wipes, and spray, soap, hand sanitizer (60%+ alcohol), facemasks among others (CDC, 2020). Regarding COVID-19 preparedness in the United States, most individuals gathered emergency items together with non-perishable foods, can foods, and toiletries, which resulted in panic buying and an initial shortage of hand sanitizers and some PPEs (Loxton, 2020; Baertlein & Fares, 2020; Gibson, 2020).

Again, at the personal level of PHEP, individuals pay attention to local guidance for any form of information on the emergency and find ways to support their neighbors, i.e., running errands for family members, friends, and older neighbors, who are at increased risk for severe illness or have limited mobility. During the onset of the COVID-19 pandemic, most Americans stayed informed and in touch by getting up-to-date information about local COVID-19 activities from local media and public health officials. This made people engage in daily preventive actions such as frequent handwashing, social distancing, staying home when they felt ill, constant cleaning and disinfecting

touched objects and surfaces, and wearing face masks in public places. Others assisted the elderly with their grocery shopping by creating online platforms that raised money to purchase and deliver groceries for them (Lee, 2020). Most of the individual level of preparedness was influenced by people's knowledge, information, and support before and during the pandemic. Although these individual factors are vital in preparedness, support from community organizations also helps augment PHEP.

1.52 Community-level

At the community-level, community organizations, community leaders, and citizens come together to develop community preparedness toolkits that provide step-by-step direction with valuable resources for making communities safer, more resilient, and more prepared (Gov Ready, 2021). Communities use the community preparedness toolkit to develop a community-based approach to emergency preparedness, i.e., the Citizens Corps Council (Gov Ready, 2021). The Citizen Corps is FEMA's grassroots plan of action to bring the government and community leaders to involve the citizens in all-hazards emergency preparedness and resilience (Gov Ready, 2021; DHS, 2019). During infectious disease outbreaks, community organizations (Non-profit organizations) support communities with emergency items and other preparedness materials.

In the United States, organizations such as American Red Cross, Salvation Army, Feeding America, Food for the poor, Rotary Club, schools, churches, and other religious groups helped communities in various stages of the COVID-19 preparedness. These organizations supported several communities by erecting quarantine shelters, distributing food, connecting families, and providing PPEs and other personal hygiene kits (American Red Cross, 2020; The Salvation Army, 2020). Aside from supporting communities with

groceries and other essential items, some faith-based organizations played a crucial role in providing mental health support through emotional and spiritual support for several American families. The American Red Cross volunteers supported health and mental health needs in several communities in Kentucky and Rhode Island (American Red Cross, 2020).

Other community organizations that support individuals and communities during PHEs are the various media platforms, i.e., TV, radio, newspapers, the internet, etc. Community media organizations are involved in providing people with updates and news during PHEs. Traditional media (TV and radio) serves as a channel of communication through which the activities of other community organizations are disseminated. American city and community news organizations provided daily COVID-19 updates, including information on preventive actions, testing and vaccination centers, and how to access healthcare when infected with the disease.

1.53 Government Level

Local, state, and federal governments can be involved in a PHEP activity, although their level of involvement might differ. The local and state government do most of the initial stages of PHEP activities. Their activities may include a health risk assessment to identify the possible hazards and vulnerabilities (e.g., populations at risk, community health assessment, etc.), epidemiological functions to maintain and upgrade the systems to effectively monitor, detect, and investigate trends of infectious diseases and other potential hazards (Malilay et al., 2014; Davis & Lederberg, 2000; Nelson et al., 2007; Gostin et al., 2012). The local and state governments are also responsible for providing the public with information and communication on PHEP and engaging the

public to ensure individuals are actively involved in PHEP activities (Nelson et al., 2007; Gostin et al., 2012).

With support from the state governments, local governments mobilize and train the workforce, experts, officials from various public health departments, and volunteers needed for a PHEP (Gostin et al., 2012, Nelson et al., 2007; CDC, 2019). The workforce is responsible for promoting, protecting, and improving individuals' and communities' health (DHHS, 2018). Local and state authorities are also responsible for developing risk communications plans, templates, and messages. (CDC, 2019). Local governments provide quality improvement in PHEP and account for resources used in their activities. The local governments also review, implement, and evaluate the activities of PHEP and report to the state if needed (CDC, 2019). All three government levels coordinate to help provide the population with health supplies, testing centers, evacuation alerts, and shelters during PHEs.

Legal decisions such as passing laws and creating legal instruments during PHEP are often the primary responsibility of the federal and state governments. This was demonstrated when the United States President signed a USD 8.3 billion emergency funding to assist COVID-19 therapeutic and vaccine development, purchase additional PPEs, testing, hire extra workers, and international activities (Chalfant, 2020). Other laws and policies passed in the United States included mandatory lockdown, face mask-wearing, social distancing, initiation of rapid testing at most health facilities, and the initial approval of Chloroquine and Hydroxychloroquine to treat COVID-19, among others (FDA, 2020). Furthermore, the United States government passed other laws that provided Americans with financial assistance. Prominent among these laws was the

CARES Act, a COVID-19 assistance policy, which was passed to provide quick and direct assistance for American workers and families, small businesses and preserve jobs for American industries (US Department of the Treasury. (2020). Also, the Stafford Disaster Relief and Emergency Act allowed funds to be made available through FEMA to coordinate the delivery of federal technical, financial, logistical, and other assistance to states and localities (FEMA, 2021).

1.6 Statement of Problem

The COVID-19 pandemic has resulted in a dramatic loss of human lives globally and presents an unprecedented challenge to public health, the world of work, and our food systems. The social and economic disruption caused by the COVID-19 pandemic is devastating, thus putting several millions of people at risk of falling into extreme poverty, with over 500 million people being undernourished (WHO, 2020). It is evident from the data on COVID-19 cases, deaths, and hospitalizations that the United States is the worse hit country, which can be attributed to the lack of preparedness at the individual, environmental, and government levels. Since the magnitude of the COVID-19 pandemic cannot be compared to any of the recent disease outbreaks in the United States, i.e., H1N1, SARS, this was a first experience for most Americans. The novelty of the virus, coupled with little or no past experience with pandemics, limited most individuals' understanding of the disease or its likely impact.

Although researchers have studied other infectious diseases such as SARS, MERS, Ebola, H1N1, Avian Flu, Zika virus extensively, there are limited population-based COVID-19 preparedness studies in the United States (Kim and Niederdeppe, 2013; Elggal et al., 2018; Almutairi et al., 2016; Madad et al., 2016). There are also no studies

on how individual and environmental factors coupled with media activities and government policies affected individuals' preparedness for the COVID-19. The lack of literature on COVID-19 preparedness in the United States can be due to the novelty of the disease and the focus of most researchers on COVID-19 clinical investigations.

Understanding the factors that influenced preparedness among Americans can serve as the basis for effective public health communications for future disease outbreaks. This study utilized a conceptual framework rooted in the Social Cognitive Theory to determine factors that influenced COVID-19 preparedness among individuals in the United States. Furthermore, mediators that enhanced variables that influenced COVID-19 preparedness in the United States were determined by this study.

1. 7 Purpose of the Study

The primary purpose of this study is to understand public emergency preparedness before and during the COVID-19 outbreak. This population-based research study is rooted in the Social Cognitive Theory (SCT) and tests the full complement of SCT variables to determine its predictability and explanatory power for COVID-19 preparedness. In addition, this study tests the mediation effects of the primary constructs of the SCT (i.e., personal cognitive, environmental, and behavioral factors) on media and policy.

1.8 Aim of the Study

To determine factors that influenced COVID-19 pandemic preparedness in the United States.

Objectives

- To determine the percentage of variance in COVID-19 preparedness explained by the personal cognitive, behavioral, and environmental factors of the SCT among residents of the United States.
- To determine whether personal cognitive, behavioral, and environmental factors significantly mediated the relationship between media activities and COVID-19 preparedness among residents of the United States.
- To determine whether personal cognitive, behavioral, and environmental factors significantly mediated the relationship between government laws/policies on COVID-19 and COVID-19 preparedness among residents of the United States.

Research Questions

- What percentage of variance in COVID-19 preparedness is explained by the personal cognitive, behavioral, and environmental factors of the SCT among residents of the United States after accounting for the demographic characteristics?
- Do personal cognitive, behavioral, and environmental factors significantly mediate the relationship between media activities and COVID-19 preparedness among United States residents?
- Do personal cognitive, behavioral, and environmental factors significantly mediate the relationship between government laws/policies on COVID-19 and COVID-19 preparedness among United States residents?

Hypothesis

- Constructs of the Social Cognitive Theory will explain a significant portion of the variance in the COVID-19 pandemic preparedness among residents of the United States.
- Personal cognitive, behavioral, and environmental factors will mediate the relationship between media activities and COVID-19 preparedness among residents of the United States.
- Personal cognitive, behavioral, and environmental factors will mediate the relationship between government laws/policies on COVID-19 and COVID-19 preparedness among residents of the United States.

1.9 The Conceptual Framework

According to McGaghie et al. (2001), the conceptual framework "sets the stage" to present a specific research question that steers the reported investigation based on a problem statement. The conceptual framework identifies research variables and clarifies the relations among the variables (McGaghie et al., 2001). This study's conceptual framework explains how government policies and media activities influence COVID-19 preparedness through individual and environmental factors.

The conceptual framework assembles the constructs of the SCT Bandura (2004) and Keller et al. (2015) and includes risk perception elements, i.e., perceived susceptibility, perceived severity, and past experience of PHE, as well as demographic characteristics, policy, and media variables.

The constructs of the SCT are:

a) Personal Cognitive factors: self-efficacy, collective efficacy, outcome expectation, and knowledge.

b) Environmental Influences: observational learning, normative beliefs, social support, and barriers and opportunities.

c) Supporting Behavioral Factors: behavioral skills, intentions, and reinforcements and punishments.

The conceptual framework specifies that:

- The SCT significantly predicts COVID-19 preparedness among United States residents,
- The SCT constructs mediate the relationship between government policies and COVID-19 preparedness among United States residents, and
- The SCT constructs mediate the relationship between media activities and COVID-19 preparedness among United States residents. (Figure 1).

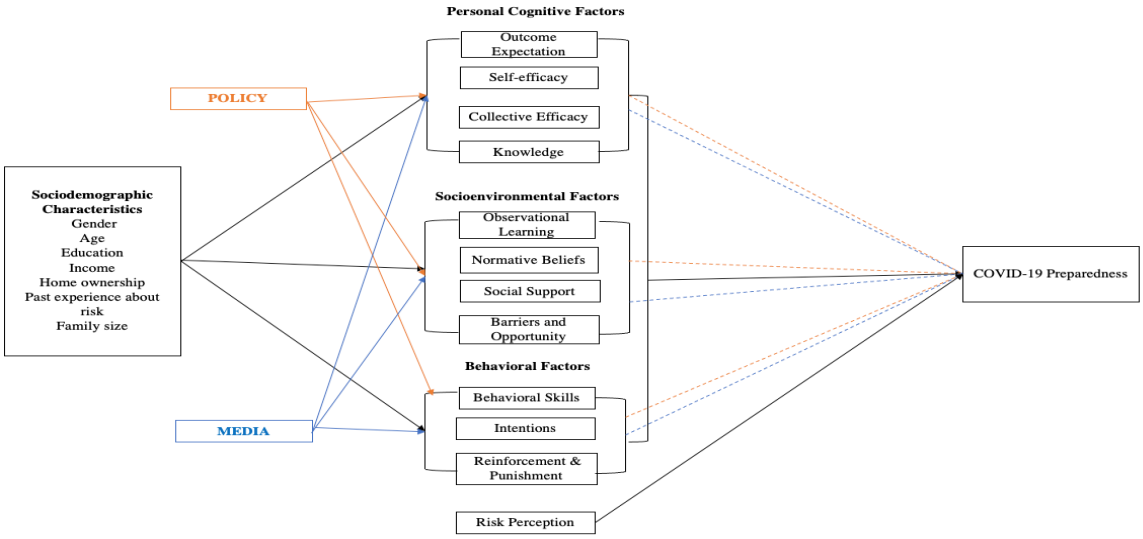

Figure 1. Conceptual Framework

CHAPTER II

2.0 LITERATURE REVIEW

Public Health Emergency Preparedness (PHEP) is critical to reducing vulnerability and increasing community resilience during an emergency or disaster (Nelson et al., 2007). PHEP is a major global problem and leaves most countries inadequately prepared for PHEs, thus not able to avoid or reduce hazard effect consequences (Paek et al., 2010). Unfortunately, most people are unprepared for any form of PHE (FEMA, 2019; DHS, 2019). Before the current COVID-19 pandemic, emergency preparedness was a major global problem, especially in middle- and low-income countries (WHO, 2007; WHO, 2015). The CDC (2016) noted that 48% of Americans do not have emergency supplies for a disaster, with approximately 52% having no copies of crucial personal preparedness documents. Lack of preparedness can be attributed to individual and environmental factors (Perry & Lindell, 2003; Miceli & Settanni, 2008) and lack of governmental policies during emergencies (Nightingale et al., 2020; Condon & Sinha, 2010; Cowling et al., 2010). This literature review outlines which individual factors, environmental factors, and governmental policies affected individuals' preparedness for the PHEs and the COVID-19 outbreak and draws on the Social Cognitive Theory of Bandura for its constructs (Bandura, 2004, 2009).

2.1 Individual Factors

Human behavior is affected and influenced by both individual factors, others' behavior, and environmental factors (Hsu and Yang, 2014). Individual factors that influence behavior can be personal cognitive and behavioral factors as well as perceptions. In public health, the ability to engage in a behavior, foresee the outcomes of some behavior patterns, and understand and accept a behavior are crucial individual capabilities (Kelder et al., 2015). Individual factors such as cognitive activities increase an individual's confidence and knowledge, and whiles behavioral skills enable individuals to perform a behavior successfully. In PHEP, all these individual factors, i.e., self-efficacy, risk perception, knowledge, outcome expectancy, and collective efficacy, are important to avoid or mitigate a public health emergency.

2.11 Self-Efficacy

Self-efficacy is the belief in a person's ability to influence events in their lives and control how they experience these events (Bandura, 1994). Self-efficacy has been applied to several domains of health behavior and has been adopted into other theories such as the Theory of Planned Behavior (TPB), Health Belief Model (HBM), Integrated Behavioral Model (IMB), and Transtheoretical Model (TTM) (Montańo and Danuta, 2015; Skinner et al., 2015; Prochaska et al., 2015). Researchers applied self-efficacy to health behaviors such as nutrition intake, weight loss, physical activities, alcohol use, HIV/AIDS prevention, among others (Fløl0 et al., 2019; Jo et al., 2018; White et al., 2019; Ha et al., 2016; Robinson et al., 2017). Also, researchers have shown how self-efficacy could affect one's preparedness for disease outbreaks and other PHEs.

Self-efficacy influences preventive behaviors in public health emergencies and disasters (Manika and Golden, 2011; Maguire et al., 2019; Keller et al., 2014). Keller et al. (2014) showed that higher self-efficacy was significantly associated with wearing facemasks, increased handwashing, reporting flu-like symptoms, and stocking medications among 2882 randomly selected students in China during the H1N1 pandemic. Findings from Maguire et al. (2019) also demonstrated that self-efficacy significantly predicted preventive behaviors such as vaccination (p-value: 0.02) and isolation (p-value: 0.02) among 309 hospital patients in a health setting in Australia.

Aside from influencing preventive behaviors, self-efficacy also plays a crucial role in the mental health of individuals during PHEs. People who have serious mental health issues and report fair or poor general health are less likely to have a household disaster and emergency communication plan (Eisenman et al., 2009). High self-efficacy can reduce anxiety levels, thus, increasing people's confidence to prepare for any disease outbreak or disaster (Lim et al., 2020; Mishra and Suar, 2011). This was demonstrated by Lim et al. (2020) when they found a strong .association between lower anxiety and higher self-efficacy (confidence in one's ability to protect him or herself from an infection) in a cross-sectional study of 4,505 respondents randomly selected from three countries. Consistent with the findings above, Said et al. (2020) also identified that psychological preparedness was associated (p-value: 0.005) with self-efficacy and self-esteem in a cross-sectional study involving emergency and disaster nurses in Asia.

Self-efficacy also builds confidence in people to be receptive to information on PHEP. Information from the media, friends, and even government agencies is crucial for disaster preparedness (Liao et al., 2010; Basolo et al., 2009; Romo-Murphy et al., 2011).

In a cross-sectional study in Hong Kong, Liao et al. (2010) demonstrated that trust in formal government and media information concerning Influenza was strongly associated ($\beta=0.23$) with self-efficacy, resulting in preventive actions such as increased handwashing against the H1N1 pandemic. Also, the concept of confidence in PHEP was demonstrated in other non-disease outbreak PHEs. Newnham et al. (2017) found that perceived barriers related to disaster evacuations in Hong Kong were fewer among people and higher self-efficacy and confidence in evacuation warnings (p-value<0.005). Similarly, Demuth et al. (2016) showed that low self-efficacy decreased evacuation intentions (p-value< 0.005) in a multivariate study of 260 randomly sampled respondents from Miami-Dade County.

Aside from directly influencing preparedness, self-efficacy also serves as a mediator within the causal sequence of variables that influence PHEP (Isa et al.,2013; Ryan et al., 2018). This is documented by Isa et al. (2013) in a cross-sectional study that involved 280 adults recruited from post-outbreak villages in the Terengganu state of Malaysia. In their study that looked at dengue knowledge and preventive behaviors, Isa et al. (2013) found that self-efficacy fully mediated the knowledge of dengue and dengue preventive behaviors. Ryan et al. (2018), in a study involving 296 individuals, demonstrated that self-efficacy strengthened the relationship between parental status and disaster preparedness ($\beta=0.0208$). Contrary to the findings of Isa et al. (2013) and Ryan et al. (2018), Samaddar et al. (2014) found that self-efficacy did not mediate outcome expectancy and disaster preparedness among 286 households in 3 cities in China.

2.12 Collective Efficacy

Collective efficacy is the belief of a group of people to perform coordinated actions to achieve an outcome (Kelder et al., 2015; Bandura, 2000). There are several circumstances in which people do not have control over social conditions or institutions affecting their lives and, as a result, cannot achieve their goals by acting independently (Bandura, 2000). Since life is not lived in individual autonomy, most of the outcomes people seek are achievable mainly through interdependent efforts. Collective efficacy is strengthened by shared goals, teamwork, communication, and prior success among a group of individuals (e.g., schools, parent groups, unions, and neighborhood organizations) (Kelder et al., 2015). Since people operate individually and collectively, self-efficacy can be both a personal and a social construct (Kelder et al., 2015). The concept of collective efficacy is widely used in student success and achievement in schools, group goal attainment, neighborhood crime, substance abuse, and athletics research Bandura, 1993; Goddard & Woolfolk, 2000; Goddard et al., 2004; Klassen et al., 2011; Hipp, 2016). Also, researchers have shown how collective efficacy could affect people's preparedness for PHEs by either serving as a moderator or a mediator to either enhance or influence some variables that influence PHEP (Babcicky & Seebauer, 2019; McIvor et al., 2010).

Collective efficacy serves as a moderator by reducing the adverse outcomes of PHEs by helping individuals and communities prepare adequately. Collective efficacy was found to have moderated the effect of the Hurricane Sandy storm on post-traumatic stress symptoms among older adults exposed to the storm in a study by Heid et al. (2017). Furthermore, Heid and colleagues identified a significant association between collective

efficacy and lower levels of current post-traumatic stress symptoms. In a similar study involving the Florida Department of Health workers, Fullerton et al. (2019) found that lower perceived collective efficacy was significantly associated with a higher likelihood of having post-traumatic stress disorder (OR, 0.93; 95% CI, 0.90-0.96).

