Engagement of Government Social Media on Facebook during the COVID-19 Pandemic in Macao: Content Analysis

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Abstract

Background: Government social media is widely used for providing updates to and engaging with the public in the COVID-19 pandemic, and Facebook is one of the popular social media platforms used by governments. However, there is only a scant of research focusing on these two areas. As the global pandemic has been easing in some places, users also react differently on social media to the messages from governments, which prompts more research in the post-pandemic time.

Objective: This study aims to understand how government social media is used and how its engagement changes in different stages throughout the pandemic. Macao is one of the jurisdictions in the world that has suppressed the transmissions of COVID-19. The case study of Macao can also provide insights for the recovery period after the pandemic.

Methods: Posts from the Facebook pages owned by the Macao Government were analyzed. Data were grouped into the prodromal, acute and chronic stages using Fink's crisis management model, and qualitative content analysis was used to classify data into categories. The average values of the engagement (i.e., the numbers of emotions, comments and shares) were compared.

Results: 1,664 posts from January 1st, 2020 to October 31st, 2020 were analyzed. The engagement was relatively low at the beginning and then surged in the acute stage, with a decreasing trend in the chronic stage. Information about latest updates, press conferences, community resilience and appreciation could maintain their engagement in the entire duration. Posts for controlling rumors attracted positive engagement and a high number of shares. The focuses of the public changed throughout the pandemic.

Conclusions: Government social media should be used with different focuses in different stages of the pandemic, for example, increasing vigilance and awareness in the prodromal stage, disseminating updates and seeking feedback in the acute stage, and focusing on mental health support and recovery policies in the chronic stage. Additionally, government social media can be an effective tool for controlling rumors, providing updates and fostering community engagement in massive public health crises.

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Keywords: government social media; Facebook; content analysis; Macao

Introduction

In this ongoing Coronavirus Disease 2019 (COVID-19) global pandemic, government social media plays an important role in engaging citizens and residents to combat the disease. A tremendous public health risk like the COVID-19 pandemic shares a lot of common characteristics with other crises, for example, a high level of uncertainty, unexpected rapid development and short triggering events [1]. Therefore, communication efforts need to ramp up to match the level of risks. Apart from the adverse effects of "infodemic" (i.e., misinformation and panic being widely spread on social media) [2–4], research highlights the potential of social media to provide trusted information and counteract misinformation [5,6], reach out to the public [7,8], raise awareness and promote behavioral changes [9]. Despite the growing body of research in this space, only a limited number of studies (for example, [7,10]) have investigated the use of social media by governments and public health authorities. As such, our study aims to conceptualize the use of government social media in this COVID-19 crisis for its effective use in future public health crises.

Our analysis of the literature shows its imbalance in both the choices of social media platforms and the period of data collection. Many studies used Twitter (e.g. [11–15]) and Weibo (e.g. [10,16–19]) as data sources, and only a scant of research examined the content on Facebook (e.g. [7,8]). Although Facebook is reported popular in many populations, research about COVID-19 content on Facebook is relatively low in number. Due to the different use, culture and politics of different social media platforms, Facebook users may pose different behaviors and this motivates our work. In addition, our literature review finds that most of the social media research about COVID-19 used data between December 2019 and April 2020. While this is understandable as user reactions were most intense at the early stages, however, as many countries move forward to another phase of the pandemic, people are expected to react differently both online and offline in the new normal. Therefore, our study can address these blanks and shed some light on the use of government social media at the beginning of the end of this global pandemic.

The dynamics of COVID-19 pandemic often requires quick responses and swift decision making, which are similar to the handling of public health crises. As such, we use the perspective of crisis management that offers a systematic approach to understand how government social media is used at different points of time, which is important since social media users prefer different content and disseminate information differently in different stages of public health crises [20,21]. More specifically, Fink's [22] model divides a crisis into four stages and allows us to compare the use of government social media in response to the COVID-19 separately.

Despite with the world's highest population density [23], Macao Special Administration Region (abbreviated to Macao SAR or Macao) is one of the jurisdictions in the world which has successfully eliminated the transmission of the disease. As a popular destination of travelers, Macao also welcomes 38 million tourists per year, and thus any ineffective infectious disease control can be catastrophic [24]. With rapid early responses and stringent preventive measures [24], the city has recorded more than 275 days without local community transmission at the time of writing. As the community has entered the recovery stage, the case study of Macao not only provides understandings about their use of government social media, but also a peek to how the engagement of social media can be leveraged in the subsequent stages of the pandemic.

