

MISINFORMATION POLICIES IN THE COVID-19 PANDEMIC

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Table of Contents

Acknowledgements	3
Abstract	4
Chapter One: Introduction, Key Questions, and Significance	5
Chapter 2: Literature Review	10
Chapter 3: Methods	17
Chapter Four: Results	21
Chapter 5: Conclusions and Recommendations	37
References	41

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Abstract

In the age of social media, there continues to be a rapid exchange of information. Beneficial to our ever evolving society, this fast paced exchange of information has many downfalls — mainly misinformation and disinformation. As the COVID-19 pandemic impacted every aspect of life, the information surrounding the pandemic spread very easily and in many instances the information was not factual. Naming it an infodemic, the Director General of the World Health Organization warned countries about the dangers of this phenomenon (Ghebreyesus, 2020). While the spread of misinformation is inevitable, nations can enact policies to curb this spread, and they have. Even before, and during the pandemic, states have implemented different types of policies that fall into mainly three categories: (1) restrictive of human rights (2) directed towards big technology companies (3) advisories/campaigns.

This thesis aims to evaluate the impact of different types of policies in a cross-national study including thirty different countries. I first categorize the different policies based on what the countries have enacted into the three categories or if they do not have a policy in place, categorize it as so. Building upon this analysis, I conducted a one-way ANOVA test and a Tukey's HSD test on the mean responses for three questions that I used as a proxy for the spread of misinformation. I found that the lowest levels of misinformation were found in the states with policies that were restrictive of human rights.

The conclusion outlines policy recommendations for states and future research: including a recommendation that states should expand their anti-misinformation programs and that researchers should conduct a country by country analysis.

Chapter One: Introduction, Key Questions, and Significance

Introduction

This thesis explores the spread of misinformation in the COVID-19 pandemic. Throughout the pandemic, misinformation has spread just as rapidly, if not faster, than the virus itself. Naming it an “infodemic”, the director general of the World Health Organization (WHO), Dr. Tedros Adhanom Ghebreyesus, warned countries early on about the dangers of the spread of misinformation (Ghebreyesus, 2020). An infodemic, as the WHO defines it is “too much information including false or misleading information in digital and physical environments during a disease outbreak” (“Infodemic” n.d.). At the onset of the pandemic, there was very little information available about the coronavirus with a “clear scientific basis” impacting the type of information that was being spread around COVID-19 (Cuan-Baltazar et al., 2020). In an effort to curb this “infodemic” the WHO created a campaign called “ COVID-19 Mythbusters” containing graphics that dispel common misconceptions about the disease and its cures (“COVID-19 mythbusters”). However, misinformation continued to rage on, beginning with the origins of the virus, people began spreading misinformation that the virus was fabricated by scientists in a lab in China (Lewandowsky et al., 2022). Since then, misinformation about the virus's origin, public health guidelines, masks, and vaccines have taken over social media applications. This spread of misinformation constantly undermines the pandemic response as it can place mistrust in public health authorities and result in unsafe behaviors. Studies have found that belief in misinformation often impacted their behavior in regards to COVID-19 related precautions (Barua et al., 2020; Vitriol and Marsh, 2021). Thus the spread of misinformation can lead to individual behaviours acting against public health guidelines that can have harmful consequences on the outcomes of a pandemic and threaten public health.

The threat of misinformation is compounded by online communications, as the COVID-19 pandemic is the first pandemic to have occurred in the age of social media. Social media serves as an easy tool for people to read and spread misinformation. Before the “infodemic” accompanying the pandemic began, states such as Germany had created laws to regulate the spread of misinformation (“Germany starts enforcing hate speech law,” 2018). As the spread of misinformation grew throughout the course of the pandemic, technology companies such as Twitter and Facebook created policies to curb this spread (“Combating COVID-19 Misinformation Across Our Apps” 2021 ;“COVID-19 misleading information policy” n.d.). Additionally, more national governments began creating policies to prevent the escalation of misinformation, with countries such as Vietnam creating policies that criminalize individuals for spreading misinformation, the United Kingdom launching an anti-misinformation education campaign with the WHO, and France creating a policy targeting technology companies (Ngyuen and Pearson 2020; WHO 2020; Chandler 2020).

These differing policy approaches can have different impacts in mitigating the spread of misinformation. This thesis aims to evaluate those differences and understand what policy initiatives are successful in targeting the spread of misinformation. Focused on the early months of the pandemic response, this thesis is focusing specifically on health misinformation related to wearing a mask.

Chapters to Follow

To provide a deeper understanding of misinformation and misinformation related policies, Chapter Two will outline the existing literature and research on these topics. The chapter will establish the gap in current literature, and why this research is necessary. Chapter Three will outline the study design and methods, outlining where the research was obtained from

and the methods of analysis. Chapter Four discusses the results of the research, highlighting the specific questions utilized to measure masking misinformation. This section summarizes the results of multiple ANOVA analyses and Tukey's HSD analyses. Chapter 5 provides recommendations for policymakers for future considerations regarding anti-misinformation policy decisions. It also provides recommendations for future research in this field of study.

The Key Question

The key question for this thesis is: How have government policies, intended to curb misinformation, impacted people's opinion on public health guidelines? Currently, there is a lot of literature that evaluates the impact of misinformation in the pandemic. However, there is very little information on how governments took action against misinformation and if they succeeded in slowing down the spread of misinformation in their respective countries. To study this question, this thesis looks across comparable data on national guidelines in Australia, Brazil, Canada, China, Denmark, Finland, France, Germany, Hong Kong, India, Indonesia, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, Norway, Philippines, Saudi Arabia, Singapore, South Korea, Spain, Sweden, Taiwan, Thailand, United Arab Emirates, United Kingdom, United States and Vietnam. This thesis will explore three types of policies implemented to combat misinformation, evaluating their different approaches and effectiveness in preventing the spread of misinformation in regards to public health guidelines. Analyzing these policies to see whether they served their purpose will fill the gap in the current literature about misinformation spread. There is a lot of research examining the detrimental impacts of misinformation, but there needs to be more information about how states can respond and help curb this spread of misinformation while being mindful of individuals' rights to free expression and health.

Background/Historical Context

Misinformation is defined as “incorrect or misleading information” (“Definition of misinformation,” n.d.). An important aspect of misinformation is that it is not deliberate. Misinformation is not created for the sole purpose of falsely informing others, it is often spread by people due to a lack of awareness (Stahl, 2006). An old phenomenon, misinformation arises around any major topic being addressed anywhere around the world. For centuries, there has been public distrust and subsequent spreading of misinformation surrounding vaccines, including that the first smallpox vaccine could turn one into a cow or cause stillbirths (Dohms-Harter 2021). In recent years, communities have arisen online under the shared erroneous that vaccines can cause autism (“Autism and vaccines,” 2022). A highly disproven and contested conclusion that still prevails in society, this piece of misinformation has shifted how people think about vaccines, with impacts on vaccination rates and infectious disease. This long standing distrust of vaccines expanded to the COVID-19 vaccine, with people who are against vaccines (anti-vaxxers) spreading blatant lies such as that vaccines contain 5G or that mRNA vaccines will manipulate the human genome, etc (Hotez et al 2021). As technology has evolved, social media applications provide a relatively unregulated space for people to spread blatant lies and fear. People often struggle to discern fact from false news, and with the far-reaching connectivity social media provides, are able to spread false information rapidly. While technology companies have slowly taken action against online misinformation posts, a previous study shows that simple warnings that a post may contain misinformation are not effective against people processing and remembering the misinformation (Ecker et al 2010). In addition to technology companies taking action, governments have also created policies to tackle this issue.