Collective efficacy can also link other factors that influence PHEP, as demonstrated in a study involving 216 households in Eastern Tyrol, Austria. Babcicky and Seebauer (2019) found that collective efficacy decreased fear and risk perception and enhanced social cohesion and efficacy beliefs to specific disaster preventive actions. Consistent with their findings, Paton et al. (2009), in a mixed-methods study of 856 randomly selected Alaskans, found that collective efficacy mediated the relationship between the positive outcome expectancy and intentions and preparedness of a PHE. Collective efficacy can also influence PHEP through trust and empowerment. Since most PHEP activities involve government agencies, a community-agency relationship needs to be perceived as trustworthy to enhance confidence in the information and education these agencies provide to their communities. In a mixed-methods study, McIvor et al. (2010) demonstrated that collective efficacy underpinned the level of empowerment among communities and their trust in disaster prevention information provided by civic authorities. Buttressing the findings of McIvor et al. (2010), a cross-cultural comparison study by Paton et al. (2010) involving 506 randomly selected respondents in Napier, New Zealand, found that collective efficacy enabled trust and empowerment among communities, thus positively influencing their intention to prepare and actual preparation.

2.13 Knowledge

The concept of knowledge and its application is vital in health systems. In the field of public health, knowledge can influence healthy behaviors. Knowledge helps people understand the health risks and benefits of different practices and the information needed for behavior change (Kelder et al., 2015). Although the cognitive influence of knowledge on behavior is significant, knowledge alone cannot produce a behavior change unless combined with other constructs such as outcome expectation and self-efficacy (Kelder et al., 2015). The knowledge components of behavior change programs describe the health and risk components of behaviors such as smoking and alcohol intake (Thomas et al., 2013; DHHS, 2012).

In addition, knowledge plays an essential role in PHEP by influencing preventive behaviors (Chan et al., 2015; Almutairi et al., 2016; Marshall, 2009). Chan et al. (2015) demonstrated that a high level of knowledge of the influenza pandemic was significantly associated with increased handwashing (p-value<0.05) and the use of soap to wash hands (p-value=0.003) during the influenza pandemic in Hong Kong. Findings from Almutari et al. (2016) in a study involving 722 physicians and nurses selected from a Saudi Arabian hospital also showed a correlation between knowledge of the Ebola disease outbreak and preparedness as well as a strong association (p-value =0.001) between knowledge of the Ebola viral disease and the implementation of strict standard infection control preventive measures.

Knowledge of PHEs also enables people to assemble emergency kits and other relevant items. In a study that provided disaster preparedness training for 439 CDC workers, Thomas et al. (2015) found that participants were more likely to have assembled

an emergency kit (44%) compared to those with basic preparedness knowledge (17%). Insufficient knowledge of the influenza virus (7%) and vaccine (4%) was found to be associated with a low level (1%) of vaccinations in a prospective cohort study of 1506 adults in Eastern China (Wendlandt et al., 2018). Contrary to the findings of Thomas et al. (2015) and Wendlandt et al. (2018), Kamate et al. (2010) found that knowledge was not a significant predictor of pandemic preparedness. In their cross-sectional study involving 791 randomly selected respondents, Kamate et al. (2010) found that although knowledge about Influenza A was high among respondents, this did not correlate with preventive behaviors (Pearson coefficient = +0.6079).

Knowledge does not only directly influence PHEP, but it also influences it indirectly as a mediator. A person's knowledge of a PHE mediates factors such as fear, distress, and misconceptions during preparedness (Lau et al., 2005; Wong & Sam, 2011; Lau et al., 2009; Almutari et al., 2016). In a cross-sectional study of 1050 randomly selected individuals, Wong and Sam (2011) found that inadequate knowledge of some signs, symptoms, and modes of transmission of H1N1 was associated with several misconceptions and less perceived susceptibility to the disease, thus affecting prevention activities. Similarly, misinformation and the general misconception about the mode of transmission of the Ebola disease led to fear within the Saudi Arabian healthcare community and the public (Almutairi et al., 2016). Still, Winters et al. (2018) demonstrated that knowledge mediated the effects of media, government, and community information sources and Ebola disease preventive behaviors in Sierra Leone during the Ebola disease outbreak.

2.14 Outcome Expectancy

Outcome expectancy is an individual's expectation about the physical or social consequences of performing an action (Kelder et al., 2015). There are two outcome expectancy variables, i.e., positive outcome expectancy (POE) and negative outcome expectancy (NOE). The former taps into the belief that personal preparation can make a difference and improve one's life, while the latter conceptualizes that hazards are too devastating for individual actions to make a difference (Paton et al., 2008; Paton et al., 2009). Outcome expectancy is used in several SCT and self-efficacy-based studies to analyze their direct effects on physical activity (Williams et al., 2005; Gao et al., 2008; Li. 2013). In the context of PHEP, outcome expectancy has been used to investigate people's intention to prepare.

A cross-sectional study involving 400 respondents in Auckland, New Zealand, by Paton et al. (2008) found that positive outcome expectancy correlated positively with the intention to prepare (0.37), community participation (0.18), and articulating problems (0.24). Paton et al. (2008) found that intention to prepare negatively correlated with negative outcome expectancy beliefs (β -0.12). Positive outcome expectancy strongly predicted SARS prevention behaviors ($\beta = .30$, $B = .21$, $SE = .05$, $p < .001$), i.e., frequent handwashing and sanitizing in a study of 429 undergraduates randomly selected from a New York University (Kim and Niederdeppe, 2013). The importance of outcome expectancy and PHEP was noted by Ernsting et al. (2011) in a study that looked at influenza vaccinations. In their longitudinal study of 594 German employees, Ernsting et al. (2011) found that outcome expectancy was strongly associated ($p<0.001$) with the intention to get an influenza vaccination. Similarly, in a randomized-controlled study

conducted in the Muang district community in Chiang Rai, a province in Thailand, Payaprom et al. (2011) found that outcome expectancies predicted intention to obtain a flu vaccine ($p < 0.001$).

Aside from pandemics and other disease outbreaks, studies have shown that outcome expectancy predicted people's preparedness in other natural disasters. In a study of outcome expectancy and self-efficacy involving 286 adult population in Mumbai, Samaddar et al. (2014) found that outcome expectancy and self-efficacy correlated with the intention for flood preparedness. Consistent with the findings of Samaddar et al. (2014), Paton et al. (2005) claimed that outcome expectancy, self-efficacy, and action coping affected the intention to prepare during natural hazards. In a randomized study involving 660 respondents from New Zealand, Paton and colleagues found that outcome expectancy mediated the effects of critical awareness, earthquake anxiety, and risk perception on the intention to prepare. Also, Johnson et al. (2005), in a mixed study that involved a survey of 300 residents and six focus groups, found that low levels of outcome expectancy and self-efficacy were associated with low levels of Tsunami preparedness intention in coastal Washington.

2.15 Risk Perception

Risk perception is essential for precautionary action, although it is sometimes biased (Brug et al., 2009) and influenced by previous disaster or disease outbreak experiences (Chan et al., 2014) as well as other socioeconomic and demographic characteristics (Ho et al., 2008). Slovic (1999) explained the psychological construct of risk perception as people's subjective judgment when characterizing and evaluating hazards. High-risk perceptions may predict protective behavior when response and self-

efficacy are high (Brug et al., 2009). In a qualitative study involving Chinese communities in Europe, Jiang et al. (2009) found that SARS information influenced perceived threat and protective behaviors among Chinese in Europe. Also, in a study involving 407 randomly selected adults, Miceli et al. (2008) demonstrated that disaster preparedness was positively associated with risk perception of flood among risk groups in the north of Italy ($\beta = 0.13$, p-value < 0.05). Contrary to both studies above, Kim et al. (2015) found that perceived likelihood and concern about contracting the 2009 H1N1 flu among Hispanic people in Arizona were not strongly associated with preventive behaviors.

2.16 Past Experience

An individual's past experiences with a disaster or an emergency can influence how they judge, prepare, and respond to feature events. In a nationwide cross-sectional study of a public health disaster such as a respiratory disease like H1N1, Heo et al. (2013) noted that previous experience with H1N1 triggered vaccination even among low-risk groups in Korea during the 2009-2010 H1N1 outbreak. Also, the relationship between past experience and reactions to events (i.e., PHEs) is not limited to disease outbreaks but other natural disasters such as earthquakes and hurricanes. In a qualitative interview involving 48 residents of three towns in New Zealand, Becker et al. (2017) demonstrated that past earthquake experiences influenced preparedness by raising awareness and knowledge, helping individuals understand the consequences of a disaster, and influencing emotions and feelings. Similarly, past hurricane experiences also mediated several variables, e.g., negative affective risk perceptions and preparedness to influence evacuation intentions among residents in Miami-Dade County, Florida (Demuth et al.,

2016). Contrary to the findings above, Chan et al. (2014), in their cross-sectional household survey involving 133 households in the Gansu Province, China, found that previous disaster experience although was significantly associated with the perception of living in a high disaster risk area (OR= 6.16), close to 11% of households, possessed a disaster emergency kit. Supporting the findings of Chan et al. (2014), Rincon et al. (2001), in a study involving 334 families in Miami, noted that only 37% of families that experienced hurricane Andrew would go to a shelter compared to 49% of families that did not (p-value<0.05).

Past experience can also influence an individual's behavioral capacity coupled with cognitive and environmental influences. Having good behavioral skills enables the successful performance of behavior such as vaccination, handwashing, wearing a face mask, and social distancing, among others. According to Bandura (1997), behavioral skills and self-regulation can be achieved through self-monitoring, goal setting, feedback about the standard of performance, self-reward, and self-instruction. Admitting that PHEP involves a continuous cycle of various activities, having the required behavioral skills to perform those activities would improve preparedness. Since preparedness is a form of behavior, there should be an interactive effect between individual and environmental factors to enable the success of PHEP.

2.2 Environmental Factors

Social structure, community socioeconomic status, and the quality of the environment all contribute to the social environment that influences certain forms of behaviors (Yen & Syme, 1999; Morenoff et al., 2001; Woolf & National Research Council, 2013). Socio-environmental factors can either permit, promote, or discourage

engagement in a specific behavior (Glanz et al., 2015). In public health, the effects of the association between socio-environmental and individual factors on health have been established by Christian et al. (2011) and Suglia et al. (2016). These factors, known as social determinants of health, include education, race, stigma, unequal access to healthcare, and social justice, among others, that influence individuals' health status (Marmont & Wilkinson, 2005). Socio-environmental factors create a network of social relationships and influence during public health emergencies (Srinivas & Nakagawa, 2008). They include social support, normative beliefs, observational learning, timeless of information, language and financial barriers, and the mass media, among others (Kapucu et al., 2008; Gamboa-Maldonado et al., 2012, Gupta, 2011; Burke, 2012; Kleier et al., 2018).

2.21 Social Support

Wills and Ainette (2012) defined social support as a process by which interpersonal relationships protect and promote an individual's wellbeing, especially in stressful life circumstances. Social support could either be in the form of emotional support, esteem support, and informational support (Kelder et al., 2015). These social support forms can come from various sources, including family, friends, community ties, romantic partners, and coworkers. Some studies have shown how social support through the strengthening of interpersonal relationships has helped alcohol, drug, and tobacco users gain perceived self-efficacy to overcome their addiction (Atadokht et al., 2015; Garmendia et al., 2008; Dobkin et al., 2002). The outcomes of other studies have also demonstrated the effects of social support on stress reduction and providing necessary aid

under challenging situations (Atadokht et al., 2015). Furthermore, researchers have shown how social support could affect individuals' PHEP.

Social support plays a significant role in networking, resilience, and capacity building in PHEP. Social support in voluntary association memberships and volunteering increases an individual's emergency preparedness capacity (Reininger et al., 2013). In a quantitative study involving 3088 households selected using a stratified two-stage cluster sampling, Reininger et al. (2013) found a higher prevalence of preparedness among individuals with the highest social support components: fairness [AOR 3.12, 95% CI: (1.86, 5.21)] and trust [AOR = 2.l06; 95% CI: (1.17, 3.62)] compared to those with the lowest of those social support components. Kim and Zakour (2017) also found evidence in their study buttressing Reininger et al. (2013). In a study that looked at disaster preparedness among 719 adults, Kim and Zakour (2017) noted that social support and connection to community organizations were significant predictors of emergency preparedness, with ORs of 1.487 and 1.353, respectively.

The significance of social support in PHEP through spontaneous networks was also established by Rooney and White (2007). In a narrative analysis of disaster preparedness and emergency response among persons with mobility impairment, Rooney and White (2007) found that personal networks (family, friends, coworkers, neighbors) and first responders were helpful during disaster PHEs. Also, Wakui et al. (2017), in a longitudinal study involving 5639 randomly selected adults (65+ years), showed that community support networks were significantly associated with the level of overall disaster preparedness (OR=1.45: care-related support, OR=1.66: emergency support) and evacuation plan (OR=1.66: care-related support, OR=2.29: emergency support) among

care recipients. Consistent with the above study findings, Eisenman et al. (2009), in a randomized, longitudinal cohort study involving 231 Latinos in Los Angeles, found that 93.3% and 91.7% of the participants in the intervention group (disaster preparedness training from the Red Cross and health officers) had emergency water and food compared to 66.7% and 60.6% without the intervention.

2.22 Normative Belief

Normative beliefs are a person's beliefs accepted by specific people or groups that dictate whether a particular behavior is appropriate (Ajzen, 2017). Normative beliefs underpin subjective norms; thus, an individual's normative beliefs determine their subjective norm. Research supports the significance of normative beliefs in guiding and predicting health behavior in direct and relevant ways by changing norms (Reyes et al., 2016; Padon et al., 2016). Health interventions and communication research based on the Social Cognitive Theory (SCT) frequently include the normative belief or subjective norm construct to help people understand the social norms and correct the normative misperceptions in their environment (DHHS, 2012; Neighbors et al., 2004).

Normative beliefs play a significant role in disease outbreaks and disaster preparedness by influencing preventive behaviors through subjective norms (Paek et al., 2010; Clayton & Griffith, 2008; Yang, 2015). In PHEP, subjective norms reflect beliefs concerning the social expectation of significant others towards preparedness and one's compunction to comply with their significant others. Paek et al. (2010) demonstrated that subjective norm was significantly and positively associated ($\beta = 0.187$, p-value < 0.001) with emergency preparedness (gathering emergency supplies and kits), and perceived norms were also significantly and positively associated ($\beta = 0.062$, p-value < 0.05) with

the number of emergency items. Normative beliefs do not only influence preparedness but also the intention to prepare. In a cross-section study of 390 college students, Yang (2015) found that subjective norm was positively and significantly ($\beta = 0.40$, p-value < 0.001) related to intentions to get the H1N1 vaccine. Consistent with the findings of Yang (2015), Myers and Goodwin (2011) also showed how subjective norms predicted the intention of individuals to get the H1N1 vaccine. In an international study involving 362 randomly selected individuals, Myers and Goodwin (2011) found that the constructs of the Theory of Planned Behavior (TPB) explained 44% of the variance to vaccinate against the H1N1 outbreak, with the subjective norm construct being a significant predictor ($\beta = 0.022$) within the theory. Similarly, Tadahiro (2006) observed a relationship between subjective norms and intention to participate in disaster prevention activities among 3,036 households in Nishi-ku of Nagoya-Shi, Japan.

2.23 Observational Learning and PHEP

Observational learning is vital in behavior science and psychology, which describes learning by observing, retaining the information, and replicating the observed behavior (Cherry, 2019; Bandura, 2004; Flyling, 2011). Bandura (2004) argued that individuals are more likely to pay attention to role models with characteristics close to themselves than others with little in common. The concept of observational learning has been applied to rehabilitation in clinical situations, i.e., aphasia, Parkinson's disease, cerebral palsy, and understanding behavioral changes such as smoking and drinking among adolescents (Oochida, 2013, Ennett, 2010).

With the lack of studies on the direct effects of observational learning on PHEP, its impacts on other constructs that influence PHEP, such as efficacy (self and collective)

and knowledge, are well documented. Self-efficacy is not only improved by encouragement but also by observational learning and role modeling (Glanz et al., 2015). Law and Hall (2008) demonstrated how observational learning improved self-efficacy beliefs among adult sports novices. In a pre and post-study involving 128 adults novices in independent and interactive sports, Law and Hall (2009) found that observational learning was positively correlated with self-efficacy for both skills and strategy. Also, Bruton et al. (2019), in a cross-sectional, experimental study, found that observational study at both the individual and team level increased self and collective efficacy task, cohesion, and performance among sports athletes.

Observational learning is also a powerful learning and knowledge tool. Since knowledge and individual cognitive abilities both play an essential role in PHEP, we cannot overlook the significance of observational learning in PHEP. Various studies have shown that learning through observation is an effective pedagogical tool for most individuals (Raedts et al., 2006; Buchanan & Wright, 2011). In an experiment to examine observational learning and physical practice on knowledge (spatiotemporal and amplitude) among 21 randomly selected respondents, Buchanan and Wright (2011) found that knowledge of spatiotemporal patterns was acquired through observational learning and physical practice and was a versatile source of information which is applicable in diverse ways. Also, in a quasi-pre and post-experimental study involving 144 randomly selected university students, Raedts et al. (2006) demonstrated that knowledge of writing and writing performances was better in the observational group than in the control group.

2.24 Timeliness of Information and Timeliness and PHEP

Information on PHEP is helpful when disseminated on time (Kapucu et al., 2008). The timeliness of PHEP information allows the public with enough opportunities to obtain emergency items and reduce property loss by boarding up homes and removing loose objects (Kapucu et al., 2008; Swan et al., 2018). In an emergency management study involving the use of Geographic Information Systems (GIS) by the Florida county emergency managers from 2004 to 2005, Kapucu et al. (2008) found that Florida counties obtained and disseminated information on time using the GIS systems. The study's findings showed that the timely manner information was received and disseminated was associated with higher levels of perceived public disaster preparedness, Kapucu et al. (2008), while delayed or untimely dissemination of information on PHEP negatively affected the decision-making capacity of individuals (Ozel, 2001). In their study, Yu and colleagues found that time pressure negatively affected decision performance and occupied emergency decision makers' cognitive resources.

2.25 Language Barrier and PHEP

PHEP information language plays an important role in understanding information communicated/disseminated during public health emergencies, especially among some minorities (immigrant population) and other native communities with native languages different from the primary language in a country. Kapucu et al. (2008) noted that disaster messages should be tailored, provided in the native languages of the target population, and feasibly disseminated in a culturally appropriate manner. In the United States, minority communities such as Latinos and Africans are at a unique disadvantage due to the lack of understanding of emergency and disaster messages due to the language barrier

(Burke et al., 2012; Ogie et al., 2018). In a multivariable study, Burke et al. (2012) found that language was one of the barriers to disaster preparedness among Latino Migrant Seasonal Farmworkers in Eastern North Carolina. Similarly, in a qualitative study, Gamboa-Maldonado et al. (2012) demonstrated that language was a barrier in the communication between emergency preparedness officers and the County of San Bernardino (Southern California) residents who are primarily Latinos during PHEs.

2.26 Financial Resources for Public Health Emergency Preparedness

PHEP can become a burden to individuals and communities with less financial resources (Gupta, 2011; Burke, 2012; Kleier et al., 2018). Financial resources help individuals or communities purchase preparedness materials, vital emergency kits, and gas for transportation when evacuations are required (Ramsbottom, 2018; Burke, 2012; Kleier et al., 2018). Using *Disaster, Evacuations, and Persons with Disabilities* data, Kim and Zakour (2017) found that higher income and informal support were related to a higher resource for preparedness among older adults in the United States. Gamboa-Maldonado et al. (2012) also noted that funding enhances successful synergies between communities targeted for PHEP and government agencies. These funds enhance diversity and cultural competency, such as recruiting a diverse range of staff at community and external levels and translating preparedness materials to suit the target population's requirements (Andrulis et al., 2011; Schoch-Spana et al., 2013).

