Engaging social media users with attitudinal messages during health crisis communication

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Abstract

To cope with the COVID-19 pandemic, various policy measures accompanied by health crisis communication were adopted in China to engage publics. In this study, we investigated how *People's Daily* communicated COVID-19 messages on Weibo. Drawing on the Appraisal Framework, we developed a three-stage mixed method approach to study 400 COVID-19 posts to identify the attitude resources employed and their association with public engagement. We found that attitudinal posts were more engaging than non-attitudinal posts. Judgment, both positive and negative, was positively associated with public engagement, whereas the use of positive Affect and Appreciation could be ineffective. These findings contribute to the understanding of how public engagement on social media can be enhanced through the use of attitudinal messages in health emergencies.

1. INTRODUCTION

The COVID-19 pandemic presents an acute health crisis worldwide. After the first confirmed case in Wuhan, China, in December 2019, COVID-19 quickly spread within the country and to neighboring areas and beyond. On 11th March 2020, the World Health Organization (2020a) declared COVID-19 a pandemic. By 19th June 2021, there were over 177 million confirmed cases, resulting in 3 million deaths worldwide (World Health Organization, n.d.). According to U.N. Secretary-General Antonio Gutteres, the devastation and ongoing threat caused by COVID-19 amount to the worst crisis that the world has faced since World War II (Lederer, 2020). As the first country hit by the COVID-19 pandemic, China responded with large-scale non-pharmaceutical interventions, such as strict lockdown, travel restrictions, and face-mask wearing (SCIO, 2020c). For such interventions to be successful, effective messaging is needed to foster public trust and enhance the willingness to participate (World Health Organization, 2005, 2020b). It follows that an important communication goal during crises is public engagement (Landi et al., 2021), which involves the solicitation of public

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response and participation (e.g., public feedback, input, and opinion) beyond one-way information delivery from the sender (Chen et al., 2020; Rowe and Frewer, 2005).

With nearly 130 million followers on China's largest social media site—Sina Weibo, *People's Daily*, a state-owned mainstream media outlet, has been actively communicating COVID-19 messages. In this study, we investigated the COVID-19 messages that *People's Daily*, i.e., the sender, communicated on Weibo by focusing on one specific aspect, i.e., attitudes in the sender's discourse, based on the Attitude system in the Appraisal Framework (Martin and White, 2005). Attitude analysis can facilitate our understanding of COVID-19 communication because such analysis can reveal how attitudes are designed in the messages to engage the audience by positioning them to feel a particular way (cf., Martin and White, 2005). Furthermore, in order to identify the real-world effect that the sender's attitudes have on publics, i.e., a group of people who have been facing the same crisis situation (Ngai and Jin, 2016), we examined the relationship between attitudes and public engagement. In social media contexts, such engagement is usually measured by the degree to which the social media users interact with the sender's messages, for instance, in the forms of 'likes', 'shares', and 'comments' (e.g., Ngai et al., 2020; Kang, 2014; Park et al., 2016; Yuki, 2015). Combining the sender's and receiver's perspectives, this study seeks to contribute to the understanding of how social media has been leveraged to communicate crisis information, and on top of that, shed light on how future crisis communication can engage publics with the use of attitudinal messages. This article presents a brief review of communication in health crises and the Attitude system in the Appraisal Framework, introduces our data and method, reports our findings from data analysis, and discusses the factors shaping the observed tendencies. Finally, research implications, limitations and future directions are briefly discussed.

2. LITERATURE REVIEW

The management of public health crises emphasizes the significance of not only medical and logistic responses but also large-scale communication to connect with affected publics (World Health Organization, 2009, 2018). Adequate messaging must be communicated right from the outset of the crisis (Reynolds and Seeger, 2005) to help convey important information about the disease to publics and motivate them to adopt the recommended measures to protect themselves from falling ill (Jones et al., 2010; Liu et al., 2020). Such communication is critical for the sustainability of a public health system during a health crisis. In the case of the COVID-19 pandemic, the rapid spread of the virus placed the health system at great risk of reaching its limits as hospitals and workers strained to meet the heavy influx of COVID-19 patients. In this context, the importance of effective health communication is further foregrounded.

Extant literature has shown that social media has become paramount in promoting health crisis communication (e.g., Chen et al., 2020; Househ, 2016). Online platforms offer an ideal place to reach an ever-expanding audience whose reliance grows stronger in crisis circumstances (Procopio and Procopio, 2007; Stephens and Malone, 2009). Due to its interactive and participatory nature, social media also provides great potential for public engagement during crisis situations (Agostino and Arnaboldi, 2016; Bonsón et al., 2019; Chen et al., 2020; Guidry et al., 2017; Landi et al., 2021). Social media can thus be used not only as a complementary channel to release crisis information, but also a tool to monitor public opinions, promote social cohesion, and foster support (Alexander, 2014; Zhang et al., 2019). It was found that during crises such as extreme weather and outbreaks of infections, crisis-related messages communicated by news media outlets, government and health authorities on social media could increase public engagement as they prompted public responses in form of 'likes', 'shares', and 'comments' (e.g., Ngai et al., 2020; Bruns et al., 2012; Criado et al., 2020; Househ, 2016; Vera-Burgos and Padgett, 2020). These social media cues are meaningful indicators of engagement. Specifically, by 'liking' a post, social media users indicate that they have noticed the health message and believe it deserves more attention (Gittelman et al., 2015). By 'sharing' a post, users actively spread the message for others to read, which facilitates health crisis prevention, as such actions could help broaden the reach of important information (Ngai et al., 2020; Guo et al., 2021). Likewise, 'comments' allow users to participate in the discussion and offer feedback (Guo et al., 2021).

Among various sources of information on social media during a crisis, news media outlets are key influencers (Bruns et al., 2012; Househ, 2016; Palen et al., 2010). Through news media, people learn about the crisis reality, understand the risk and personal susceptibility (Klemm, 2016), and make personal health decisions (Basch et al., 2020). As news media outlets increasingly shift to the online sphere, especially social media, their messages have become among the most reposted types of content (Bruns et al., 2012; Palen et al., 2010). For example, in China, *People's Daily*, a state-owned newspaper with the largest circulation in the country (People.com, n.d.), is an important mainstream media outlet active on social media. During the COVID-19 crisis, *People's Daily* was obliged as a state-owned entity to communicate responsibly and strategically in order to help contain the pandemic. Leveraging Sina Weibo as an important channel of communication, *People's Daily* engages in frequent messaging to its over 130 million followers on a daily basis, rendering itself an "influential social media creator" of crisis information (Austin et al., 2012:192).

Although social media offers opportunities for health crisis communication, the expected impact of such communication heavily relies on what the crisis messages are and how they are communicated. To study such messages, extant research focused on dimensions such as content frames, narrative or nonnarrative styles, and emotions. For example, one study found that when reporting a health crisis, 'action' and 'consequence' were the two most salient frames employed in the *New York Times* (Shih et al., 2008): the 'action' frame stressed actions taken against the disease and prevention measures that can be adopted, whereas the 'consequence' frame mainly focused on the disease's health and socioeconomic impact. Another study of *People's Daily* found that while 'action' was also salient, the other frames that were predominant included 'new evidence' and 'reassurance' (Ngai et al., 2020). Further research also investigated the different message styles, i.e., narratives (information delivered in a storytelling manner) and non-narratives (information delivered in a more direct manner, for example, by citing statistical evidence), used in health crisis communication (Ngai et al., 2020; Bekalu et al., 2018). Additionally, some research examined message appeals (emotional and rational appeals) (Huang and DiStaso, 2020) and the differential use of positive emotions (e.g., reassurance and relief) and negative emotions (e.g., concern and frustration) (Guidry et al., 2017; Liu and Kim, 2011). Such features in the sender's messages were found to have varying impacts on public engagement. For example, narrative style and emotional messages positively predicted social media users' intention to interact by 'liking' or 'sharing' the messages (Ngai et al., 2020; Huang and DiStaso, 2020).

These studies reveal the various features and aspects of the messages communicated in health crisis situations, but none of them provides a systematic account of the attitudes communicated by the sender, how these attitudes are presented, and above all, whether these attitudinal messages have an impact on public engagement. From the perspective of discourse and linguistic studies, an attitude analysis is critical for fully understanding the sender's messages because this could reveal how the sender intends to interact with the receiver and the feelings the sender aims to share, and such an analysis is directly linked to how the receiver is positioned to feel (Martin and White, 2005). The paucity of such studies hinders our understanding of the attitude resources that have been employed by health crisis communicators and the potential impact of such resources on crisis communication. This study is therefore presented as a modest attempt to address this gap by studying how attitudes were communicated by *People's Daily* to engage publics during the COVID-19 crisis in a social media context.