The content analysis methodology was used in this study. We collected 1,664 COVID-19-related posts from the official Facebook pages of the Macao SAR Government from January 1st, 2020 to October 31st, 2020. These posts were classified based on their nature and the actions taken by the

government with a qualitative approach. In addition, we examined the trends of different types of engagement associated with the posts, for example, total, positive and negative engagement, as well as the numbers of comments and shares. Our findings contribute to the understanding of how the engagement of government social media, particularly Facebook, evolves in the development of the pandemic using the empirical data. We also conceptualize the findings so that they are applicable in future public health crises.

The rest of this paper is structured as follows. Firstly, in the Background section, we give a brief introduction of the COVID-19 outbreak in Macao and the literature that supports our work. Then, we present our research design, methods and the results, followed by the discussion for the main findings and their implications.

Background

Literature Review

Crises are unpredictable and highly uncertain events in an organization or even a society [25]. Its unpredictable and disruptive nature lead to the needs of crisis management, which aims to identify the key issues in a crisis and reduce harm [26]. Among the research of crisis management, the four-stage model proposed by Fink [22] is a popular tool for researchers to understand the development of crises. This model divides the lifecycle of a crisis into four crisis stages [27,28], namely *prodromal, acute, chronic* and *resolution*. In this work, we combined these stages with the progress of the COVID-19 pandemic based on the time when cases were confirmed. Table 1 lists our definitions of these stages and explains how this model can split the timeline of the COVID-19 outbreak for further analysis.

Table 1. Crisis stages of the COVID-19 outbreak

Crisis Stage	**Definition**	**Start of Stage**	**End of Stage**
Prodromal	This comes before the actual crisis, and its main focus is to prevent or delay the crisis to happen.	The start of the current analysis	The first confirmed COVID-19 case
Acute	This stage follows the prodromal stage. It is signaled by the sudden onset of the event, and the event often develops rapidly. The main goals lie in controlling the crisis and avoiding its deterioration.	The first confirmed case	28 days after the last case of local transmissions [a]

Chronic	The crisis situation begins to ease in this stage and its appearance is less dramatic in appearance. As such, the focuses should be on relieving controlling measures, reducing damage and initiate the steps towards recovery.	The first day after the acute period	The end of the current analysis
Crisis Resolution	The crisis is over in this stage. Learnings should be synthesized for preparing the responses to future crises and the society/organization is returning to normal.	Not applicable (since the world is still in the middle of the pandemic at the time of writing, this stage is not applicable).	

[a] We used a criterion that the end of an outbreak can be declared when there are no infections after two incubation periods, i.e. 28 days for SARS-CoV-2, as commonly used in other research [29,30].

On the other hand, there has been a growing body of research regarding the use of social media during COVID-19. Some scholars have expressed concerns of the misinformation spread on social media [2,5] amid others acknowledge the potential of social media for positive purposes [4,6,31], for instance, directing people to trusted information, counteracting misinformation, enabling a culture of preparedness and accelerating research. Additionally, studies show that many categories of content were posted on different social media platforms, and we summarize these findings in Table 2, which serve as the theoretical foundation for the classification of our collected Facebook data.

Table 2. Content categories of COVID-19 social media in the existing literature

Category	**Concepts and Related Literature**
Plans and Measures	• Disposition of government [32] • Government's handling of crisis [10] • Policy [33] • Preventive measures [7] • Government response [14,34] • Action [18] • Policies, guidelines and official actions [19] • Notifications and measures been taken [35] • Control measures [36]
Public Health Messages	• Civic skills [37] • Caring of self-interest [32] • Education [8] • Infection prevention [33] • Disease prevention [18] • Popularization of prevention and treatment [34]
Rumor Control	• Rumor Control [37] • Falsehood correction [7] • Counter-rumor [35]
Latest News	• Latest news [10] • News and information about the epidemic [12] • New cases of COVID-19 [17]

Appreciation	• Appreciation of Front-Line Workers [10] • Appreciation [7]
Community Resilience	• Donations of money, goods or services [35] • Making donations [34]

The COVID-19 Outbreak in Macao

The COVID-19 outbreak in Macao is part of the unprecedented worldwide pandemic. The first case of the disease was confirmed on January 22nd, 2020 which marked the start of the local outbreak. The city saw nine more cases by February 4th, and more imported cases had emerged since. With strong early responses and preventive measure in place, the local transmission has successfully contained and the last local transmission was confirmed on March 29th. As of July 17th, 2020, the city has 46 cumulative confirmed cases of COVID-19, and all of these have recovered with zero fatality.