The spread of misinformation and policies implemented to combat misinformation largely restrict the human rights to health and free speech. Many nation states throughout the pandemic have utilized their power to censor individuals under the guise of protecting them (Kelly and Patisson 2021). In doing so, these states are restricting the right to free speech and consequently the right to health. Protecting one's health is of utmost importance in the middle of a pandemic. If governments themselves are spouting false information or restricting those from spreading correct information because it contradicts the state, they are harming the health of those that may believe the false information.

Significance for Public Policy

As the world becomes increasingly globalized and the ability to spread information takes no more than a few clicks, governments must manage the spread of misinformation, as it pertains to this and future pandemics and in general. The rapid spread of misinformation could negatively impact any national and global government efforts to protect people. Governments must be able to respond to such crises quickly, effectively and yet make sure they are not restricting people's freedom of speech. It is vital that states are able to act preventatively in the future to prevent the blatant disregard of guidelines as seen in this pandemic. This question will shed light on what policies are effective in preventing misinformation, providing evidence for governments to either follow in these country's footsteps or approach their strategies differently.

This thesis evaluates policies that are education/information campaigns, policies that directly censor and criminalize people who spread misinformation, as categorized by the state, and policies that target technology companies.

Chapter 2: Literature Review

The current literature surrounding misinformation encapsulates the impact of misinformation and people's susceptibility to misinformation; however, there is little existing research on the impact of policies that seek to prevent the spread of misinformation.

Misinformation and disinformation have been prominent problems in the age of the internet, and especially during the COVID-19 pandemic, with the World Health Organization Director General Dr. Tedros Ghebreyesus characterizing it as an infodemic (Ghebreyesus, 2020). While both present wrong information, there is a key difference between misinformation and disinformation. Disinformation is the purposeful spread of wrong information, whereas misinformation is simply wrong information (Stahl, 2006). This thesis will focus on misinformation and people's behavior as motivated by misinformation.

Impact of Misinformation on Behavior

Spreading misinformation in the digital age is, unfortunately, inevitable. A study analyzing the spread of misinformation via Twitter found that false information spreads "farther, faster, deeper, and more broadly than the truth" (Vosoughi et al., 2018). This research is concerning as growing misinformation can impact people's behaviors and reactions, especially in a public health emergency.

As the COVID-19 pandemic raged on, misinformation spread across nations. A study conducted in April to May of 2020 aimed to measure how susceptible people were to COVID-19 misinformation in the United Kingdom, Ireland, the United States, Spain and Mexico. Finding that susceptibility to misinformation greatly impacts how people respond to public health guidelines including a reduction in willingness to get the COVID-19 vaccine and recommend it to others (Roozenbeek et al, 2020). While the authors cannot claim causality, this study

demonstrates the dangers of the spread of misinformation on behavior. The rapid spread of misinformation diminished the power of public health guidelines in Italy at the beginning of the COVID-19 pandemic, leading to the rapid spread of infectious disease; proving detrimental and potentially causing overcrowded hospitals (Prandi and Primiero, 2020).

As the pandemic continued to progress, misinformation spread on social media at an alarmingly fast pace, with researchers finding that misinformation is easily engaged by users as the truth (Kouzy et al 2020). Another study found that exposure to social media, namely Twitter, increased misperceptions of the COVID-19 pandemic (Bridgman et al., 2021). These studies reached similar conclusions, finding that exposure to traditional news media results in fewer misperceptions of COVID-19 and that an increase in misperceptions resulted in less compliance with social distancing (Bridgman, et al., 2021). This key distinction between the impact of social media versus traditional media is vital in understanding the influence of policy on misinformation spread — as many national misinformation policies are targeting journalists and individuals and other policies are targeting technology companies with their misinformation policies (Bridgman et al., 2021).

In evaluating the impact of misinformation on behavior during the pandemic, researchers conducted a study where subjects were either exposed to public health posters with misinformation warnings, not exposed to warnings or not exposed to public health posters at all. While the effects were not very large, the researchers found that “even a single exposure to misinformation” can impact behavior (Greene and Murphy, 2021). The concerning results call for further research into the impact of misinformation on behavior.

Similarly, a study by Barua et al found that misinformation disrupts people's responses to the COVID-19 pandemic (2020). This study helps provide context as to the reasons why people

change their behaviors based on the frameworks used in the study. Finding that the credibility of the author is positively associated with an individual's response, the researchers recommend that individuals should evaluate the source of the information before they believe it (Barua et al, 2020). If the policy aims to simply stop the spread of misinformation, it might not change people's behavior, but if it is a policy that disseminates trustworthy information, it could impact individual responses (Barua et al, 2020).

Throughout the pandemic, there have been varying sources of misinformation — from messages on different social media platforms to world leaders making outrageous claims. Former U.S. President Donald Trump claimed that hydroxychloroquine, an anti-malarial drug, would be effective against the coronavirus, deviating from actual science based public health guidelines and solutions (Milman, 2020). An analysis of media coverage in the United States found that President Trump was a key person in the spread of the infodemic (Evanega et al, 2020). Another world leader, Jair Bolsonaro, promoted misinformation about COVID-19, downplaying its severity, and also calling for the use of hydroxychloroquine based drugs (Ricard and Medeiros 2020). Such dangerous claims of misinformation, coming from top government officials solidified the infodemic accompanying the pandemic.

A literature review of misinformation related research within the realm of health found that there exists a problematic rise in misinformation and its prevalence on social media over factual information (Wang et al., 2019) Finding that much of the research surrounding misinformation concerns vaccinations and infectious disease, Wang et al provide a pre-pandemic analysis that emphasizes the dangers of the spread of false information via social media (2019). Building upon this, another literature review stated that social media plays a large role in the spread of misinformation, especially health misinformation, and that low literacy and health

levels, and a distrust in government lead to rapid spread of misinformation (Chowdhury et al 2021). Thus demonstrating the type of environment promoting the rapid spread of misinformation. Researchers Nan et al found that health misinformation spreads largely via social media, and while they could not conclude if it spreads in conjecture to science misinformation, they found that health misinformation is often anti-science and has many negative connotations (2021).

Actions to Mitigate the Spread of Misinformation

A framework titled the “fuzzy trace theory” states that people process the “gist” of concepts differently than they process things verbatim (Reyna, 2012). The theory also states that people tend to make decisions based on the gist of information rather than verbatim representations, therefore leading to the acceptance of misinformation (Reyna, 2012). The author suggests that policymakers should shift from simply attempting to change behavior or persuading citizens to focus on shifting its science communication to ensure that people are able to “achieve insight” from the information they receive (Reyna, 2012). This article provides further insight into why people believe misinformation and what can be done on a policy level to mitigate its spread that will be effective. In creating evidence-based policies, policymakers need to account for these scientific explanations of human behavior.

Misinformation and disinformation can largely impact people’s behaviors and subsequently public health. Therefore when creating the best policies to curb the spread of false information, researchers must consider it to be a social determinant of health. In evaluating information ethics, Morley et al argue that education is not sufficient in protecting public health, states can appropriately restrict posts deemed as misinformation, the vastness of the “infosphere” removes credible actors from gatekeeping information thus making it easier to spread and a just

system protects those most susceptible to inaccurate health information (2020). Thus creating an ethical framework for policy makers to consider in creating and implementing policies that protect the right to health without egregiously restricting the right to free speech.