3. ANALYTICAL FRAMEWORK AND DEVELOPMENT OF RESEARCH QUESTIONS

A framework that has been developed to model the expression of attitudes is the Attitude system in the Appraisal Framework (Martin and White, 2005). According to the Attitude system, attitudes can be construed in three different dimensions: Affect, Judgment, and Appreciation. Affect addresses people's emotional reactions (e.g., she is pleased by her speedy recovery), whereas Judgment and Appreciation are more concerned with shared community values, i.e., values by which people's behaviors can be assessed in terms of their ethics—Judgment (e.g., she is very kind to her patients); and values with which objects or events can be evaluated in terms of their impact, complexity, and worth—Appreciation (e.g., the current situation is rather complex).

The Attitude system has been extensively applied in research concerning personal and institutional discourses to study how attitudinal meanings were designed, for example, to promote positive self-presentation (Ho, 2020), build rapport and trust (Ho, 2014; Jensen, 2009), and legitimize or delegitimize political stances (Feng, 2017; Hoffmann, 2018). To understand the attitudes *People's Daily* exhibited in its public communication during COVID-19, this study considers adopting the Attitude system for analysis. Instead of making general comments based on the entirety of a text, the Attitude system offers a bottom-up approach of textual analysis grounded in the close reading of each linguistic choice made in the text that signifies a particular kind of attitude and, therefore, enables a systematic account of the sender's attitudes.

Before diving into a more in-depth investigation of the different attitude dimensions (Affect/Judgment/Appreciation), the first research question that this study addresses is whether attitudinal posts, compared with non-attitudinal posts, lead to stronger public engagement as measured by the numbers of 'likes', 'shares', and 'comments' generated; therefore, the first research question was derived as follows:

RQ1. Were there any differences between the impact of attitudinal and nonattitudinal posts on public engagement?

Once we confirmed the impact of the attitudinal posts, we proceeded to investigate the attitudinal posts in terms of the Affect, Judgment, and Appreciation dimensions they demonstrated. We also investigated Affect, Judgment, and Appreciation with regard to valences (positive/negative): Affect is concerned with positive or negative emotions, whereas Judgment addresses behaviors that we criticize or praise, and Appreciation reflects whether objects and

events are either good or bad and complex or simple. In this connection, the following research question was developed:

RQ2a. What were the distributions of the attitude dimensions (Affect/Judgment/Appreciation) and valences (positive/ negative) in the attitudinal posts?

We then analyzed the attitudes in terms of how they were expressed (RQ2b). Martin and White (2005) distinguished between inscription and invocation. Inscription refers to the direct realization of attitudes through the use of attitudinal lexes such as 'pleased', 'brave', and 'important'. In contrast, an attitude can also be invoked without any explicit attitude markers; rather, the attitude is elicited implicitly by describing a situation or an event. It is also possible to co-construct an attitude with both inscription and invocation. Thus, the next research question was proposed as follows:

RQ2b. How were attitudes expressed in terms of inscription and invocation?

Affect, Judgment, and Appreciation are broad dimensions that can be analyzed a step further in delicacy. Affect can be further analyzed in terms of emotions such as admiration, satisfaction, anxiety, and sympathy, whereas Judgment and Appreciation can be explored in terms of different values. On the one hand, Judgment values of behaviors are understood in terms of capacity (e.g., competent/incompetent), tenacity (e.g., resolute/reckless), and morality (e.g., kind/cruel). On the other hand, Appreciation values of objects/events can be examined in terms of their impact (e.g., harmful/beneficial), complexity (e.g., complex/easy), and worth (e.g., useful/useless). Furthermore, attitudes are often construed as reactions to some specific triggers (Martin and White, 2005). For example, the emotion of sympathy (Affect) is a feeling directed at other people who are suffering. Following Martin and White (2005:72), we refer to these triggers of attitudes as "the appraised". Thus, RQ2c was formulated as follows:

RQ2c. What were the emotions/values and who were the appraised?

Shifting the perspective from the sender to the receiver, we also studied the association between *People's Daily*'s attitudinal posts and social media users' engagement. We consider such an investigation essential because ultimately, the goals of health crisis communication are to raise public awareness, foster support and the willingness to collaboration in the containment of COVID-19. Following extant research, we investigated the level of public engagement in terms of 'likes', 'shares', and 'comments' on social media (e.g., Ngai et al., 2020; Kang, 2014; Park et al., 2016; Yuki, 2015). In this study, we focused first on the potential effect of different attitude dimensions, i.e., Affect, Judgment, and Appreciation on public engagement, as this could shed light on the dimension that was the most effective in eliciting public engagement. Moreover, we also explored the effect of different valences on public engagement during the health crisis, which is characteristic of negative feelings (Ho et al., 2020). By doing so, we aimed to reveal the impact of congruent attitudes (negative valence) and incongruent attitudes (positive valence). We believe that such understandings can offer important insights for designing and deploying attitudinal messages to engage public in future health crisis situations. The last research question was proposed as follows:

RQ3. Were the different uses of the attitude dimensions (Affect/Judgment/Appreciation) and valences (positive/negative) associated with public engagement?

4. METHOD

4.1. Research design

This study employed a three-stage mixed method approach incorporating content analysis (including quantitative and qualitative content analyses) and textual analysis. A quantitative content analysis, which was employed in both stages one and two in this study, is a unobtrusive method that allows researchers to "assess words, phrases, or in-text relationships" (Boettger and Palmer, 2010:346) in media messages (Allen, 2017; Bock et al., 2011) in a scientific and systematic manner (Bock et al., 2011). This analytic method can produce generalizable predictions (Krippendorff, 2004) and "make conclusions about their presence" (Boettger and Palmer, 2010:346–357). Specifically, in a quantitative content analysis, predefined coding categories that are mutually exclusive are employed, and different raters are independently involved in the coding process (Boettger and Palmer, 2010). The generalizability of the results of such an analysis could then be tested using inferential statistics (Boettger and Palmer, 2010). In stage one, a quantitative

content analysis was conducted to reveal the presence of attitudes in *People's Daily*'s COVID-19 communication using the Attitude system in the Appraisal Framework. Then, we performed a statistical analysis to confirm the association between posts embedded with attitude resources and public engagement (RQ1). Next, we employed quantitative content analysis to reveal the distributions of the attitude dimensions (Affect/Judgment/Appreciation) and their valences (positive/negative) (RQ2a) in the attitudinal posts identified in the first stage using the Attitude system. Regarding inscribed and invoked attitudes (RQ2b), considering that an attitude may be co-constructed by both inscription and invocation rather than solely by either of the two, instead of conducting a quantitative content analysis, we conducted a qualitative content analysis as this approach allows a single unit to be coded under multiple categories (Boettger and Palmer, 2010). A qualitative content analysis was also preferred for the examination of emotions of Affect, values of Judgment and Appreciation, and the appraised (RQ2c) as a predefined framework or specific items for coding are lacking. The researchers were required to scrutinize and interpret the text (Boettger and Palmer, 2010) to identify the related emotions, values, and the appraised. Categories were established and refined on an emergent and iterative basis (Boettger and Palmer, 2010). Given that such qualitative analyses do not employ multiple raters and allow double-coding, inferential statistics should be avoided as they may result in false inferences (Boettger and Palmer, 2010). Textual analysis was also introduced in the second stage to provide an in-depth elaboration of the use of Affect, Judgment, and Appreciation. In the third stage, we performed an inferential statistical analysis to examine the effect of Affect, Judgment, and Appreciation and their valences on different levels of public engagement (RQ3).

4.2. Data collection

With a circulation of three million, *People's Daily*, a state-owned mainstream media outlet, is the most influential newspaper in China and is ranked as one of the world's top 10 newspapers (People.com, n.d.). With nearly 130 million followers, *People's Daily* is the most followed and visited news media account on Sina Weibo. Therefore, we chose *People's Daily*'s Sina Weibo account for data collection.

First, via the Weibo account of *People's Daily,* we captured all posts and their corresponding public responses (i.e., the number of 'likes', 'shares', and 'comments') from 20th January to 11st March 2020. This period began when China activated nationwide public health emergency responses to contain COVID-19 (SCIO, 2020a, 2020b) and ended on the day the World Health Organization (2020a) declared the COVID-19 outbreak a pandemic. Subsequently, all online posts related to COVID-19 and the corresponding public responses were manually collected. In total, 3,281 posts were gathered.

4.3. Sample size and collection

We employed the sample size calculator developed by the Australian Statistics Bureau to estimate a sample size of 400 posts (confidence level of 95%, a confidence interval of 0.05, and standard error of 0.02) to represent the target population for statistical analysis. Next, we used an integer randomizer to randomly generate 400 integers. Subsequently, we retrieved the 400 corresponding posts and their public responses (i.e., the number of 'likes', 'shares', and 'comments') from the database with 3,281 posts to create a corpus for content and textual analyses.

4.4. Coding procedure and scheme

We drew insights from the Attitude system of the Appraisal Framework to develop the coding scheme for our investigation of the use of attitude resources in *People's Daily*'s COVID-19 communication. In particular, quantitative content analysis was performed on the coding of the attitudinal posts (RQ1), the use of Affect, Judgment, and Appreciation, and their valences (RQ2a). To ensure the production of generalizable predictions (Krippendorff, 2004), double coding was not allowed.