2.27 Mass Media

Mass media is a significant facilitator in PHEP (Tekeli-Yesil et al., 2011; Cretikos et al., 2008) through education, information, constructing of public perceptions, and

serving as a channel for communication (Paek et al., 2010, Barnes et al., 2008; Rodriguez et al., 2007; Paul & Dutt, 2010). Mass media are communication outlets used to store and deliver information or data (Shapiro et al., 2007; Luhmann, 2000) and consist of the internet, broadcasting, and publishing (Peters, 2010, media, 2020). Mass media outlets are effective channels for message dissemination and a preferred choice for risk communications and emergency warnings (Rodriguez et al., 2007; Said et al., 2011; Houston et al., 2015). A major outlet of mass media, i.e., social media, is now the world's information hub with over 3 billion users globally, with over 250 million in the United States of America alone (Clement, 2020; Perrin & Anderson, 2019; Pew Research Center, 2010). A study commissioned in 2009 by the American Red Cross Association concluded that social media was the fourth most popular access to emergency information, making it a very effective communication channel to reach the public during PHEs.

The mass media has been demonstrated to effectively educate and inform the masses on PHEP. Broadcast and internet media have been very effective in disseminating reliable information on disease outbreaks, emergencies, and natural disasters (Houston et al., 2015; Cretikos et al., 2008; Tekeli-Yesil et al., 2011; Rive et al., 2012; Acar & Muraki, 2011). In disease outbreak preparedness, mass media helps direct people to trusted sources such as the CDC, WHO, and FEMA, amongst others, for reliable information on the disease (Merchant & Lurie, 2020). Mass media played an important role worldwide in providing COVID-19 disease updates and tracking through live updates dashboards (Anwar et al., 2020). COVID-19 pandemic searches on social media platforms escalated, with Facebook and google scholar sites directing users to the WHO

websites and other leading medical journals, respectively (Jin, 2020; Josephson, 2020). Also, mass media platforms provided users with information and education on the benefits of preventive measures, i.e., vaccinations, handwashing, and social distancing. In a disease outbreak, mass media platforms inform individuals about the availability of vaccines, where to get tested, what to do with the results, and where to receive care if necessary (Merchant & Lurie, 2020). Anwar et al. (2020) noted that the mass media provided a unified platform for all public health communicators, health education guidelines, and social distancing strategies while keeping social connections. Olowokure et al. (2012) saw a positive correlation (r=0.67; p-value: 0.02) between the volume of media reporting on the H1N1 pandemic and the number of laboratory tests in West Midlands England. Chen and Stoecker (2020) demonstrated that additional published reports about Influenza by the media were associated with an increase in the vaccination uptake rate among 65+ adults.

The significance of mass media in the swift dissemination of information during PHEs is well documented. COVID-19 disease live updates dashboards from the CDC, WHO, and Harvard University are constantly updated and easily accessible by the population. In a qualitative study involving nine graduate and undergraduate students, White et al. (2009) demonstrated that online social networking sites were fast, cheap, and accessible channels for emergency communications. They also found that online social networking sites helped coordinate and managed response, recovery efforts, and shared ideas during PHEs.

Another reliable source of PHE information and education is the traditional media (radio). Radio is the prime source of information when Twitter and other forms of social

media are not accessible due to power outages or poor connections resulting from rainstorms or other natural disasters. Burger et al. (2013) demonstrated this when they found that most individuals in Central New Jersey and Jersey shore communities relied on radio and friends for information when severe power outages rendered cell phones, web, and social media on cell phones less usable during Super Storm Sandy. Cretikos et al. (2008) showed that broadcast media (radio) was the primary source of information (78%; 68-88%) during the storm disaster in New South Wales, Australia, in June 2007. Findings from Tekeli-Yesil et al. (2010) also demonstrated that the broadcast media was the leading source of information on earthquake awareness and precautionary measures among residents in Istanbul, with 89% and 48% of the respondents getting their information from the television/radio and newspapers or magazines respectively.

The mass media can also be a self-information tool. The mass media has been involved in specific school educational programs on preparedness attitudes and risk perception activities to help develop behavioral actions for disaster reduction (Romo-Murphy et al., 2011; Shiwaku & Shaw, 2007). In a survey involving 1,065 students from 12 schools in Maiko Japan, Shiwaku and Shaw (2007) showed that adding a media component (internet, newspapers) to emergency preparedness education tasks improved the awareness level among students from places that had a higher risk of future earthquakes. In a quasi-experimental study involving 213 primary and intermediate pupils from Napier, New Zealand, Ronan et al. (2012) also noted that the addition of local broadcast media and other educational messages increased pupils' knowledge, physical, and psychosocial preparedness.

Role of Mass Media in Constructing Public Perceptions of Risks

Media outlets have been beneficial in constructing the public's perceptions of the risk associated with PHEs, thus improving population preparedness (Paul & Dutt, 2010; Sharma et al., 2009). Newspapers, television, radio, and other media channels reporting on the risks of the tropical cyclones on the East coast of India were associated (p-value< 0.05) with evacuation behavior (Sharma et al., 2009). While evacuation behavior was high among individuals who considered some media outlets a source of information and education, television and radio transmission of disaster warnings on cyclone Sidr in Bangladesh increased awareness of the threat and fatalities if people failed to evacuate (Paul & Dutt, 2010). Peak et al. (2010), in a survey involving 1,302 randomly selected adults in Georgia, showed that paying attention to the news was significant (p-value <0.001) to having survival kits at home and also preparing individuals cognitively for disasters and emergencies.

Contrary to the findings of Paul and Dutt (2010) and Sharma et al. (2009), West and Orr (2007) demonstrated that media and other communicational channels did not affect people's perceptions of PHEs. In a study of 785 randomly selected individuals in Rhode Island, West and Orr (2007) found that communication channels, including the weather media, were not significantly (p-value >0.05) associated with residents' perception of vulnerability. Also, McCauley et al. (2013) found that false news reports on the April 2009 H1N1 flu outbreak allegedly originating from Mexican pig farms led to most Latinos having to cope with the stress of stigmatization.

Mass Media as Communication Channel

PHE warnings and policies are usually generated by official government agencies and disseminated through mass media to the general population. In the United States of America, federal agencies such as FEMA, the American Red Cross, Office of Homeland Security, Environmental Protection Agency (EPA), CDC, and others are responsible for planning, reacting, and supplying emergency items before, during, and after any PHE. News coverage of PHE usually gains more attention than any other issue among the general public in the United States of America (Pew Research Center, 2010).

Mass media coverage of disasters and emergencies shapes or influences how the population and the government perceive, view, and respond to PHEs (Rodriguez et al., 2007). Sharma et al. (2009) demonstrated that a higher number of media outlets that reported on government evacuation warnings during the tropical cyclones on the East coast of India was significantly associated (p-value< 0.05) with high evacuation behaviors. Ronan et al. (2012) showed the significance of mass media as an effective communication channel used by government agencies and public sector organizations. In their study on crisis communication in Australia's 2011 South East Queensland floods, Ronan et al. (2012) found that the Queensland Police successfully disseminated timely and relevant information to its immediate audience and successfully amplified those messages using Twitter. Lovari and Bowen (2020) also showed that government agencies and public sector organizations used social media (Twitter and Facebook) and radio to create good media relations with reporters.

On the other hand, the media is criticized for framing situations during PHEs depending on their selected focus (Barnes et al., 2008; Mirón & Ward, 2007). Barnes et

al. (2008) noted that the media framed most Hurricane Katrina stories by highlighting government response and less often addressed individuals and communities' preparedness or responsibility levels. In addition, Pieri et al. (2019) noted that media framing in the United Kingdom of the 2014-2015 Ebola outbreak led to most people believing that the Ebola outbreak was similar to any other pandemics. Although the media has been sometimes criticized for framing situations during PHEs, they are the first and biggest communication channel for government laws and policies on PHEs and preparedness.

2.3 Laws and Policies

Laws and policies during a PHE differ concerning the particular emergency. Sometimes mandatory evacuation laws and policies are enforced during hurricanes, wildfires, and other natural disasters. Other times, governments have policies that allow financial assistance to individuals during PHEs. Although implementing some of these laws and policies has been a problem in some cities (Condon & Shinsha, 2010), the outcomes of these laws and policies have significantly improved public health (Cheng et al., 2020; Aquino et al., 2020; Chinazzi et., 2020). There were successful social distancing, isolation, and face mask policies and laws passed during the SARS outbreak in 2003 and the current COVID-19 (Syed et 2003; Feng et al., 2020).

2.31 Face Masks as a Preventive Measure

Face masks are used as a preventive measure during infectious disease outbreaks (Maclntyre et al., 2009; Cowling et al., 2009). They serve as a barrier against respiratory droplets from traveling from one person to another when they sneeze, cough, talk, or into the air reducing the spread of respiratory diseases (CDC, 2020, Cheng et al., 2020; Condon & Shinsha, 2010; Johnson et al., 2009). In a systematic literature review,

Cowling et al. (2010) found some evidence to support using face masks to protect others during illness and reduce influenza virus transmission. Similarly, the findings of an international study conducted from December 31, 2019, to April 8, 2020, in eight countries showed that diagnosed cases of COVID-19 were significantly lower ($p<0.001$) within populations with community-wide masking compared to other populations with lower usage of face masks Chen et al. (2020). Contrary to the findings of Cowling et al. (2010) and Chen et al. (2020), Bae (2020) found that face masks (cotton or surgical) did not effectively filter the influenza virus.

2.32 Social Distancing

The combination of facemasks and social distancing further reduces the spread of influenza. (Maclntyre & Wang, 2020). Social distancing lowers the interactions between people in a broader community in which some individuals may be infectious but asymptomatic (Wilder-Smith and Freeman, 2020; CDC, 2020). To practice social distancing, the CDC advised staying at least six feet apart from one another. In a systematic review of articles on the impact of social distance measures in Brazil, Aquino et al. (2020) found that social distancing measures adopted by the population appeared effective for what, particularly when combined with isolation and quarantining of contacts. Consistent with the findings of Aquino et al. (2020), Rashid et al. (2011) noted that the closure of schools, jobs and the banning of mass gatherings reduced the transmission and delayed the peaking of the influenza pandemic in 2009. Using a mathematical modeling approach, Matrajt and Leung (2020) found that social distancing interventions averted the incidence, hospitalizations, and deaths associated with COVID-19.

Both isolation and quarantine are effective methods for controlling infectious disease outbreaks. People with a contagious disease are separated from healthy individuals through isolation, while quarantine separates and restricts the movements of individuals exposed to a contagious disease and monitors them for signs of illness (CDC, 2017, Taghrir et al., 2020). While isolation requires a sick person to stay at home, quarantine requires a predefined and serviced location. During an outbreak of an infectious disease, quarantine stations are created in several locations within the geographic area of the outbreak. Aside from the quarantine stations at ports of entry and land border crossings in the United States, anyone who comes into contact with a confirmed COVID-19 case is advised to stay home for 14 days as a form of quarantine (CDC, 2017, 2020). Although quarantines come with some psychological, emotional, and financial implications, Taghrir et al. (2020) noted they were successfully used to limit the spread of early pandemics such as the Plague epidemic of 1347-1352, the Cholera outbreak in the nineteenth century, and the Influenza pandemics of the early 1900s (CDC, 2013). With the current COVID-19, Taghrir et al. (2020) found in a mini policy review that mass quarantine in China was an effective strategy in controlling the spread of the disease in the country. In a similar study using a smaller population, Hou et al. (2020) found that quarantine and isolation reduced latent individuals' contact rate in Wuhan, China.

2.33 Travel Ban

The traveling routes of individuals often determine the pattern of spread of infectious disease during a pandemic or disease outbreak, and traveling patterns enable infectious diseases to spread worldwide at alarming rates, hence the importance of

introducing traveling bans during pandemics. Therefore, restricted travel through policy or laws is an efficient means of controlling the international spread of infectious diseases during a pandemic (Camitz and Liljeros, 2006; Hollinsworth et al., 2006; Chinazzi et al., 2020). Governments use traveling restrictions to reduce their population's risk of an emerging epidemic in different countries. Traveling bans, laws, and policies result in adverse economic impacts on travel and tourism companies (Hollinsworth et a., 2006; Nicola et al., 2020) and sometimes on the local economy. While admitting that travel bans are associated with some financial problems, their public health benefits during disease outbreaks are well noted. Poletto et al. (2014) found that international travel restrictions to West African countries with the Ebola virus disease in 2014 reduced the global spread of the disease. Similarly, Constantino et al. (2020) noted that complete travel bans between China and Australia reduced cases of COVID-19 by about 86% in Australia during the peak of the epidemic.

2.34 Policies on Financial Assistance

Some laws allow government agencies and other international organizations such as the World Bank, WHO, United Nations, and other governmental agencies in different countries to support PHEP financially. The World Bank took a lead role during the 2014 – 2016 Ebola outbreak in West Africa to create a Pandemic Emergency Financing (PEF) facility responsible for providing funds during outbreaks of specific infectious diseases (World Bank, 2019). In the United States, the Stafford Disaster Relief and Emergency Act allowed FEMA to coordinate the delivery of federal technical, financial, logistical, and other assistance to states and localities during major disasters or emergencies. Also, the CARES Act, a COVID-19 assistance policy, was passed to provide quick and direct

assistance for American workers and families, small businesses and preserve jobs for American industries US Department of the Treasury (2020).

2.35 Identifying Gaps in the Literature

Although there are numerous studies on PHEs for infectious diseases SARS, MERS, Ebola, H1N1, Avian Flu, Zika virus, among others (Kim and Niederdeppe, 2013; Elggal et al., 2018; Almutairi et al., 2016; Madad et al., 2016), there is a dearth of population-based COVID-19 preparedness studies in the United States. There are limited published studies on how individual and environmental factors affect one's preparedness for COVID-19. Furthermore, reports on how other essential elements such as media activities and government policies affected preparedness are scarce. Most COVID-19 research is focused on clinical studies to develop better treatments and a vaccine (Slaoui &Hepburn, 2020; Kambhampati et al., 2020), and there is a paucity of research on COVID-19 preparedness due to the novelty of the disease.

Another significant gap in the literature is the lack of published studies that test the full complement of the SCT and other health behavior theories in predicting or explaining behavior change. With the SCT, researchers often only focus on individual constructs, e.g., self-efficacy/normative beliefs/intentions (Webb and Sheeran, 2006; Liao et al., 2010) or combine them (Romo-Murphy et al., 2011; Paek et al., 2010) or add them to constructs from other theories (Manika and Golden, 2011; Maguire et al., 2019). Theories present a systematic view of situations or events by stating relations among variables to explain and predict events of situations (Keller et al., 2015); thus, applying the entirety of a theory in a study provides a better understanding of the predictability and explanatory strength of the specific theory. This study tests the full complement of the

SCT, thus enabling readers to understand how well the theory predicts COVID -19 preparedness.

Finally, this study adds the mediating effects of the primary constructs of the SCT, i.e., personal cognitive, environmental, and behavioral factors allowing the researchers to move beyond simply asking, "***does*** an intervention lead to improved health?" to asking ***how*** the intervention influences health or behavior change (MacKinnon & Luecken, 2008). There has been a surge in mediation and moderation analysis because they explain the "*why," "how,"* and *"which"* questions researchers ask by providing a more sophisticated understanding of interdependencies between psychological processes and behavior or health outcomes (MacKinnon & Luecken, 2008; Kraemer et al., 2008).

2.36 Justification for Theory Selection

The conceptual framework for this study is rooted in the Social Cognitive Theory (SCT) since the SCT describes the interactive characteristics of individuals and their environment that underline behavior change (Glanz et al., 2015; Bandura, 1989). Previous use of the SCT was to assess the preparedness and prevention of swine flu (Prati et al., 2011, Paton et al., 2008) and disaster preparedness (McIvor, 2009; Paton et al., 2005). Also, in previous studies, the SCT constructs have been modified to investigate the predictive power and specific routes of selected variables related to actual preparedness or intention to prepare (Ejeta et al., 2015). Having some knowledge of COVID-19 and understanding how it spreads, coupled with both individual and environmental factors, play a significant role in understanding COVID-19 preparedness hence the rationale for using the SCT for this study.

CHAPTER III

3.0 METHODOLOGY

3.1 Study Setting

The United States is a country on the North American continent and the third-largest country in population and size (National Geographic Society, 2021). The total land area of the United States as of 2018 was 9,147,420 km^2 (3,531,838 square miles) (The World Bank, 2021), with an estimated population of 328,239,523 in 2019 (V2019) (US Census Bureau, 2021). The female population (50.8%) of the United States is slightly higher than the male population, with the persons under 18 years and 65+ years forming 22.4% and 16.5% of the population, respectively (US Census Bureau, 2021). Regarding race, 60.1% of Americans are white (non-Hispanic and non-Latino), 13.4% are Black and African American, with Hispanic or Latino groups forming 18.5% of the population (US Census Bureau, 2021). English and Spanish are the two most spoken languages in the United States (US Census Bureau, 2021).

3.2 COVID-19 Profile of the United States

As of the first quarter of 2021**,** the United States is currently the epicenter of the COVID-19, and states like New York, California, Florida, and Texas report the most cases and fatalities (CDC 2021). Compared to other countries, the United States, by the end of 2020, had the highest daily confirmed COVID-19 cases and deaths, with the

country recording over 20 million cases with close to 400,000 deaths (CDC, 2021, 2020, Roser et al., 2020). Data from the CDC (2021) shows that COVID-19 cases are highest among individuals aged 18-24, with most deaths among adults 80 years and over. Furthermore, COVID-19 cases were highest among American Indian/Alaska Natives non-Hispanics compared to other races (Black non -Hispanics, white non-Hispanics, Asian/Pacific Islander non-Hispanics, and Hispanics), with COVID-19 cases and deaths equally distributed among all counties nationwide (CDC, 2021). Human mobility and COVID-19 transmission dashboard created by the CDC and the Georgia Tech Research Institute as of April 1, 2021, showed that human mobility has decreased from workplaces (-30/%), retail and recreation (-16%), transits stations (-26%) but increased at homes (30%) (CDC, 2021). Furthermore, the CDC (2021) noted on April 1 that the general mobility index of the United States was 4.0.

New cases and fatalities started declining in January 2021. According to the CDC website, on April 1, 2021, the observed and forecasted weekly COVID-19 deaths in the United States dropped steeply from about 24,000 deaths to around 6000 deaths. The decrease in new cases and deaths is attributed to the rapid COVID-19 vaccinations nationwide (CDC, 2021). The daily count of total COVID-19 vaccine doses administered had continuously risen since December 14, when the vaccine was made public (CDC, 2021). As of March 2021, the United States was among a few counties (e.g., Gibraltar, Israel, United Kingdom, Chile) to have administered over 40 doses of the covid-19 vaccine per 100 people (Patterson et al., 2021).

3.4 Philosophical Worldview of the Study.

This study is grounded in the postpositivist philosophical worldview (Ryan, 2006), popularly known as the scientific method, which premises the notion that "causes" determine outcomes or effects (Creswell & Creswell, 2017). The postpositivist worldview supports the idea that the problems studied by postpositivists reflect the importance of identifying and assessing the causes of the practical outcomes, i.e., those found in experimental studies (Philips & Burbules, 2000; Creswell & Creswell, 2017). Using the postpositivist philosophical worldview, this study seeks to understand public emergency preparedness before and during the COVID-19 pandemic in the United States by surveying individuals in the country.