The emergency and crisis management system in Macao originated in the severe acute respiratory syndrome (SARS) outbreak in 2003. This system and key legislations such as the Law on Prevention, Control and Treatment of Infectious Diseases and its supporting administrative laws, the 10-Year Plan for Disaster Prevention and Mitigation of the Macao SAR (2019-2028), the inter-departmental emergency plan, the new commanding system for public emergency management, have been established to empower the government to rapidly respond to mass emergencies and disasters. Before COVID-19, the crisis management system was primarily used for natural disasters such as typhoons Hato (2017) and Mangkhut (2018) [38]. In this current outbreak, the system and related legislation enables the government to realize public health measures and isolate potentially infectious patients [24]. Next, we provide a brief overview of measures and actions taken by the government in every crisis stage during this outbreak.

In the prodromal stage, Macao put some preparatory measures in place even before the start of the local outbreak [24], in response to the cases of pneumonia of unknown cause in Wuhan, China at the end of December 2019 [39]. Starting from January 1st, 2020, body temperature check was enforced for all passengers travelled from Wuhan, and health declaration forms (which are legal documents requesting contact details, travel history in the past 14 days, and personal health conditions) became mandatory in order to enter Macao. On January 21st (one day before the first confirmed case), the government established a 24-hour Novel Coronavirus Emergency Coordination Center for monitoring the development of the potential infections.

On January 22nd, a traveler from Wuhan was identified as the first confirmed infections in Macao [40], which signaled the entering into the acute stage. In the following two weeks, nine more cases Wuhan were found infected and admitted to hospital [41]. In the meantime, various stringent measures (Table 3), ranging from centralized procurement of face masks to stricter border control, were introduced to reduce the transmission of the virus. Local transmissions continued to be discovered until March 29th. The acute stage ended on April 25th as there were no more local cases in 28 days.

Table 3. Main measures and actions taken by the Macao SAR Government in the acute period [42]

Policy Category	**Measures and Actions**

Disposition of government	• Establish the Novel Coronavirus Emergency Coordination Center • Increase the warning level of public emergencies • Improve public education (e.g., setting up anti-epidemic homepages, holding daily press conferences, etc.) • Global procurement of face masks
Prevention and control	• Strengthen health screening and quarantine • Reduce social gatherings • Close casinos, businesses and entertainment premises • Suspend classes in schools and universities • Issue epidemic prevention guidelines • Issue guidelines for the resumption of work • Set up an online personal health declaration system
Medical support	• Suspend non-critical medical services • Provide support to front-line medical staff • Provide mental health assistance
Border control and immigration	• Limited entry to Macao by travelers • Suspend self-service customs clearance • Shorten clearance time to avoid queues and allow social distancing
Business support	• Establish a special anti-epidemic assistance fund • Launch the first round of economic assistance measures • Tax reduction and exemption • Provide subsidized employee training
Livelihood support	• Issue electronic shopping vouchers • Subsidize water and electricity bills • Monitor the prices of food and other daily necessities

In the chronic stage (April 26th and onwards), Macao recorded only one imported case and has entered the phase of recovery. While strict preventive measures largely remained, the government has been focusing on reviving the economy, protecting job opportunities and supporting businesses (for instance, the launch of the second round of economic assistance measures). The city also saw the ease of some border control measures and schools resumed classes in stages.

In summary, the Macao government has suppressed the COVID-19 outbreak with a combination of different policies. Many of these policies were also posted to different social media platforms, including Facebook, in order to inform the public of the updates and the actions taken by the authorities. For the purpose of our analysis, the abovementioned lists of these policies and measures were also used for classifying Facebook posts, as detailed in the next section.

Methods

Data Collection

Information posted on the official Facebook pages of the Macao SAR Government was the subject of this study. According to the latest internet usage report, Facebook is the second popular social networking platform used by Macao residents [43]. 69% of Macanese internet users use Facebook, among them 94% are 18-34 years old, 75% are 35-54 years old, and 36% are over 55. Facebook is one of the social networking platforms used by the government to engage with the public since 2017

[44], and therefore this platform can provide a reasonable sample for us to study the use of government social media in this pandemic. Customized scripts written in Python (version 3.8) were used to crawl data from Facebook every three days. Post content, comments and emotions were updated in our database on a rolling basis to allow capturing the late interactions from other Facebook users even the posts had been published for some time. Human ethics applications were exempted by the University's committee because we used publicly accessible data and would report the results in an aggregated manner.