For RQ1, we first examined the presence of attitude resources in *People's Daily*'s COVID-19 communication. We coded the presence of attitude resources on a post basis. Posts with the presence of attitude resources (Affect/Judgment/Appreciation) were coded as 1) attitudinal posts, and posts without attitude resources were coded as 2) non-attitudinal posts. Then, we performed a statistical analysis to compare the impact of the attitudinal posts and non-attitudinal posts on public engagement.

Regarding RQ2a, we coded the use of the different attitude dimensions and valences in the attitudinal posts. In defining the unit of analysis, we first considered the construct of 'clause'. Compared with the well-developed status of 'clause' in English grammar, clauses are not traditionally considered units in the rank scale of Chinese grammar, and the term has been less well defined (He and Zhong, 2017). Studies have revealed an ongoing debate regarding the operational definitions of the concept in Chinese grammar (e.g., Guo, 2013; He and Zhong, 2017; Song et al., 2017). For example,

some scholars proposed defining clauses as an extension of verbal groups following English grammar (Guo and He, 2012), but were criticized for overlooking the fact that Chinese predicators can be filled by a range of elements in addition to verbal groups (e.g., adjectives) (He and Zhong, 2017). Others suggested that the presence of intonation could be taken as a key criterion in identifying Chinese clauses (Chu and Wang, 2009), but this was also considered problematic due to the subjective nature of determining the presence or absence of intonation (Song et al., 2017). Due to the indeterminacies in identifying clause boundaries in Chinese, we decided to use sentences as the unit for this analysis. A sentence is considered a meaningful unit in a content analysis of written documents (Krippendorff, 2004), although sentences are only considered as a written textual unit rather than a grammatical unit in systemic functional grammar (Halliday and Matthiessen, 2014). Specifically, we coded the presence of Affect, Judgment, and Appreciation based on their dominance on a sentence basis. In the case where more than one attitude dimensions appeared in the same sentence, we analyzed the attitudes in the text to determine which dimension was foregrounded. Example (1) serves as a case in point. The recounting of the behaviors of soldiers (who 'guard lives, guard hopes, guard the hustle and bustle of life') elicits Judgment toward their attribute, whereas the lexical choice of 放心 'assured' at the end of the sentence indicates an emotion (Affect). Considering that the verb 守护 'guard' that represents the soldiers' behavior is rendered with repetitions, the elicited attitude (i.e., Judgment) is further amplified (cf., Martin and White, 2005:144); therefore, we considered Judgment the dominant attitude exhibited in this sentence.

(1) *(人民子弟兵) 守护生命, 守护希望, 守护那熙熙攘攘的烟火气, 有你们在, 我们放心!* '(PLA soldiers) guard lives, guard hopes, guard the hustle and bustle of life, you are here, we are assured!' (An excerpt from the *People*'*s Daily*'s post, 20th January 2020)

For each identified case of Affect, Judgment, and Appreciation, we also coded its valence (positive/negative) on a sentence basis. Similar to how we determined the dominance of Affect, Judgment, and Appreciation in a sentence, when both positive and negative valences were identified in the same sentence, we determined the dominant valence by closely examining the neighboring words and expressions. For example, although negative Affect is indicated by 心疼 'heart ache' in Example (2), it is the positive Affect 敬佩 'admire' that has been scaled up in its intensity because it is adverbially modified by 更 'more'; therefore, positive valence is dominant in this particular sentence.

(2) *他们疲惫的样子, 令人心疼, 更令人敬佩!* 'Their tired look makes our heart ache, but it makes us admire them more!' (An excerpt from the *People*'*s Daily*'s post, 20th January 2020)

As for inscription and invocation (RQ2b), for each identified attitude, we further analyzed how the attitude was realized with linguistic resources. An attitude expressed explicitly via an attitudinal lexis (e.g., 欣慰 'pleased', 勇敢 'brave', and 重要 'important') was coded as a case of 'inscription'. In contrast, an attitude expressed with indirect realization, such as by presenting an event or a situation without explicit markers, was included as 'invocation'. For example, from the recounting of 'he reunited with his family', positive Affect can be inferred, and this Affect could therefore be counted as being invoked rather than inscribed. Finally, the cases in which both inscription and invocation interact with each other to express an attitude (e.g., he is pleased that he reunited with his family) were categorized under 'co-occurrence'.

As mentioned, further coding of the attitudes in terms of emotions, values, and the appraised did not begin with fixed categorizes (R2c). Instead, we allowed the coding categories to emerge based on iterative reading and refinements.

4.5. Interrater reliability

The coding was performed by the first author, the primary coder. For the quantitative content analysis regarding RQ1 and RQ2a, the coding of the attitude dimensions and valences was conducted by the first author and a second coder independently. The second coder is well trained and has a postgraduate communication degree. To ensure interrater reliability in the coding of attitude resources, the coder was repeatedly trained on the coding scheme. All disagreements between the author/first coder and the second coder were discussed. The measure of interrater reliability was based on the co-coding of 80 posts from the data pool (20% of the total number of posts sampled) (Boettger and Palmer, 2010). For all categories, the average agreement was 95%, and the average Cohen's Kappa was greater than 0.8, suggesting a strong agreement (Hallgren, 2012). See the Appendix for the interrater reliability results of the coding of various dimensions of attitude resources.

4.6. Statistical analyses

Since the use of a quantitative content analysis allows the researcher to produce generalizable predictions (Krippendorff, 2004) in RQ1, we employed one-way ANOVA in SPSS to reveal the impact of attitudinal and non-attitudinal posts on different levels of public engagement. For RQ2, both quantitative and qualitative content analyses were employed, and we used descriptive statistics to report our findings.

Regarding the impact of the attitude dimensions and valences on public engagement (RQ3), we performed Poisson Regression, a count regression model (Herbison et al., 2015) in SPSS to investigate the multivariate relationships (Chau et al., 2018) between Affect, Judgment, and Appreciation (coded data generated by the quantitative content analysis) and public responses in terms of the count number of 'likes', 'shares', and 'comments' (dependent variables) and between the two attitude valences (coded data generated by the quantitative content analysis) and public responses in terms of the count number of 'likes', 'shares', and 'comments' (dependent variables). We used SPSS to examine whether the assumptions of Poisson Regression are met. When there was a violation of the assumptions, such as the overdispersion of outcome variables, which is expected in the real-world dataset (Sroka and Nagaraja, 2018), we replaced Poisson Regression with Negative Binomial Regression (NB2) (Herbison et al., 2015) to improve the Good-ness of Fit, particularly Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC). NB2 is effective in fitting various types of data seen in public health research (Gurland, 1959), and "the negative binomial model is a more general model compared with the Poisson regression model that relaxes the strong assumption that the underly-ing rate of the outcome is the same for each included participant" (Herbison et al., 2015:7).

5. FINDINGS

5.1. Association between the attitudinal posts and public engagement

For RQ1, we found that among the 400 randomly sampled posts, 188 (47%) contained attitudinal meanings of Affect, Judgment, and Appreciation, whereas slightly more than half of the posts (n = 212, 53%) were non-attitudinal posts. One-way ANOVA tests were run on public response indicators, i.e., the number of 'likes', 'shares', and 'comments', to determine whether there were any significant differences between attitudinal posts and non-attitudinal posts. Although the presence or absence of attitudes did not show significant differences in the number of 'likes' and 'com-ments' generated, our results showed that the mean number of 'shares' generated by the attitudinal posts (9080.5 ± 4 2939.5) was significantly higher than those generated by the non-attitudinal posts (2292.2 ± 6457.2), F (1,398) = 5.168, p = .033.

5.2. Different uses of the attitude dimensions and valences

RQ2a first queried the different uses of the attitude dimensions, i.e., Affect, Judgment, and Appreciation, in *People's Daily's* communication during COVID-19 outbreak. Our findings indicated that in the 188 attitudinal posts, which con-tained a total of 673 sentences, 545 sentences contained attitude resources. Further examination on the use of Affect, Judgment, and Appreciation indicated that over half of these sentences (n = 328, 60.2%) belonged to the Judgment dimension, evaluating behaviors in the COVID-19 crisis (See Table 1). 184 sentences (33.8%) were categorized into the Affect dimension, manifested as emotional reactions to people/agents and their behaviors. The Appreciation dimen-sion occupied the smallest proportion (6.0%), with only 33 sentences evaluating objects/events. Furthermore, regarding the attitude valences, the overall distribution shown in Table 1 illustrated a clear predominance of positivity (n = 456, 83.7%), a tendency consistent among all three attitude dimensions.

Table 1
Overall distribution of attitudes by dimension, valence, and expression.

