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Governmental Persuasion Strategies on Social Media during COVID-19: A Comparative Study of the US and China

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Since scientists identified the SARS-CoV-2, a kind of coronavirus causing the ongoing COVID-19 pandemic (Wu, Chen, and Chan 2020), more than two years have passed. To avoid the transmission of this infectious disease, which could cause a series of respiratory symptoms, governments and organizations worldwide have worked to diffuse new behaviors – wearing a mask, keeping social distance, washing hands, holding virtual parties, etc. Scientific research shows that these methods are simple but effective (Eikenberry et al. 2020; Mal and Mukherjee 2020; Sun and Zhai 2020). However, it is not easy to promote these behaviors because they have never been practiced consistently with previous social norms and habits (National Academies of Sciences, Engineering, and Medicine [NASEM] 2020). Therefore, decision-makers needed to apply a combination of strategies to persuade the public to accept the "new normal" (Brydges et al. 2020; Rab et al. 2020) and follow instructions when releasing messages germane to COVID-19 (Javed et al. 2020; Pastor 2020; Setyawan and Lestari 2020). Previous literature covers the crisis responses of public health departments in individual countries (Choi et al. 2015; Middleton 2017), but research seldom compares social media messaging strategies of different countries' governmental institutions with equivalent responsibilities during a same public health crisis.

Therefore, the researcher conducted this study, which explored how the U.S. and Chinese governments used strategies on social media to publish persuasive messages encouraging healthy behaviors to the audience during COVID-19. Focusing on the theoretical lens of Cialdini's seven principles of persuasion, the researcher has collected the messages released by the Centers for Disease Control and Prevention Centers (CDC) on Twitter and the posts published by the National Health Commission of China (NHC) on Sina Weibo. The two governmental institutions are the primary decision-makers for executing COVID-19 prevention and control policies in the two countries. After analyzing the CDC and NHC's messages with Cialdini's principles of persuasion, the researcher investigated other messaging patterns, and conducted a pooled time series analysis based on different phases of the pandemic. Finally, this study discussed the effectiveness of Cialdini's rules of persuasion and provided suggestions for governmental messaging strategies during crises.

LITERATURE REVIEW

PRINCIPLES OF PERSUASION

A persuasive message is defined as "the central message that intrigues, informs, convinces, or calls to action" (Ashman 2018). Robert B. Cialdini, a social

psychologist and an expert in persuasion theory, developed seven principles of persuasion in interpersonal communication topics since 1984 (Cialdini 1984, 2009, 2016). They are reciprocation, commitment, and consistency, social proof, liking, authority, scarcity, and unity.

The rule of reciprocation means people "should try to repay, in kind, what another person has provided" (Cialdini 2009, 33). Thinking about how to use the rule to gain someone's compliance to some requests, Cialdini took his personal experience as an example. When he refused a young boy's first request of purchasing a ticket to the Boy Scouts circus, he felt it was hard to refuse the boy's alternative request of buying some chocolate bars. As the boy made a concession on his request, Cialdini felt obligated to change his attitude from non-compliant to compliant. The "return action" (Cialdini 2009, 58) betrays the reciprocity rule's power in social influence (Cialdini 2009). Cialdini's classic example of this involves people being more likely to tip a waiter if they are given something with the bill, like mints or fortune cookies.

The rule of commitment and consistency means that people desire to be "consistent" with what they have done before (Cialdini 2009, 85-86). If people commit to doing something, they will probably do as they promised (Kaptein et al. 2009). Cialdini (2009) raised a good example for this rule, written commitment. If people filled out the appointment card by themselves stating that they would visit the doctor's office next time, it was more likely that they showed up on time. On the contrary, if the nurse filled out the card for the patients, the patients might miss the appointment to a larger degree (Cialdini 2009).

The principle of social proof means that people determine what is correct based on "what other people think is correct" (Cialdini 2009, 164). The word-of-mouth (WOM) communication is a showcase for this principle (Godes and Mayzlin 2004). For example, Godes and Mayzlin (2004) collected online conversations from Usenet, discussion groups based on the Internet, to analyze the reviews of 44 TV shows in the U.S. By comparing the Nielsen ratings and the number of online posts on Usenet, they found that people made offline decisions – to watch or not to watch - according to the online reviews from the general public. Also, when evaluating a restaurant, customers would like to listen to the general reviewers' rating opinions, not the editors' reviews (Zhang et al. 2010).

The rule of liking means people tend to accept the information provided by people with whom they are familiar and whom they like (Cialdini 2009). Inviting 61 participants to have an experiment on cooperating with a confederate in a task and buying raffle tickets from the confederate after the cooperation, a study discovered that when the experimenter believed that he/she and the confederate had similarities, he/she tended to accept the request to purchase tickets (Goei et al. 2003).

The principle of authority takes advantage of people's "automatic obedience" towards authority figures – parents, teachers, judges, employers, and government leaders – to transit persuasive messages (Cialdini 2009, 295). For example, patients follow doctors' instructions because the latter have more medical knowledge and have a medical degree (Cialdini 2009). A health provider's information could be more credible just because of his/her professional job (Sundar 2008).