Data Analysis

Our research design followed the qualitative content analysis approach which allows studying complex phenomena and patterns in the health context by transforming a large amount of textual data into systematic themes and categories [45]. We used qualitative axial coding [46,47] to sort Facebook posts into two dimensions, that is, the categories of posts and the actions taken by the government. Both deductive and inductive reasoning was used in the coding process. A preliminary codebook was deducted from existing literature of the content of social media during crises (Table 2) and this codebook was used to guide the analysis. In this process, codes that did not exist in the codebook were inducted through re-reading the data and merging similar codes. This approach can preserve the theories and principles that are applicable for our analysis, while allowing for the flexibility for unexpected or new insights to be captured, which results in a rigorous, comprehensive and reliable study [48].

We also obtained the numbers of comments, shares, likes and emotions, such as love (the "heart" emotion), laugh (the "ha-ha" emotion), care, angry and sad, which were then used for measuring the level of different types of engagement of the Facebook posts. More specifically, we calculated and examined the following four metrics:

- Positive emotion: The sum of likes, love, laugh and care emotions
- Negative emotion: The sum of angry and sad emotions
- Numbers of comments
- Numbers of shares
- Total engagement: The sum of all emotions, the number of comments and the number of shares

Positive and negative emotions were used for understanding the sentiment expressed by Facebook users; the numbers of comments showed the degree that users wanted to interact with the government and other users by leaving comments; and, the numbers of shares indicated the magnitude of the propagation of information. The average values of such variables were then aggregated by calendar weeks in order to observe the trends at different times during the pandemic. In addition, we compared these figures across different post categories and the actions by the government. One-way ANONA tests were used to evaluate the significance of the average values in different stages.

Results

Data Overview

Before the COVID-19 outbreak in Macao, there were no dedicated government Facebook pages about public health. We targeted the official government Facebook pages (e.g., Macao SAR Government News) and manually selected posts about the disease. After the establishment of the Novel Coronavirus Emergency Coordination Center and its dedicated page, information related to COVID-19 was posted on this specific page and therefore all the posts on this page were included in our research. We totally collected 1,664 posts from Facebook, including text-based posts, images and

recorded live videos. These posts covered a 304-day duration from January 1st, 2020 to October 31st, 2020. These data were assigned into three different crisis stages using the criteria outlined in Table 1, and the cut-off points are listed in Table 4. Then, two researchers were trained to perform coding on the data. Their coding achieved 87% of agreement, and the inter-coder reliability Krippendorff's Alpha $\alpha = 0.810$ which was over the threshold value ($\alpha \geq 0.800$) required for the use in academic research [49,50].

Table 4. Date and week ranges of different crisis stages

Crisis Stage	Date Range	Week Range (of Calendar Year)
Prodromal	January 1st, 2020 – January 21st, 2020	Week 1 – 4
Acute	January 22nd, 2020 – April 25th, 2020	Week 4 – 17
Chronic	April 26th, 2020 – October 31st, 2020	Week 18 – 44

Engagement in Different Stages

Firstly, we analyzed the engagement in the prodromal, acute and chronic stages respectively. Figure 1 shows the trends of the average values of different metrics of Facebook engagement by weeks. In the first few weeks of the prodromal crisis stage, the engagement went downwards initially and turned upwards when the time got closer to the discovery of the first COVID-19 case in Macao. After the first confirmed case, positive emotion, comments and shares were observed at a high level in the acute crisis stage, accompanied by occasional surges of negative emotion. As the pandemic entered the chronic crisis stage, all metrics tended to decrease over time. In general, the level of positive emotion was higher than the negative one in the entire pandemic. For comments and shares which are considered stronger types of engagement, they both demonstrated higher values in the acute stages. Additionally, the overall engagement showed a decreasing trend after the earlier weeks in the acute stage. As shown in Table 5, the means of all types of engagement were significantly different in the ANOVA test.