Regulating misinformation is a difficult task. Researchers have suggested three methods of regulating misinformation: (1) Individual self-regulation, (2) Platform-Based Innovations and (3) Government Action (Brown et al, 2021). While people do tend to have confirmation bias over information they encounter online, self-regulation through media literacy education would be a cost effective and an overall effective strategy (Brown et al, 2021). In targeting social media platforms Brown emphasizes the downfalls of allowing companies to self-regulate as these for-profit institutions would never act in ways that limit business models that drive profits. Brown calls for companies to incorporate fact-checkers into their organizations and redirect users from misinformation to credible sources (as Twitter has been doing in the pandemic in cooperation with the CDC). Lastly, when discussing government action, Brown includes examples of how laws can be restrictive of speech and questions the efficacy of such policies in finding and removing misinformation, thus identifying a key gap in the literature on the effectiveness of these strategies (Brown et al 2021).

Pomeranz and Schwid conducted a study to evaluate the types of governmental responses to misinformation in the covid-19 pandemic (2021). They selected countries that have adopted the International Covenant on Civil and Political Rights (ICCPR) and developed national laws to protect free expression within their countries. Among these countries, they found that countries responded in five ways: (1) Increased access to factual education, as seen in Taiwan, Ethiopia, the UK, South Africa and Nigeria, (2) Restricting the release of factual information, as seen in China, Belarus, Aruba, Peru, Kuwait, Bosnia, Brazil and the U.S, (3) Governments themselves

disseminated non-factual information as was done in Iran, China, Russia, the US, Kenya, and Madagascar, (4) Governments criminalized commercial fraud for fake cures, mostly seen in the US and European Union, and lastly, (5) Criminalizing individuals and journalists speaking against governments and COVID-19 as enacted in Kenya, the Philippines, Sri Lanka, Cambodia, Botswana and Zimbabwe. While not a comprehensive resource of government responses in the pandemic, this study demonstrates how countries have differentially violated human rights, especially those listed under the ICCPR (Pomeranz and Schwid 2021). Harmful policies, as enacted by some of these countries, restrict human rights and further the spread of misinformation.

Many countries have implemented restrictive laws since before the pandemic began to control the spread of misinformation from Germany to the Philippines (West 2017). In implementing these laws, governments often target journalists criticizing the state (West 2017). Resulting in a restriction on the right to free speech, such laws that regulate misinformation can inadvertently censor voices of truth (West 2017). There are many ways in which misinformation and disinformation can be combated: increasing individual media literacy, technology companies identifying misinformation for its users, and governments can encourage factual journalism (West 2017).

Adding to discourse on regulating misinformation, technology companies have sought to control the spread of misinformation. Natali Helberger draws attention to opinion power, which is defined as “as the ability of the media to influence processes of individual and public opinion formation” (Helberger 2020). Social media companies have large amounts of opinion power and it is vital that this power is dispersed to stop companies from being “quasi-governments;”

Helberger calls for the creation of better policies to regulate these companies and prevent the spread of misinformation (2020).

Evaluating the impact of fake news, a study utilized the framework of third person effects. This states that “others are more vulnerable to media effects than they are. Finding that third person effects increase support for media literacy campaigns over media regulation, the authors speculate that this might occur due to the fact that people do not want their right to free speech infringed upon. While this study was conducted only in the United States, it provides a basis for how people might want to be governed in terms of misinformation (Jang and Kim 2018). Building on this, Cheng and Luo applied this framework during the COVID-19 pandemic finding that people with negative affections such as worry and fear were linked to supporting government action, a contrast to the study by Jang and Kim in 2018 (2020).

With governments across the globe taking different approaches to containing the spread of misinformation, it is difficult to understand the impact of misinformation policies. Comparing legal and non-legal approaches, Goldberg evaluates the German misinformation policy targeting technology companies and other bills in Ireland, Cyprus and Singapore and contrasts them with European Initiatives (Goldberg 2018). While emphasizing the importance of both legal and non-legal approaches, Goldberg concludes that both approaches might work better in conjunction with each other (Goldberg 2018).

Evidence for Strategies to Curb Misinformation

There is not a lot of literature evaluating the impact of different policies and strategies to curb the spread of misinformation. The most researched strategies are anti-misinformation education campaigns. In researching measures to combat misinformation, Michael Hameleers conducted a study to evaluate the effectiveness of media literacy messages, fact checkers and a

combination of the two (Hameleers 2020). Researchers provided individuals with a piece of misinformation and either saw a media literacy message beforehand, received a fact-checking message afterwards or both. They found that exposure to a fact-checking message does lower the perceived accuracy of the piece of misinformation, but there are no significant differences in the level of agreement to the misinformation. While more research needs to be conducted in more countries and with larger sample size, this correlation demonstrates that media literacy does positively impact perception of misinformation, which is vital in understanding what policies may or may not work (Hameleers 2020). Another study found that news literacy messages are effective in changing people's perceptions of pieces of misinformation, but it requires repeated messaging rather than a one time message (Tully et al 2019). Through a study conducted in Zimbabwe, in collaboration with a "trusted civil society organization," researchers found that messaging from a trusted source increased knowledge on COVID-19 and subsequently impacted behavior to follow public health guidelines (Bowles et al 2020).

Expanding on the current literature, my research will look further into the different types of regulatory actions and anti-misinformation campaigns to evaluate their impact in reducing the spread of misinformation. I will be looking at whether policies that limit the right to free speech can protect the right to health or if other policies are more effective.

Chapter 3: Methods

This thesis utilizes a mainly quantitative approach to analyze the impact of policies on the spread of misinformation through survey data.

Survey Data

The data for this study was obtained from the YouGov COVID 19 Behavior Tracker. This series of surveys was implemented by YouGov in collaboration with the Imperial College in London. YouGov is an international survey and analytics group with a global reach. The surveys created for this behavior tracker were conducted in Australia; Brazil; Canada; China; Denmark; Finland; France; Germany; Hong Kong; India; Indonesia; Italy; Japan; Malaysia; Mexico; Netherlands; Norway; Philippines; Saudi Arabia; Singapore; South Korea; Spain; Sweden; Taiwan; Thailand; UAE; UK; USA; Vietnam. The data collection period began in April 2020, with weekly collection of data until September 2020 for most countries. (Some countries were surveyed past that date, but this study will not be utilizing data past those dates.) The survey questions were developed by Sarah P. Jones from the Imperial College London's Institute of Global Health Innovation, and some questions have been adapted from collaborative sources.

Variables

Policies implemented to combat misinformation are the independent variable in this study. The dependent variable in this study is misinformation, which is categorized by behaviors in subsequent survey responses. The next section delves into the questions that categorize the dependent variable.

Questions For Analysis

This study analyzed questions from this survey surrounding behavior led by misinformation. The data from the following questions was pertinent to analysis in this study:

Coronavirus (COVID-19) is very dangerous for me

- Response: Likert Scale; 1-Disagree, 7-Agree

It is likely that I will get coronavirus (COVID-19) in the future

- Response: Likert Scale; 1-Disagree, 7-Agree

Wearing a mask will protect me against coronavirus (COVID-19)

- Response: Likert Scale; 1-Disagree, 7-Agree

Wearing a mask will protect others against coronavirus (COVID-19)

- Response: Likert Scale; 1-Disagree, 7-Agree

These questions all offer insight into the spread of misinformation as they reflect people's behavioral reactions to common misinformation surrounding public health procedures during the early months of the pandemic. The early months of the pandemic brought about misinformation regarding wearing a mask, therefore this question will specifically provide insight into that phenomenon. These responses across countries provide a robust understanding of the spread of misinformation, and people's understanding of the virus. The first question and the fourth question center the individual at the core of misinformation. Based on misinformation they have read, people may believe they are somehow immune to the coronavirus, therefore their susceptibility to such misinformation will be measured by these two questions. The second question measures how much of a threat people believe the coronavirus will be. Individuals that have been exposed to misinformation regarding covid-19, especially during the time frame of this study, may not believe in its longevity or ability to impact people in the long-term. Lastly, the last question evaluates misinformation related to masks and their functionality. Individuals

exposed to mask related misinformation may not believe in a mask's ability to protect others. This will allow for better contextualization of public opinion in the various countries being evaluated.