"Opportunities seem more valuable to us when their availability is limited" describes the scarcity principle in the process of decision making (Cialdini 2009, 321). Cialdini set his own story as an example. When he learned that a new Mormon temple allowed non-Mormon visitors to see the building inside in a limited time frame, Cialdini booked the tour without hesitation. Even though he was not interested in religion or architecture, the time-limited offer appealed to him more. The feeling of "protentional unavailability" drives people to make quick decisions because they are afraid of losing something (Cialdini, 2009, 322). Scholars found that people tended to attend the sports events more actively when the tickets were scarce (Wann, Bayens, and Driver 2004).

The unity principle means that people can be influenced by shared identities and the sense of belongingness for being together with others (Cialdini 2016; Vargheese, Collinson, and Masthoff 2020). Different from the liking principle which focuses on "being alike," the rule of unity seeks a common ground that "Oh, that person is one of us." The "shared identities," such as race or ethnicity, helps people define the groups where they belong (Cialdini 2016, 302). As the most recent principle developed by Cialdini, the unity rule was explored in various settings, including a hospital (Gaube et al. 2020), game-based learning (Wit 2020), and online shops (Halbesma 2017). Analyzing 224 persuasion techniques used by 20 online shops in the Netherlands, Halbesma (2017) discovered that online travel shops applied more of the unity principle in the techniques than online retail shops. For example, the shop allowed the customer to buy tickets for friends or work together with friends on a flight planner (Halbesma 2017). Such acting together behavior is an indicator of shared identities in the unity principle (Cialdini 2016).

PERSUASION IN COVID-19

Cialdini has updated the persuasion studies with more up-to-date scenarios in computer-mediated communication (Bator and Cialdini 2000; Guadagno and Cialdini 2002, 2009). He also helped organizations planning persuasion tactics during the COVID-19. Along with other scholars, Cialdini mapped out tactics for organizations to encourage people to adopt the new health behaviors during COVID-19 (NASEM 2020). Utilizing the authority principle, organizations

should send clear messages, employ trusted messengers, and stop mentioning misinformation. (NASEM 2020). As one of the authors, Cialdini provided a revised script for contact tracers to better communicate with positive COVID-19 patients and ask the patients to offer private contacting information (Sciamanna, Du, and Cialdini 2021). Besides, he suggested being honest about side effects and relying on trustworthy experts' words when persuading people to take COVID-19 vaccines (Barli and Thiel 2021).

Other scholars have conducted persuasion studies targeting COVID-19 as well. Pennings and Symons (2021) argued that persuasion worked better than coercion or incentives when governments promoted the COVID-19 vaccines to the public because the public needed to trust governments. What's more, they suggested that having a vaccine spokesperson chosen from the vaccine-hesitant groups (using the liking principle) would be vital for increasing the vaccination rate. Another example using the liking principle is Bechler et al.'s (2021) study. Instead of focusing on the persuader, Bechler and his colleagues (2021) stressed selecting the best persuasion target to enlarge the persuasive effect. The scholars asked the experiment participants to indicate to what degree they were pro-mask or anti-mask. And then they invited the strongly pro-mask people to send messages to other participants on wearing a face covering. The researchers found that the persuaders would like to choose targets who had slightly negative views on the mask. However, it could be in vain because the study showed that those persuasive messages could be more effective on targets who had a slightly positive attitude.

PERSUASION WITH DIRECTIVE OR NON-DIRECTIVE MESSAGES

Directive and nondirective approaches were discussed firstly in the counseling and psychotherapy field (Snyder 1945). The directive method is that the counselor plays the authority role, leads the conversation with the client, and provides instructions. The non-directive approach means that the client controls the direction of the unstructured conversation and the therapist plays the role of the listener (Cuijpers et al. 2012).

In communication studies, scholars refer to the term "directive" as a way that the communicator gives the conclusion directly and the "non-directive" as a way that the audience draws their own conclusions after the conversation (Hovland and Mandell 1952). It is not easy to decide which is the better way to persuade others with new ideas with the directive or non-directive messages. Research showed that a non-directive approach could be more likely to change the audience's attitude (Hovland and Mandell 1952). However, scholars in persuasive communication found that attitude change was not as drastic when the

communicator did not tell the intended conclusion as to when the communicator did tell the conclusion (Thistlethwaite, De Haan, and Kamenetzky 1955).

Searle (1979) stated that one type of persuasion can involve a directive speech in which the speaker requests the audience to take action (Searle 1979) while being too explicit can make the audience feel insulted (O'Keefe 1997). Aspden, Ingledew, and Parkinson (2015) found that non-directive messages could be more effective when promoting safe sun messages. Few studies have discussed the use of directive/non-directive messages in the social media context.

GOVERNMENTS' MESSAGES ON SOCIAL MEDIA DURING PUBLIC HEALTH CRISIS

Peters (2011) pointed out that crises – from natural disasters to civic disruptions, economic collapses to mass violence – were windows displaying the patterns of governance. They are opportunities for governments to increase the learning capacity towards emergent situations.