	Positive			Negative			Total
	Inscription	Invocation	Co-occurrence	Inscription	Invocation	Co-occurrence	
Affect	76	62	21	5	18	2	184 (33.8%)
Judgment	58	172	43	15	21	19	328 (60.2%)
Appreciation	17	4	3	3	4	2	33 (6.0%)
Subtotal	151 (27.7%)	238 (43.7%)	67 (12.3%)	23 (4.2%)	43 (7.9%)	23 (4.2%)	
Total	456 (83.7%)			89 (16.3%)			545 (100%)

5.3. Overall distribution of attitude expression

In terms of expression, approximately half (n = 281, 51.6%) of the attitudes studied were constructed without any clear attitudinal lexes, i.e., solely through invocation (Table 1). In these cases, rather than directly telling the audience how to feel, the messages elicited attitudes implicitly, such as by representing events or people's behaviors and actions. Such implicitness is in fact a preferred choice in news reporting as an attempt to reduce attitudinal responsibility and maintain objectivity (Feng, 2017; Martin and White, 2005). Nevertheless, as indicated by the other half of the attitudinal messages (n = 264, 48.4%), *People's Daily* did not always shy away from being explicit in expressing attitude. In these cases, inscription was used to represent an attitude either by itself (n = 174, 31.9%) or in co-occurrence with invocation (n = 90, 16.5%). As the patterns of expression vary across Affect, Judgment, and Appreciation, a more detailed account of each dimension is provided in the next three subsections in which we discuss emotions/values and the appraised (RQ2c).

5.4. Affect resources exhibited in the attitudinal posts

Our results in Table 1 showed that the Affect dimension was instilled with a remarkable sense of positivity. Of the 184 sentences of Affect, positive valence was recorded in 159 cases (86.4%) and included five main emotions: 'assurance', 'satisfaction', 'admiration', 'hope', and 'gratitude'. In contrast, present only in 25 sentences (13.6%), negative Affect primarily manifested as 'sympathy', with only 6 sentences of 'anxiety'. In terms of expression (Table 1), a roughly even split was observed between inscription (n = 81, 44.0%) and invocation (n = 80, 43.5%), with the remaining cases (n = 23, 12.5%) co-constructed by both. In this way, *People's Daily* presented emotions by maintaining a balance between direct and indirect realization.

As mentioned earlier, Affect is the negative or positive emotion reacting to a specific trigger (the appraised). In our analysis of the appraised, we found two broad categories, namely, behaviors and people/agents, at which Affect was directed. As shown in Table 2, the largest proportion of Affect (n = 114, 61.9%) reacted to crisis-relief behaviors during the COVID-19 pandemic. Remarkably, the Affect elicited by such behaviors was overwhelmingly cast in a positive light and expressed in the emotions of 'assurance' (n = 45), 'satisfaction' (n = 37), and 'hope' (n = 29). 'Assurance' refers to the feeling of security and control over the current crisis situation often in response to reduced uncertainty and increased controllability. 'Satisfaction' is the feeling of achievement in relation to the progress made either in the medical treatment of COVID-19 victims or the containment of viral transmission. 'Hope' (n = 29) is the positive inclination and optimism toward the promising outlook of resolving the COVID-19 crisis.

In the remaining 70 sentences (38.1%) using Affect, people/agents involved in COVID-19 were appraised. Specifically, four emotions of Affect, i.e., 'admiration', 'gratitude', 'sympathy', and 'anxiety', were directed at three groups of people (i.e., frontliners, patients, and publics) and China's international counterparts.Most notably, the Affect toward frontliners (n = 56, 30.4%) emerged as a central theme, with 'admiration' (n = 32) being the dominant emotion. Here, 'admiration' is a respectful feeling directed at not only health care workers but also PLA soldiers, construction workers, and police officers, praising them for contributing admirably at the forefront. The second most frequent type of Affect toward frontliners was 'sympathy' (n = 16), which is negative in valence, as it involves feelings of empathy and sadness toward frontliners' plight brought on by stress, high risks, and overwork as they attempt to cope with the pandemic. 'Gratitude' was also expressed as the dominant emotion in seven sentences, thanking frontliners as they worked to ensure the well-being of patients and publics in general. In the remaining 7.7% Affect, 'gratitude', 'admiration', 'sympathy', and

Table 2
Valence, emotions and the appraised in the posts using Affect resources.

Valence	Emotions	The appraised					Total
		Crisis-relief behaviors	Frontliners	International counterparts	Patients	Publics	
Positive	assurance	45	0	0	0	0	45 (24.4%)
	satisfaction	37	0	0	0	0	37 (20.1%)
	admiration	0	32	0	1	1	34 (18.5%)
	hope	29	0	0	0	0	29 (15.8%)
	gratitude	0	7	3	2	2	14 (7.6%)
Negative	sympathy	0	16	2	1	0	19 (10.3%)
	anxiety	3	1	1	0	1	6 (3.3%)
	Total	114 (61.9%)	56 (30.4%)	6 (3.3%)	4 (2.2%)	4 (2.2%)	184 (100%)

'anxiety' appraised people/agents other than frontliners, i.e., international counterparts (n = 6, 3.3%), patients (n = 4, 2.2%), and publics (n = 4, 2.2%). Seven sentences of gratitude were expressed to thank China's international counterparts (e.g., Japan and the UK) for their support, COVID-19 survivors for donating their plasma, and members of publics for volunteering to help. Negative Affect, namely, 'sympathy' and 'anxiety', was also used to express empathy, sadness, and worry mainly over the physical and emotional sufferings of COVID-19 victims and the increasingly grim challenge of COVID-19 facing other countries.

People's Daily often directly inscribed such emotions in sentences using attitudinal lexes (n = 81, 44.0%), such as 期待 'look forward', 致敬 'pay respect', and 感谢 'thank'. Many of such lexes were verbs used at the outset of a sentence, and the subject was very often omitted (e.g., 期待更多好消息 'look forward to more good news'). In this way, the emoter of the Affect process was unspecified and remained open and inclusive; thus, the audience could be involved in the feeling state. In contrast, the explicit use of attitudinal lexes was absent in 80 cases (43.5%) of Affect in which emotions were solely represented by invocation, as illustrated in Example (3). In addition to the exclusive use of either inscription or invocation, *People's Daily* also paired both within the same sentence to represent Affect (n = 23, 12.0%). The positive emotion in Example (4) was dually inscribed with assurance expressions (i.e., 安定人心 'calm hearts' and 温暖人心 'warm hearts') and invoked by recounting an emotion-eliciting situation, i.e., the bending curve of the pandemic, in the voice of an expert as an explanation to where the assuring feeling came from.

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(3) 作为确诊病例的产妇陈女士，剖宫产2天后终于和隔离的宝宝'视频'团聚。'Ms. Chen, who tested positive during pregnancy, finally reunited with her baby in quarantine via video after her cesarean delivery two days ago.' (An excerpt from the *People's Daily*'s post, 8th February 2020)

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(4) '疫情1周或10天左右达到高峰'，钟南山院士的这个判断，安定人心也温暖人心。 '"The epidemic is expected to reach its peak in about a week or 10 days." This prediction of the Academician Zhong Nanshan calmed the hearts of the people and warmed them.' (An excerpt from the *People's Daily*'s post, 28th January 2020)

5.5. Judgment resources exhibited in the attitudinal posts

As shown in Table 1, there were 328 cases of Judgment. Like the pattern observed for Affect, the Judgment dimension was also entrenched with positive valence (n = 273, 83.2%). The values expressed in positive Judgment were mainly 'competent/resolute' (n = 132, 40.2%) and 'moral' (n = 141, 43.0%). Negative Judgment (n = 55, 16.8%) was classified as 'incompetent/reckless' (n = 13, 4.0%) and 'immoral' (n = 42, 12.8%). In terms of the appraised, we identified eight main groups, including frontliners, government institutions, publics, patients, international counterparts, China as a nation, non-governmental organizations, and individual Chinese cities (e.g., Wuhan) (see Table 3). Regarding expression, in contrast to the even distribution of inscription and invocation recorded in Affect, Judgment was mostly represented through invocation (n = 193, 58.8%).

The most salient feature was that frontliners (n = 103), the group that was the most frequently appraised, were evaluated entirely positively as having not only outstanding expertise and courage ('competent/resolute', n = 55) but also high moral standards ('moral', n = 48). The second most positively appraised were government bodies and their officials (n = 65), both were positively assessed mainly in terms of their effective measures and commitment to containing the COVID-19 pandemic ('competent/resolute', n = 48). Their morality was also praised in 17 sentences, highlighting their humanitarian support to publics. Positive Judgment was directed at publics (n = 55) in terms of self-protection measures and cooperative actions. Sixteen sentences were found to contain positive Judgment of China as a nation, highlighting perseverance, determination, and solidarity as the collective spirit shared by Chinese people both in the past and during the current pandemic. The remaining 34 sentences were found to contain positive Judgment which appraised four other groups, i.e., patients (n = 15), international counterparts (n = 8), non-governmental organizations (n = 5), and individual Chinese cities (n = 6), praising how they fought tenaciously in the pandemic and lent a helping hand to others in need. Although much smaller in proportion, 55 (16.8%) cases of negative Judgment criticized people's behaviors. For example, 'incompetent/reckless' referred to actions assessed to be impotent, unsuccessful, and careless, whereas Judgment of 'immoral' behaviors included those that were unfair, cruel, dishonest, selfish, and malicious. Among the sentences of negative Judgment, 24 pointed to individuals (19 in the 'publics' category; five in the 'patients' category) who acted recklessly (e.g., not wearing masks) or behaved immorally (e.g., spreading rumors or not being honest about the travel history to high-risk areas); 20 sentences singled out individual government officials (n = 15) and non-governmental organizations such as local charity (n = 5), criticizing their incompetency and corruption. As for international counter-

Table 3
Valence, values and the appraised of the posts using Judgment resources.