Comparative Policy Analysis

The independent variables in this study are the policies created to combat misinformation in different countries. However, countries have wide ranging policy responses – from simple advisory to restrictions on freedom of speech. These policies have wide ranging consequences on its citizens and could largely impact how people react to the policies. In order to account for the differences in impact on behavior as a result of these policies, I have separated these policies, based upon Brown et al's., study titled “Regulating the spread of online misinformation.”, into different categories: (1) restrictive of human rights (2) directed towards big technology companies (3) advisories/campaigns. Countries that have policies that restrict human rights are policies that punish the right to free speech for citizens and journalists. These policies were created under the guise of limiting the spread of misinformation, however, many of them broadly criminalize those speaking out against the state. Policies directed towards big technology companies place the onus of the spread of misinformation on the platforms that facilitate the spread of misinformation. Companies are often required to remove this content within a certain time period without having to face fines or other consequences. This policy response creates a grey area in limiting speech, as while the responsibility to limit the spread of misinformation falls on companies, companies can restrict the right to speech by deleting content that might not necessarily be misinformation, but something said against the state. Lastly, national information and education campaigns vary in length and depth, but ultimately their goal is to educate and inform the public – with the information coming directly from the government

or in collaboration with other public service organizations. Through this categorization, I am able to analyze how different policies can elicit different responses in the spread of misinformation.

Quantitative Analysis

The data for each question is grouped by week, with six weeks of data for each country. For each country, I conducted a cross-tab to evaluate the mean responses for the categorical variable questions. In doing so, I plotted mean responses for each country by each question. Utilizing R, the responses were plotted over time for each type of policy in order to see the differences in the trends of responses. In order to understand the differences that different policy responses may elicit, I grouped the responses to all of the questions and then performed a one-way ANOVA to observe any statistical significance between the responses for countries that have policies that are restrictive, countries that have policies that are education/campaign based, countries that have policies that target technology companies and countries with no policies. This allowed me to evaluate the relationship between the countries and the policies to see if there are any statistically significant differences in the mean responses to each question that must be evaluated. Utilizing a one-way ANOVA provides an effective method in understanding any differences. After the one-way analysis, I conducted a Tukey's HSD test to narrow which policies might be resulting in the differences in responses.

Limitations of the Study

In this cross-national study, the pandemic impacted different countries at different times, and therefore people may have not seen as much misinformation towards the early months measured in this data set. This difference in the timing of misinformation across countries, in turn, may impact individual behavior and thus responses to the survey. In addition, while I was

able to find sources on the creation of legislation many sources did not elaborate on if the laws were enforced.

Additionally, this study is limited in the availability of data. While there is extensive data for the first six months of the pandemic, there are a limited number of countries in which the data has been collected past September 2020, therefore restricting a further understanding of the changes over an extended period of time. Further, the data was collected in multiple countries, and while efforts were taken to standardize the methodology across countries, the data may not be representative of each country's population. While survey collectors were able to diversify the regions within the countries they studied, the sample sizes of people measured for each country might not reflect the overall behaviors of each nation.

Chapter Four: Results

Country Categorization

Countries approach curbing the spread of misinformation and disinformation differently, with some countries going as far as criminalizing individuals that spread false information and others releasing anti-misinformation campaigns. The countries in this study all vary in their response to controlling the spread, and for the purposes of this research these countries will be categorized as: Restrictive of Individual Human Rights, Targeting Technology Companies, Anti-misinformation/disinformation campaigns and task forces, and No Policy. The following section will categorize each country in the study's policy or lack thereof.

Australia implemented a task force in June 2018 to identify misinformation and disinformation in relation to their upcoming federal election. They also launched a social media literacy campaign, again related to their federal election in 2019. This campaign was created “to encourage voters to ‘carefully check the source of electoral communication they see or hear’” (“Stop and Consider campaign,” 2019.). Additionally, in June 2020 the Australian Communications and Media Authority introduced the development of a voluntary code which was released in February 2021. However due to the scope of the study being limited to only April 202-September 2020, the potential impacts of this policy will not be measured (“Digital Platforms commit to action on Disinformation,” 2021).

Brazil briefly implemented a policy that enables the spread of false information in the Fall of 2021. This policy aimed to prevent technology companies from removing false information; however, the Supreme Court and Senate of Brazil overturned this policy (Nicas, 2021). However before this drastic measure, in 2018 the Brazilian government signed an agreement with Facebook and Google to prevent the spread of misinformation surrounding

elections, however there were no details on how they were enforcing this amongst the technology companies (Alves, 2018).

In 2019, Canada launched a digital charter to hold technology companies accountable for the spread of misinformation and disinformation on their platforms (Reichert, 2019). Prime Minister Justin Trudeau said that companies that fail to comply will face “meaningful financial consequences” (Reichert, 2019). China has a deep history of creating anti-misinformation legislation. For example in 2017, they stated that social media companies are not allowed to share their own news stories, they must be links from officially registered news media (Repnikova, 2018). They also shut down accounts on Weibo, a popular social media website in China, often “detaining” and “imposing penalties” on those dissenting against the government (Repnikova, 2018).

Denmark created a task force, similar to Sweden, to address and evaluate misinformation and disinformation online. In addition, they launched an information campaign, using materials similar to Sweden (Funke and Flamini 2021). Finland’s policy regarding misinformation is an education campaign. In 2014, Finland launched an anti-fake news education campaign, incorporating media literacy education for children in school (Mackintosh, 2019). They incorporate how to identify misinformation and teach students how to think critically about the social media posts that they observe (Mackintosh, 2019).

Before the pandemic, France had passed a law in 2018 to limit misinformation regarding elections, by allowing judges to call for the removal of this information. Violations of this law would result in imprisonment and a fine (Fiorentino 2018). In early 2020, as the pandemic ravaged France, French authorities passed a law similar to Germany’s NetzDG law, as discussed below. This law calls on technology companies to remove misinformation, terrorism, and child

pornography within twenty four hours (Chandler, 2020). In 2018, Germany launched a law titled *Netzwerkdurchsetzungsgesetz (NetzDG)*. This law aimed to reduce the spread of misinformation by prompting social networking companies with over 2 million users to remove false information within twenty four hours. If these companies fail to do so, they will have to pay large fines (“Germany starts enforcing hate speech law,” 2018). Hong Kong has proposed an anti-fake news bill but has not currently taken action on implementing the legislation, and have also declared that criminalization will be a last resort (Kihara, 2021).

India in the past had no national policy implemented to curb the spread of misinformation. In February 2021, they launched a policy to hold technology companies legally accountable for the spread of misinformation via their platforms (Choudhury, 2021).

Indonesia created a task force to monitor and dispel misinformation, however there is not much information on what this body does after identifying misinformation (Kapoor, 2018). However, people spreading disinformation in the past have faced legal consequences, for example a jihadist group spreading propoganda faced arrests as a result of spreading misinformation (Lamb, 2018).