As English and Mandarin Chinese are the top two languages spoken among the world, Twitter in the U.S. and Sina Weibo in China are the most popular social media platforms within the language context (Ding and Zhang 2010). In a comparative study, Ding and Zhang (2010) chose the U.S. Department of Health and Human Services (DHHS), the U.S. CDC, Ministry of Health of China (MOH), and the China CDC as research subjects, comparing their risk communication tactics on social media during the H1N1 flu epidemic in 2009. They found that the Chinese governmental institutions seldom interacted with the audience and were reluctant to receive feedback or comments. This one-way communication method on social media followed the mainstream dissemination approaches used by the Communist Party of China on mass media (Zhang 2004). Comparatively, the U.S. health authorities applied a two-way communication strategy using social media as tools to provide real-time information, guidelines, and suggestion, allowing the audience to comment under the messages. However, Ding and Zhang (2010) considered this two-way approach was considerably limited because the public could not get involved in the decision-making process via social media. They could only follow or comment on the instructions after the authorities had made the policy.

Both countries have updated their communication strategies since Ding and Zhang's (2010) study. During the COVID-19 pandemic, the CDC, a U.S. federal agency with 75 years' history (Parascandola 1996), is the primary public health sector dealing with the COVID-19 control and prevention. The equivalent department in the Chinese government is the National Health Commission (NHC), which is responsible for collecting reports from regional health public health departments and making policies over the COVID-19 (Liao et al. 2020). Comparing the two organizations' messaging strategies during the COVID-19

epidemic, Turner, Wang, and Robinson's (2021) cross-cultural study discovered that the message tactics were consistent with Hofstede's (1980, 2013) national dimension index of the U.S. and China. The CDC located in an individualistic country with lower power distance, sent no messages stressing on the role of the government, whereas the NHC of China, a collectivistic country with higher power distance, published more posts presenting the government performance in the pandemic.

Previous literature has not explored Cialdini's seven principles of persuasion in social media messages released by public health organizations. Thus, this cross-country study asked the following research questions:

RQ1: What principles of persuasion does the CDC apply?
RQ2: What other messaging patterns are identified other than Cialdini's principles from the CDC's Twitter account?
RQ3: What principles of persuasion does the NHC apply?
RQ4: What other messaging patterns are identified other than Cialdini's principles from the NHC's Weibo account?

Turner, Wang, and Robinson (2021) suggested messaging strategies in early and late stages of a pandemic might be different. The use of timely messages is a pivotal strategy during crises (Hale 2005) or political campaigns (Panagopoulos 2011). Research shows that early appeals via phone calls in a political campaign could be more effective in raising voting levels (Panagopoulos 2011). In a social media context where each post has a timestamp following a timeline view, the speed of responses affects the credibility of the publisher (Westerman, Spence, and Van Der Heide 2014). Conducting an experiment with 502 participants in a health crisis setting, Huang and DiStaso (2020) discovered that the hospital could earn more trust if it responded in one day on Facebook, rather than one week. Thus, the researcher will answer the following research questions in the analysis:

RQ5: What are the relationships between the CDC's messaging frequencies and the daily positive COVID-19 cases in the US?
RQ6: What are the relationships between the NHC's messaging frequencies and the daily positive COVID-19 cases in China?

METHODS

DATA COLLECTION

Using the "rtweet" package (Kearney 2019) in R programming language, the researcher captured 1,630 original tweets (N = 1,630) from the CDC's Twitter account (@CDCgov) related to COVID-19, which were published from 00:00 GMT January 11th, 2020 to 23:59 GMT January 20th, 2021. The start date is the

first day that the organization began to tweet about the disease. It said on January 11th, 2020,

> A new coronavirus may be the cause of a pneumonia outbreak being investigated in China. CDC is closely monitoring the situation & has stood up emergency response system in case it's needed.

The end date of the data collection is Presidential Inauguration Day when President Joe Biden began his term as the 46th President of the U.S. and published new strategies towards the COVID-19 (Goldstein and Stanley-Becker 2021). Coincidently, the date also marks the finding of the first case of COVID-19 in the U.S. one year ago. The CDC posted the message on January 20th, 2021,

> One year ago, the first case of #COVID19 in the US was reported to CDC. Cases continue to rise across the country. The current 7-day average of new cases is 208,548. Help slow the spread. 😷 Wear a mask. 🚫 Avoid crowds. ↔ Stay 6 feet apart.

> Similarly, a web crawler was used based on Python programming language(Chen 2019) to scrape data from the NHC's official Weibo account (@健康中国 [Health China]). From 00:00 (GMT+8) January 11th, 2020 to 23:59 (GMT+8) January 20th, 2021, the organization originally posted 3,554 messages (N = 3,554) related to COVID-19 (See Table 1). The NHC's first date of mentioning the disease is the same as the CDC's, which is January 11th, 2020,

> #HealthRelease [China will share the genetic sequence information of the new coronavirus with the WHO] Wuhan's pneumonia of unknown etiology epidemic has attracted widespread attention from all walks of life. In order to maintain global health security, China will share with the WHO the genetic sequence information of the novel coronavirus detected in cases of Wuhan's unexplained viral pneumonia.

To have the same numbers of total days in the data comparison between the CDC and the NHC, the end date of the NHC's messages is also the same as the CDC's.

Table 1. CDC and NHC Data Comparison.