The postpositivist philosophical paradigm is rooted in determinism, reductionism, empirical observation and measurement, and theory verification (Creswell & Creswell, 2017). Determinism suggests examining the relationship between/among variables is key to answering hypotheses and questions through surveys and experiments (Creswell & Creswell, 2017). Also, the reductionistic nature of the postpositivist approach allows ideas, i.e., variables that comprise hypothesis and research questions, to be reduced into a small and discrete set to enable easy testing (Creswell & Creswell, 2017). The knowledge that evolves through a postpositivist lens hinges on measurement and careful observation of the objective reality in the world, thus, allowing the researcher to develop numeric measures of individual behaviors and other observations. Postpositivists also accept the scientific method approach to research, enabling researchers to begin a study with a theory, obtain data supporting or disproving the theory, and do further revisions and tests (Creswell & Creswell, 2017). The postpositivist philosophical paradigm allows for a

quantitative approach that enables surveys to produce numerical data that can be statistically analyzed and establish relationships between/among variables. This will enable researchers to accept their theory and, if necessary, make significant revisions or conduct additional tests. The postpositivist philosophical worldview allows me to establish the relationship between my independent and dependent variables and test the SCT theory in this study. Furthermore, it makes the interpretation of my results easier as study variables are reduced to a small and discrete set. Using this philosophical paradigm, I will contribute to the literature on the predictability of the SCT in COVID-19 preparedness in the United States.

3.5 Research Design

A non-experimental cross-sectional quantitative research survey design (Creswell &Creswell, 2017) was used to determine the factors that influence COVID-19 preparedness among individuals in the United States. This research design does not involve the manipulation of independent variables random assignment of participants to conditions or orders of conditions (Chiang et al., 2015). Since the independent variables in this study were not manipulated or randomly assigned to conditions or orders of conditions, a non-experimental cross-sectional quantitative research design is the preferred study design to address the study's research questions.

3.51 Non-Experimental Quantitative Research (Survey) Design

A survey design was deemed appropriate for this study as it would provide quantitative descriptions and enable researchers to test for associations among variables. Also, a survey design economy coupled with the rapid turnaround in data collection makes it the preferred research design for this study. A survey design helps researchers

provide descriptive statistics (percentages and frequencies) on study participants' demographic characteristics and help researchers answer questions about the relationships between independent variables (media activities, policies, and the mediators) and the dependent variable (COVID-19 preparedness).

This survey was cross-sectional; data was collected at one point in time (Creswell & Creswell, 2017). Data was collected through the ResearchMatch online tool in this cross-sectional survey research design. ResearchMatch is a free and secured online tool created by academic institutions across several countries and consists of volunteers and researchers affiliated with over 180 academic institutions. ResearchMatch works by allowing potential volunteers to register by providing some health and demographic information. Approved researchers can search non-identifiable volunteer data to find potential matches for their study. Volunteers are notified by random emails from the researcher. They can choose if the researcher can have their contact information to provide further details on the study, so they decide to take part in the study or not. If the researcher uses REDCap, interested participants will automatically be sent a link to the survey consent forms, inclusion criteria, and the survey in REDCap.

The rationale for this data collection platform's choice is the convenience it brings to the study in this period of COVID-19 with several restrictions on physical contact. Also, cross-sectional surveys allow the researcher to obtain real-time data without interviewers, thus helping researchers get easy access to data at a lower cost (Roberts & Allen, 2015). The survey contained 77 items, and participants were required to use about 15-20 minutes to complete this survey. Using an online data collection approach increased the study's response rate. (Harlow, 2010; Roberts, 2015). Although the online

data collection approach has some weaknesses (survey fraud, cooperation problems), the ResearchMatch platform is secured and well-structured to limit these problems.

3.6 The Population and Sampling

3.61 Population

This study's target population are adults aged 18 years or older currently residing in the United States and available on the ResearchMatch platform. The ResearchMatch platform, as of April 1, 2021, had 162,069 members, out of which 152,364 were volunteers and 9,705 researchers. The number of volunteers on the ResearchMatch platform was used as our sampling frame. Since the ResearchMatch platform is available throughout the United States, it has volunteers and researchers from all parts of the country, thus aligning volunteers and the larger United States population. I searched for potential participants from the non-identifiable volunteer data to find possible matches for the study. Emails about the study were randomly sent through ResearchMatch to all these potential matches. Interested volunteers were automatically sent a link to REDCap, where the study consent forms, inclusion criteria, and the survey were all available. Participants who wanted to participate in the study proceeded to the survey after reading the consent forms and completing the inclusion criteria questions.

3.62 Type of Sampling: Probability-based Internet Panels

A probability-based internet panel sampling method was used for this study (Hays, 2015). Internet panels first came into use in 1985 (Saris & De Pijper, 1986) and have since been accepted by the research world. The use of internet panels in data

collection is increasing because it is cost-effective, enables access to large and diverse samples rapidly, takes lesser time compared to the traditional methods to obtain data, and the standardization of the data collection process makes the replication of studies easy (Hill et al., 2007; Fricker, 2016; Hays, 2015). Examples of probability-based panels include Telepanel/CentERpanel, Knowledge Networks (now GFK KnowledgePanel®), the American Life Panel, the LISS Panel, and the Understanding American Study panel, RessearhMatch, among others (Hays, 2015).

The probability-based internet panel approach works for this study due to its rapid access to large and diverse samples, cost-effectiveness, and the lesser time it takes to obtain study data. Furthermore, it allows the researcher to randomly select study participants, thus reducing selection bias. Also, this approach to data collection helps the researcher address the study's research questions, which focus on determining factors to influence behavior change among a considerable population. Despite the advantage of having a known denominator, i.e., sampling frame, the probability-based internet panels often have a low recruitment participation rate (Hays, 2015).

Challenges such as data integrity may arise using internet panels. Some respondents may engage in various less than optimal strategies to get through surveys in a short period, thus leading to a variety of undesirable responses such as answering too fast and false responses. To help improve the data quality, all respondents with high levels of missing data in this study were excluded (Liu et al., 2010).

3.63 Sample Size

This study did not have a specific sample size as the survey was allowed to stay on the ResearchMatch platform for a month. The study had close to 3800 respondents

after a month. All incomplete surveys were removed, thus remaining 3383 respondents who had fully completed the survey. This sample size number was used in the research analysis.

3.7 Instrumentation

3.71 Instrument Design

This study's instrument was designed through a three-step process, including content domain determination, item generation, and instrument construction (Thorndike, 1995). The first step identified the content domain through a literature review on factors influencing PHEs and PHEP, SCT, and interviews with some respondents. Keywords and phrases used in the literature review were preparedness, public health emergencies, social cognitive theory, instrumentation, surveys, survey instrumentations, survey designs, instrument design, public health emergency instruments, and public health emergency preparedness instruments. Literature from these searches enabled the researcher to identify existing surveys used in similar PHEP studies and provide clear definitions of the constructs, boundaries, components, and dimensions. Also, the qualitative data obtained from the interviews helped the researcher determine variables and concepts of the relevant constructs and generate survey items for the study.

Based on the information gathered from the literature review and interviews, the instrument items were generated for this study. Although the study instrument contains a few reworded items from other instruments, the majority of the items were created by the researcher based on the theories that underpinned the study and the results of the literature searches and interviews. Instrument items were compared with the study research questions to ensure they reflected and were relevant to the study research

questions (Bowling, 2014). The instrument had a total of 77 items categorized under the primary constructs of the study: individual and environmental factors influencing PHEP, preparedness, and some demographic items. Thirteen (13) demographic items ranging from age, gender, income, and chronic diseases to political affiliation, among others, were created. Individual factors had 20 items further grouped under sub-constructs such as self-efficacy, collective efficacy, knowledge, past experience, perceived risks, outcome expectancy, behavioral skills, intention reinforcement, and punishment. A total of 27 items were generated to address environmental factors. The items represented sub-environmental factors such as normative beliefs, barriers, media, and policy. Finally, 17 items were created to measure participants' preparation for the emergency and the kind of supplies they gathered before and during the COVID-19 epidemic.

In the final stage, i.e., instrument construction, the items grouped under their respective constructs were refined and organized in a suitable sequence and format, making them easy to use. The final instrument consisted of 77 closed-ended questions with only one opened-ended question. The response options for the instrument included two sets of 5-point Likert scales, which measured participants' level of agreement and level of preparedness, respectively. Other response options were yes/no and some multiple-choice answers. The only open-ended question was the last item on the instrument that asked participants to add anything that was not captured in the instrument.

Regarding decision-making on the closed-ended questions, an average value was calculated for all constructs, with more than one item being measured on the Likert scale. This was used in the inferential analysis to answer all three study research questions. Furthermore, multiple-choice response options were used mainly to understand the

demographic characteristics of the sample and their standing across key variables. Finally, the "yes/no" responses were used in descriptive and other items. After the instrument was completed, it was sent out to a group of experts for validation.

3.72 Instrument Validation

Valid and reliable instruments are essential in studies that involve complex constructs (Rubio et al., 2003). The validity of an instrument is the instrument's ability to measure the properties of the construct under study (Devon et al., 2007). The purpose of validating the instrument is to ensure that it measures what it is supposed to measure (Lai, 2013). Traditionally, three standard forms of validity are demonstrated: content, criterion, and construct validity (Rubio et al., 2003). Content validity is used to determine the extent to which items on a measure or scale access the same content (Rubio et al., 2003). This allows the instrument to make appropriate and meaningful inferences and decisions (Moss, 1995). Content validity can be characterized as logical validity or face validity, with the former indicating the validity of a measure based on its appearance and the latter involving a more rigorous process, for instance, using a panel of experts to evaluate the content validity of a measure (Rubio et al., 2003). The next type of validity is criterion validity or predictive or concurrent, and it is another form of validity used to describe how well scores on a measure (predictor) predict scores on another measure of interest (criterion) (Nunnally & Bernstein, 1994). Criterion validity is considered the "gold standard," and statistical relationships are usually established using correlations. There are three types of criterion validity; postdictive, concurrent, and predictive (Rubio et al., 2003). The third form of traditional validity is construct validity. Anastasi and Urbina (1997) described construct validity as "the extent to which the test may be said to

measure a theoretical construct or trait" (p.126). Construct validity is used in survey research and treatment effects (Fink, 2010; Reichardt, 2005). Three kinds of construct validity are factorial, known groups (convergent), and discriminant (divergent) validity (Rubio et al., 2003).

3.73 Content Validation

For this study, content validity was used to validate the instrument. A panel of experts comprising content experts and potential participants was selected. The content experts chosen for this validation were professionals who have published or worked in public health promotion/risk communication/ PHEs and other related fields and healthcare providers with experience in COVID-19 patients and treatments. Potential research subjects were selected, thus ensuring a representation of the population for whom the measure is being developed. A total of 10 content experts and 4 potential participants were selected for this study. Although the literature is diverse concerning the required number of content experts to validate an instrument, some researchers suggested a range of two to twenty experts (Walz et al., 2010; Gable and Wolf, 2012).

An email was sent to the Expert Panel ten days prior to soliciting their participation. A copy of the instrument and a cover letter was attached to the email. The cover letter included the purpose of the study, why the said expert/potential participant was selected, a description of the measures or constructs and their scoring, and a detailed explanation of the response form. Explaining the use and the purpose of the measures or constructs clarifies the significance of the content validity study (Rubio et al., 2003). The experts were asked their viewpoints on the clarity, relevancy or representativeness, and comprehensiveness of the items in measuring the constructs they are defined to measure.

The cover letter for the two groups of panel members (content experts and potential participants) was designed to reflect their educational levels. The experts were requested to judge the Content Validity Ratio (CVR) and Content Validity Index (CVI) and reflect on instrument comprehensiveness. Potential participants on the Panel were asked to perform face validity checks and the readability of the instrument. Experts were also asked to perform a face validity check when they judged the instrument.

3.74 Content Validity Ratio (CVR)

CVR was used to determine whether an item is necessary for operating a construct in a set of items or not (Zamanzadeh et al., 2015). Experts were requested to score each item from 1 to 3 (1: not necessary, 2: useful but not essential, 3: essential). CVR ranges from "1" and "-1"; thus, a higher CVR score shows further agreement of the experts on the necessity of an item in an instrument (Zamanzadeh et al., 2015). Using the CVR formula: CVR= (N_e - N/2)/(N/2), in which the N_e is the number of panelists indicating "essential" and N is the total number of panelists, CVR for each item was calculated. The Lawshe table was then used to determine the minimum numeric CVR required to retain an item on an instrument (Lawshe, 1975). According to the Lawshe table (Table 1), 0.62 is the minimum CVR value for an item with a total number of 10 experts. Therefore, all items with a CVR less than 0.62 were eliminated. After the first round of judgment, thirteen items had CVRs less than 0.62, and they were eliminated from the initial 91 items created. The remaining 78 items were modified based on the experts' recommendations in the first round of judgment. The instrument was sent out for the second round of judgment to determine the Content Validity Index.

Table 1.*The Lawshe Table for Minimum Values of Content Validity Ratio (CVR).*

No. of Panelists	Min Value
5	0.99
6	0.99
7	0.99
8	0.75
9	0.78
10	0.62
11	0.59
12	0.56
13	0.54
14	0.51
15	0.49
50	0.42
25	0.37
30	0.33
35	0.31
40	0.29

3.75 Content Validity Index (CVI)

The CVI was calculated on the remaining78 items in the second round. The experts were asked to rate the instrument items in terms of relevancy and their clarity to assess the underlying constructs based on the theoretical definitions of the constructs and their definitions. The ratings were done on a four-point ordinal scale for relevancy and clarity. The rating of relevancy was: 1 [not relevant], 2 [somewhat relevant], 3 [quite relevant], 4 [highly relevant] and clarity was: 1 [not clear], 2 [somewhat clear], 3 [quite clear], 4 [very clear] (David, 1992; Waltz & Bausell, 1981). Each of the ratings (relevancy and clarity) were then dichotomized by combining the values of "1" and "2" together and "3" and "4" together to form two dichotomous categories of responses:

relevancy; "not relevant," and "relevant" and clarity; "not clear" and "clear." CVIs for clarity and relevancy were calculated for each item (I-CVI) and the scale (S-CVI). Both I-CVI and S-CVI range from "0"- "1" (Lynn, 1986; Waltz & Bausell, 1981).

To obtain the CVI for clarity, the number of experts who judged the item as clear (rating 3 or 4) was divided by the total number of experts (10) (Lynn, 1986; Waltz & Bausell, 1981). CVI judgment on each item was made as follows: if the item CVI is higher than 79%, the item was appropriate, CVI between 70% and 79% means the item needs revision, and a CVI less than 70% is eliminated (Abdollapour et al., 2011). Among the remaining 86 instrument items after CVR was calculated in the first round of the content validity analysis, one item had a CVI lower than 70%, two items had CVIs between 70% and 79%, and the remaining items had CVIs scores above 79%. The item with a CVI below 70 was eliminated. The other two items with CVIs between 70% and 79% were modified based on the recommendations of some of the experts, while the remaining items with CVI over 79 were maintained (Abdollapour et al., 2011).

CVI for item relevancy was calculated by dividing the number of experts who judged an item as relevant (rating 3 or 4) by the total number of experts (10). All the items but one had a CVI of less than 79%. That particular item was also modified based on the recommendations from some of the experts. Subsequently, an overall CVI for both relevancy and clarity of the instrument (S-CVI) was calculated using the conservative approach: total items on the instrument that achieved a rating of "3" or "4" divided by the total number of content experts (Lynn, 1986; Beck, 2001). The overall content validity of the instrument for relevancy and clarity were 0.918 and 0.929, respectively. Table 2 shows CVI calculations for relevancy and clarity on the remaining 77 items.

3.76 The Comprehensiveness of the Instrument

The experts were asked to judge whether the content of the instrument items and any of their dimensions were complete and comprehensive in terms of the theoretical definitions of concepts and dimensions. Comprehensiveness was expressed as a proportion of experts who identified the instrument's comprehensiveness as favorable by the total number of experts (Lynn, 1986, Grant & Davis, 1997). The agreement on total comprehensiveness was ten, and the comprehensiveness of the entire instrument was 1. Table 2 shows the comprehensiveness calculated for each dimension and the whole instrument.

Table 2. *Content Validity Index and Comprehensiveness of Instrument Dimensions and Total Instrument at the Second Round of Judgment*.

Dimensions of construct of study	Num. of Experts giving a rating of 3 pr 4 to relevancy of item	I-CVI: relevancy	Num. of Experts giving rating of 3 or 4 to the clarity of item	I-CVI: Clarity	Interpretation	The comprehensiveness of instrument dimensions and total instrument	
						Agree	Proportion of Consensus
Self-Efficacy							
D-1	10	1	8	0.8	Excellent	9	0.9
D-2	10	1	8	0.8	Excellent		
Collective-Efficacy						9	0.9
D-1	10	1	8	0.8	Excellent		
Knowledge							
D-1	10	1	10	1	Excellent		
D-2	10	1	10	1	Excellent		
D-3	10	1	10	1	Excellent		
D-4	10	1	10	1	Excellent		
D-5	10	1	10	1	Excellent		
D-6	10	1	10	1	Excellent		
D-7	10	1	10	1	Excellent		
D-8	8	0.8	10	1	Excellent		
D-9	10	1	10	1	Excellent		
D-10	8	0.8	10	1	Excellent		
D-11	9	0.9	10	1	Excellent		
D-12	10	1	10	1	Excellent		
D-13	10	1	10	1	Excellent		
D-14	10	1	10	1	Excellent		
D-15	10	1	10	1	Excellent	10	1
D-16	10	1	10	1	Excellent		
D-17	9	1	10	1	Excellent		
D-18	10	1	10	1	Excellent		

Dimensions of construct of study	Num. of Experts giving a rating of 3 pr 4 to relevancy of item	I-CVI: relevancy	Num. of Experts giving rating of 3 or 4 to the clarity of item	I-CVI: Clarity	Interpretation	The comprehensiveness of instrument dimensions and total instrument	
D-19	10	1	10	1	Excellent		
D-20	10	1	10	1	Excellent		
D-21	10	1	10	1	Excellent		
D-22	10	1	10	1	Excellent		
D-23	10	1	10	1	Excellent		
D-24	10	1	10	1	Excellent		
D-25	10	1	10	1	Excellent		
D-26	10	1	10	1	Excellent		
D-27	10	1	10	1	Excellent		
D-28	10	1	10	1	Excellent		
D-29	10	1	10	1	Excellent		
Past Experience							
D-1	10	1	10	1	Excellent		
D-2	10	1	10	1	Excellent	10	1
D-3	10	1	10	1	Excellent		
Perceived Severity							
D-1	10	1	10	1	Excellent	10	1
D-2	10	1	10	1	Excellent		
D-3	10	1	10	1	Excellent		
Perceived Susceptibility							
D-1	10	1	10	1	Excellent	10	1
D-2	10	1	10	1	Excellent		
D-3	10	1	10	1	Excellent		
Outcome Expectancy						10	1
D-1	10	1	10	1	Excellent		
D-2	10	1	10	1	Excellent		
Behavioral Skills						9	0.9
D-1	10	1	8	0.8			
Intention							

Dimensions of construct of study	Num. of Experts giving a rating of 3 pr 4 to relevancy of item	I-CVI: relevancy	Num. of Experts giving rating of 3 or 4 to the clarity of item	I-CVI: Clarity	Interpretation	The comprehensiveness of instrument dimensions and total instrument	
D-1	10	1	10	1	Excellent		
D-2	10	1	10	1	Excellent	10	
D-3	10	1	10	1	Excellent		
Reinforcement and Punishment							
D-1	9	0.9	8	0.8	Excellent		
Normative Beliefs							
D-1	10	1	10	1	Excellent		
D-2	9	0.9	10	1	Excellent	10	1
D-3	9	0.9	8	0.8	Excellent		
D-4	9	0.9	10	1	Excellent		
Barriers							
D-1	10	1	10	1	Excellent		
D-2	10	1	10	1	Excellent	10	1
D-3	10	1	10	1	Excellent		
D-4	10	1	10	1	Excellent		
Media							
D-1	10	1	10	1	Excellent		
D-2	10	1	10	1	Excellent		
D-3	10	1	10	1	Excellent		
D-4	10	1	10	1	Excellent		
D-5	10	1	10	1	Excellent		
D-6	10	1	10	1	Excellent		
D-7	10	1	10	1	Excellent		
D-8	10	1	10	1	Excellent		
D-9	10	1	10	1	Excellent	10	1
D-10	10	1	10	1	Excellent		
D-11	10	1	10	1	Excellent		
D-12	10	1	10	1	Excellent		
D-13	10	1	10	1	Excellent		
D-14	10	1	10	1	Excellent		
D-15	10	1	10	1	Excellent		

Dimensions of construct of study	Num. of Experts giving a rating of 3 pr 4 to relevancy of item	I-CVI: relevancy	Num. of Experts giving rating of 3 or 4 to the clarity of item	I-CVI: Clarity	Interpretation	The comprehensiveness of instrument dimensions and total instrument	
D-16	10	1	10	1	Excellent		
D-17	10	1	10	1	Excellent		
Policy						10	1
D-1	10	1	10	1	Excellent		
Preparedness							
D-1	10	1	10	1	Excellent		
D-2	10	1	10	1	Excellent		
D-3	10	1	10	1	Excellent		
D-4	10	1	10	1	Excellent	10	1
D-5	10	1	10	1	Excellent		
D-6	10	1	10	1	Excellent		
D-7	10	1	10	1	Excellent		
D-8	10	1	10	1	Excellent		
D-9	10	1	10	1	Excellent		
D-10	10	1	10	1	Excellent		
D-11	10	1	10	1	Excellent		

NOTE: Agreement on total comprehensiveness =10, Comprehensiveness of the entire instrument = 1, Overall content validity index (relevancy) of the instrument using the conservative approach = 0.918, Overall content validity index (clarity) of the instrument using the conservative approach = 0.929, The agreement on total comprehensiveness =10, The comprehensiveness of the entire instrument was = 1.