Italy has no specific law addressing misinformation, however, in 2018, nearing one of their elections they created a portal through which citizens can report instances of misinformation. If the officials monitoring the portal find that the post breaks Italian laws, they may pursue legal action (Funke and Flamini, 2021).

Japan currently has not implemented any legislation in relation to misinformation. Malaysia adopted a law in 2018 that criminalized the spread of misinformation with harsh sentences and fines as the consequences (Beech, 2018). A key aspect of this law is that the government decides what can be considered to be misinformation, thus harming individuals who may state factually correct information that is against the government's actions (Beech, 2018).

And then in 2021, Malaysia relaunched a version of the same law under the guise of spreading COVID-19 related misinformation (Schuldt 2021).

Mexico does not have any legislation to address misinformation, however the spread of “fake news” was of huge concern to the Mexican President during the COVID-19 pandemic. It was found that a majority of the misinformation being spread was actually touted by members of his own authorities (Vivanco 2020).

The Netherlands launched an anti-misinformation social media campaign prior to their election in 2018, however they have not taken any further action or expanded their plans in regards to misinformation since then (“Dutch government to launch anti-fake news campaign,” 2018). Norway currently does not have any active legislation to prevent or stop the spread of false information. The Philippines penal code has a provision in its article 154, which criminalizes the spread of false information that can impact “public order” (“Philippine Laws, Statutes, Codes and Issuances,” 2020). They also introduced a new law during the COVID-19 pandemic, specifically targeting misinformation related to the pandemic (Guerra 2020).

The Saudi Arabian government reminded its citizens via Twitter in 2018 that “producing rumors or fake news that would affect the public order or public security or sending or resending it via social media or any technical means” is impermissible and would result in very serious repercussions (O’Connor, 2018). Singapore passed a law in 2019 that punishes individuals that spread any false information, especially if done with malicious intent (Funke and Flamini, 2021). As misinformation surrounding public health measures during the pandemic grew exponentially, Singapore invoked this law again (Berger, 2021).

Spain does not have any specific policies dedicated to combating misinformation. In 2019, for their general election, they created a task force to monitor and remove false

information but there is no further information on this (Funke and Flamini 2021). However, as people utilized social media to share jokes and criticize the government, Spain utilized its penal code to punish individuals harshly for their actions (“Spain: Concerns as Penal Code used to criminalise jokes and misinformation about coronavirus”, 2020). South Korea attempted to pass a law in late 2021 targeting individuals for spreading “fake news” (Sang-Hun, 2021). However it faced huge backlash due to its restrictive nature and therefore was set aside for the time being (Sang-Hun, 2021).

Sweden had created anti-misinformation information campaigns in the form of brochures (Funke and Flamini 2021.). Taiwan currently has a law that fines and punishes individuals who spread misinformation (Chung, 2019). Taiwan has been battling misinformation recently through a multitude of educational approaches. They host debates and highlight factual information at these events, they also have a portal where individuals can send information to determine if it is factually correct (Kerr, 2020).

Thailand has had very strict misinformation policies over the years. Before the COVID-19 pandemic, the Thai Cyber Crime Act largely restricted freedom of speech and punished individuals for speaking against the state, all while naming it misinformation (“Thailand: Cyber crime act tightens internet control,” 2016). In July of 2021, Thailand announced that they are banning the spread of false information that “that cause panic, misunderstanding or confusion "affecting state security, abusing the rights of others, and order or good morality of the people"” (Wongcha-um, 2021).

The United Arab Emirates has kept its strategy the same, pre-pandemic and now during the pandemic. The UAE had a previous fine of millions of dirhams for spreading misinformation and

now continues to fine individuals spreading misinformation specifically related to the COVID-19 pandemic (Agarib, 2018; “UAE announces \$5,500 fine for coronavirus fake news,” 2020).

The United Kingdom worked with the WHO at the beginning of the pandemic with a social media campaign titled “Stop the Spread” to prevent coronavirus related misinformation (“Countering misinformation about COVID-19,” 2020). Additionally, in 2019, the government announced that they would incorporate literacy training- specifically how to spot misinformation in the curriculum for children (Dathan 2019).

The United States has made many attempts to address misinformation federally. However, nothing has come to fruition over the many years this has been a point of discussion. There are state level attempts to regulate the spread of science miscommunication (Funke and Flamini 2021). The closest the US has come to addressing misinformation was in 2021 when the Surgeon General of the USA announced an advisory to inform people how to protect themselves and others from misinformation (Murthy 2021).

Vietnam has had a law since 2019 that requires technology companies to delete posts determined to be misinformation by the Vietnamese government to combat fake news (Jennings 2019). However this definition of fake news is very vague and issues are only flagged as fake news by the Vietnamese government (Jennings 2019). They also had a law in place to criminalize those who spread misinformation. Additionally at the onset of the pandemic, Vietnam launched a policy building upon the previous one, and began fining individuals who spread false information, yet again there is uncertainty on what can be considered fake information and Vietnamese authorities plan to expand this law beyond the coronavirus (Ngyuen and Pearson, 2020).

Based on the policies implemented in these countries, I split the policies into three categories: Criminalization of Individuals, Consequences for Technology Platforms, Information Campaigns and Task Forces and No Policy. I added a column to my dataset for these policies where countries that fell under Criminalization of Individuals = 1, Consequences for Technology Platforms = 2, Information Campaigns and Task Forces = 3, No Policy = 0. Additionally, the following demonstrates what category each country was placed in:

❖ Criminalization of Individuals

- Vietnam, UAE, Thailand, Singapore, Philippines, Malaysia, Indonesia, China, Spain, Italy, Saudi Arabia

❖ Consequences for Technology Platforms

- Germany, France, Brazil, Canada

❖ Information Campaigns and Task Forces

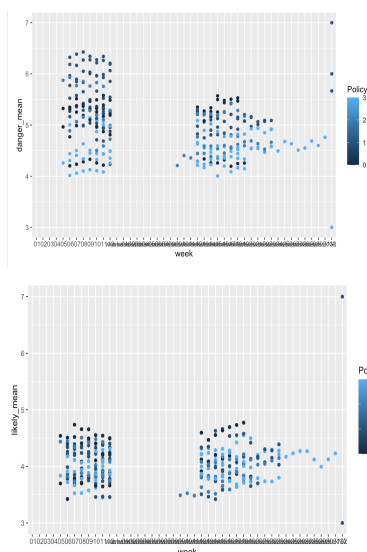
- Finland, Netherlands, Denmark, Australia, UK, Taiwan, Sweden

❖ No Policy

- United States, Norway, Mexico, Japan, India, Hong Kong, South Korea

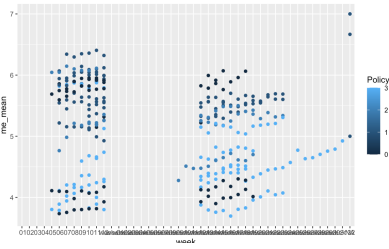
Statistical Analysis

First, R was utilized to create a visualization plotting the overall trends of all of the



countries, regardless of type of policy over time for the questions “Coronavirus (COVID-19) is very dangerous for me,” “It is likely that I will get coronavirus (COVID-19) in the future,” “Wearing a mask will protect me against coronavirus (COVID-19),” “Wearing a mask will protect others against coronavirus (COVID-19)” which asks to for respondents to respond on a scale of 1-7 with 1 being

disagree and 7 being agree. While the following charts provide an overview of what to expect with subsequent analysis, each question was broken down by category of policy to understand



the statistical significance of these policies.