	Total Days	Total Messages	Average
CDC	376	1630	4.34
NHC	376	3554	9.45

SAMPLING AND CODING

The research extracted 100 sample messages from each account and coded them with the following messaging types.

> When the text simply states facts or scientific data without requesting or drawing conclusions for the audience (e.g., "COVID19 is widespread in several

areas of the U.S., particularly in the South, West, and parts of the Midwest."), it is a non-directive post. When the post includes explicit requests or makes decisions for the audience to change attitudes or behaviors (e.g., "Wear a mask over your mouth and nose."), it is identified as a directive message.

The researcher also coded the persuasive messages with Cialdini's (1984, 2009, 2016) seven principles of persuasion: reciprocity, consistency, liking, social proof, authority, scarcity, and unity. If the message appears with two or more principles, the researcher chose the most salient principle, which is easier to tell without further considering, from them as the category of the message.

If the message has an expression such as "if you follow this account, you will get great resources," it is coded as reciprocity.

When the post includes certain expressions, such as "keep doing something," or "continue to do something", it is classified as consistency.

If the message has liking expressions, e.g., "we are alike", it uses the rule of liking.

If the post has celebrities' endorsements or has a meaning that other people from other places did the same behavior, it is considered as social proof.

If experts or an organizations' name appears in the message, the message would be coded as the authority.

When the post includes words related to time-limited or quantity-limited expressions, it is categorized as the scarcity principle.

Last, if the message shows recognition of shared identity, such as "we are Chinese/American", the post would be considered as unity.

FINDINGS

Research Question 1: What Principles of Persuasion Does the Centers for Disease Control and Prevention Apply?

Among the 100 sample messages from the CDC's Twitter account (n = 100), three Cialdini's principles were identified: authority (n = 40), social proof (n = 5), and consistency (n = 1). The rest of the messages (n = 47) didn't apply any principles of persuasion (See Table 2).

Authority

Forty messages applied the authority strategy with experts' or organizations' names (n = 40). For example, the CDC posted on December 2nd, 2020,

> CDC is providing public health agencies with options to shorten the length of quarantine in some situations. Quarantine length is determined by local public health authorities, so follow guidance from your health dept. about how long you should quarantine. https://t.co/ezhjUjAEhy https://t.co/JC2MlC4CRM

It stresses the organization, CDC, is taking measures towards the pandemic. Also, on July 15th, 2020, it relied on the credibility of Google and posted, "CDC and @Google remind you that wearing cloth face coverings in public settings can help #SlowTheSpread of #COVID19."

Table 2. Cialdini's Principles in Sample Messages.

	CDC	NHC
Authority	40	70
Social Proof	5	6
Consistency	1	3
Reciprocity	0	0
Liking	0	0
Scarcity	0	0
Unity	0	0
Without Any Principles	47	21
Total	100	100

Social Proof

In terms of the social proof principle, five messages share the characteristic (n = 5). For example, this message appeared on August 27th, 2020,

> Testing all residents and staff in West Virginia nursing homes helped limit the spread of #COVID19. Testing all residents and staff, regardless of symptoms, may help protect those at higher risk for COVID-19 and prevent larger outbreaks.

This message conveys the information that since the action in West Virginia works, it will work within the nation.

Consistency

Only one message uses words with a meaning of continuity. On March 30th, 2020, the organization tweeted,

> Worried about your pet during the #COVID19 outbreak? There's no evidence that pets can get sick from the virus or spread the virus in the U.S. Continue taking every day preventive actions to keep yourself healthy.

Messages without Cialdini's Principles

There are 47 messages not showing any keywords or expressions from Cialdini's principles of persuasion. They have no tactics on how to persuade the audience more effectively. For example, the message on May 30th, 2020 said,

While shopping for groceries and other household items, order online or over the phone if possible. Pick up curbside or ask for deliveries to be left on your doorstep to avoid person-to-person contact.

Research Question 2: What Other Messaging Patterns Are Identified Other than Cialdini's Principles from the Centers for Disease Control and Prevention's Twitter Account?

The CDC provides 63 directive messages in the 100-case sample (n = 63). Take the tweet on April 7th, 2020 as an example, "Plan meals and have your food delivered, if possible. If you must go to the store during #COVID19, avoid peak hours and try to send only one person to shop." The messages show an explicit meaning on instructing people's behaviors towards the COVID-19 and always include suggestions or recommendations.

The rest of the 37 messages are non-directive and don't have explicit instructions (n = 37). For example, on October 16th, 2020, the CDC posted,

> The latest CDC #COVIDView report shows that every region in the United States is reporting an increase in the percentage of medical visits for illnesses with symptoms similar to those associated with #COVID19 illness.

The messages basically include scientific facts or stats about COVID-19. They don't ask the audience to take any protective actions to stop the transmission of the disease. After reading the message, the potential conclusion can be "I know, and so what?" It can also be "So I need to be more cautious when going outside." No matter what kind of decision they make, the audience can draw their own conclusions from this message. Another example is what it said on December 28th, 2020,

> FACT: #COVID19 vaccination helps keep you from getting COVID-19. The vaccines currently available in the US are more than 90% effective at preventing COVID-19, according to clinical trials, and are important tools to stop the pandemic.