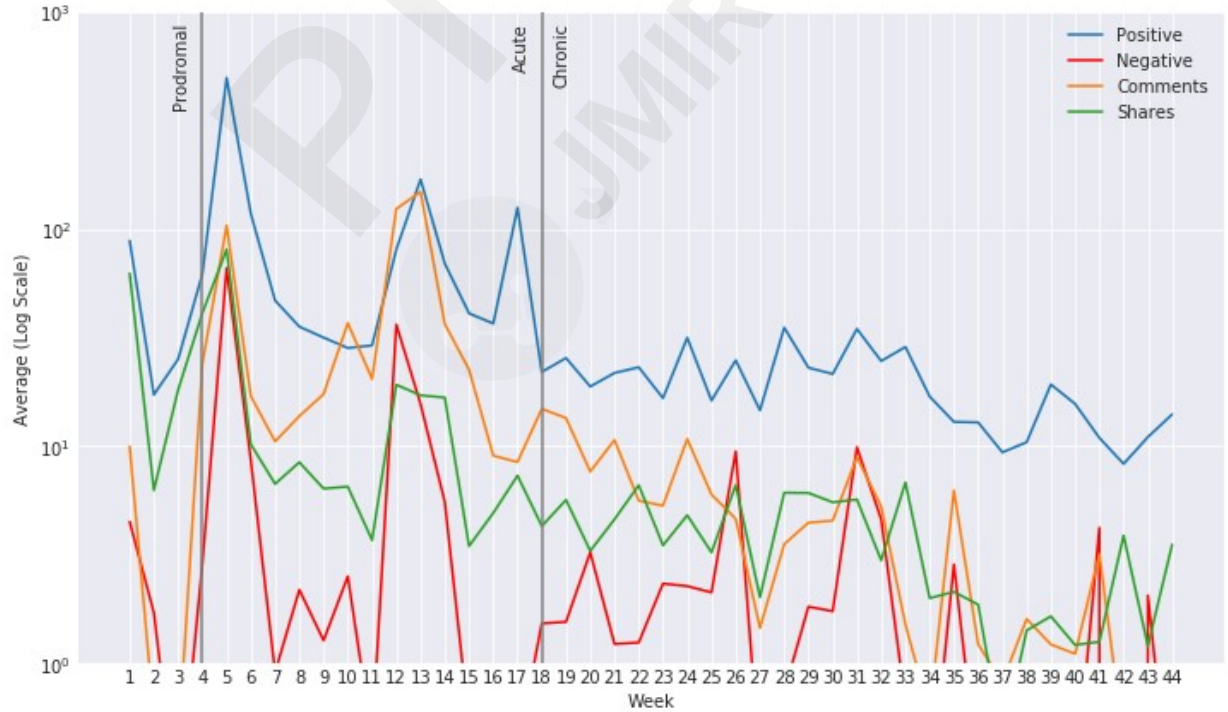

Figure 1. Trend of Facebook engagement in crisis stages

Table 5. ANOVA results for engagement in different stages

	Prodromal (N=18)		Acute (N=481)		Chronic (N=1165)		ANOVA	
Metrics	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**F**	**P**
Positive Emotion	35.39	60.56	99.59	372.89	20.29	42.48	25.829	0.000*
Negative Emotion	1.72	4.40	9.64	66.54	2.24	23.01	5.690	0.003*
Comments	2.72	9.36	34.83	124.30	3.80	20.18	34.683	0.000*
Shares	22.17	50.21	15.91	47.01	3.82	14.28	33.219	0.000*

* Significant at P<0.005 level

Engagement by Post Categories

Additionally, we investigated how the engagement of categories of content differs in various stages of the pandemic. As detailed in the Method section, Facebook posts underwent a qualitative coding process, and they were grouped into seven categories as shown in Table 6. The first six categories were similar to concepts reported in other literature about crisis or emergency management, while the last category about press conference live was derived from our data.

Table 6. Categories of Facebook posts

Name	Definition	Count
Plans and Measures	Government's plans and measures to combat the pandemic	542
Public Health Messages	Messages for educating the public, persuading them to change behavior and preventing COVID-19 infection	99
Rumor Control	Posts for rumor control or clarifying untrue information	22
Latest News	Latest update about the pandemic, including regular updates of numbers	709
Appreciation	Appreciation message to front-line workers and public staff for controlling the pandemic	44
Community Resilience	Actions (e.g., donations of resources) taken by communities (e.g., non-government organizations and individuals) to combat the pandemic	17
Press Conference Live	Live video of the government's press conferences about the pandemic and its latest development	231

Figure 2 shows the trends of engagement of these categories in different times of the pandemic, and Table 7 displays the one-way ANOVA tests for examining whether their trends demonstrated differences in the stages of the pandemic. The data illustrates that posts of regular updates, for example, the Latest News and Press Conference Live categories, were less engaged after the acute stage (significant at P<0.0005 level). Similarly, for posts about government's plans and measures, the positive emotion and the number of shares went downwards (significant at P<0.0005 level), but their negative emotion and the number of comments did not show significant differences among stages. On the other hand, content about community resilience and the appreciations of front-line staff had a consistent engagement, with the ANOVA tests showing no significant differences across different

stages. In addition, these two categories showed minimal negative emotions from the users. Finally, also shown in the figure, the Rumor Control category had a level of positive engagement and a number of shares throughout the pandemic, while the numbers of negative emotion and comments remained low for this category.