3.77 Face Validity of the Instrument

Once the panel of experts completed the judgment on the instrument and all modifications were completed, the four potential participants on the panel were requested to judge items in the instrument on their simplicity, importance, and understandability (Zamanzadeh et al., 2015). All four participants judged items in the instrument as simple, important, and easy to understand.

3.8 Reliability

Reliability refers to the stability of a measuring instrument and its stability over time (Surucu & Maslakci, 2020; Heale & Twycross, 2015). This study employed internal consistency to calculate the instrument's reliability. Internal consistency can be assessed using Cronbach's alpha, spilt half reliability, item to total correlation, or Kruger-Richardson coefficient (Robert et al., 2011; Wang et al., 2017; Heale & Twycross, 2015, Thompson et al., 2010; Feldt, 1969). This study used Cronbach's alpha to measure the internal consistency of the six scales. Six subscales were used in this study. The six scales measured personal cognitive factors, behavioral factors, environmental factors, risk perceptions, media, and preparedness. Cronbach alpha was calculated following the administration of the survey using all 3383 respondents' data. The personal cognitive subscale consisted of 7 items ($\alpha = 0.67$), the behavioral factors subscale consisted of 5 items ($\alpha = 0.72$), the environmental factors subscale had 8 items ($\alpha = 0.69$), the risk perception subscale had 6 items ($\alpha = 0.74$), the media subscale had 18 items ($\alpha = 0.82$) and the preparedness subscale had ($\alpha = 0.81$).

3.9 Measures

3.91 Independent Variables

Government laws/policies. Government laws/policies were measured using a single question asking how government policies such as lockdowns, travel bans, and financial assistance helped participants prepare for the COVID-19 pandemic. This construct was measured using a 5-point Likert scale (1= Not at all to 5= Very Much).

Media activities. Media activities were measured using two sets of questions. The first set of questions measured how participants trusted these media sources; television, newspapers, social media/internet, and radio news. This variable was measured using a 6-point Likert scale (0= No trust to 5= A Great Deal of Trust). The second set of questions measured how often participants used their trusted media source for COVID-19 information. This was measured using a 6-point Likert scale (0= Never 5= A Very Often).

3.92 Mediators

Personal Cognitive Factors. Personal cognitive factors had four subscales: self-efficacy, collective efficacy, outcome expectations, and knowledge. All these variables constitute the personal cognitive construct of the SCT (Kelder et al., 2015). The personal cognitive factors subscale included seven items and was measured using a 5-point Likert scale (1= Not at all to 5= Very Much).

Behavioral Factors. Behavioral factors had three subscales: intention, reinforcement and punishment, and behavioral skills. All these variables constitute the behavioral factors construct of the SCT (Kelder et al., 2015). The behavioral factors

subscale included five items and was measured using a 5-point Likert scale (1= Not at all to 5= Very Much).

Environmental Factors. Environmental factors had four subscales: normative beliefs, social support, observational learning, and barriers. All these variables constitute the environmental factors construct of the SCT (Kelder et al., 2015). The environmental factors subscale included eight items and was measured using a 5-point Likert scale (1= Not at all to 5= Very Much).

3.93 Dependent Variable

Preparedness: COVID-19 preparedness was measured using six items on a 6-point Likert scale (0= Not prepared to 5= Extremely Prepared). The items measured how participants were prepared to work from home, change their jobs, remote learning for their kids, how to protect themselves if COVID-19 gets worse, and the general preparedness for the pandemic.

3.10 Pilot Testing

The instrument was pilot tested using 30 potential participants. Individuals who met the study's inclusion criteria were randomly selected from the University of Louisville Belknap campus. Students were randomly handed a QR code that had a link to the survey, and the first 30 responses were used for this phase. Pilot testing of the instrument provided an opportunity to assess the time needed to complete the survey and provided the researcher with an idea of the final data. Also, findings from the pilot testing were used to improve the questions, format of the questions, and instructions (Creswell & Creswell, 2017).

3.11 Administering the Survey

After the pilot test was completed, all the participants' comments were incorporated into the survey in REDCap. The survey, including the study preamble and consent forms, was uploaded on the ResearchMatch platform. Study invitation emails were randomly sent to volunteers and researchers on ResearchMatch. Interested participants were asked to click a link in the email, which directed them to REDCap, where the study consent form, preamble, and survey were uploaded. After reading the study preamble and consent forms, participants who were interested and qualified for the study went ahead to take the survey. Participants were required to take about 15 – 20 minutes to complete the survey.

3.12 Data Handling and Storage

Data management involved collecting, organizing, and maintaining the data obtained for the study. All the data obtained from ResearchMatch were anonymous and were labeled with only numbers. These numbers were generated systematically based on the survey order, i.e., 001 for the first respondent, 002 for the second, etc. All the data were electronic and saved on my personal laptop with a secure password and a copy saved on the University of Louisville I-Drive. All the research data were collected, organized, and maintained in compliance with the appropriate ethical standards.

3.13 Data Analysis

Data analysis is the most vital part of any research and involves summarizing collected data to make sense. According to LeCompte and Schensul (1999), data analysis is a process a researcher employs to reduce data to a story and its interpretation. The survey was closed after a month on the ResearchMatch platform, and the data was

downloaded and subjected to quantitative data management. Data analysis for this study began after the data was downloaded. The data analysis involved data management, running both descriptive and inferential statistics, and looking for statistical significance. Quantitative data management included organizing data notes, uploading data onto analysis software, and cleaning the data (Z O'Leary, 2020). The data was uploaded onto Statistical Package for Social Sciences (SPSS), cleaned, and patterns of non-responses and partial responses were removed from the survey to prevent any bias in the study result and validity of the instrument (Coste et al., 2013).

Quantitative descriptive analysis characterizes a phenomenon through identified patterns in data to answer questions about who, where, what, when, and to what extent (Loeb et al., 2017). An excellent descriptive analysis provides simplified data about populations, policies, needs, methods, demographics, etc. (Loeb et al., 2017). Although descriptive data can stand independently, they often form part of a broader study that involves causal analysis. Descriptive statistics (Loeb et al., 2017) were used to understand the sample's demographic characteristics and its standing across key variables. Subsequently, inferential statistics were conducted for hypothesis testing. This form of analysis enabled researchers to estimate how they can reliably make predictions and generalize their research findings based on data (Sullivan-Bolyai and Boya, 2014). Inferential statistics helps researchers to draw conclusions beyond the immediate data of the study through data analysis, hypothesis testing and answering of research questions. Two separate inferential statistics were conducted: hierarchical regression (hypothesis one) and mediation (hypothesis two and three).

Hierarchical Regression Model (Hypothesis One)

The hierarchical regression model, a form of multiple regression, addressed the first hypothesis. This analysis tool allowed us to introduce our independent variables in

blocks, thus allowing the researcher to control the order of the variables entered into the model and assess the incremental predictive ability of any variable of interest (McQuarrie, 1988). The hierarchical model had four blocks; the first block contained the demographic characteristics, which comprised of eight demographic variables (political affiliation, race, employment, gender, marital status, highest education, income, age). The second block had the personal cognitive variable, followed by the behavioral factors variable in the third block and the environmental factors variable in the final block. The hierarchical model produced a single equation:

$$Y = \beta_0 + \beta_1 X_{1+} \beta_2 X_{2+} \beta_3 X_3 + \beta_4 X_4 + \varepsilon.$$

R-square was used to explain the variance explained by each of the independent variables on the dependent variable, whiles change in R-square was used to judge the contribution of each block in explaining variance above and beyond prior blocks. Also, F-change, f-statics, and p-values were used to determine if R-square and change in R-square values were significant, thus, testing the hypothesis. Finally, we checked for model assumptions: linearity, normality, and multicollinearity. We checked for linearity using scatterplots to check whether the relationship between the independent and dependent variables is linear. The normality of the data was determined using a Q-Q-Plot. The Q-Q-Plot was used to check whether the errors between the obtained and predicted dependent variables are normally distributed. Lastly, the Variance Inflation Factor (VIF) was used to determine the multicollinearity of the study variables.

Using a Hierarchical Regression Analysis

$$Y = \beta_0 + \beta_1 X_{1+} \beta_2 X_{2+} \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

X_1 = Demographic characteristics (political affiliation, race, employment, gender, marital status, highest education, income, age).

X_2 = Personal Cognitive Factors

X_3 = Behavioral Factors

X_4 = Environmental Factors

Y = Preparedness

β = Regression Coefficient

ε = Error

Mediation (Hypothesis Two and three)

Two separate multiple mediators' models were created for the mediation analysis. The first model (Figure 1) had media activities as the independent variable and COVID-19 preparedness as the dependent variable, with personal cognitive, behavioral, and environmental factors as mediators. The second model (Figure 2) had government laws/policies as the independent variable and COVID-19 preparedness as the dependent variable, with personal cognitive, behavioral, and environmental factors as mediators. These variables were selected as mediators because they are psychosocial variables and affected both independent variables (media activities and government laws/policies) and the dependent variable (COVID-19 preparedness) (Baron & Kenny, 1986; MacKinnon, 2007). The mediation analysis is more complex compared to the hierarchical regression as it also provides information about how independent variables affect a dependent variable (Baron & Kenny, 1986; MacKinnon, 2007). Also, all the independent variables used in the hierarchical regression were used as mediators in the mediation analysis, and COVID-19 preparedness was maintained as the dependent variable. The independent

variables were media activities and government laws/policies for hypotheses one and two, respectively. Furthermore, the mediation analysis generated several regression equations representing the direct and indirect effects.

The mediation analysis was conducted using PROCESS (add-on in SPSS). PROCESS is a handy tool created by Hayes for SPSS which can be used for both simple and complex mediation (involving two or more mediators), as seen in the second and third hypotheses (Hayes, 2017). The PROCESS tool also estimates the direct, indirect, and total effects and various inferential tests (Hayes, 2017).

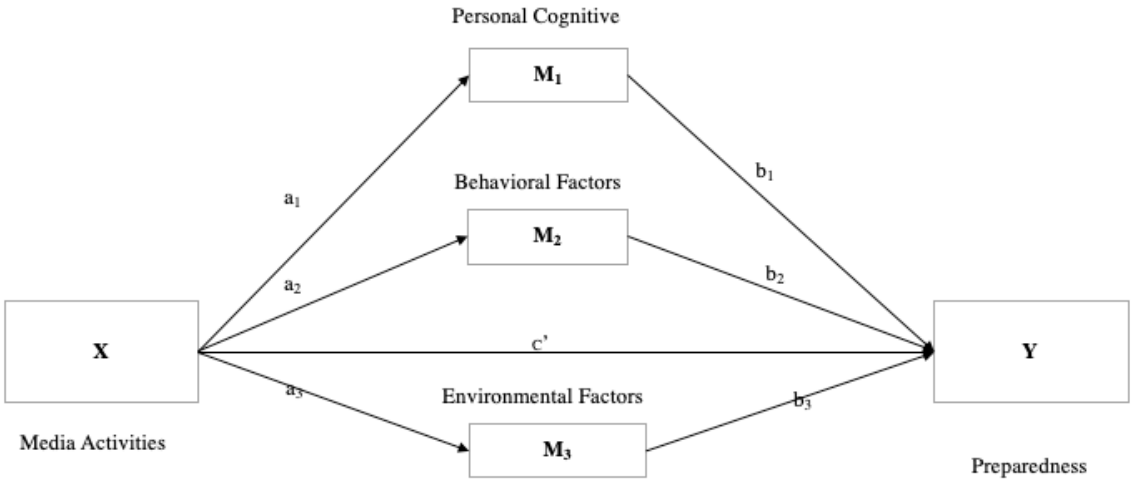

Figure 2. A conceptual diagram of a parallel three mediator model

Key Effects Reported

Direct effects

- The direct effect of media activities on personal cognitive factors $\mathbf{a_1}$.
- The direct effect of media activities on behavioral factors $\mathbf{a_2}$.
- The direct effect of media activities on environmental factors $\mathbf{a_3}$.

- The direct effect of media activities on preparedness **c'**.

Direct effects: Hypothesis

- Media activities will be positively and significantly associated with all three mediators.
- Media activities will be positively and significantly associated with COVID-19 preparedness.

Indirect effects

- The indirect effect of media activities on preparedness with personal cognitive factors as a mediator: $\mathbf{a_1b_1}$
- The indirect effect of media activities on preparedness with behavioral factors as a mediator: $\mathbf{a_2b_2}$
- The indirect effect of media activities on preparedness with environmental factors as a mediator: $\mathbf{a_3b_3}$
- The total indirect effect of media activities on preparedness through all the three mediators: $\mathbf{a_1b_1 + a_2b_2 + a_3b_3}$

Indirect effects: Hypothesis

- Media activities will significantly affect COVID-19 preparedness through all three mediators.

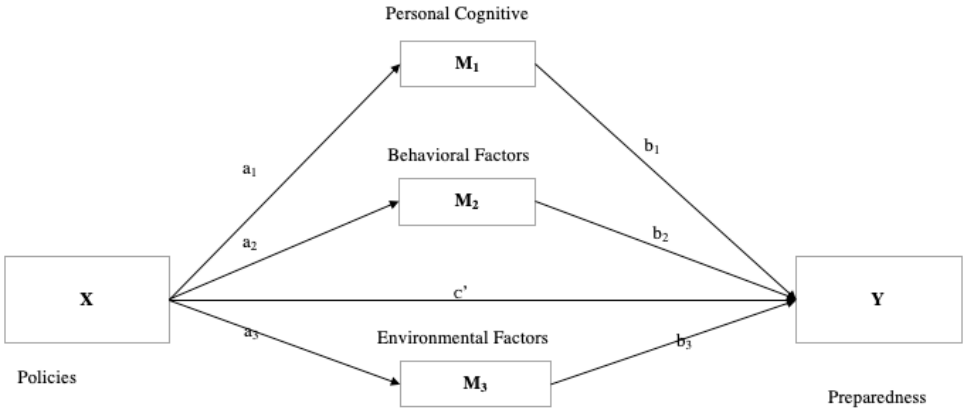

Figure 3. A conceptual diagram of a parallel three mediator model

Key Effects Reported

Direct effects

- The direct effect of government laws/policies on personal cognitive factors $\mathbf{a_1}$
- The direct effect of government laws/policies on behavioral factors $\mathbf{a_2}$
- The direct effect of government laws/policies on environmental factors $\mathbf{a_3}$
- The direct effect of government laws/policies on preparedness **c'**

Direct effects: Hypothesis

- Government laws/policies will be positively and significantly associated with all three mediators.
- Government laws/policies will be positively and significantly associated with COVID-19 preparedness.

Indirect effects

- The indirect effect of government laws/policies on preparedness with personal cognitive factors as a mediator: $\mathbf{a_1b_1}$

- The indirect effect of government laws/policies on preparedness with behavioral factors as a mediator: $\mathbf{a_2b_2}$
- The indirect effect of government laws/policies on preparedness with environmental factors as a mediator: $\mathbf{a_3b_3}$
- The total indirect effect of government laws/policies on preparedness through all the three mediators: $\mathbf{a_1b_1 + a_2b_2 + a_3b_3}$

Indirect effects: Hypothesis

- Government laws/policies will significantly affect COVID-19 preparedness through all three mediators.

Indirect effects: Hypothesis

- Media activities will significantly affect COVID-19 preparedness through all three mediators.

3.14 Ethical Considerations and Human Subjects Protection Plan

As a student researcher involved in other research studies, all my necessary CITI trainings were completed. I provided respondents with the study preamble and consent forms and explained the purpose of the study as well as the study's voluntary nature. Participants were allowed to make informed decisions on whether to participate or not. Consent documents were sent to participants before surveys were deployed to them. The consent form contained details of the study, the voluntary nature of the research, contact persons for complaints about the study, potential risks and benefits, confidentiality measures, what participation entails, and the utilization of the results. I ensured that all participants understood the consent form was simple and easily understood.

3.15. Risks/Benefits Assessment

Risks

There are no major foreseeable risks for participating in the study. However, there is a possible risk of loss of confidentiality. To prevent this from happening, all identifying information was coded. We did everything to secure their data by keeping them in a locked file.

Benefits

Participants may not benefit directly from this study, but the findings will inform the public health policymakers on PHEP for future pandemics.

CHAPTER IV

4.0 RESULTS

4.1 Descriptive results

This section presents results based on descriptive and inferential analyses. The descriptive statistics were used to gain an understanding of the demographic characteristics of the study sample across key variables; age, gender, marital status, the highest level of education attained, ethnicity, race, primary language spoken, current employment status, monthly income, political affiliation, and COVID-19 diagnosis. The first hypothesis was tested using inferential statistics that involved a hierarchical regression, and a mediation analysis was used to test hypotheses two and three.

4.11 Demographic Characteristics

All the study's demographic characteristics are shown in table 3 below. A total of 3383 participants took part in this study, with females comprising 62.8% of the study population (35.5% males). More than half of the study population (51.6%) were married, 859 (25.4%) were single, 579 (17.1%) were divorced/separated, and 170 (5%) were widowed. Most of the study participants (41.5%) had an associate degree, 1367 (40.4%) participants had a bachelor's degree, 11 (0.5%) participants did not complete high school, and 16 (0.5%) had a graduate degree. The ethnicity of most participants was non-Hispanic (93.3%), with only 163 (4.8%) of the respondents reporting as Hispanic and 65

(1.9%) preferring not to say their ethnicity. The dominant race among study participants was white Caucasians 2729 (80.7%), followed by the Black/African American race 426 (12.6%), Asian/Pacific Islanders 69 (2.9%), American Indian/Alaskans 28 (0.8%), and other races 79 (2.3%). English was the primary language spoken by the majority (98.8%; 3341) of our study respondents. Few study respondents spoke primary languages such as French (0.6%), Spanish (0.5%), and Arabic (0.1%).