Readers can simply take this message as a piece of information about COVID-19 vaccines, or they might also get nudged and decide to take the vaccines as soon as possible.

Research Question 3: What Principles of Persuasion Does the National Health Commission of China Apply?

Three of Cialdini's principles were identified from the 100 cases of the NHC: authority (n = 70), social proof (n = 6), consistency (n = 3). There are thirteen persuasive posts having no techniques on persuasion (n = 21) (See Table 2).

Authority

The NHC mainly applies Cialdini's authority tactic (n = 70) to convince the people. Government organizations, officials, experts, and health providers are

the characters appearing in these messages. For example, it posted about a doctor's story on how he assisted his medical team during the pandemic on March 6th, 2020. The instruction from Chinese Premier, Keqiang Li, on how to deal with the pandemic on February 2nd, 2020, also serves as an example in this category.

> [translated] The meeting requested that the spirit of the important instructions of General Secretary Jinping should be implemented conscientiously, local responsibilities should be constrained, openness and transparency should be maintained, early detection, early reporting, early isolation, and early treatment should be better achieved, and the fight against the epidemic should be resolutely won.

Social Proof

The social proof principle appears in the NHC's sample six times (n = 6). The messages focus on the patient's feelings and use the experience to ask the audience to take serious precautious towards the disease. For example, on February 17th, 2020, it posted a patient's recovery story to show his gratitude to the health providers. As another way to use the social proof principle, the organization also invites celebrities to endorse protective measures on January 13th, 2020,

> [translated] Chinese New Year is here, CCTV host @田薇_TianWei
>
> Happy New Year to everyone! Tian Wei reminds everyone that you must wear a mask when taking public transportation, to protect yourself is to protect others! I wish you all have a happy and healthy new year!

Consistency

There are three messages including words meaning continuity. For example, on April 1st, 2020, the NHC posted, "[translated] We call on all people to adhere to good hygiene habits, be the first responsible person for their own health, and continue to contribute to consolidating the results of epidemic prevention and control."

Among the 100 cases, 21 messages do not contain any principles of persuasion. They are mainly in a Q&A style. For example, on February 11th, 2020, it published,

> [translated] Subway or taxi, which risk is higher? There is no need to distinguish which risk is higher. As long as there are places where people are concentrated, there will be risks, so you must insist on wearing masks, because in public places, your hands will touch the surface of some public facilities. Wash your hands when you go home.

Research Question 4: What Other Messaging Patterns Are Identified Other than Cialdini's Principles from the National Health Commission of China's Weibo Account?

The Chinese organization used the NHC as a platform to release non-directive news or stories related to COVID-19 (n = 45). For example, on February

22nd, 2020, it reported that "some experts from the China-WHO Joint Expert Investigation Team for New Coronary Pneumonia will visit Wuhan." And on January 19th, 2021, it published an announcement on the ineffective prevention and control of the COVID-19 Epidemic in Gaocheng People's Hospital of Shijiazhuang City, Hebei Province and Xinle City Hospital of Traditional Chinese Medicine.

Among the non-directive messages, a group of posts was health providers' stories (n = 26). For example, the NHC released a nurse's story on February 26th, 2020,

[translated] "When I took over at 3 a.m., many patients were asleep; when they got off work, they saw hope in their eyes. I was so relieved that they had another Christmas Eve." This "post-90s" nurse tapped on the phone. Shi Jing, born in 1990, is from Jiamusi, Heilongjiang, and has been a nurse for 10 years. But this is the first time she has experienced such a big "battle."

Comparatively, directive messages (n = 55) are more explicit and provide instructions directly. For example, the organization ask people to be cautious about traveling during the Lunar New Year Spring Festival on January 13th, 2021,

> [translated] To do a good job in the prevention and control of the epidemic during the Spring Festival transport, the most important measure is to repeatedly emphasize and repeatedly demand to implement normalized epidemic prevention and control work. Appeal to the general public: If you must travel, pay attention to traffic and travel information, and at the same time, pay attention to peak travel, take care of the whole process, and try to avoid going to crowded places. Don't panic once you have suspicious symptoms. Be sure to wear a mask and go to the nearest medical institution for treatment.

Research Question 5: What Are the Relationships between the Centers for Disease Control and Prevention's Messaging Frequencies and the Daily Positive COVID-19 Cases in the US?

The researcher used a pooled time series analysis to investigate the change of the number of daily posts as the pandemic developed in different phases. According to Sayrs (1989, 7), the pooled time series analysis is a "regression analysis for data that are a combination of cross-sections and time series." Using the timeline released by the American Journal of Managed Care (AJMC Staff 2021), the researcher conducted a pooled time series analysis on the CDC's message timing.

The pooled data consisted of the number of daily tweets by date. The researcher created a series of dummy variables to account for period-based trends in the number of daily cases of COVID-19 in the U.S. and China. The researcher ran the statistical analysis to test the significance of the effect of the number of

cases of COVID-19 on the messaging during each phase compared to the baseline of the first phase of the pandemic.

Dependent Variable

The "CDCDailyTweets" is the dependent variable for the model (See Figure 1). It is the number of daily messages published by the CDC on its official Twitter account from January 11th, 2020 to January 20th, 2021.