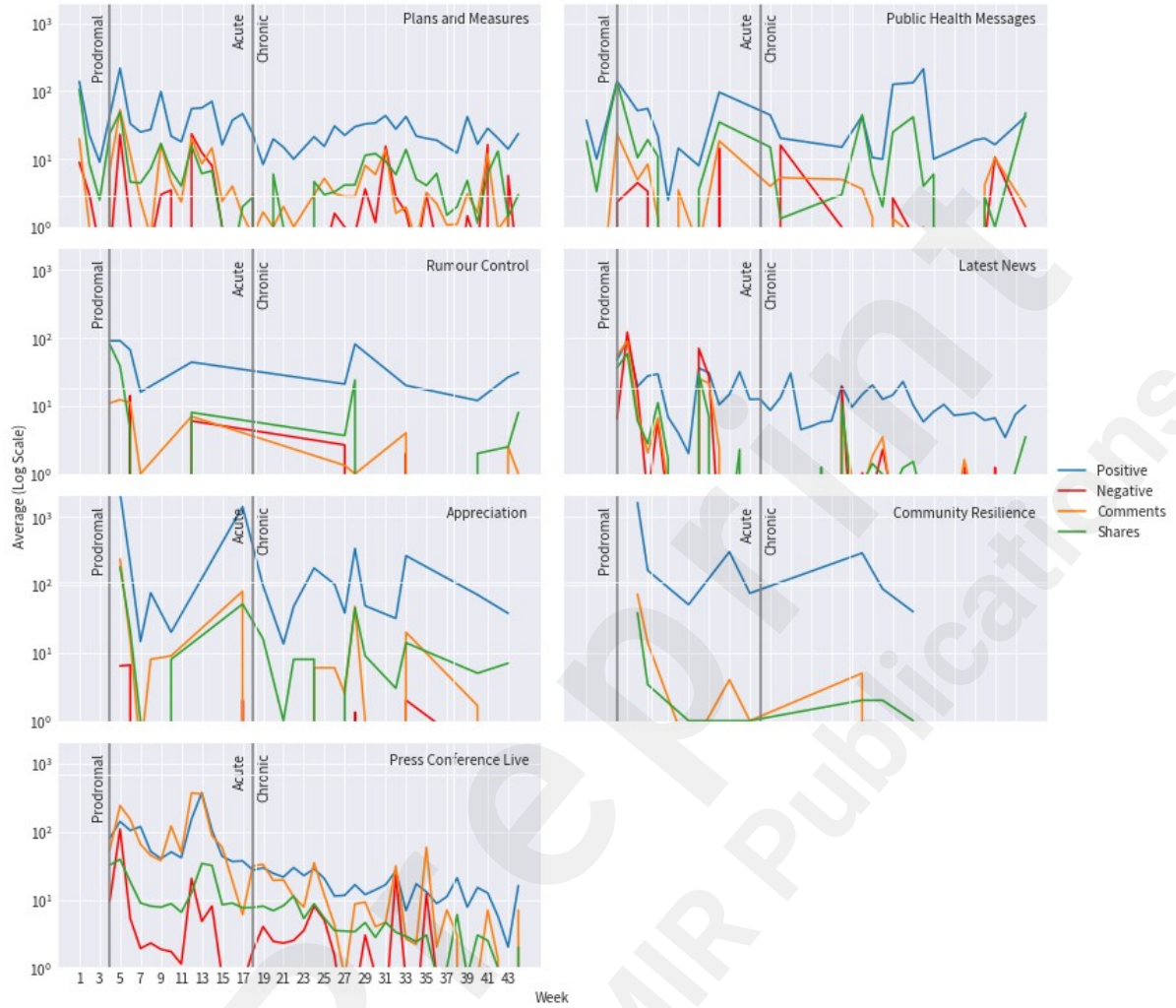

Figure 2. Trend of Facebook engagement of different post categories

Table 7. ANOVA results for mean differences of different post categories

Category	**Positive Emotion**	**Negative Emotion**	**Comments**	**Shares**
Plans and Measures	F=5.5522 P=0.0041*	F=0.0353 P=0.9653	F=1.8798 P=0.1536	F=5.5737 P=0.0040*
Public Health Messages	F=0.4158 P=0.6610	F=0.4184 P=0.6593	F=2.1545 P=0.1215	F=0.3698 P=0.6919
Rumor Control	F=1.2766 P=0.3019	F=0.2728 P=0.7642	F=0.9818 P=0.3929	F=0.6107 P=0.5533
Latest News	F=27.9090 P=0.0000*	F=17.2005 P=0.0000*	F=19.5396 P=0.0000*	F=24.0817 P=0.0000*
Appreciation	F=2.6463 P=0.1113	F=0.9319 P=0.3399	F=2.2047 P=0.1451	F=2.3012 P=0.1368
Community Resilience	F=0.6011 P=0.4502	N/A (Due to No Negative Posts)	F=0.6712 P=0.4255	F=0.7575 P=0.3978