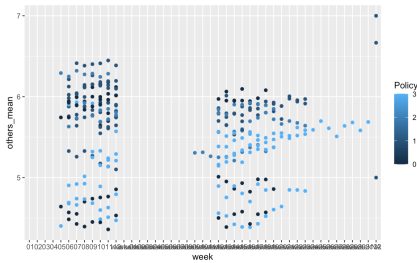
All four of these charts demonstrate a wave-like pattern amongst all types of policies for each of the questions, indicating that the

responses changed over time, potentially in response to external

factors throughout the pandemic. However, to further understand

the impact of these policies, I conducted a One-Way ANOVA

analysis for each of the four questions.



Analysis of Variance Table

Response: danger_mean

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
as.factor(Policy)	3	43.184	14.3947	74.688	< 2.2e-16 ***
Residuals	319	61.481	0.1927		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
 Tukey multiple comparisons of means
 95% family-wise confidence level

Fit: aov(formula = danger_mean ~ as.factor(Policy), data = total)

\$`as.factor(Policy)`

	diff	lwr	upr	p adj
1-0	0.3703491	0.1943062	0.54639206	0.0000007
2-0	-0.1216000	-0.3347005	0.09150057	0.4546339
3-0	-0.5402087	-0.7169387	-0.36347876	0.0000000
2-1	-0.4919491	-0.6897924	-0.29410581	0.0000000
3-1	-0.9105578	-1.0685566	-0.75255909	0.0000000
3-2	-0.4186088	-0.6170636	-0.22015391	0.0000006

Note.***p < 0.05

The first ANOVA was conducted on the question “Coronavirus (COVID-19) is very dangerous for me.” For the ANOVA, I factored the variable policy to ensure that all four levels of the variable were accounted for. In doing so, the output demonstrates that the sum of squares or, the total variation, is 43.184 for the Policy factor and 61.481 for the residuals. Additionally,

the F value is 74.688. This value is vital in determining the significance of this test, as a higher F value indicates that the variation we observe is not due to chance. And lastly, the p value is 2.2×10^{-16} , which at an alpha level of 0.05 ($p < 0.05$) indicates that this variation is highly significant. This tells us that the variation we see in the responses for this question in countries with these different types of policies is not due to chance. However, an ANOVA test does not indicate where that difference in policies can be observed. Therefore, in order to see the difference between types of policies, I conducted a Tukey's HSD. Tukey's HSD compares the groups to one another and provides information on which of the policies are statistically significant. Tukey's HSD demonstrates that the mean difference between policy 1 and policy 0 is 0.370 meaning that on average respondents living in countries with policy 1 responded 0.370 points higher than respondents in countries living with no policy. The confidence interval is 0.1943062 0.54639206 and the p value is 0.0000007 meaning that this difference is significant at a significance level of 0.05. Next, it demonstrates that the mean difference between policy 2 and policy 0 is -0.121 meaning that on average respondents living in countries with policy 2 responded 0.121 points lower than respondents in countries living with no policy. The confidence interval is -0.3347005 0.09150057 and the p value is 0.4546339 meaning that this difference is not significant at a significance level of 0.05. We can also see that the mean difference between policy 3 and policy 0 is -0.540 meaning that on average respondents living in countries with policy 2 responded 0.540 points lower than respondents in countries living with no policy. The confidence interval is -0.7169387 -0.36347876 and the p value is 0.0000 meaning that this difference is significant at a significance level of 0.05. Additionally, the mean difference between policy 2 and policy 1 is -0.491 meaning that on average respondents living in countries with policy 2 responded 0.491 points lower than respondents in countries living with policy 1.

The confidence interval is -0.6897924 -0.29410581 and the p value is 0.0000 meaning that this difference is significant at a significance level of 0.05. The mean difference between policy 3 and policy 1 is -0.910 meaning that on average respondents living in countries with policy 3 responded 0.910 points lower than respondents in countries living with policy 1. The confidence interval is -1.0685566 -0.75255909 and the p value is 0.0000 meaning that this difference is significant at a significance level of 0.05. Lastly, the mean difference between policy 3 and policy 2 is -0.418 meaning that on average respondents living in countries with policy 3 responded 0.418 points lower than respondents in countries living with policy 2. The confidence interval is -0.6170636 -0.22015391 and the p value is 0.0000006 meaning that this difference is significant at a significance level of 0.05.

Analysis of Variance Table

Response: likely_mean

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
as.factor(Policy)	3	1.059	0.35307	2.9832	0.0315 *
Residuals	317	37.517	0.11835		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
 Tukey multiple comparisons of means
 95% family-wise confidence level

Fit: aov(formula = likely_mean ~ as.factor(Policy), data = total)

\$`as.factor(Policy)`

	diff	lwr	upr	p adj
1-0	-0.03688361	-0.17510711	0.101339891	0.9011933
2-0	-0.17005360	-0.33705056	-0.003056628	0.0441434
3-0	-0.10555799	-0.24432942	0.033213430	0.2037053
2-1	-0.13316999	-0.28844803	0.022108059	0.1213695
3-1	-0.06867439	-0.19309622	0.055747448	0.4843296
3-2	0.06449560	-0.09127039	0.220261593	0.7084449

*Note.****p < 0.05

The next ANOVA was conducted for the question: “It is likely that I will get coronavirus (COVID-19) in the future.” The sum of squares or, the total variation, is 1.059 for the Policy factor and 37.517 for the residuals. Additionally, the F value is 2.9832, which is a low f value and combined with the p value of 0.0315, indicates that while the results are statistically significant, they are not highly significant. This tells us that the variation we see in the responses for this question in countries with these different types of policies is not due to chance, but should be evaluated carefully. Since an ANOVA test does not indicate where that difference in

policies can be observed, I also conducted a Tukey's HSD after this second ANOVA. Tukey's HSD demonstrates that the mean difference between policy 1 and policy 0 is -0.0368 meaning that on average respondents living in countries with policy 1 responded 0.369 points lower than respondents in countries living with no policy. The confidence interval is -0.17510711 0.101339891 and the p value is 0.9011933 meaning that this difference is not significant at a significance level of 0.05. Next, it demonstrates that the mean difference between policy 2 and policy 0 is -0.170 meaning that on average respondents living in countries with policy 2 responded 0.170 points lower than respondents in countries living with no policy. The confidence interval is -0.33705056 -0.003056628 and the p value is 0.0441434 meaning that this difference is significant at a significance level of 0.05, however it is very close to the cut off point. We can also see that the mean difference between policy 3 and policy 0 is -0.105 meaning that on average respondents living in countries with policy 3 responded 0.105 points lower than respondents in countries living with no policy. The confidence interval is -0.24432942 0.033213430 and the p value is 0.2037053 meaning that this difference is not significant at a significance level of 0.05. Additionally, the mean difference between policy 2 and policy 1 is -0.133 meaning that on average respondents living in countries with policy 2 responded 0.133 points lower than respondents in countries living with policy 1. The confidence interval is -0.28844803 0.022108059 and the p value is 0.1213695 meaning that this difference is not significant at a significance level of 0.05. The mean difference between policy 3 and policy 1 is -0.068 meaning that on average respondents living in countries with policy 3 responded 0.068 points lower than respondents in countries living with policy 1. The confidence interval is -0.19309622 0.055747448 and the p value is 0.4843296 meaning that this difference is not significant at a significance level of 0.05. Lastly, the mean difference between policy 3 and

policy 2 is 0.064 meaning that on average respondents living in countries with policy 3 responded 0.064 points higher than respondents in countries living with policy 2. The confidence interval is -0.09127039 0.220261593 and the p value is 0.7084449 meaning that this difference is not significant at a significance level of 0.05. The results of this ANOVA analysis and Tukey's HSD test are inconclusive.