Approximately 1385 (40.9%) of the study respondents had full-time employment, 989 (29.2%) had retired, 346 (10.2%) were unemployed/disabled, 305 (9.0%) were part-time employees, 185 (5.5%) were self-employed, 115 (3.4%) were students and 48 (1.4%) had other forms of employment. One thousand five hundred sixty (1560) participants (46.1%) had two household members, 853 (25.2%) participants had one household member, 481 (14.2%) participants had three household members, and the rest of the participants had four or more household members. As of the time of this study, 834 (24.7%) of the study participants were unemployed, 629 (18.6%) participants made over $4800, 386 (11.4%) of the participants made less than $1999, and 326 (9.6%) study participants preferred not to disclose their monthly income. 687 (20%) of the participants reported having obesity, respiratory disease (asthma) 399 (11.8%), heart and cardiovascular disease 332 (9.8%), diabetes 288 (8.5%), immunodeficiency disorders 246 (7.3%), and cancer (121; 3.6%). The study results showed that 2580 (76.3%) of the study participants had at least one chronic condition, participants with two chronic conditions were 498 (14.7%), and those with three chronic conditions were 117 (5.2%). Three hundred and fifty-two (352;10.4%) of the study participants were diagnosed with COVID-19, 3018 (89.2%) participants were not diagnosed, and 13 (0.4%) preferred not

to disclose their COVID-19 diagnosis. Finally, 995 (29.4%) of the participants were liberal, with 837 (24.7%) being slightly liberal, 681 (20.1%) moderate, 357 (10.6%) somewhat conservative, 203 (6.0%) very conservative, with 310 (9.2%) of the participants not willing to disclose their political affiliation.

Table 3. *Demographic Characteristics of Study Participants*

Demographic Characteristics		
Age	**Frequency**	**Percent**
18-24 years	166	4.9
24-34 years	492	14.5
35-44 years	491	14.5
45-54 years	508	15.0
55-64 years	695	20.5
65+	1031	30.5
Total	3383	100.0
Gender		
Male	1200	35.5
Female	2126	62.8
Other	46	1.4
I prefer not to say	11	.3
Total	3383	100.0
Marital Status		
Single/Never Married	859	25.4
Married	1744	51.6
Divorced/Separated	579	17.1
Widow/widower	170	5.0
I prefer not to say	31	.9
Total	3383	100.0
Highest Education		
Less than high School	11	.3
High Sch Diplo	152	4.5
Some college	431	12.7
Associate degree	1406	41.6
Bachelor's degree	1367	40.4
Graduate degree	16	.5
Total	3383	100.0
Ethnicity		

Demographic Characteristics		
Age	**Frequency**	**Percent**
Hispanic	163	4.8
Non-Hispanic	3155	93.3
I prefer not to say	65	1.9
Total	3383	100.0
Race		
American. Ind/Alaska	28	.8
Asian/Pacific Islander	69	2.9
Black/African American	426	12.6
White/Caucasian	2729	80.7
I prefer not to say	52	1.5
Other	79	2.3
Total	3383	100.0
Primary Language Spoken		
English	3341	98.8
Spanish	18	.5
Arabic	2	.1
Swahili	1	.0
French	20	.6
Other	1	.0
Total	3383	100.0
Employment		
Full-time	1385	40.9
Part-time	305	9.0
Self-employed	185	5.5
Unemployed/disabled	346	10.2
Retired	989	29.2
Student	115	3.4
Other	48	1.4
I prefer not to say	10	.3
Total	3383	100.0
Income		
Unemployed	834	24.7
>1,999	386	11.4
$1,200-$2,399	390	11.5
$2,400-$3,599	463	13.7
$3,600-$4,800	355	10.5
<$4,800	629	18.6
I prefer not to say	326	9.6
Total	3383	100.0

Demographic Characteristics Age	Frequency	Percent
Number of Chronic Conditions		
None	56	1.7
One	2580	76.3
Two	498	14.7
Three	177	5.2
Four	59	1.7
Five	12	0.4
Six	1	0.0
Total	3383	100.0
Diagnosed with COVID-19		
Yes	352	10.4
No	3018	89.2
I prefer not to say	13	0.4
Total	3383	100.0
Political Affiliation		
Very Liberal	995	29.4
Slightly Liberal	832	24.7
Moderate	681	20.1
Slightly Conservative	357	10.6
Very Conservative	203	6.0
I prefer not to say	310	9.2

4.2 Inferential Analysis

Research Question 1: What percentage of variance in COVID-19 preparedness is explained by the personal cognitive, behavioral, and environmental factors of the SCT among Americans?

A hierarchical regression analysis was used to test the research hypothesis. Another name for this method is incremental variance partitioning (Pedhazur, 1982). It allows us to focus on the variables forming the hypothesis and simultaneously sieving out the influence of the control variables likely to have moderating effects on COVID-19 preparedness. McQuarrie (1988) also noted that hierarchical regression allows the

researcher to control the order of the variables entered into the model, allowing the researcher to assess the incremental predictive ability of any variable of interest. Table 4 reports the results of the hierarchical linear multiple regression analysis aligned to hypothesis 1 above. As reported, demographic characteristics were entered in the first block, followed by personal cognitive factors in block two, behavioral factors in block three, and environmental factors in block four.

Prior studies have demonstrated that pandemic preparedness can be influenced by demographic characteristics. (e.g., Sultana et al., 2022; Saeed et al., 2021). Therefore, eight demographic variables (political affiliation, race, employment, gender, marital status, highest education, income, age) were included in the first of four blocks of the hierarchical multiple regression. Demographic variables were added as controls to reduce the likelihood of spurious relationships based on personal, behavioral, and environmental characteristics. All eight demographic variables were entered into the regression equation in the first step, the coefficient of determination ($\mathbf{R^2}$) was found to be 0.133, indicating that these demographic variables explain 13.3% of COVID-19 preparedness (Table 4).

Based on the arrangement of the constructs of the SCT, the personal cognitive factors variable was our second entry. By adding the personal cognitive factors variable in step 2, $\mathbf{R^2}$ increased from 0.133 to 0.366. This $\mathbf{R^2}$ change (0.233) is significant; F (1, 3,373) = 1240.53, p <.01). This implies that personal cognitive factors explain an additional 23.3% of the variation in COVID-19 preparedness among Americans (Table 4).

In the third step, the behavioral factors variable was entered. The decision to enter this variable was still based on the arrangement of the constructs in the SCT. When the

behavioral factors variable was entered, the **R^2** increased from 0.366 to 0.400, indicating a change of 0.034. This **R^2** change (0.034) is significant; F (1, 3,372) = 191.89, p <.01). This implies that an additional 3.4% of the variation in COVID-19 preparedness among Americans is explained by behavioral factors (Table 4).

In the final step (fourth step), the environmental factors variable was entered in the equation still based on the arrangement of constructs in the SCT. In the final model, **R^2** increased from 0.4 to 0.485, indicating a change of 0.085 (8.5%). This **R^2** change (0.0485) is significant; F (1, 3,371) = 555.40, p <.01). This means that an additional 8.5% of the variation in COVID-19 preparedness among Americans is explained by environmental factors. The total hierarchical regression model explained about 49% of the variation in COVID-19 preparedness among Americans (Table 4).

Table 4. *Summary of Hierarchical Regression Analysis for variables predicting COVID-19 preparedness*

Model, Step, and Predictor Variable	R^2	ΔR^2	**ΔF**	**df**	**p-value**
Model 1	0.133			(8, 3374)	<.01
Demographic Characteristics					
Model 2	0.366	0.233	1240.53	(1, 3373)	<.01
Demographic Characteristics					
Personal Cognitive Factors					
Model 3	0.400	0.034	191.89	(1, 3372)	<.01
Demographic Characteristics					
Personal Cognitive Factors					
Behavioral Factors	0.485	0.085	555.40	(1, 3371)	<.01
Model 4					
Demographic Characteristics					
Personal Cognitive Factors					
Behavioral Factors					
Environmental Factors					

4.23 Standardized and Unstandardized Coefficients

Table 5 reports the unstandardized (B) and standardized (β) regression coefficients for steps one to four. From the standardized coefficients in the final regression model, we found cognitive factors to be positively and significantly ($p < 0.001$) level related to COVID-19 preparedness ($\beta = 0.364$). The standard coefficient for behavioral factors is positive ($\beta = 0.121$) and significant at $p < 0.0$ level. We found that environmental factors were positively and significantly ($p < 0.001$) related to COVID-19 preparedness ($\beta = 0.330$). For the demographic variables; age ($\beta = 0.128, p < 0.001$), gender ($\beta = -0.090, p < 0.001$), marital status ($\beta = 0.009, p = 0.520$), highest education ($\beta = 0.052, p < 0.001$), race ($\beta = 0.004, p = 0.746$), employment ($\beta = 0.068, p < 0.001$), income ($\beta = 0.065, p < 0.001$), and political affiliation ($\beta = 0.003, p = 0.846$). Finally, inspection of collinearity statistics showed that all study variables had a VIF less that 2 and tolerance less than 1.

Table 5. *Summary of Standardized and Unstandardized Coefficients*

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**T**	**Sig**
1	(Constant)	2.011	.157		12.820	<.001
	Age	.146	.013	.214	10.941	<.001
	Gender	-.088	.034	-.042	-2.554	.011
	Marital Status	-.034	.023	-.026	-1.472	.141
	Highest Education	.132	.014	.163	9.616	<.001
	Race	-.016	.029	-.009	-.549	.583
	Employment	.080	.011	.141	7.359	<.001
	Income	.064	.009	.124	6.894	<.001
	Political Affiliation	-.075	.011	-.109	-6.531	<.001
	Cognitive Factors					
	Behavioral Factors					
	Environ. factors					
2	(Constant)	.085	.145		.585	.559
	Age	.106	.011	.155	9.235	<.001
	Gender	-.166	.029	-.079	-5.637	<.001
	Marital Status	-.013	.020	-.010	-.647	.518
	Highest Education	.079	.012	.098	6.729	<.001
	Race	-.012	.025	-.007	-.490	.624

	Employment	.065	.009	.114	6.930	<.001
	Income	.046	.008	.088	5.733	<.001
	Political Affiliation	-.036	.010	-.053	-3.702	<.001
	Cognitive Factors	.638	.018	.498	35.221	<.001
	Behavioral Factors					
	Environ. factors					
3	(Constant)	-.457	.146		-3.127	.002
	Age	.098	.011	.144	8.767	<.001
	Gender	-.188	.029	-.090	-6.554	<.001
	Marital Status	-.005	.019	-.004	-.252	.801
	Highest Education	.064	.012	.079	5.529	<.001
	Race	.001	.024	.000	.025	.980
	Employment	.055	.009	.096	5.973	<.001
	Income	.038	.008	.074	4.908	<.001
	Political Affiliation	-.017	.010	-.025	-1.765	.078
	Cognitive Factors	.572	.018	.446	31.289	<.001
	Behavioral Factors	.244	.018	.200	13.852	<.001
	Environ. factors					
4	(Constant)	-1.037	.138		-7.524	<.001
	Age	.087	.010	.128	8.447	<.001
	Gender	-.189	.027	-.090	-7.101	<.001
	Marital Status	.011	.018	.009	.643	.520
	Highest Education	.042	.011	.052	3.886	<.001
	Race	.007	.022	.004	.324	.746
	Employment	.039	.008	.068	4.559	<.001
	Income	.033	.007	.065	4.637	<.001
	Political Affiliation	.002	.009	.003	.194	.846
	Cognitive Factors	.467	.018	.364	26.654	<.001
	Behavioral Factors	.147	.017	.121	8.753	<.001
	Environ. factors	.410	.017	.330	23.567	<.001

4.31 Research Question 2:

Do personal cognitive, behavioral, and environmental factors significantly mediate the relationship between media activities and COVID-19 preparedness among United States residents?

Before the mediation analysis, a correlation analysis was performed to see if the study variables, notably the mediation variables, were related. Pearson correlations revealed that all the three mediators (personal cognitive, behavioral, and environmental factors), media activities, government laws/policies, and preparedness were significantly ($p < .01$) and positively related to each other (Table 6). The coefficients for these relationships ranged from 0.15 to 0.54.

Table 6. *Descriptive Statistics and Bivariate Pearson Correlations Among All Variables*

Variables	***M***	***SD***	***1***	***2***	***3***	***4***	***5***	***6***
Personal Cognitive Factors	3.89	.845	------					
Behavioral Factors	3.71	.886	311**	------				
Environmental Factors	3.60	.871	.358**	.359**	----			
Media Activities	2.08	1.053	.150**	.208**	.222**	-----		
Government Laws/Policies	3.38	1.353	.225**	.277**	.301**	.392**	------	
Preparedness	3.40	1.083	.543**	.375**	.532**	.152**	.241**	-----

** Correlation is significant at the 0.01 level

Figure 4 is a parallel mediator model which depicts the association between media activities and the mediators and the association between the mediators and COVID-19 preparedness among Americans. Media activity is the independent (X) variable, COVID-19 preparedness is the dependent variable (Y), and the mediators are made up of personal (M_1), behavioral (M_2), and environmental (M_3) factors. In this model, media activity is modeled as influencing COVID-19 preparedness among Americans directly and indirectly through the mediators with the condition that no mediator influences the other.

The study results indicated that the path coefficient from media activities to personal cognitive factors was significant ($\beta = 0.12$, $SE = 0.0136$, $p < 0.001$) and accounted for 2.2% of the variance. Also, media activities were significantly associated with behavioral activities and accounted for 4.3% of the variance. Finally, media activities were significantly associated with environmental activities ($\beta = 0.18$, $SE = 0.0139$, $p < 0.001$) and accounted for 4.9% of the variance.

4.311 Direct and Indirect Effects.

The study results indicate that media activities did not have a direct effect ($\beta = -0.011$, $SE = 0.014$, $p < 0.437$) on COVID-19 preparedness among Americans but did have an indirect effect through the three mediators. The first indirect effect ($a_1b_1 = 0.58$) is the effects of media activities on COVID-19 preparedness among Americans mediated by personal cognitive factors. The study results showed a significant indirect effect of media activities on COVID-19 with personal cognitive factors as a mediator. The second indirect effect ($a_2b_2 = 0.029$) was the effects of media activities on COVID-19 preparedness among Americans mediated by behavioral factors. Study findings showed a significant indirect effect of media activities on COVID-19 with behavioral factors as a

mediator. The third indirect effect ($a_3b_3 = 0.08$) was the effects of media activities on COVID-19 preparedness among Americans mediated by environmental factors. The study outcome showed a significant indirect effect of media activities on COVID-19 with environmental factors as a mediator.

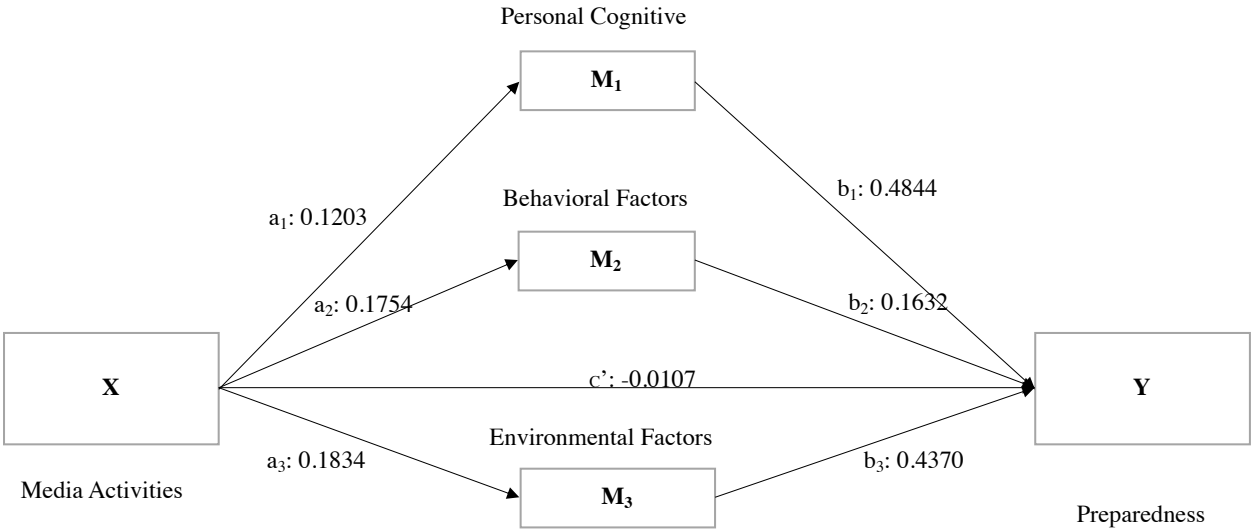

*Figure 4.*A statistical diagram of the parallel multiple mediator model for the effects of media activities on COVID-19 preparedness

Table 7. *Regression Coefficients, Standard Errors, and Model Summary Information for the Presumed SCT Constructs Influence Parallel Multiple Mediator Model Depicted in the Model Above*

		Consequent													
		M_1 (Personal Cog. Factors)				**M_2 (Behavioral Factors)**				**M_3(Environmental Factors)**				**Y(Preparedness)**		
Antecedent		Coeff.	SE	*p*		Coeff.	SE	*p*		Coeff.	SE	*p*		Coeff.	SE	*p*
X(Media Acts.)	a_1	0.120	0.014	<0.001	a_2	0.175	0.014	<0.001	a_3	0.183	0.014	<0.001	c’	-0.011	0.014	0.437
M_1(P.Cog)		____	____	____		____	____	____		____	____	____	b_1	0.484	0.018	<0.001
M_2(Beha. Fac)		____	____	____		____	____	____		____	____	____	b_2	0.163	0.017	<0.001
M_3(Environ)													b_3	0.437	0.018	<0.001
Constant	i_{M1}	3.644	0.032	<0.001	i_{M2}	3.343	0.033	<0.001	i_{M3}	3.221	0.032	<0.001	i_Y	-0.661	0.080	<0.001
		R^2= 0.023				R^2= 0.043				R^2= 0.049				R^2= 0.4408		
		F(1, 3381) = 77.726, *p*=<0.001				F(1, 3381) = 153.394, *p*=<0.001				F(1, 3381) = 174.755, *p*=<0.001				F(4, 3378) = 665.653, *p*=<0.001		

4.32 Research Question 3:

Do personal cognitive, behavioral, and environmental factors significantly mediate the relationship between government laws/policies on COVID-19 and COVID-19 preparedness among American residents?

Figure 5 is a parallel mediator model that depicts the association between government laws/policies and the mediators and the association between the mediators and COVID-19 preparedness among Americans. Government laws/policy is the independent (X) variable, COVID-19 preparedness is the dependent variable (Y), and the mediators are made up of personal (M_1), behavioral (M_2), and environmental (M_3) factors. In this model, government laws/policy is modeled as influencing COVID-19 preparedness among Americans directly and indirectly through the mediators with the condition that no mediator influences the other.

The study results indicated that the path coefficients from government laws/policies to personal cognitive factors was significant ($\beta = 0.14, SE = 0.011, p < 0.001$) and accounted for 5.1% of the variance. Also, government laws/policies were significantly associated with behavioral activities and accounted for 7.7% of the variance ($\beta = 0.18, SE = 0.040, p < 0.001$). Finally, government laws/policies were significantly associated with environmental activities ($\beta = 0.20, SE = 0.011, p < 0.001$) and accounted for 9.1% of the variance.

4.321 Direct and Indirect Effects.

The study results indicate that government laws/policies had both a direct effect ($\beta = 0.132, SE = 0.011, p < 0.001$) and indirect effects on COVID-19 preparedness among Americans. The first indirect effect ($a_1b_1 = 0.07$) is the effects of government

laws/policies on COVID-19 preparedness among Americans mediated by personal cognitive factors. The study results showed a significant indirect effect of government laws/policies on COVID-19 with personal cognitive factors as a mediator. The second indirect effect (a_2b_2= 0.03) was the effects of government laws/policies on COVID-19 preparedness among Americans mediated by behavioral factors. Study findings showed a significant indirect effect of government laws/policies on COVID-19 with behavioral factors as a mediator. The third indirect effect (a_3b_3 = 0.08) was the effects of government laws/policies on COVID-19 preparedness among Americans mediated by environmental factors. The study outcome showed a significant indirect effect of government laws/policies on COVID-19 with environmental factors as a mediator.