Independent Variables

Based on the timeline of the pandemic in the U.S., the researcher created four dummy variables for different phases to look at the relationship between the number of daily tweets and the number of daily new COVID-19 cases within certain time periods. The first phase of the pandemic in each of the U.S. and China was the omitted category or baseline.

Independent Variable #1: USDailyNewCases.

It means the number of daily new COVID-19 confirmed cases. The COVID-19 case data in the U.S. is from Our World in Data, a data research platform (Ritchie et al. 2020).

Figure 1. CDC Daily Tweets and Date.
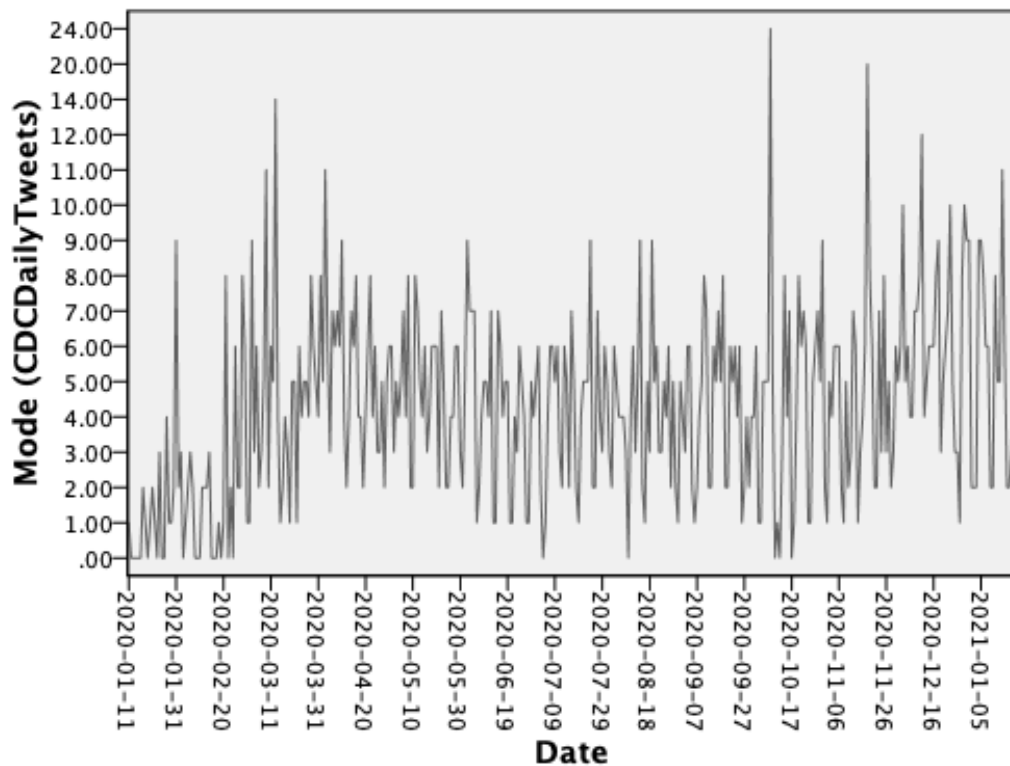
Baseline: Period 1: 1.11.2020 to 1.30.2020.

As mentioned before, January 11th, 2020 was the first day that the CDC started to mention COVID-19 on Twitter. As the pandemic developed, the U.S. declared a public health emergency over the disease on January 31st, 2020 (Miller and Edwards 2020). Therefore, the researcher set the time period from January 11th, 2020 to January 30th, 2020 as the baseline of my analysis. During this period of time, the U.S. government started to realize the severeness of the disease and began to take control and prevention actions.

Dummy Variable: Period 2: 1.31.2020 to 3.12.2020.

On March 13th, 2020, former U.S. President Donald Trump declared a national emergency and provided federal funds to fight the COVID-19 (Liptak 2020). From January 31st, 2020 to March 12th, 2020, COVID-19 started to affect every people's life and the country decided to take national measures on combating the pandemic.

Dummy Variable: Period 4: 3.13.2020 to 8.1.2020.

During this time frame, former President Donald Trump signed the CARES Act into law (Grisales et al. 2020), and the number of COVID-19 deaths in the U.S. surpassed 100,000 (CDC 2020). On August 2nd, 2020, former White House virus expert, Dr. Deborah Brix, recognized a new phase of COVID-19 that was extraordinarily widespread in the U.S. (Chiacu 2020).

Dummy Variable: Period 4: 8.2.2020 to 11.8.2020.

The country went into a new phase of the pandemic with daily new cases constantly rising up. On November 9th, 2020, U.S. President Joe Biden announced his COVID-19 transition team (Mucha and Bradner 2020).

Dummy Variable: Period 5: 11.9.2020 to 1.20.2020.

The end date of the data collection is the Presidential Inauguration Day when President Joe Biden began his term as the 46th President of the U.S. and published new strategies towards the COVID-19 (Goldstein and Stanley-Becker 2021).