Press Conference Live	F=17.0049 P=0.0001*	F=0.6698 P=0.4140*	F=25.2165 P=0.0000*	F=16.4521 P=0.0001*

* Significant at p<0.005 level

Engagement by Actions

In order to observe how different actions taken by the government can engage users more effectively on social media, we calculated the average values of total engagement in each stage and list the top five actions in Table 8. In this part of the analysis, the prodromal stage was excluded because most of the key actions happened in the acute and chronic stages (after the first confirmed case), and the number of posts for individual actions was too small to draw any conclusion in the prodromal stage.

Table 8. Top 5 actions with most engagement in acute and chronic crisis stages (mean values are shown)

	Acute				Chronic			
	Event	**Total**	**Positive**	**Negative**	**Event**	**Total**	**Positive**	**Negative**
1	Research Breakthrough	343.50	306.00	0.00	Violations of Preventive Measures ↑	254.46	106.46	75.23
2	Reports of Cases	330.77	43.40	129.82	Reports of Cases	184.25	32.25	71.00
3	Violations of Preventive Measures	235.00	53.33	99.67	Research Breakthrough ↓	182.33	159.67	0.67
4	Patients Recovered	213.25	190.00	1.50	Mental Health Support	92.50	73.00	0.00
5	Mask Supply Scheme	177.14	115.67	0.33	Border Control and Quarantine	58.32	42.05	0.65

As shown in Table 8, content in three areas: (1) research breakthrough about COVID-19, (2) reports of confirmed cases, and (3) reports of violations of COVID-19 preventive measures (such as quarantine requirements) consistently drew considerable attention during both acute and chronic stages. During the outbreak, people also focused on how patients recovered from the disease and the information about the mask supply scheme. In the chronic stage, we could observe that the focuses of the audience shifted to other areas, for example, users tended to engage with information about mental health support, border control (including re-opening the border) and quarantine measures.

It is also notable that some measures (for instance, research breakthrough, patients recovered, mask supply scheme, mental health support and border control and quarantine) had overwhelmingly positive engagement, whereas posts about violations of preventive measures and reports of cases attracted largely negative emotions throughout different stages. Additionally, the focus on the violations went up to the first place in the chronic stage, whereas the one on research breakthrough dropped to the third.

Discussion

Principal Results

Highlights of Each Stage

During this pandemic, we observed that the engagement on the government social media was lower at the beginning, and peaked at the acute stage in which the disease was widely transmitted. Research shows that people tend to obtain information when they perceive strong situational relevance [51], that is, the situation is relevant to themselves. At the prodromal stage, the city had not struck by the virus which may cause the public to have a “wait and see” attitude, resulting in a drop in engagement on social media at the earlier time. With hindsight, reports have suggested the seeming importance of preventive measures [52–54], such as hand hygiene, the use of face masks and social distancing. As the measures for fighting COVID-19 require everybody to play their part, we argue that the use of government social media can be strengthened in the prodromal stage to increase the vigilance of the public and the awareness of these preventive measures.

The acute phase of the pandemic attracted significant engagement with the posts about the government’s plan, measures, and regular updates of the outbreak, along with higher levels of commenting and sharing. It is no doubt that social media is an effective tool for governments and authorities to broadcast updates in crises [55]. Additionally, comments and shares are regarded as a type of engagement with a higher cognitive load on government social media [10]. By commenting and sharing, users can interact and discuss the content with the government officials and other users, meanwhile, disseminate these posts further in their social media circles. The higher numbers of comments and shares may also represent the demand from the public for greater participation in policymaking and execution. Overall, social media engagement can be a probe for governments to receive feedback and adjust their measures. The use of government social media in the acute stage should focus on providing up-to-date information and seeking feedback for government’s measures from the public.