Valence	Values	The appraised								Total
		Front liners	Government Institutions	Publics	Patients	International counterparts	China as a nation	Non-governmental organizations	Individual Chinese cities	
Positive	competent/ resolute	55	48	9	8	0	6	1	5	132 (40.2%)
	moral	48	17	46	7	8	10	4	1	141 (43.0%)
Negative	incompetent/ reckless	0	8	5	0	0	0	0	0	13 (4.0%)
	immoral	0	7	14	5	11	0	5	0	42 (12.8%)
Total		103 (31.4%)	80 (24.4%)	74 (22.6%)	20 (6.1%)	19 (5.8%)	16 (4.9%)	10 (3.0%)	6 (1.8%)	328 (100%)

parts, all 11 sentences involving negative Judgment placed the US under evaluation, condemning its politicians and media for making unfair allegations regarding China's handling of the COVID-19 crisis.

In terms of expression, Judgment was mainly invoked by recounting what behaviors and actions were carried out without attitudinal lexes (n = 193, 58.8%). In such cases, attitudes were elicited as *People's Daily* offered factual descriptions of how people behaved during the COVID-19 pandemic without explicitly appraising such behaviors as either good or bad and appropriate or inappropriate. In Example (5), the kindness of a Japanese city was highlighted not with any Judgment lexes but through presenting the actual actions it carried out in helping China. In addition to invocation, Judgment was also inscribed (n = 73, 22.3%). First, positive attitudinal lexes such as 坚决 'resolute', 成功 'successful', and 善良 'kind' were used to directly evaluate people's actions. Second, directives were also considered inscribed Judgment because they directly indicate authorial approval/disapproval toward a behavior similar to lexicalized Judgment (Martin and White, 2005:55, 181). Thus, such directives could inscribe Judgment toward actions to be carried out in the future through modulations of obligations (e.g., 要 'need', 必须 'must', and 不应 'shouldn't') or direct commands (e.g., 勤洗手 'wash hands frequently'). Finally, Judgment was expressed by patterning both inscription and invocation (n = 62, 18.9%). In Example (6), negative Judgment was both inscribed (恶劣 'abominable') and invoked (information regarding the actions carried out).

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(5) 据日本媒体报道, 日本大分市27日将防灾仓库中储备的三万只口罩捐给武汉, 纸箱上还用中文写着"武汉加油!"
'According to the report of Japanese media, on the 27th Japan's Oita city took 30,000 face masks from its disaster prevention stockpiling and donated them to Wuhan and they wrote "Wuhan, keep fighting!" in Chinese on the cardboard boxes of donated supplies.' (An excerpt from the *People's Daily*'s post, 28th January 2020)

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(6) 特别恶劣的是, 苟某有意隐瞒其子与其一同从武汉返宁的事实, 其子也多次在外活动, 并密切接触人群。 'What is particularly abominable is that Gou intentionally hid his travel history to Wuhan with his son before returning to Xining; his son also went out and was in close contact with many people.' (An excerpt from the *People's Daily*'s post, 1st February 2020)

5.6. Appreciation resources exhibited in the attitudinal posts

Occupying merely 6% of all attitudes, the Appreciation dimension recorded a more positive valence (n = 24, 72.7%) than negative valence (n = 9, 27.3%), similar to both Affect and Judgment. Values of Appreciation were classified into 'effective/important', 'controllable', 'useful', and 'complex/challenging', with only the last classification being negative in its valence. In terms of expression, inscriptions and invocation were used either alone or in conjunction to construct Appreciation in the sentences.

The appraised included China's crisis management, the COVID-19 pandemic, and self-efficacy information (e.g., knowledge about the virus and information regarding how individuals can protect themselves) (see Table 4). Sixteen (48.5%) sentences of Appreciation evaluated China's crisis management as both effective and important in containing viral transmission and curing patients. COVID-19 was appraised in 14 (42.4%) sentences referencing the pandemic: while posing formidable challenges to the nation and its people (n = 9), the pandemic was still very much under control (n = 5). Finally, three cases (9.1%) appraised the self-efficacy information in *People's Daily*'s posts as useful and worthy of attention. Compared with the cases in which Appreciation was solely invoked (n = 8, 24.2%), inscribed Appreciation had a stronger presence either on its own (n = 20, 60%) or in co-occurrence with invocation (n = 5, 15.2%). Such an

Table 4
Valence, values and the appraised of the posts using Appreciation resources.

Valence	Values	The appraised			Total
		Crisis management	COVID-19 pandemic	Self-efficacy information	
Positive	effective/ important	16	0	0	16 (48.5%)
	controllable	0	5	0	5 (15.1%)
	useful	0	0	3	3 (9.1%)
Negative	complex/challenging	0	9	0	9 (27.3%)
	Total	16 (48.5%)	14 (42.4%)	3 (9.1%)	33 (100%)

attitude was thus often constructed with attitudinal lexes that, for example, positively evaluated the crisis management effort (e.g., 重要 'important') and self-efficacy information (e.g., 有用 'useful') or negatively assessed the pandemic (e.g., 严峻 'severe' and 复杂 'complex').

5.7. Association between the attitude dimensions and public engagement

As mentioned in Section 5.1, the attitudinal posts triggered a higher level of public engagement by generating more public responses on Weibo especially in the form of 'shares'. To answer RQ3, the following analysis explored the question further to determine whether a difference exists in the public response generated by Affect, Judgment, and Appreciation. To that end, as introduced in Section 4.6, we selected Negative Binomial Regression (NB2) to test the effect of the three attitude dimensions on the number of 'likes', 'shares' and 'comments'. The Omnibus tests indicated that the overall model was a significant improvement in fit over a null model for predicting 'likes' ($p < .0001$), 'shares' ($p < .0001$), and 'comments' ($p < .001$). Specifically, in terms of 'likes', for each additional sentence in the Judgment dimension, the Incidence Rate Ratio (IRR) indicated that 1.326 (95% CI, 1.128 to 1.560) times more 'likes' were generated, which was a statistically significant result, $p = .001$. In terms of 'shares', both Affect ($p = .007$) and Judgment ($p < .0001$) were significant and positive predictors: the IRR indicated that each sentence increase in Affect generated 1.370 (95% CI, 1.089 to 1.724) times more 'shares', whereas each sentence increase in Judgment resulted in 1.567 (95% CI, 1.359 to 1.806) times more 'shares', an impact slightly larger than that of Affect. Finally, Affect was a negative and significant predictor of 'comments', $p = .007$. The IRR indicated that for each additional sentence in Affect, the number of 'comments' was expected to decrease by a factor of 0.822 (95% CI, 0.714 to 0.947).

Based on these statistical results, it can be concluded that when compared with Affect and Appreciation, Judgment appeared to have a positive impact on public engagement, generating more public responses in terms of both 'shares' and 'likes'. The impact of Affect, however, varied among different levels of public responses. Although the use of Affect was positively linked to the number of 'shares', it seemed to be ineffective in generating 'comments'.

5.8. Association between attitude valences and public engagement

To address RQ3, we continued to run the NB2 tests to compare the impact of different valences within the same attitude dimension. For the Affect dimension, the Omnibus tests indicated that the overall model was a significant improvement in fit over a null model for predicting 'likes' ($p = .001$) and 'comments' ($p < .0001$). Although negative Affect was not a statistically significant predictor, positive Affect was significantly negatively related to the number of both 'likes' and 'comments': the IRR indicated that each additional sentence with the positive valence of Affect resulted in the number of 'likes' decreasing by a factor of 0.722 (95% CI, 0.619 to 0.842) and the number of 'comments' decreasing by a factor of 0.742 (95%, 0.655 to 0.840), both of which were significant results, $p < .0001$. For the Judgment dimension, the Omnibus tests indicated that the full model was a significant improvement in fit over a null model for predicting 'likes' ($p < .0001$), 'shares' ($p < .0001$), and 'comments' ($p < .001$). The positive valence of Judgment was a significant and positive predictor of the number of 'likes' ($p = .001$) and 'shares' ($p < .0001$). The IRR indicated that for each additional sentence with positive Judgment, 1.311 (95% CI, 1.121 to 1.532) times more 'likes' and 1.477 (95% CI, 1.274 to 1.712) times more 'shares' were generated. The negative valence of Judgment, although not a significant predictor of 'shares', was significantly positively related to both 'likes' ($p < .0001$) and 'comments' ($p < .001$). Specifically, the IRR indicated that the number of 'likes' and 'comments' increased by a factor of 1.689 (95% CI, 1.328 to 2.149) and 1.442 (95% CI, 1.183 to 1.757), respectively, with each additional sentence in negative Judgment. For Appreciation, the Omnibus test indicated that the overall model was a significant improvement in fit over a null model for predicting 'shares' ($p = .013$). The positive valence of Appreciation was negatively linked to the number of 'shares', a statistically significant result, $p = .001$. According to the IRR, each sentence increases in positive Appreciation would be expected to decrease the number of 'shares' by a factor of 0.431 (95% CI, 0.262–0.708).