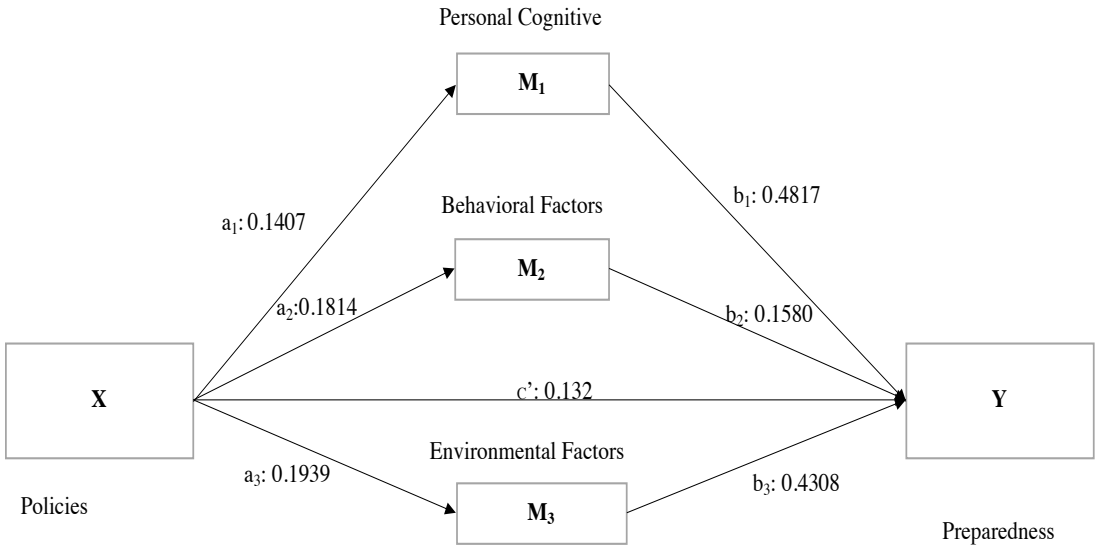

Figure 5. A statistical diagram of the parallel multiple mediator model for the effects of government policies on COVID-19 preparedness

Table 8. *Regression Coefficients, Standard Errors, and Model Summary Information for the Presumed SCT Constructs Influence Parallel Multiple Mediator Model Depicted in the Model Above*

	Consequent														
	M_1 (Personal Cog. Factors)				M_2 (Behavioral Factors)				M_3(Environmental Factors)				Y(Preparedness)			
Antecedent		Coeff.	SE	*p*		Coeff.	SE	*p*		Coeff.	SE	*p*		Coeff.	SE	*p*
X(Policies)	a_1	0.141	0.011	<0.001	a_2	0.181	0.011	<0.001	a_3	0.194	0.011	<0.001	c'	0.013	0.11	0.232
M_1(P.Cog)		____	____	____		____	____	____		____	____	____	b_1	0.482	0.018	<0.001
M_2(Beha. Fac)		____	____	____		____	____	____		____	____	____	b_2	0.158	0.016	<0.001
M_3(Environ)													b_3	0.431	0.018	<0.001
Constant	i_{M1}	3.419	0.038	<0.001	i_{M2}	3.094	0.040	<0.001	i_{M3}	2.947	0.039	<0.001	i_Y	-0.661	0.082	<0.001
	R^2= 0.051 F(1, 3381) = 180.658, *p*=<0.001				R^2= 0.077 F(1, 3381) = 280.676, *p*=<0.001				R^2= 0.091 F(1, 3381) = 337.368, *p*=<0.001				R^2= 0.4409 F(4, 3378) = 666.020, *p*=<0.001			

CHAPTER V
5.0 DISCUSSION, CONCLUSION, RECOMMENDATION, AND IMPLICATIONS

Overview of the chapter

The purpose of this study was to test the full complement of the SCT constructs to determine its predictability and explanatory power for COVID-19 preparedness and test the mediation effects of the primary constructs of the SCT (i.e., personal cognitive, environmental, and behavioral factors) on media and policy variables. This study utilized a non-experimental cross-sectional quantitative research (survey) design involving 3383 participants who completed a 77-item survey. This chapter discusses the key findings of this study in the context of the literature on emergency preparedness. The discussion chapter will conclude with a discussion of the study's limitations and implications for practice, policy, and future research.

Research Questions

RQ1: What percentage of variance in COVID-19 preparedness is explained by the personal cognitive, behavioral, and environmental factors of the SCT among Americans after accounting for demographic characteristics?

RQ 2: Do personal cognitive, behavioral, and environmental factors significantly mediate the relationship between media activities and COVID-19 preparedness among United States residents?

RQ 3: Do personal cognitive, behavioral, and environmental factors significantly mediate the relationship between government laws/policies and COVID-19 preparedness among United States residents?

5.1 Discussion of Research Findings

Research Question 1

All the constructs of the SCT theory in their respective blocks added some amount of variance in COVID-19 preparedness accounting for a total variance of 48.5% that was explained by personal cognitive, behavioral, and environmental factors. Demographic factors explained the first 13.3% of the hierarchical regression model, while personal cognitive factors explained 23.3%, behavioral factors added 3.4%%, and environmental factors explained an additional 8.5%.

This finding is similar to previous studies by Hossain et al., 2019; Sewaa et al., 2020; Saeed et al., 2021, when all nine demographic characteristics explained approximately 13.3% of the unique variance in COVID-19 preparedness among residents of the United States. This study also confirms Sultana et al. 2022 and Sewaa et al.'s (2020) study, which found that educational level, age, employment, and gender were significantly associated with COVID-19 knowledge and preparedness.

This study found that adding personal abilities for processing information and applying the knowledge are beneficial in PHEP. The personal cognitive factors variable comprised self-efficacy, collective efficacy, knowledge, and outcome expectation (Kelder et al., 2015). When these variables were added to the hierarchical regression model, they increased the explained variance significantly.

Knowledge is critical in pandemic preparedness for helping people understand the health risks and benefits of preparing for a pandemic. A cross-sectional study by Chan et al. (2015) found knowledge was associated with increased handwashing and the use of soap to wash hands during the influenza pandemic in Hong Kong. Similarly, Thomas et al. (2015) noted that knowledge of pandemics increases the assembling of emergency kits and other relevant items. Lack of knowledge on pandemics or disease outbreaks can result in fewer vaccinations and assembling emergency items (Wendlandt et al., 2018).

This study finding demonstrated the significance of personal cognitive factors in pandemic preparedness, supporting the findings of Keller et al. (2014) and Maguire et al. (2019), who described that preparing for an emergency required some sort of behavior change. Activities such as wearing facemasks, increased handwashing, reporting flu-like symptoms, vaccination, isolation, and stocking medications have been-argued to be effective in pandemic preparedness and strongly associated with high self-efficacy (Keller et al., 2014; CDC, 2012, 2019, 2020; WHO, 2019; Maclntyre & Wang, 2020).

When the behavioral factor variables (behavioral skills, intentions and reinforcements, and punishment) were included in the model, the total variance increased to 40.0%, implying that behavioral factors explained an additional 3.4% of the variance in COVID-19 preparedness among residents of the United States. This result confirms Savadori and Lauriola's (2021) study, showing that behavioral skills were associated with pandemic preparedness and protective behaviors. Similarly, Al-Amer et al.'s (2022) systematic review and meta-analysis study found that increased vaccination intention is associated with actual vaccination and achieving herd immunity against COVID-19. The intention to prepare for a PHEP positively affects other factors such as attitude, risk

perception, and perceived benefits (Irfan et al., 2021). Contrary to our study findings, Kwon et al. (2010) found no positive association between intention to receive a vaccine against H1N1 and the actual vaccination coverage. This outcome may be attributed to the news of adverse events following immunization and fake news on the vaccine's side effects.

Finally, environmental factors, which were made up of normative beliefs, social support, observational learning, and barriers, were entered into the regression. They increased the total variance to 48.5%, thus adding an additional variance of 8.5% in COVID-19 preparedness among residents of the United States. This result aligns with the findings of Reininger et al. (2013) and Kim and Zakour (2017), who found a higher prevalence of preparedness among individuals with the highest social support components (fairness and trust) and connections to community organizations. This can be due to the networking, resilience, and capacity building social and community connections bring. Furthermore, social support can result in strong interpersonal relationships, which has been argued to boost the self-efficacy needed during PHEP.

5.2 Research Questions 2 and 3

The study findings showed that the contribution of government laws/policies and media activities to COVID-19 preparedness among residents of the United States occurred indirectly through the constructs of the SCT for both independent variables. Personal cognitive, behavioral, and socioenvironmental factors fully mediated the effects of media activities on COVID-19 preparedness. This means that the effects of media activities on COVID-19 preparedness among residents of the United States were completely transmitted with the help of our mediators. With the second mediation model,

the effect of government policies/laws on COVID-19 preparedness was partially mediated by the study mediators. This also means that a portion of the effect of government laws/policies on COVID-19 preparedness among residents of the United States was influenced by our mediators. The direct effects of government laws/policies on COVID-19 preparedness among residents of the United States can be attributed to the direct financial assistance offered to residents through the CARES Act. This finding was highlighted by Cuervo et al. (2017), who found that government financial support helped Latino immigrants prepare for Hurricane Sandy.

This study went a step further to shed light on the paths by which (a) government laws/policies and (b) media activities influence COVID-19 preparedness by concentrating on the mediating role of personal cognitive, behavioral, and environmental factors. The findings suggest that Americans who were positively impacted by the government laws/policies and media activities on COVID-19 were likely to be prepared for the COVID-19 pandemic, specifically, those who rated highly on all three primary constructs of the SCT. Americans who believed that government laws/policies and media activities were helpful during the pandemic were inclined to process the information on COVID-19 and apply their knowledge of the pandemic to either gathering emergency items, preparing to work from home, changing jobs, providing remote learning for their kids, and saving money. This finding may be explained by Thomas et al. (2015), Keller et al. (2014), and Maguire et al. (2019), who found that knowledge of pandemics and other public health emergencies together with self-efficacy were significantly associated with pandemic preventive behaviors (vaccinations) among individuals. On the contrary,

insufficient knowledge of the influenza virus led to very low levels of vaccinations among a cohort of Eastern Chinese adults (Wendlandt et al., 2018).

Secondly, the study findings show that Americans who believed that government laws/policies and media activities were helpful during the pandemic were inclined to perform health-enhancing behaviors that prepared them for the COVID-19 pandemic. Some of these behaviors included the intention to gather emergency items, avoid mass gatherings and get vaccines when they became available. This result parallels Al-Amer et al.'s (2022) systematic review and meta-analysis study, which found that increased vaccination intention is associated with actual vaccination and achieving herd immunity against COVID-19. Behavioral factors also help individuals develop the right attitude and risk perceptions required during public health emergency preparedness (Irfan et al., 2021). Therefore, this study finds that good government laws/policies and the right information from the media plays an essential role in predicting pandemic preparedness through the appropriate behavioral factors.

Finally, the third finding of the mediation analysis highlighted that American residents who were influenced by government laws/policies and media activities were inclined to practice observed preparedness behaviors, seek some physical and social support within their environment to aid their preparedness behavior. Reininger et al. (2013) explained this finding when they noted that social support plays a significant role in networking, resilience, and capacity building in public health emergencies. Social support through voluntary association memberships and volunteering increases an individual's emergency preparedness capacity (Reininger et al., 2013). Furthermore, in previous studies, social support and connection to community organizations are

significant predictors of emergency preparedness (Kim and Zakour, 2017). Besides community organizations, people's preparedness for public health emergencies is influenced by the behaviors of their significant others (subjective norm). People are likely to prepare for public health emergencies when they see their significant others prepare. Paek et al. (2010), in their study, found that subjective norm was significantly and positively associated with emergency preparedness. In conclusion, the effects of government laws/policies and media activities on COVID-19 preparedness among residents of the United States were significantly mediated by personal cognitive, behavioral, and environmental factors of the SCT.

5.3 Conclusion

This study identified the factors that influenced COVID-19 preparedness in the United States and highlighted the importance of government laws/policies and media activities on COVID-19 preparedness. Study findings will add to the literature on how the primary constructs of the SCT influenced COVID-19 preparedness among American residents and how these constructs influenced the effects of media activities and government policies/laws/mandates (face mask and social distancing laws, financial assistance, etc.), on COVID-19 preparedness. Therefore, the impacts of public health emergencies can be reduced by effective preparedness at the individual, environmental and government levels.

5.4 Limitations

There are a few limitations to the present study. First, since the study data was retrospective, there is the possibility of a recall bias from study participants. We believe that participants could erroneously respond to their ability to recall past events during the

start of the COVID-19 pandemic. We tried to overcome this limitation by providing a time frame, i.e., from winter 2020 (before there were many cases of COVID-19 in the United States) to Winter/Spring 2021 (when vaccines were starting to be given out and COVID-19 cases began to decline).

Secondly, the data used for this study were based on self-reported past behaviors and predictions about future actions. Admitting that self-reports often represent adequate approximations of actual behaviors (Ajzen and Fishbein, 1980), they understandably have limitations. Intentions and socially desirable past behaviors are usually over-reported, and less desirable past behaviors are underreported (Mostafa, 2006).

The final limitation was using a volunteer-based online platform, ResearchMatch, to recruit and collect study data. ResearchMatch is limited to only volunteers and researchers, thus affecting the generalizability of the research findings. In addition, the demographic data obtained for this study showed a high percentage of educated older white females, although this finding was similar to other online surveys. Furthermore, to reduce the likely errors associated with individuals rushing through the survey, the researcher did not use any incomplete data in the final analysis.

5.5 Strengths

This study provides empirical evidence on how constructs of the SCT can be used in creating and testing hypotheses. Furthermore, this study adds to the literature by showing the significance of mediators in explaining the factors that influence individual pandemic preparedness. Another strength of this study is using a validated instrument for data collection. Findings from this study can be applied to future pandemics, possibly future waves of COVID-19, or other public health emergencies.

5.6 Implications

5.61 Implications for Practice

Effective and appropriate risk communication messages are vital in mitigating the impact of disasters (Coppola & Maloney, 2009; Cheng et al., 2008). Vhale (2013) noted that effective risk communication builds trust and establishes credibility for risk communicators, thus creating opportunities for greater involvement that can lead to a greater degree of agreement and consensus (WHO, 2013). This study provides insight into understanding the factors that affect COVID-19 preparedness and effective public health risk communication. Considering the fear and panic during pandemics and other public health emergencies and disasters, effective risk communication can deal with fears and uncertainties around the population during any emergency (OECD, 2013). Furthermore, communicating the correct facts during pandemics and public health emergencies is crucial in creating a venue where questions can be answered and uncertainties addressed (OECD, 2013). This was a significant problem during the COVID-19 outbreak.

Finally, from the study findings, pandemic preparedness is influenced by cognitive, behavioral, and environmental factors coupled with some government policies. In future pandemics and other waves of COVID-19, practitioners should consider creating interventions that encompass all these factors to achieve the maximum benefit. Some of these interventions should focus on ways individuals can process information and apply knowledge of pandemics and other public health emergencies. Also, practitioners should consider some of the physical and social factors when creating

population-based interventions, as findings of this research show that these factors are significant predictors of PHEP.

5.62 Implications for Policy

The devastating effects of the COVID-19 pandemic have negatively impacted the United States and globally; hence significant policies should be put in place to prevent and minimize the impact of future pandemics and other public health emergencies. Understanding the factors that influence preparedness is necessary before countries can move towards more effective public health emergency preparedness policies and other institutional actions designed to prevent the adverse effects of future pandemics.

The present study identified the significance of government policies in influencing Americans to prepare for the COVID-19 pandemic. The United States government (federal and state) can maximize the impact of such policy interventions by passing them quicker. The United States travel ban on China came into effect on February 2, 2020, after forty-five nations had already imposed travel restrictions on China (Bollyky & Nuzzo, 2020). An earlier ban on international travel from China would have helped decrease the over 40,000 travelers from China who had already entered the United States from China between the first official report of the outbreak in China and the announcement of the United States travel restrictions (Bollyky & Nuzzo, 2020). Secondly, the delay in passing policies on the wearing of facemasks and the ban on social gatherings in some states did that help the control of the pandemic as a nation. It seemed to be a political battle than a fight against the pandemic. The United States government should consider national interests rather than political interests in future public health

emergencies. This will help the nation as a whole to prepare for future pandemics or emergencies, thus reducing the deleterious impacts of these disasters.

The timely passage of laws and policies during public health emergencies is crucial, but findings from this study showed that some of these interventions are mediated by several psychosocial factors. These mediators or factors influence the impact of these policies on preparedness. In creating laws and policies during public health emergencies, governments should incorporate elements that will improve individuals' psychological, physical, and social lives to enhance the effects of these interventions.

5.63 Implication for Future Research

The present study provides the baseline for understanding the factors that influenced COVID-19 preparedness in the United States. Constructs of the SCT significantly explained about 49% of the variance in COVID-19 preparedness in the United States after accounting for demographic characteristics. Researchers can apply the SCT to understand the factors that affected COVID-19 preparedness in other countries. Furthermore, future studies should seek to apply the full complement of the SCT in predicting other public health emergencies and diseases, i.e., epidemics, wildfires, earthquakes, and hurricanes, among others.

In addition, the findings from this present study serve as a baseline for a qualitative study to better understand the findings of this study. The results of qualitative research done after quantitative research give depth to the initial quantitative results and increase their decision-making value (Creswell and Creswell, 2017). Further qualitative studies will answer questions on "why" and "how" personal cognitive, environmental, and behavioral factors affected COVID-19 preparedness among Americans. Furthermore,

how these factors mediated the effects of media activities and government policies on COVID-19 can be addressed in future studies. The outcomes of these qualitative studies can add vital information and rich descriptive illustrations that strengthen the information gathered in this present study.

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APPENDICES

Appendix A: List of Abbreviations

BBC	British Broadcasting Cooperation
CARES Act	The Coronavirus Aid, Relief, and Economic Security Act
CDC	Center for Disease Prevention and Control
COVID-19	Coronavirus Disease 2019
CNN	Cable News Network
DHHS	Department of Health and Human Services
EVD	Ebola Virus Disease
FEMA	Federal Emergency Management Agency
FDA	Food and Drug Authority
GDP	Gross Domestic Product
GHG	Green House Gas
GIS	Geographic Information Systems
HBM	Health Belief Model
HHS	Health and Human Service
H1N1	Swine Flu
IHR	International Health Regulations

IMB	Integrated Behavioral Model
IMF	International Monetary Fund
MERS	Middle East Respiratory Syndrome
NOE	Negative Outcome Expectancy
PHE	Public Health Emergency
PHEIC	Public Health Emergency of International Concern
PHEP	Public Health Emergency Preparedness
PEF	Pandemic Emergency Financing
POE	Positive Outcome Expectancy
SARS	Severe Acute Respiratory Syndrome
SCT	Social Cognitive Theory
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
TPB	Theory of Planned Behavior
TTM	Transtheoretical Model
UN	United Nations
USD	United States Dollar
WHO	World Health Organization

Appendix B: IRB Approval letter

Human Subjects Protection Program Office
300 E. Market Street, Suite 380
University of Louisville
Louisville, KY 40202

UNIVERSITY OF LOUISVILLE

DATE:	August 23, 2021
TO:	Muriel J Harris, PhD, MPH
FROM:	The University of Louisville Institutional Review Board
IRB NUMBER:	21.0473
STUDY TITLE:	**Understanding Public Emergency Preparedness before and during the coronavirus outbreak: Implications for effective Public Health and Risk Communication.**
REFERENCE #:	730322
DATE OF REVIEW:	08/20/2021
CONTACT FOR QUESTIONS:	Sherry Block 852-2163 slbloc04@louisville.edu

This study was reviewed on 08/20/2021 by the Chair/Vice Chair of the Institutional Review Board and approved through Expedited Review Procedure, according to 45 CFR 46.110(b), since this study falls under Category 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

This study now has final IRB approval from 08/20/2021 through 08/19/2024.

This study was also approved through 45 CFR 46.116 (C), which means that an IRB may waive the requirement for the investigator to obtain a signed informed consent form for some or all subjects.