Analysis of Variance Table

Response: me_mean

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
as.factor(Policy)	3	66.506	22.1688	61.596	< 2.2e-16 ***
Residuals	319	114.809	0.3599		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
 Tukey multiple comparisons of means
 95% family-wise confidence level

Fit: aov(formula = me_mean ~ as.factor(Policy), data = total)

```
$`as.factor(Policy)`
      diff      lwr      upr      p adj
1-0  0.6618755  0.42130851  0.9024425 0.0000000
2-0  0.2123482 -0.07885888  0.5035553 0.2372903
3-0 -0.4634112 -0.70491700 -0.2219054 0.0000070
2-1 -0.4495273 -0.71988495 -0.1791696 0.0001365
3-1 -1.1252867 -1.34119582 -0.9093775 0.0000000
3-2 -0.6757594 -0.94695278 -0.4045660 0.0000000
```

Note.***p < 0.05

This next ANOVA is for the question “Wearing a mask will protect me against coronavirus (COVID-19). The sum of squares or, the total variation, is 66.506 for the Policy factor and 114.809 for the residuals. Additionally, the F value is 61.596, which is high indicates that these results are significant. And lastly, the p value is 2.2×10^{-16} , which at an alpha level of 0.05 ($p < 0.05$) indicates that this variation is highly significant. This tells us that the variation we see in the responses for this question in countries with these different types of policies is not due to chance. I also conducted a Tukey’s HSD after this third ANOVA. Tukey’s HSD demonstrates that the mean difference between policy 1 and policy 0 is 0.661 meaning that on average respondents living in countries with policy 1 responded 0.661 points higher than respondents in countries living with no policy. The confidence interval is 0.42130851 0.9024425 and the p value is 0.00000 meaning that this difference is significant at a significance level of 0.05. Next, it demonstrates that the mean difference between policy 2 and policy 0 is 0.212 meaning that on average respondents living in countries with policy 2 responded 0.212 points higher than respondents in countries living with no policy. The confidence interval is -0.07885888 0.5035553 and the p value is 0.2372903 meaning that this difference is not significant at a significance level of 0.05. We can also see that the mean difference between policy 3 and policy 0 is -0.463 meaning that on average respondents living in countries with policy 3 responded 0.463 points lower than respondents in countries living with no policy. The confidence interval is -0.70491700 -0.2219054 and the p value is 0.0000070 meaning that this difference is not significant at a significance level of 0.05. Additionally, the mean difference between policy 2 and policy 1 is -1.12 meaning that on average respondents living in countries with policy 2 responded 1.12 points lower than respondents in countries living with policy 1. The confidence interval is -1.34119582 -0.9093775 and the p value is 0.0000000 meaning that this difference is significant

at a significance level of 0.05. The mean difference between policy 3 and policy 1 is -0.958 meaning that on average respondents living in countries with policy 3 responded 0.958 points lower than respondents in countries living with policy 1. The confidence interval is -1.17413521 -0.7435774 and the p value is 0.000000 meaning that this difference is significant at a significance level of 0.05. Lastly, the mean difference between policy 3 and policy 2 is -0.67 meaning that on average respondents living in countries with policy 3 responded 0.67 points lower than respondents in countries living with policy 2. The confidence interval is -0.94695278 -0.4045660 and the p value is 0.0000000 meaning that this difference is significant at a significance level of 0.05.

Analysis of Variance Table

Response: others_mean

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
as.factor(Policy)	3	26.673	8.8910	42.91	< 2.2e-16 ***
Residuals	319	66.098	0.2072		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Tukey multiple comparisons of means
95% family-wise confidence level

Fit: aov(formula = others_mean ~ as.factor(Policy), data = total)

\$`as.factor(Policy)`

	diff	lwr	upr	p adj
1-0	0.4973636	0.3148308	0.67989644	0.0000000
2-0	0.3545100	0.1335535	0.57546651	0.0002553
3-0	-0.1721730	-0.3554181	0.01107219	0.0741714
2-1	-0.1428537	-0.3479905	0.06228314	0.2759437
3-1	-0.6695366	-0.8333600	-0.50571321	0.0000000
3-2	-0.5266829	-0.7324539	-0.32091203	0.0000000

Note. *** $p < 0.05$

This final ANOVA is for the question “Wearing a mask will protect others against coronavirus (COVID-19)”. The sum of squares or, the total variation, is 26.673 for the Policy factor and 66.098 for the residuals. Additionally, the F value is 42.91, a slightly lower but still significant number indicates that the variation we observe is in fact significant. And lastly, the p value is 2.2×10^{-16} , which at an alpha level of 0.05 ($p < 0.05$) indicates that this variation is highly significant. This tells us that the variation we see in the responses for this question in countries with these different types of policies is not due to chance. I also conducted a Tukey’s HSD after this last ANOVA. Tukey's HSD demonstrates that the mean difference between policy 1 and policy 0 is 0.497 meaning that on average respondents living in countries with policy 1 responded 0.497 points higher than respondents in countries living with no policy. The confidence interval is 0.3148308 0.67989644 and the p value is 0.00000 meaning that this difference is significant at a significance level of 0.05. Next, it demonstrates that the mean difference between policy 2 and policy 0 is 0.354 meaning that on average respondents living in countries with policy 2 responded 0.354 points higher than respondents in countries living with no policy. The confidence interval is 0.1335535 0.57546651 and the p value is 0.0002553 meaning that this difference is significant at a significance level of 0.05. We can also see that the mean difference between policy 3 and policy 0 is -0.172 meaning that on average respondents living in countries with policy 2 responded 0.172 points lower than respondents in countries living with no policy. The confidence interval is -0.3554181 0.01107219 and the p value is 0.0741714 meaning that this difference is not significant at a significance level of 0.05. Additionally, the mean difference between policy 2 and policy 1 is -0.142 meaning that on average respondents living in countries with policy 2 responded 0.142 points lower than

respondents in countries living with policy 1. The confidence interval is -0.3479905 0.06228314 and the p value is 0.2759437 meaning that this difference is not significant at a significance level of 0.05. The mean difference between policy 3 and policy 1 is -0.669 meaning that on average respondents living in countries with policy 3 responded 0.669 points lower than respondents in countries living with policy 1. The confidence interval is -0.8333600 -0.50571321 and the p value is 0.000000 meaning that this difference is significant at a significance level of 0.05. Lastly, the mean difference between policy 3 and policy 2 is -0.526 meaning that on average respondents living in countries with policy 3 responded 0.475 points lower than respondents in countries living with policy 2. The confidence interval is -0.7324539 -0.32091203 and the p value is 0.0000000 meaning that this difference is significant at a significance level of 0.05.

The ANOVA analysis demonstrates there is in fact a difference within the responses under each type of policy. The further analysis demonstrates the differences in the nuances within the different policies and how they influence misinformation. For many of the comparisons, people under policy 3 were more likely to respond lower than people under policy 0,1 or 2 indicating that information campaigns and task forces may influence misinformation differently than the other types of policies.