These results indicated that Judgement was positively associated with public responses regardless of whether its valence was positive or negative. Specifically, positive Judgment positively predicted 'likes' and 'shares', whereas negative Judgment positively predicted 'likes' and 'comments'. In contrast, positive valence in both Affect and Appreciation was generally negatively related to public responses: positive Affect was a negative predictor of 'likes' and 'comments', and 'shares' was negatively predicted by positive Appreciation.

6. DISCUSSION

Our findings showed that *People's Daily* employed attitude resources in 47% of the 400 examined COVID-19 posts. Overall, compared with 53% of the non-attitudinal posts, these attitudinal posts had a positive impact on encouraging

public engagement, especially in terms of 'shares'. Such sharing actions on social media are especially important during a health crisis like COVID-19, as they not only signal awareness of the communicated message, but also indicate the further action adopted by social media users to proactively advocate the spread of the message. This action has the potential to help reach an even larger audience to rally support for the containment of viral transmission.

Furthermore, as a dominant dimension of the sender's attitudes, Judgment had a more consistent positive impact on public engagement than Affect and Appreciation. According to Martin and White (2005), Judgment is distinct from the other two attitude dimensions because it is an institutionalized attitude that socially assesses people's behaviors according to shared ethical values. This ethical nature perhaps helps explain the prominence of Judgment in COVID-19 communication. As Kotalik (2005:424) argued, "every discourse about health care has not only a scientific but also a moral dimension". As with all public health crises, a key challenge faced in the COVID-19 pandemic is the overwhelming health care needs confronting the limited resources available. Thus, all decisions regarding resource allocation should be evaluated based onnot only medical science but also shared ethical concerns about fairness, accountability, trustworthiness, and transparency (Thompson et al., 2006). When a crisis hits, such ethical concerns are magnified and would put the behaviors of key actors (e.g., government institutions) under intensified media scrutiny (Lee, 2009). Failure to address such concerns during health crises tends to incur heavy costs, such as the loss of public trust, lack of morale, confusion, and stigmatization (Bell et al., 2004; Bernstein and Hawryluck, 2003). Furthermore, for a highly collectivist society such as China where people are very much 'we'-conscious, such ethical concerns are placed in an even more prominent position on the level of whether people's behaviors conform to the social norm shared by the 'in groups' (Hofstede, 2001). The transgression of social norms is considered harmful to the interest of the "in groups" and is often strongly rejected. Proactively seeking to address ethical concerns, *People's Daily* employed a generous amount of Judgment resources. This effort in emphasizing Judgment paid off, as it attracted a high level of public engagement on social media. Although both valences of Judgment elicited a higher level of 'likes', an indicator of a higher awareness of the communicated message, positive Judgment and negative Judgment functioned differently in encouraging advocacy and interaction: negative Judgment stimulated more interaction by encouraging publics to voice their opinions, whereas positive Judgment played a role in generating more 'shares', suggesting a higher level of advocacy in the spreading of the desirable behaviors communicated with positive Judgment.

Next, we turn to the different uses of attitude valences and their differential impacts. The posts were overwhelmed with positive attitudes, but an interesting contradiction uncovered in our investigation of the receiver's perspective is that positive valence did not seem to be positively associated with public engagement in the Affect and Appreciation dimensions. Instead, positive valence was negatively associated with 'likes', 'shares', and 'comments'. In what follows, we discuss some possible explanations as to why so many positive attitudes were employed and why they were not effective in generating public engagement.

From the sender's perspective, the dominance of positivity contributed to an overwhelming sense of hope and optimism and portrayed frontliners, the government, and publics in a favorable light. Such dominance of positivity from the sender's end is consistent with what crisis communication scholars recommend on the ground that a greater amount of positive information should be communicated to counterbalance the overwhelming negativity during times of crisis (Covello et al., 2001). Indeed, during outbreaks such as COVID-19, publics are likely to experience a range of negative emotions, including fear, anxiety, and helplessness, as their emotional disposition (Ho et al., 2020). Negative information in news reports updated on a daily basis, such as mortality and morbidity statistics indicative of the alarming speed of viral transmission, could create further tension and increase negative feelings (Bavel et al., 2020). Such negative emotions can exert a detrimental impact on crisis management by causing anxiety, which harms people's health, and creating mental noise, which interferes with their cognitive ability to process rational information (Covello et al., 2001). To counterbalance such negativity, positive valence in all three attitude dimensions was deemed essential: positive Affect served to alleviate negative feelings by reassuring publics and keeping them hopeful; positive Judgment functioned to shape a positive ethical evaluation of key actors in crisis relief; and positive Appreciation mainly highlighted the effectiveness and importance of crisis management.

Despite these potential benefits of positive valence, however, the results of this study showed that it was less likely to arouse public responses on social media when positive valence was used in the Affect and Appreciation dimensions. We draw on two perspectives to explain this contrast.

First, negative dominance theory posits that the mental processing of negative and positive information in high-concern situations is asymmetrical: negative information tends to receive greater processing efforts than positive information (Covello et al., 2001). This theory's implications are consistent with findings from psychology that highlight people's tendency to attach greater importance to losses (negative) than to gains (positive) (Maslow, 1981). Meanwhile, negative attitudes may also generally trigger a deeper level of processing than positive attitudes, which also perhaps explains why 'comments', the type of responses that requires the most processing effort, tended to increase with the number of sentences that exhibited negative valence and decrease with those with positive valence.

The second perspective is drawn from cultural studies. According to a survey of Hofstede's dimensional model of national culture, a strong orientation shared in Chinese culture is restraint (Hofstede, 2001), which refers to people's tendency to control desires and impulses and a general feeling that it is not right to pursue mere gratification by indulging oneself (Hofstede, 2001). Therefore, it is a possibility that people in a restrained culture may identify less with positive emotions and react critically to those who indulge themselves in meeting personal desires, especially at the cost of violating social norms. For example, a post criticizing those who went out with friends for pleasure-seeking activities without wearing masks generated heavy criticism, such as the one in Example (7). Although such a pleasure-seeking activity occurred only in late February 2020 when the spread of the virus was largely contained in China, the social norms of mask-wearing and social distancing were still very much in place; therefore, violating these norms just for the sake of having fun was deemed unacceptable.

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(7) 解禁是为了复工复产, 不是为了让人扎堆出去吃喝玩乐的! 'The ban was lifted so that people can go to work and resume production, not so that they can crowd together for food and drinks!' (A comment to the *People's Daily*'s post, 23th February 2020)

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7. IMPLICATIONS, LIMITATIONS AND FURTHER STUDIES

The first important implication for future health crisis communication is that using attitude resources in the sender's discourse has an impact on engaging publics by generating more public responses. In particular, the role of attitudes in promoting 'shares' on social media merits special attention because such an action is an indicator of the awareness of the information and advocacy for it to spread. The latter is especially important in health crisis communication. These attitudes can be designed to combine a variety of emotional reactions, behavioral judgments, and object/event evaluations, appraising the crisis management effort and the people, organizations, and countries involved.

Second, addressing ethical considerations, which is key to effective health crisis management, can be achieved by embedding Judgment resources that assess behaviors based on shared community ethical values in communicated messages. Another interesting implication is that the use of negative attitudes may create an even larger impact on public responses than positive attitudes. This might be particularly true in collectivist contexts that endorse restraint, such as in China, where negative attitudes may strike a stronger chord, and violations of social norms can trigger indignation and provoke heated discussion, which, in turn, reinforces shared norms that facilitate the containment of viral transmission during a health crisis such as the COVID-19 pandemic.

Regarding the limitations of this study, the findings are confined to a relatively small sample size of 400 social media posts in total. In addition, only one of the state-owned mainstream media sources, *People's Daily*, is investigated in this study. Further studies can be conducted to test the findings with a larger sample size and to undertake a cross-comparisons with another prominent state-owned media outlet, *the China Central Television*. This will allow richer data to be obtained and further enhance the potential for generalization.