The researcher created a linear regression model for the data. The dependent variable is CDCDailyTweets, and the independent variables are USDailyNewCases, CDCPeriod2, CDCPeriod3, CDCPeriod4, and CDCPeriod5. After running in SPSS, 14.9% of the data in CDCDailyTweets can be explained by the independent variables. The Durbin-Watson statistic is 1.674, which is near to 2.

The researcher set the time period from Jan 11th, 2020 to January 30th, 2020 as the baseline ($B = .392$, $t = 2.766$, $p = .006$). In period 2, the number of daily tweets becomes less than the baseline and it is statistically significant ($B = .211$, $t = 2.663$, $p = .008$). Compared with the baseline, the number of daily tweets is higher in period 3, and it is statistically significant ($B = .526$, $t = 4.715$, p

= .000). In period 4, compared with the baseline, the number of daily tweets is slightly less (B = .378, t = 3.422, p = .000). In period 5, there is no relationship in the number of daily tweets and the number of daily cases (B = .201, t = 1.164, p = .245).

For the U.S. data, the relationship between the CDC's messaging frequencies and the daily positive COVID-19 cases is strongest for period 3 (March 13th, 2020 to August 1st, 2020), which indicates that the number of the CDC's daily tweets was very responsive to the rise of the daily cases. Respectively, there is no statistical relationship in period 5 (November 9th, 2020 to January 20th, 2021), which could be explained by the reason that the new administrative team of President Biden was finding new strategies and policies during the transition period.

Research Question 6: What Are the Relationships between the National Health Commission of China's Messaging Frequencies and the Daily Positive COVID-19 Cases in China?

The Chinese government published a white paper reporting the government performances during the timeline of the pandemic in China (The State Council Information Office of the People's Republic of China [SCIO] 2020). The researcher developed the following phases for the NHC's performance on Weibo.

Dependent Variable

The "NHCDailyPosts" is the dependent variable for the model (See Figure 2). It is the number of daily messages published by the NHC on its official Sina Weibo account from January 11th, 2020 to January 20th, 2021.

Figure 2. NHC Daily Tweets and Date.
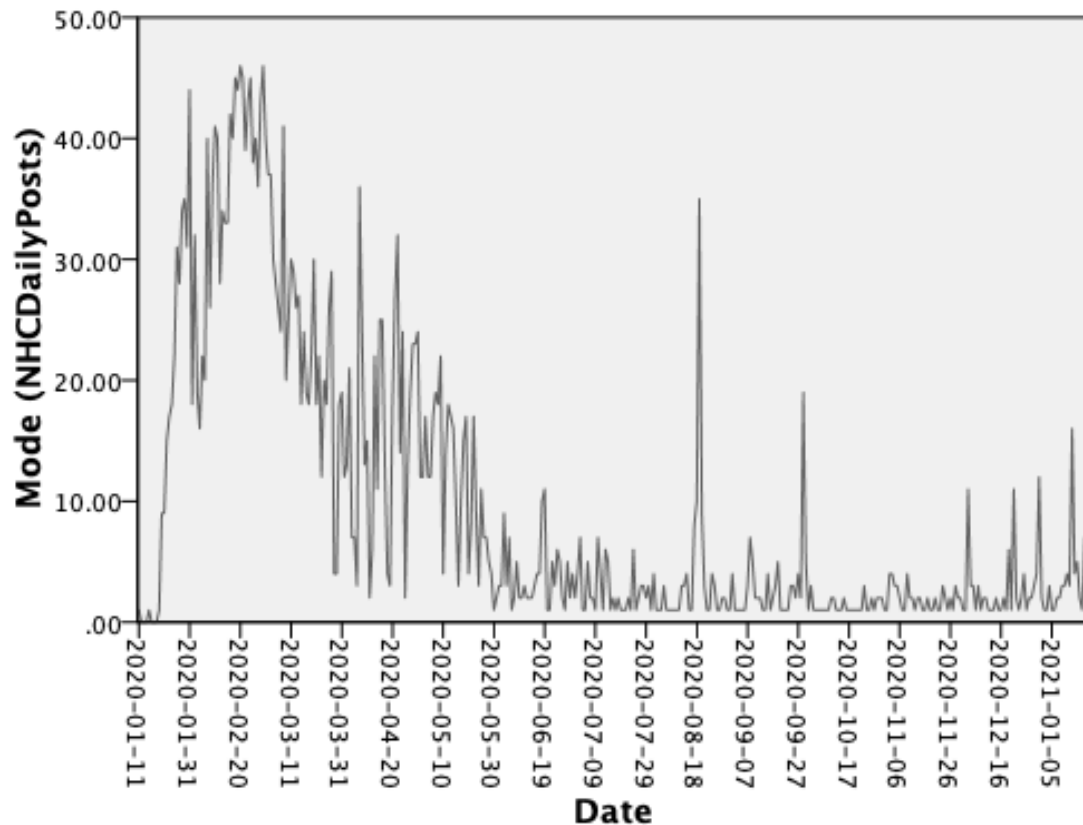
Independent Variables

Based on the timeline of the pandemic in China, the researcher created three dummy variables for different phases to look at the relationship between the number of daily tweets and the number of daily new COVID-19 cases within certain time periods.

Independent Variable #1: ChinaDailyNewCases.