The following items have been approved:

Submission Components			
Title	Version #	Version Date	Outcome
Pilot Study invitation document	Version 1.0	08/10/2021	Approved
Study invitation clean version	Version 3.0	08/10/2021	Approved
Study Protocol clean Version	Version 3.0	08/10/2021	Approved
SURVEY	Version 1.0	07/15/2021	Approved
PREAMBLE Clean Version	Version 3.0	08/10/2021	Approved

IRB policy requires that investigators use the IRB "stamped" approved version of informed consents, assents, and other materials given to research participants. For instructions on locating the IRB stamped documents in iRIS visit: https://louisville.edu/research/humansubjects/iRISSubmissionManual.pdf
Your study does not require continuing review per federal regulations. Your study has been set with a three-year expiration date following UofL local policy. If your study is still ongoing at that time, you will receive automated reminders to submit a continuing review form prior to the expiration date. If you complete your study prior to the expiration date, please submit a study closure amendment.

All other IRB requirements are still applicable. You are still required to submit amendments, personnel changes, deviations, etc… to the IRB for review. Please submit a closure amendment to close out your study with the IRB if it ends prior to the three year expiration date.

Human Subjects & HIPAA Research training are required for all study personnel. It is the responsibility of the investigator to ensure that all study personnel maintain current Human Subjects & HIPAA Research training while the study is ongoing.

Site Approval
Permission from the institution or organization where this research will be conducted **must** be obtained before the research can begin. For example, site approval is required for research conducted in UofL Hospital/UofL Health, Norton Healthcare, and Jefferson County Public Schools, etc...

Privacy & Encryption Statement
The University of Louisville's Privacy and Encryption Policy requires identifiable medical and health records; credit card, bank account and other personal financial information; social security numbers; proprietary research data; and dates of birth (when combined with name, address and/or phone numbers) to be encrypted. For additional information: http://louisville.edu/security/policies.

Implementation of Changes to Previously Approved Research
Prior to the implementation of any changes in the approved research, the investigator must submit modifications to the IRB and await approval before implementing the changes, unless the change is being made to ensure the safety and welfare of the subjects enrolled in the research. If such occurs, a Protocol Deviation/Violation should be submitted within five days of the occurrence indicating what safety measures were taken, along with an amendment to revise the protocol.

Unanticipated Problems Involving Risks to Subjects or Others (UPIRTSOs)
A UPIRTSO is any incident, experience, or outcome, which has been associated with an unexpected event(s), related or possibly related to participation in the research, and suggests that the research places subjects or others at a greater risk of harm than was previously known or suspected. The investigator is responsible for reporting UPIRTSOs to the IRB within 5 working days. Use the UPIRTSO form located within the iRIS system. Event reporting requirements can be found at: http://louisville.edu/research/humansubjects/lifecycle/event-reporting.

Payments to Subjects
In compliance with University policies and Internal Revenue Service code, payments to research subjects from University of Louisville funds, must be reported to the University Controller's Office. For additional information, please call 852-8237 or email controll@louisville.edu. For additional information: http://louisville.edu/research/humansubjects/policies/PayingHumanSubjectsPolicy201412.

pdf

The committee will be advised of this action at a regularly scheduled meeting.

We value your feedback; let us know how we are doing: https://www.surveymonkey.com/r/CCLHXRP

Sincerely,

Peter M. Quesada, Ph.D., Chair
Social/Behavioral/Educational Institutional Review Board
PQ/slb

Appendix C: Participant Recruitment Script

STUDY INVITATION

The University of Louisville is inviting you to participate in a research study. The purpose of this study is to understand public emergency preparedness before and during the COVID-19 outbreak. This study is an online survey that will take approximately 15 minutes to complete.

You may qualify for this study if you:

- Live in the US or in a US Territory
- Are 18 years or older

If you have any questions, concerns, or complaints about the research study, please contact Dr. Muriel Harris at (502) 852-4061.

Participants will not be compensated for their participation in this study.

Thank you for your consideration!

Appendix D: Study Preamble

Understanding Public Emergency Preparedness before and during the coronavirus outbreak: Implications for effective Public Health and Risk Communication.

Date

Dear _____:

You are being invited to participate in a research study. The purpose of this study is to understand public emergency preparedness before and during the coronavirus outbreak. This study is being conducted by Raphael Fumey. There are no known risks for your participation in this research study. The information collected may not benefit you directly. The information learned in this study may be helpful to others.

The information you provide will help researchers and policymakers understand the factors that influenced COVID-19 preparedness. Your completed survey will be stored at the University of Louisville**.** The survey will take approximately 10-20 minutes to complete. To take part in this survey, you will be asked a few initial questions, and if you are able to answer those questions, you will be enrolled as a subject, but if you are unable to answer the questions, you cannot proceed to take part in the actual survey.

Individuals from the Department of Health Promotion and Behavioral Sciences, the Institutional Review Board (IRB), the Human Subjects Protection Program Office (HSPPO), and other regulatory agencies may inspect these records. In all other respects, however, the data will be held in confidence to the extent permitted by law. Should the data be published, your identity will not be disclosed. There is no information in this survey that will identify you. We are not collecting any directly identifiable information such as your name, mailing address, or email address.

Taking part in this study is voluntary. By answering survey questions, you agree to take part in this research study. You do not have to answer any questions that make you uncomfortable**.** You may choose not to take part at all. If you decide to be in this study, you may stop taking part at any time. If you decide not to be in this study or if you stop taking part at any time, you will not lose any benefits for which you may qualify.

If you have any questions, concerns, or complaints about the research study, please contact Dr. Muriel Harris at (502) 852-4061.

If you have any questions about your rights as a research subject, you may call the Human Subjects Protection Program Office at (502) 852-5188. You can discuss any questions about your rights as a research subject, in private, with a member of the Institutional Review Board (IRB). You may also call this number if you have other

questions about the research, and you cannot reach the research staff, or want to talk to someone else. The IRB is an independent committee made up of people from the University community, staff of the institutions, as well as people from the community not connected with these institutions. The IRB has reviewed this research study.

If you have concerns or complaints about the research or research staff and you do not wish to give your name, you may call 1-877-852-1167. This is a 24-hour hot line answered by people who do not work at the University of Louisville.

Sincerely,

Signature of the Investigator **Signature of the Co-Investigator**

Appendix E: Study Instrument

Understanding Public Emergency Preparedness before and during the coronavirus outbreak: Implications for effective Public Health and Risk Communication.

DEMOGRAPHICS

1. What is your age?
    - 18-24 years old
    - 25-34 years old
    - 35-44 years old
    - 45-54 years old
    - 55-64 years old
    - 65 years old and above
    - I prefer not to say

2. What is your gender?
    - Male
    - Female
    - Other_____
    - Prefer not to say

3. What is your marital status?
    - Single/never married

- Married
- Divorced/Separated
- Widow/widower
- I prefer not to say

4. What is the highest degree or level of school you have completed? *If currently enrolled, the highest degree received*.
    - Less than high school diploma
    - High school diploma
    - Associates degree
    - Some college
    - Associate degree
    - Bachelor's degree
    - Graduate degree (M.S., PhD., M.D…..)
    - I prefer not to say
5. What is your ethnicity?
    - Hispanic
    - Non-Hispanic
    - I prefer not to say

6. What is your race?
    - American Indian or Alaska Native
    - Asian or Pacific Islander

- Black or African American
- White/Caucasian
- I prefer not to say
- Other _____

7. What is your primary language spoken at home?
    - English
    - Spanish
    - Arabic
    - Swahili
    - French
    - Other_____
    - I prefer not to say

8. What is your current employment status?
    - Employed Full-Time
    - Employed Part-Time
    - Self-employed
    - Unemployed/disabled
    - Retired
    - Student
    - Other_____
    - I prefer not to say

9. Including yourself, how many people live in your household? _____

10. How much money do you make per month on your current job?

- Unemployed
- Less than $1,999
- $1,200 - $2,399
- $2,400 - $3,599
- $3,600 - $4,800
- More than $4,800
- Prefer not to say

11. Do you have any of the following chronic medical conditions?

- Heart or cardiovascular disease
- Respiratory disease (asthma)
- Diabetes
- Obesity
- Cancer
- Immunodeficiency disorders
- Others (Specify)
- None
- Prefer not to say

12. What is your political affiliation?

- Very Liberal
- Slightly Liberal
- Moderate
- Slightly Conservative
- Very Conservative
- I prefer not to say

13. Were you ever diagnosed with COVID-19?

- Yes
- No
- I prefer not to say

Instructions: all questions in this part of the survey will be based on activities from winter 2020 (before there were many cases of COVID-19 in the United States) to Winter/Spring 2021 (when vaccines were starting to be given out and COVID-19 cases started to decline).

PERSONAL COGNITIVE FACTORS

Please read each of the following statements and indicate your level of agreement from **Not at all [1] to Very much [5]**

1. Self-Efficacy		**Total**
• I had difficulty in protecting myself from COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
• I had difficulty in preparing for COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	
2. Collective Efficacy		
• I worked effectively with my family to prepare for COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
3. Outcome expectation		
• I believed that hand washing and sanitizing practices could protect me from COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
• I believed that wearing a face mask could protect me from COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	
• I believed that social distancing could protect me from COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	
4. Knowledge		
• I think I had a good understanding of what the symptoms of COVID-19 were (based on information available at the time).	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**

BEHAVIORAL FACTORS

Please read each of the following statements and indicate your level of agreement from **Not at all [1] to Very much [5]**

5. Intention		
• I had plans to wear my facemask anytime I went out of my house.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
• I had plans to get a vaccine when it became available.	**Not at all [1] [2 [3] [4] [5] Very Much**	
• I thought of stocking up on emergency items (food, toilet papers, medicine, etc) in case the stores ran out.	**Not at all [1] [2 [3] [4] [5] Very Much**	
6. Reinforcement and punishment		
• I was motivated to prepare for COVID-19 because of the fear of getting infected by the virus.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
7. Behavioral Skills		
• I had some skills that aided me in protecting myself from COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**

ENVIRONMENTAL FACTORS

Please read each of the following statements and indicate your level of agreement from **Not at all [1] to Very much [5]**

8. Normative Beliefs		
• My family and friends believed I needed to be prepared for COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
9. Social Support		

• My family, friends, and/or neighbors helped me prepare for COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
10. Observational Learning		
• I was motivated to purchase preparedness items (such as masks and hand sanitizer) by watching others purchase those items.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
• I learned new information and behaviors on how to protect myself from COVID-19 by watching others.	**Not at all [1] [2 [3] [4] [5] Very Much**	
11. Barriers		
• Lack of information about COVID-19 was a barrier to my being prepared for COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
• Lack of social support was a barrier to my COVID-19 preparedness,	**Not at all [1] [2 [3] [4] [5] Very Much**	
• Time pressure was a barrier to my COVID-19 preparedness.	**Not at all [1] [2 [3] [4] [5] Very Much**	
• Financial pressure was a barrier to my COVID-19 preparedness.	**Not at all [1] [2 [3] [4] [5] Very Much**	

RISK PERCEPTION

Please read each of the following statements and indicate your level of agreement from **Not at all [1] to Very much [5]**

12. Perceived Severity		
• I believed that getting infected with COVID-19 would hurt my social life	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
• I believed that getting infected with COVID-19 would hurt my financial well-being.	**Not at all [1] [2 [3] [4] [5] Very Much**	

• I believed that getting infected with COVID-19 would hurt my mental well-being.	**Not at all [1] [2 [3] [4] [5] Very Much**	
13. Perceived Susceptibility		
• I believed that I would get infected with COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	**5**
• I believed that a family member living in my home would become infected with COVID-19.	**Not at all [1] [2 [3] [4] [5] Very Much**	
• I believed that a friend would become infected with COVID-19	**Not at all [1] [2 [3] [4] [5] Very Much**	
14. Past Experience		
Please read each of the following statements and indicate Yes or No.		
• Have you personally experienced any natural disasters (hurricane, tornados, fires, disease outbreaks, etc.)?	**Yes /No**	
• Have you personally experienced any man-made disasters (terrorist attacks, explosions, etc.)?	**Yes/No**	

MEDIA AND OTHER SOURCES OF INFORMATION

15. Rate the level of trust you put in these sources to give reliable information about COVID-19?

Please rate from 0 (No trust) to 5 (A great deal of trust)

Source	**0**	**1**	**2**	**3**	**4**	**5**
o Television news						
o Newspapers						
o Social Media/Internet						

	o Radio news/programs						
	o Friends or Family						
	o Federal Government (example: President) and Health Agencies (example: the Centers for Disease Control and Prevention (CDC))						
	o State and Local government (example: Governor or Mayor) and Health Agencies (like the State Health Department)						
	o International Health Organizations (like the World Health Organization)						
	o Other _____						
16.	How often do you use your most trusted media source for COVID-19 information? **Please rate from 0 (Never) to 5 (Very Often)**						
	Source						
	o Television news						
	o Newspapers						
	o Social Media/Internet						
	o Radio news						
	o Friends or Family						
	o Federal Government (example: President) and Health Agencies (example: the Centers for Disease Control and Prevention (CDC)						

○ International Health Organizations (like the World Health Organization)							
• Other _____							

17. Which of the following television news companies do you mostly watch or listen to for news on COVID-19? **Please select one**

Media Outlet	
○ ABC	
○ CBS	
○ CNN	
○ Fox News	
○ MSNBC	
○ One American News Network (OANN)	
○ Other _____	

18. Which of the following social media platforms do you mostly obtain information on COVID-19? **Please select one**

Media Outlet	
○ Bloggers	
○ Facebook	
○ Instagram	
○ TikTok	
○ Twitter	
○ YouTube	

○ Other _____	

POLICY

19. How much did government policies such as the lockdown laws, travel bans, and financial assistance helped you prepare for the COVID-19 outbreak?	**Not at all [1] [2 [3] [4] [5] Very Much**

PREPAREDNESS

Read each of the following questions and rate your response on a scale of **0 (Not prepared) -5 (Extremely prepared).**

20. How prepared were you to work from home?	**[0] [1] [2 [3] [4] [5] [N/A}**
21. How prepared were you to change jobs?	**[0] [1] [2 [3] [4] [5] [N/A**
22. How prepared was your household to provide remote learning (online school) for your kids, if you have any?	**[[0] [1] [2 [3] [4] [5] [No kids]**
23. Are you financially prepared for the future waves of COVID-19 or other global disease outbreaks?	**[0] [1] [2 [3] [4] [5]**
24. If COVID-19 gets worse, how prepared are you to protect yourself and your loved ones?	**[0] [1] [2 [3] [4] [5]**
25. How prepared are you for future pandemics or large scale disasters?	**[0] [1] [2 [3] [4] [5]**
26. Before the COVID-19 vaccines were available, did you stock your house with any of the following supplies? **Please answer Yes or No for each item by circling the appropriate response**	

Supplies	
Paper towels, Tissues, Toilet paper	**Yes/No**
Soap, Detergent, and Hand sanitizers	**Yes/No**
A first aid kit	**Yes/No**
Thermometer	**Yes/No**
Groceries	**Yes/No**
Extra prescription medications	**Yes/No**
Non-prescription medicine, like aspirin or Tylenol	

27. Overall, do you think you were prepared for the COVID-19 pandemic? **Not prepared [0] [1] [2 [3] [4] [5] (Extremely prepared).**

28. Has your experience with COVID-19 made you get prepared for other types of emergencies, like power outages or new disease outbreaks? **Not at all [1] [2 [3] [4] [5] Very Much**

29. Is there anything else you would like to tell us about your COVID-19 preparedness that was not captured by this survey?

_____

30. Thank you for completing this survey

CURRICULUM VITAE

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University of Louisville

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EDUCATION

Ph. D. Candidate, University of Louisville (2019 – present)
Department of Health Promotion and Behavioral Sciences
Dissertation: Understanding Public Emergency Preparedness before and during the coronavirus outbreak: Implications for effective Public Health and Risk Communication.

Ph. D. Student, University of Louisville (2017-2019)
Department of Health Promotion and Behavioral Sciences
Main Modules: Research Methods, Health Policy, Survey Methods, Epidemiology, Intermediate Statistics, Health Instrumentations Qualitative Analysis, Linear Regression, Health Policy, Socio- determinants of Health, Biostatistics, Theory of Health Promotion Bioethics, Health Risk Communication, ETC.

MPH University of Sheffield, England (2012-2014)
Main Modules: Epidemiology, Statistics, Leading and Managing Health Services, Health Promotion, Global Public Health, HIV/AIDS, Health Needs Assessment, and Communicable diseases control.
Dissertation: Factors affecting the healthcare of the National Health Insurance Scheme clients in Obuasi Municipality in the Ashanti Region of Ghana.

BSc Community Nutrition, University for Development Studies, Ghana (2006 – 2010)
Main Modules: International Nutrition, Food, and Nutrition Security and Surveillance, Program Planning, Management and Administration, Nutrition Program Management and Administration, Dietetics, Nutritional Status Assessment, Rural Sociology, Community and Development Change.

POSITIONS

Data Coordinator, University of Louisville Ryan White HIV/AIDS Program (2018 - 2022)

Division of Infectious Disease, University of Louisville.

Student Researcher: Community-Acquired Pneumonia Study Louisville, Hepatitis A study Louisville (2018-2020)
Division of Infectious Disease, University of Louisville

Regulatory Officer, Ghana Foods and Drug Authority, Ghana (2010 – 2012)

Census Officer, Ghana Statistical Service (2010)

Dietician; Koforidua Regional Hospital, Ghana (2019)

CONFERENCE PRESENTATION

Fumey, R., Upadhyay. S., Luong, T.V.T., Choudhury, J.C. S., Ghosh, K., Carrico, R. Risk factors for Hepatitis A among food service workers in Louisville are not different from the general population. *Research Louisville*. October 10, 2018, Louisville, Kentucky.

Thomas, S.D., Alobaydullah, A.A., Fumey, R., Chaney, C., Simpson, A., & LaJoie, A.S. (2021). Influencers of the decision to vaccinate and engage in other COVID-19 protective behaviors. *43rd Annual Meeting of the Society for Medical Decision Making*. October 18-20, 2021 (Virtual/Poster).

Alobaydullah, A.A., Thomas, S.D., Fumey, R., Simpson, A., Chaney, C., & LaJoie, A.S. (2021). Understanding the social and cognitive influences on the adoption of COVID-19 non-pharmaceutical interventions behaviors. *American Public Health Association Annual Meeting*. October 21, 2021 (Virtual/Poster).

Thomas, S.D., Allobaydullah, A., Fumey, R., Chaney, C., Simpson, A, and LaJoie, A.S., (2021). *Acceptance of COVID-19 Vaccine & Non-Pharmaceutical Interventions*. UL-School of Public Health and Information Sciences SGA Presents: Public Health Seminar Series. Louisville, Kentucky.

Alobaydullah, A., Thomas, S.D., Fumey, R., Chaney, C., Simpson, A, and LaJoie, A.S., (2021). *Non-Pharmaceutical Interventions Compliance in Saudi Arabia*. UL-School of Public Health and Information Sciences SGA Presents: Public Health Seminar Series. Louisville, Kentucky.

SKILLS

Information Technology

Proficient in popular applications including Redcap, Microsoft Word, PowerPoint, Epi Info, and Statistical Package for the Social Sciences (SPSS). I used these applications in practical work, dissertations, and presentations.

Advocacy

As a former member of the Ghana Food and Drugs Authority Industrial Service Support Unit, I raised awareness of the use of iodate salt. I educated most food manufacturers on Good Manufacturing processes in some areas in Ghana.

AWARDS

2022	University of Louisville Ph.D. Dissertation Completion Scholarship
2020	University of Louisville International Student Tuition Support
2019	Scholarship
2018	University of Louisville International Student Tuition Support Scholarship
	University of Louisville International Student Tuition Support Scholarship
2017-2020	Ghana Educational Trust Fund Scholarship (University of Louisville)
2012-2014	Ghana Educational Trust Fund Scholarship (University of Sheffield)

REFEREES

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