In conclusion, this study provides insights into the effectiveness of employing attitudes in crisis communication by investigating both the sender's and the receiver's perspectives. We believe that the findings of this study can contribute to the current understanding of how public engagement on social media can be enhanced through the use of attitudinal messages in health crisis situations.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

APPENDIX A. INTERRATER RELIABILITY OF THE CODING ON VARIOUS TYPES OF ATTITUDE RESOURCE

Coding items	Percent Agreement	Scott's Pi	Cohen's Kappa	Krippendorff's Alpha	N
No. of pos-Affect	92.5%	0.879	0.879	0.88	80
No. of neg-Affect	97.5%	0.846	0.847	0.848	80
No. of pos-Judgment	87.5%	0.829	0.829	0.831	80
No. of neg- Judgment	97.5%	0.917	0.917	0.918	80
No. of pos-Appreciation	95%	0.859	0.859	0.861	80
No. of neg-Appreciation	100%	1	1	1	80

References

Agostino, D., Arnaboldi, M., 2016. A measurement framework for assessing the contribution of social media to public engagement: An empirical analysis on Facebook. Public Manage. Rev. 18 (9), 1289–1307. https://doi.org/10.1080/14719037.2015.1100320.

Alexander, D.E., 2014. Social media in disaster risk reduction and crisis management. Sci. Eng. Ethics 20 (3), 717–733. https://doi.org/10.1007/s11948-013-9502-z.

Allen, M., 2017. The Sage Encyclopedia of Communication Research Methods. Sage Publications Limited, London. http://doi.org/10.4135/9781483381411.n66.

Austin, L., Liu, B.F., Jin, Y., 2012. How audiences seek out crisis information: Exploring the social-mediated crisis communication model. J. Appl. Commun. Res. 40 (2), 188–207. https://doi.org/10.1080/00909882.2012.654498.

Basch, C.H., Hillyer, G.C., Meleo-Erwin, Z., Mohlman, J., Cosgrove, A., Quinones, N., 2020. News coverage of the COVID-19 pandemic: Missed opportunities to promote health sustaining behaviors. Infection, Dis. Health 25 (3), 205–209. https://doi.org/10.1016/j.idh.2020.05.001.

Bavel, J.J.V., Baicker, K., Boggio, P.S., Capraro, V., Cichocka, A., et al., 2020. Using social and behavioural science to support COVID-19 pandemic response. Nat. Hum. Behav. 4, 460–471. https://doi.org/10.1038/s41562-020-0884-z.

Bekalu, M.A., Bigman, C.A., McCloud, R.F., Lin, L.K., Viswanath, K., 2018. The relative persuasiveness of narrative versus non-narrative health messages in public health emergency communication: Evidence from a field experiment. Prev. Med. 111, 284–290. https://doi.org/10.1016/j.ypmed.2017.11.014.

Bell, J.A., Hyland, S., DePellegrin, T., Upshur, R.E., Bernstein, M., et al., 2004. SARS and hospital priority setting: A qualitative case study and evaluation. BMC Health Services Res. 4 (1), 36. https://doi.org/10.1186/1472-6963-4-36.

Bernstein, M., Hawryluck, L., 2003. Challenging beliefs and ethical concepts: The collateral damage of SARS. Crit. Care 7 (4), 1–3. https://doi.org/10.1186/cc2336.

Bock, A., Isermann, H., Knieper, T., 2011. Quantitative content analysis of the visual. In: Margolis, E., Pauwels, L. (Eds.), The Sage Handbook of Visual Research Methods. Sage Publications Limited, London, pp. 265–282. https://doi.org/10.4135/9781446268278.

Boettger, R.K., Palmer, L.A., 2010. Quantitative content analysis: Its use in technical communication. IEEE Trans. Prof. Commun. 53 (4), 346–357. https://doi.org/10.1109/tpc.2010.2077450.

Bonsón, E., Perea, D., Bednárová, M., 2019. Twitter as a tool for citizen engagement: An empirical study of the Andalusian municipalities. Government Inform. Quart. 36 (3), 480–489. https://doi.org/10.1016/j.giq.2019.03.001.

Bruns, A., Burgess, J., Crawford, K., Shaw, F., 2012. Crisis communication on Twitter in the 2011 South East Queensland floods. ARC Centre of Excellence for Creative Industries and Innovation. https://apo.org.au/node/27948

Chau, A.M.H., Lo, E.C.M., Wong, M.C.M., Chu, C.H., 2018. Interpreting poisson regression models in dental caries studies. Caries Res. 52 (4), 339–345. https://doi.org/10.1159/000486970.

Chen, Q., Min, C., Zhang, W., Wang, G., Ma, X., et al., 2020. Unpacking the black box: How to promote citizen engagement through government social media during the COVID-19 crisis. Comput. Hum. Behav. 110,. https://doi.org/10.1016/j.chb.2020.106380 106380.

Chu, Z., Wang, W., 2009. 现代汉语小句的判断标准 [Criteria for identifying clause in modern Chinese]. J. Ningxia Univ. 31 (4), 28–35. https://doi.org/10.3969/j.issn.1001-5744.2009.04.005.

Covello, V.T., Peters, R.G., Wojtecki, J.G., Hyde, R.C., 2001. Risk communication, the West Nile virus epidemic, and bioterrorism: Responding to the commnication challenges posed by the intentional or unintentional release of a pathogen in an urban setting. J. Urban Health 78 (2), 382–391. https://doi.org/10.1093/jurban/78.2.382.

Criado, J.I., Guevara-Gómez, A., Villodre, J., 2020. Using collaborative technologies and social media to engage citizens and governments during the COVID-19 Crisis. The case of Spain. Digital Government: Res. Pract. 1 (4), 1–7. https://doi.org/10.1145/3416089.

Feng, W.D., 2017. Ideological dissonances among Chinese-language newspapers in Hong Kong: A corpus-based analysis of reports on the Occupy Central Movement. Discourse Commun. 11 (6), 549–566. https://doi.org/10.1177/1750481317726928.

Gittelman, S., Lange, V., Crawford, C.A.G., Okoro, C.A., Lieb, E., et al., 2015. A new source of data for public health surveillance: Facebook likes. J. Med. Internet Res. 17, (4). https://doi.org/10.2196/jmir.3970 e98.

Guidry, J.P., Jin, Y., Orr, C.A., Messner, M., Meganck, S., 2017. Ebola on Instagram and Twitter: How health organizations address the health crisis in their social media engagement. Public Relations Rev. 43 (3), 477–486. https://doi.org/10.1016/j.pubrev.2017.04.009.

Guo, J., 2013. 对"小句"概念的重新审视 [Reanalysis of the concept of clause]. J. Beihua Univ. 14 (4), 15–19. https://doi.org/10.3969/j.issn.1009-5101.2013.04.004.

Guo, J., He, Y., 2012. 现代汉语小句限定性衰减研究 [A study on the attenuation of finiteness of clauses in mandarin Chinese]. Appl. Linguist. 1, 144.

Guo, J., Liu, N., Wu, Y., Zhang, C., 2021. Why do citizens participate on government social media accounts during crises? A civic voluntarism perspective. Inform. Manage. 58, (1). https://doi.org/10.1016/j.im.2020.103286 103286.

Gurland, J., 1959. Some applications of the negative binomial and other contagious distributions. Am. J. Public Health Nations Health 49 (10), 1388–1399. https://doi.org/10.2105/ajph.49.10.1388.

Hallgren, K.A., 2012. Computing inter-rater reliability for observational data: An overview and tutorial. Tutorials Quantit. Methods Psychol. 8 (1), 23–24. https://doi.org/10.20982/tqmp.08.1.p023.

Halliday, M.A.K., Matthiessen, C.M.I.M., 2014. Halliday's Introduction to Functional Grammar. Routledge, London and New York.

He, W., Zhong, W., 2017. 系统功能语法视角下汉语小句的限定与非限定之分 [Finite and non-finite classification of Chinese clause within the framework of systemic functional grammar]. Foreign Lanuage Educ. 38 (5), 7–12.

Herbison, P., Robertson, M.C., McKenzie, J.E., 2015. Do alternative methods for analysing count data produce similar estimates? Implications for meta-analyses. System. Rev. 4 (1), 163. https://doi.org/10.1186/s13643-015-0144-x.

Ho, C.S., Chee, C.Y., Ho, R.C., 2020. Mental health strategies to combat the psychological impact of COVID-19 beyond paranoia and panic. Ann. Acad. Med. Singapore 49 (1), 1–3 http://www.annals.edu.sg/pdf/49VolNo3Mar2020/V49N3p155.pdf.

Ho, V., 2014. Managing rapport through evaluation in grounder–A qualitative study. J. Pragmatics 61, 63–77. https://doi.org/10.1016/j.pragma.2013.11.019.

Ho, V., 2020. Marketization attempts by universities in Hong Kong: An appraisal analysis of institutional responses to quality audit evaluations. Lingua 237, 37–50. https://doi.org/10.1016/j.lingua.2020.102811.

Hoffmann, C.R., 2018. Crooked Hillary and dumb Trump: The strategic use and effect of negative evaluations in US election campaign tweets. Internet Pragmatics 1 (1), 55–87. https://doi.org/10.1075/ip.00004.hof.