It means the number of daily new COVID-19 confirmed cases. The COVID-19 case data in China is from Our World in Data, a data research platform (Ritchie et al. 2020).

Baseline: Period 1: 1.11. to 2.20.2020.

This phase covers the first response stage and the initial progress stage in the white paper (SCIO 2020). As the most serious period of the pandemic with

1829 daily positive cases on average, the NHC posted with a congruent frequency.

Dummy Variable: Period 2: 2.21.2020 to 3.17.2020.

The government announced that the virus had been contained in Wuhan, and the daily new case remained in single digits from March 17th, 2020.

Dummy Variable: Period 4: 3.18.2020 to 4.28.2020.

The newly confirmed domestic cases on the Chinese Mainland dropped to single digits during this phase, and the SCIO officially wrote that "the epidemic peak had passed in China as a whole" (SCIO 2020, 22).

Dummy Variable: Period 4: 4.29.2020 to 1.20.2021.

The Chinese government saw the period starting from April 29 as a new stage of ongoing prevention and control. As the pandemic was controlled, the daily posts of the NHC's Weibo account dropped to 3.94 pieces per day.

The researcher created a linear regression model for the data. The dependent variable is NHCDailyPosts, and the independent variables are ChinaDailyNewCases, NHCPeriod2, NHCPeriod3, and NHCPeriod4. After running in SPSS, 62.6% of the data in NHCDailyPosts can be explained by the independent variables. Even though the Durbin-Wastson score is .799, which is lower than 2, as the researcher added new periods into the model, the dummy variables in this heteroskedastic model moved in the direction of detrending the time series, as the DW score rose slightly.

When the researcher set the period from Jan 11th, 2020 to Feb 20th, 2020 as the baseline (B = .195, t = 5.227, p = .000). In period 2, compared with the baseline, the number of posts become higher (B = .284, t = 6.815, p = .000). In period 3, there is no real difference in the number of daily posts and the number of daily new cases (B = -.071, t = -1.509, p = .132). This can be interpreted that during this period, the pandemic was generally controlled by the government (SCIO 2020). Therefore, timely messages on the NHC's Weibo account were not as urgent as before. In period 4, compared with the baseline, the number of daily posts were fewer (B = -.579, t = -10.522, p = .000). This indicates that as the country had fewer COVID-19 cases, the NHC started to accept the new norm that fighting against the virus was a continuous battle, and timely messages may not be necessary anymore.

DISCUSSION

Brehm (1966) suggests that people are reluctant to accept messages that violate their freedom of choice. During the COVID-19 pandemic, the changing of social norms and daily routines set challenges for governments to promote health behaviors on social media. According to Ding and Zhang (2010), a consistent media presence like promoting spokespeople could help governmental institutions

to earn trust in the public health crisis. Cialdini's principles of persuasion provide useful strategies for governments and organizations to plant into the social media messages.

The findings reveal that the authority rule is the most frequently applied strategy of both the CDC and the NHC. It is not a surprising phenomenon for China's governmental institutions. As a collectivism country with a high power distance index (Turner, Wang, and Robinson 2021), the country relies on the power of authorities to assure the public that the government has already contained the virus. Compared with the CDC which set the CDC itself as the major source for the rule of authorities, the NHC mentions various entities with authorities: central and local governmental institutes (e.g., the NHC, the Wuhan Health Commission, the Hubei Health Commission), central and local officials (e.g., President Xi, the NHC leaders), famous doctors and normal health providers.

A timely message pattern also plays an important role in persuading the audience. In the time series analysis, the period from March 13th, 2020 to August 1st, 2020 has the highest standardized coefficient, which indicates that the number of the CDC's daily tweets was very responsive to the rise of the daily cases. The period from November 9th, 2020 to January 20th, 2021 has no significance, which could be explained that the new administrative team of President Biden was finding new strategies and policies during the transition period.

Since the beginning of the pandemic, the NHC has kept publishing a daily update of COVID-19 cases on Weibo, which shows a pattern of consistency. In the samples, nine messages share the same style. For example, it was posted on November 1st, 2020,

> [translated] From 00:00 to 24:00 on October 31, 31 provinces (autonomous regions and municipalities) and the Xinjiang Production and Construction Corps reported 24 new confirmed cases. Among them, 21 were imported from abroad (7 in Gansu, 5 in Shanghai, 3 in Inner Mongolia, 3 in Guangdong, 1 in Fujian, 1 in Sichuan, and 1 in Shaanxi), 3 local cases (all in Xinjiang); no new deaths cases; no new suspected cases.

The consistency assures people that the government is tracking the progress of COVID-19 and convincing people to protect themselves by following the instructions from the authorities.

There are several limitations associated with this study. First, the word limitations of each message on Twitter and Sina Weibo are different. Twitter has a 280-character limitation, whereas the longest length of a Sina Weibo post can be 5,000 characters. The difference might influence the styles of expression between the U.S. and China. Second, the varieties between English and Chinese languages could also have an effect on the messaging patterns. At last, this study mainly

discusses the messaging strategies on the two social media platforms. The social media usage behaviors could be huge differences among various cultures (Ding and Zhang 2010). The researcher believes that the cultural, political, historical, and economic elements behind the messages are also worthy to investigate.

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