Question	Results
<p>Question 1: Coronavirus (COVID-19) is very dangerous for me</p>	<ul style="list-style-type: none"> ● Tukey's HSD indicates: ● Under policy 3 responded lower (towards disagree) when compared to policy 1,2 0 ● Policy 2 responded lower (towards disagree) in comparison to 1
<p>Question 2: It is likely that I will get coronavirus (COVID-19) in the future</p>	<ul style="list-style-type: none"> ● Inconclusive results ● ANOVA is significant but Tukey's HSD indicates need for further examination
<p>Question 3: Wearing a mask will protect me against coronavirus (COVID-19)</p>	<ul style="list-style-type: none"> ● Tukey's HSD indicates: ● Under policy 3 responded lower (towards disagree) when compared to policy 1,2 0 ● Policy 2 responded lower (towards disagree) in comparison to 1 ● Under policy 1 responded higher (towards agree) when compared to policy 3,2, 0
<p>Question 4: Wearing a mask will protect others against coronavirus (COVID-19)</p>	<ul style="list-style-type: none"> ● Tukey's HSD indicates: ● Under policy 3 responded lower (towards disagree) when compared to policy 1,2 0 ● Policy 2 responded lower (towards disagree) in comparison to 1 ● Under policy 1 responded higher (towards agree) when compared to policy 3,2, 0

Chapter 5: Conclusions and Recommendations

Lessons Learned and Conclusions

The results of this study found that there is a difference in mean response to all three questions measuring misinformation for the different types of policy responses: policies that criminalize individuals, policies that target technology companies and anti-misinformation education campaigns. Tukey's analysis shows that when comparing policy 3 and 2, and 3 and 1, people responding to all four questions were more likely to respond lower (towards Disagree), indicating that there is a statistically significant difference amongst the two policies.

Interestingly, this was much harder to discern when comparing policy 3 to no policies, as there was only one statistically significant difference of means, indicating that there is a difference when comparing policy 3 to 1 and 2, but more research needs to be done when looking at no policies and information campaigns. The results for comparing policy 2 to policy 1 and 3 indicate that for the most part, there is a significant difference in means, however the responses are mixed. When comparing policy 2 and 1, respondents are more likely to respond lower for policy 2 than policy 1, but when comparing policy 3 and policy 2, respondents are more likely to respond higher (towards Agree). When comparing policy 2 to no policy, it resulted in a series of statistically significant responses that indicate that there might not be as much of a difference between having no policy compared with having a policy targeting technology companies. Lastly, when comparing policy 1 to 0, 2 and 3, we can see that respondents are more likely to respond higher, towards 7, for policy 1. Across all countries, people under policy 1 are responding higher (towards Agree). These results therefore fail to reject the null hypothesis that states that people under policy 3 would respond higher than people under the other policies/ no policy.

Policy Implications

The results of this study demonstrate that countries with more restrictive misinformation policies (that criminalize individuals) have lower levels of misinformation. These results might simply be due to fear of being criminalized by saying or sharing what might be considered the wrong thing — not necessarily based on scientific fact but based on what the government deems correct. This is concerning as it may mean these policies are restricting free speech and that it is harder to prevent misinformation in democratic countries that respect human rights. Additionally, the lower responses for the anti-misinformation campaigns indicates that these policies might not work as intended. Education campaigns often require a lot of time when implemented to truly influence public opinion and these results indicate that the campaigns in this study may have required more time. The nature of the varied responses when comparing policy 2 to other policies, begs the question: are the policies targeting technology companies effective, as sometimes they prompt higher responses, but sometimes they do not. This might have to do with the fact most people experience social media and technology differently, depending on who they interact with and so, this policy might not impact some as much as others. This could also mean that certain people are disproportionately impacted, with their right to free speech and health violated by these technology companies. Unfortunately, misinformation may be the price individuals' may have to pay for liberty. Entirely stopping the spread of misinformation is not probable as people have the right to free speech, therefore governments may have to create solutions that may infringe upon these rights but in the least restrictive manners possible.

Policy Considerations And Recommendations

An important aspect of the technology-targeting policies that policymakers would need to consider is the fact that even though they face consequences, technology companies might not regulate their websites and applications to the standards of the government. They might also

disproportionately remove posts that the state considers misinformation rather than those that actually are misinformation, thus restricting rights while allowing the spread of misinformation. And lastly, due to the nature of social media and how fast something can spread from one part of the world to another, such content regulation might not be possible on a state by state basis, where social media posts rapidly spread throughout the world. Engaging this global misinformation spread will require a global policy approach to regulating social media companies that mirrors their impact and spread across the globe as a means to universally prevent misinformation from spreading. This can be set via a code or official document via the World Health Organization providing nations with guidelines on how to curb the spread of misinformation with keeping in mind differences in cultures around the globe.

Based on the shortcomings of the anti-misinformation education campaigns, I recommend that governments invest more in those initiatives and policies, taking multi-year approaches instead of creating short-lived, minimal effort campaigns based on salient issues of the moment. This could allow individuals to see scientific information at face value and make informed decisions when encountering misinformation. Having long term exposure to media literacy and understanding how to recognize misinformation, generally or for a specific topic, individuals can ingrain these tools into their daily lives and change how they approach information found online. Additionally, this effort must be an international effort, ideally spearheaded by a governing body to inform everyone, even those in countries where governments themselves are spreading misinformation, such as Bolsonaro or Trump during the first few years of the pandemic. Everyone deserves access to accurate information and doing so in that manner will ideally reach as many people as possible.

While these results highlight that restrictive and criminalizing policies result in less misinformation, it is not clear that these rights-violating policies serve the best interest of the public. Therefore, there needs to be more research on who these policies actually serve and when it might be permissible to criminalize an individual for spreading false information – before more countries begin implementing such policies.

When responding to emergencies, governments must create responses driven by trust which can be created via the use of factual information, transparency and preparedness (Ahern and Loh, 2021). Often in uncertain situations, pieces of information are rapidly changing. For example, at first the general public was advised against wearing a mask (“Fact check: Outdated video of Fauci saying “there’s no reason to be walking around with a mask” 2020). As information on spread of the virus grew, guidelines changed. When there is trust placed in governing authorities, such changes in guidance would ideally lead to individuals adapting. However, when governments themselves are spreading misinformation and undermining public health this trust can easily be broken. Thus, responding in the face of uncertainty remains a delicate task but is essential in curbing the spread of misinformation.

Areas For Future Research

The results from this study prompt further research questions from communications and policy experts. This study opened the door for understanding the future development of misinformation policies. There are many reasons that could explain the results of this study. As I mentioned earlier, there are many confounding factors that could not have been accounted for in this study, such as the beginning of the pandemic in each individual country, cultural responses, other government responses, etc that could have resulted in these findings. Further research must

be done to explore those factors to enrich our understanding of misinformation in a pandemic and the impact of misinformation policies.

Given the limited time frame of this research project, future research can also be conducted to understand how vaccine related misinformation spreads and how people respond to it as compared to other public health measures.

For future research, it is vital that researchers collect further data on individual countries and conduct a state by state analysis. Each state, based on its culture and government leaders had a different response to the pandemic, and these differential responses vastly impacted people's perceptions surrounding misinformation regarding that pandemic as well. In moving forward, there needs to be an in-depth country-by-country analysis to better understand how people view health and COVID-19 related misinformation. In addition, there also needs to be a study evaluating the different types of information campaigns and their impacts on curbing health misinformation. This study grouped the various types of anti-misinformation campaigns into one group for the scope of the study, but a long term study evaluating different types of anti-misinformation campaigns, such as the media literacy campaign, might help researchers gain a better understanding of how these policies might work.

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