Hofstede, G., 2001. Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations. Sage publications Limited, London.

Househ, M., 2016. Communicating Ebola through social media and electronic news media outlets: A cross-sectional study. Health Inform. J. 22 (3), 470–478. https://doi.org/10.1177/1460458214568037.

Huang, Y., DiStaso, M., 2020. Responding to a health crisis on Facebook: The effects of response timing and message appeal. Public Relations Rev. 46, (3). https://doi.org/10.1016/j.pubrev.2020.101909 101909.

Jensen, A., 2009. Discourse strategies in professional e-mail negotiation: A case study. Engl. Specif. Purp. 28 (1), 4–18. https://doi.org/10.1016/j.esp.2008.10.002.

Jones, S.C., Waters, L., Holland, O., Bevins, J., Iverson, D., 2010. Developing pandemic communication strategies: Preparation without panic. J. Bus. Res. 63 (2), 126–132. https://doi.org/10.1016/j.jbusres.2009.02.009.

Kang, M., 2014. Understanding public engagement: Conceptualizing and measuring its influence on supportive behavioral intentions. J. Public Relations Res. 26 (5), 399–416. https://doi.org/10.1080/1062726x.2014.956107.

Klemm, C., 2016. Making a Drama out of a Crisis? A Multidisciplinary Study of News Media Coverage of Public Health Crises and the Role of Emotion PhD dissertation. Vrije Universiteit Amsterdam, Amsterdam.

Kotalik, J., 2005. Preparing for an influenza pandemic: Ethical issues. Bioethics 19 (4), 422–431. https://doi.org/10.1111/j.1467-8519.2005.00453.x.

Krippendorff, K., 2004. Content Analysis: An Introduction to Its Methodology. Sage Publications Limited, London.

Landi, S., Costantini, A., Fasan, M., Bonazzi, M., 2021. Public engagement and dialogic accounting through social media during COVID-19 crisis: A missed opportunity? Account., Auditing Accountability J.. https://doi.org/10.1108/AAAJ-08-2020-4884.

Lederer, E.M., 2020. UN chief says COVID-19 is worst crisis since World War II. AbcNews. https://abcnews.go.com/US/wireStory/chief-covid-19-worst-crisis-world-war-ii-69905340 (Accessed 21 August 2020)

Lee, K., 2009. How the Hong Kong government lost the public trust in SARS: Insights for government communication in a health crisis. Public Relations Rev. 35 (1), 74–76. https://doi.org/10.1016/j.pubrev.2008.06.003.

Liu, B.F., Austin, L., Lee, Y.I., Jin, Y., Kim, S., 2020. Telling the tale: The role of narratives in helping people respond to crises. J. Appl. Commun. Res. 48 (3), 328–349. https://doi.org/10.1080/00909882.2020.1756377.

Liu, B., Kim, S., 2011. How organizations framed the 2009 H1N1 pandemic via social and traditional media: Implications for US health communicators. Public Relations Rev. 37 (3), 233–244. https://doi.org/10.1016/j.pubrev.2011.03.005.

Martin, J.R., White, P.R., 2005. The Langauge of Evaluation. Palgrave Macmillan, London.

Maslow, A.H., 1981. Motivation and Personality. Prabhat Prakashan, New Delhi.

Ngai, C.S.B., Jin, Yin, 2016. Examining the effectiveness of crisis communication strategies on Sina Weibo in relation to the acceptance of the strategies by the Chinese publics. J. Bus. Tech. Commun. 30(4), 451–494. https://doi.org/10.1177%2F1050651916651907

Ngai, C.S.B., Singh, R.G., Lu, W., Koon, A.C., 2020. Grappling with the COVID-19 health crisis: Analysis of communication strategies and their effects on public engagement on social media. J. Med. Internet Res.. https://doi.org/10.2196/21360.

Palen, L., Starbird, K., Vieweg, S., Hughes, A., 2010. Twitter-based information distribution during the 2009 Red River Valley flood threat. Bull. Am. Soc. Inform. Sci. Technol. 36 (5), 13–17. https://doi.org/10.1002/bult.2010.1720360505.

Park, H., Reber, B.H., Chon, M.-G., 2016. Tweeting as health communication: Health organizations' use of Twitter for health promotion and public engagement. J. Health Commun. 21 (2), 188–198. https://doi.org/10.1080/10810730.2015.1058435.

People.com., n.d. 报社简介 [Introduction to People's Daily]. People's Daily. http://www.people.com.cn/GB/50142/104580/ (Accessed 21 August 2020)

Procopio, C.H., Procopio, S.T., 2007. Do you know what it means to miss New Orleans? Internet communication, geographic community, and social capital in crisis. J. Appl. Commun. Res. 35 (1), 67–87. https://doi.org/10.1080/00909880601065722.

Reynolds, B., Seeger, M.W., 2005. Crisis and emergency risk communication as an integrative model. J. Health Commun. 10 (1), 43–55. https://doi.org/10.1080/10810730590904571.

Rowe, G., Frewer, L.J., 2005. A typology of public engagement mechanisms. Sci. Technol. Human Values 30 (2), 251–290. https://doi.org/10.1177/0162243904271724.

SCIO, 2020a. Xi orders resolute efforts to curb virus spread. The State Council Information Office of the People's Republic of China. http://english.scio.gov.cn/topnews/2020-01/21/content_75635065.htm (Accessed 21 August 2020)

SCIO, 2020b. China to curb spread of new coronavirus-related pneumonia. The State Council Information Office of the People's Republic of China. http://english.scio.gov.cn/topnews/2020-01/21/content_75635465.htm (Accessed 21 August 2020)

SCIO, 2020c. Fighting Covid-19: China in action. The State Council Information Office of the People's Republic of China. http://www.scio.gov.cn/zfbps/ndhf/42312/Document/1682142/1682142.htm (Accessed 21 August 2020)

Shih, T.J., Wijaya, R., Brossard, D., 2008. Media coverage of public health epidemics: Linking framing and issue attention cycle toward an integrated theory of print news coverage of epidemics. Mass Commun. Soc. 11 (2), 141–160. https://doi.org/10.1080/15205430701668121.

Song, R., Ge, S., Shang, Y., Lu, D., 2017. 面向文本信息处理的汉语句子和小句 [Chinese sentence and clause for text information processing]. J. Chin. Inform. Process. 31 (2), 18–35.

Sroka, C.J., Nagaraja, H.N., 2018. Odds ratios from logistic, geometric, poisson, and negative binomial regression models. BMC Med. Res. Method. 18 (1), 112. https://doi.org/10.1186/s12874-018-0568-9.

Stephens, K.K., Malone, P.C., 2009. If the organizations won't give us information...: The use of multiple new media for crisis technical translation and dialogue. J. Public Relations Res. 21 (2), 229–239. https://doi.org/10.1080/10627260802557605.

Thompson, A.K., Faith, K., Gibson, J.L., Upshur, R.E.G., 2006. Pandemic influenza preparedness: An ethical framework to guide decision-making. BMC Medical Ethics 7 (1), 12. https://doi.org/10.1186/1472-6939-7-12.

Vera-Burgos, C.M., Padgett, D.R.G., 2020. Using Twitter for crisis communications in a natural disaster: Hurricane Harvey. Heliyon 6, (9). https://doi.org/10.1016/j.heliyon.2020.e04804 e04804.

World Health Organization, 2005. Effective Media Communication during Public Health Emergencies: A WHO Handbook (No. WHO/CDS2005.31). https://www.who.int/csr/resources/publications/WHO_CDS_2005_31/en/ (Accessed 21 August 2020)

World Health Organization, 2009. Pandemic Influenza Preparedness and Response (No. 9789241547680). https://www.who.int/publications/i/item/9789241547680 (Accessed 21 August 2020)

World Health Organization, 2018. A Checklist for Pandemic Influenza Risk and Impact Management: Building Capacity for Pandemic Response (No. 978-92-4-151362-3). https://www.who.int/publications/i/item/9789241513623 (Accessed 21 August 2020)

World Health Organization, 2020a. Archived: WHO Timeline - COVID-19. https://www.who.int/news-room/detail/27-04-2020-who-timeline—covid-19 (Accessed 21 August 2020)

World Health Organization, 2020b. Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf (Accessed 21 August 2020)

World Health Organization, n.d. WHO Coronavirus (COVID-19) Dashboard. https://covid19.who.int/ (Accessed 19 June 2021)

Yuki, T., 2015. What makes brands' social content shareable on Facebook? An analysis that demonstrates the power of online trust and attention. J. Advertising Res. 55 (4), 458–470. https://doi.org/10.2501/jar-2015-026.

Zhang, C., Fan, C., Yao, W., Hu, X., Mostafavi, A., 2019. Social media for intelligent public information and warning in disasters: An interdisciplinary review. Int. J. Inf. Manage. 49, 190–207. https://doi.org/10.1016/j.ijinfomgt.2019.04.004.

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