Finally, there is a shift of focuses observed as the pandemic progresses. According to Table 8, information about research breakthrough, case reports and violation of preventative measures maintained a high level of engagement in both acute and chronic stages. However, in the earlier stage, people showed interests in how patients were recovered and the supply of face masks, which reflects that both preventions and the ongoing improvements of the outbreak are the main concerns at this stage. When the pandemic enters the chronic stage, the focus moves towards mental health support and the ease of border control and quarantine measures. As a micro-economy, the economy of Macao has suffered strong impact in its gaming [56] and hospitality [57] industries, while the city has enforced stringent measures in the areas where are comprised of its main income, for instance, closing down casinos, mandatory quarantine of travelers and the ban of international tourists. Unlike the previous outbreak of SARS, this pandemic has lasted a much longer duration [57], and people have gradually become anxious under this situation. As the COVID-19 crisis eases, it is understandable that the public turns their focuses to the return of the normal. As a practical implication, it is useful for governments to adopt social media to provide mental health support and information about the recovery of business and economy, in order to reduce the uncertainly of the public and to plan out the directions for the policies after the chronic stage.

Implications for Rumor Control and Regular Updates

Highlighted by many scholars, infodemic is a part of this COVID-19 pandemic as misinformation is wildly spread on the internet [2–4]. Monitoring and correction of misinformation are both critical for flighting the infodemic [58]. Being a part of this global phenomenon, Macao is not immune to the

infodemic and therefore the government posted a wide range of posts in order to control rumors. Fortunately, it appeared that these social media posts could keep the engagement with the public with a positive reception in all crisis stages, which further reflects the needs of trustworthy updates from the public. Infodemiology and infoveillance frameworks [58], supported by necessary legislation (e.g., Article 26 in the Macao Civil Protection Law), can help the authorities to detect anomalies such as rumors and misinformation on social media. After rumor detection, in order to clarify and correct those rumors, government social media will be one of the channels to amplify the correct messages among the public. Our findings reinforce the potential of using government social media to counteract falsehood information.

Started on the day of the first confirmed case, the Macao SAR Government had been organizing daily press conferences and these were aired live on social media simultaneously every day. This is a necessary step for improving the transparency of the government and reducing the uncertainty of the public during this COVID-19 crisis [5]. Not many places in the world organized official daily press conferences in the pandemic. However, in some locations with a success for controlling the virus (for example, Taiwan and Melbourne), daily and persistently press conferences were considered as a welcomed measure [59,60]. In the case of Macao, it can be seen that these press conference live posts can maintain a constant level of engagement in the acute stage, which shows the usefulness of government social media in providing regular updates.

Implications for Community Engagement

Our results suggest that information about community resilience and appreciation can attract steady and overwhelming positive engagement with minimal negative responses on social media. The quick involvement of the community can help with the control of COVID-19 and protect the interests of the public [61]. In fact, community organizations often work with the Macao SAR Government in different matters including the recovery of natural disasters and this pandemic [38,62]. The posts on Facebook allow the public to understand the community efforts spent in the outbreak. To this end, we argue that government social media can be used for creating a positive sentiment against the pandemic and bringing communities together. In addition, other research highlights that government social media often carries only one-way communication in disease outbreaks [19,20], that is, messages are conveyed from governments to the public. As we observe different levels of engagement with the information posted by governments on social media, there is a potential to turn this communication into bidirectional for maximizing its use. The engagement can be used as indicators for measuring the acceptance of certain policies in the pandemic and for fine-tuning them to meet the needs of citizens.

Limitations

There are cultural and political differences in the use of social media. Additionally, different governments adopt different approaches to handle the outbreaks of COVID-19. As such, other researchers from other places may have different observations about government social media, and we suggest conducting localized research and generate collective knowledge in this discipline. Besides, classification errors might happen in the content analysis process. However, we used inter-coder reliability checks to ensure the error rate was acceptable for academic research.

Comparison with Prior Work

At the time of writing, this work is one of the first few articles examining the use of government social media on Facebook, as well as an early content analysis of social media in the post-pandemic stage of COVID-19. Our data collection period lasted for ten months which was longer than many other social media studies about COVID-19.

Conclusions

In this paper, we studied how government social media can engage with the public in the COVID-19 pandemic using the lens of the four-stage crisis management model. Our work shows that the engagement of government social media is lower at the prodromal stage, then surges in the acute stage, and gradually decreases in the chronic stage. There is a shift of focus from the pandemic to the policies for recovery after the acute stage. In different stages, the aims of utilizing governments social media should be given with different emphases. In summary, we believe that government social media is a great channel to disseminate reliable information to the public, as well as an effective tool to bring communities together for fighting future outbreaks of infectious diseases.

Conflicts of Interest

none declared

Abbreviations

COVID-19: coronavirus disease 2019
Macao SAR: Macao Special Administrative Region
SARS: severe acute respiratory syndrome

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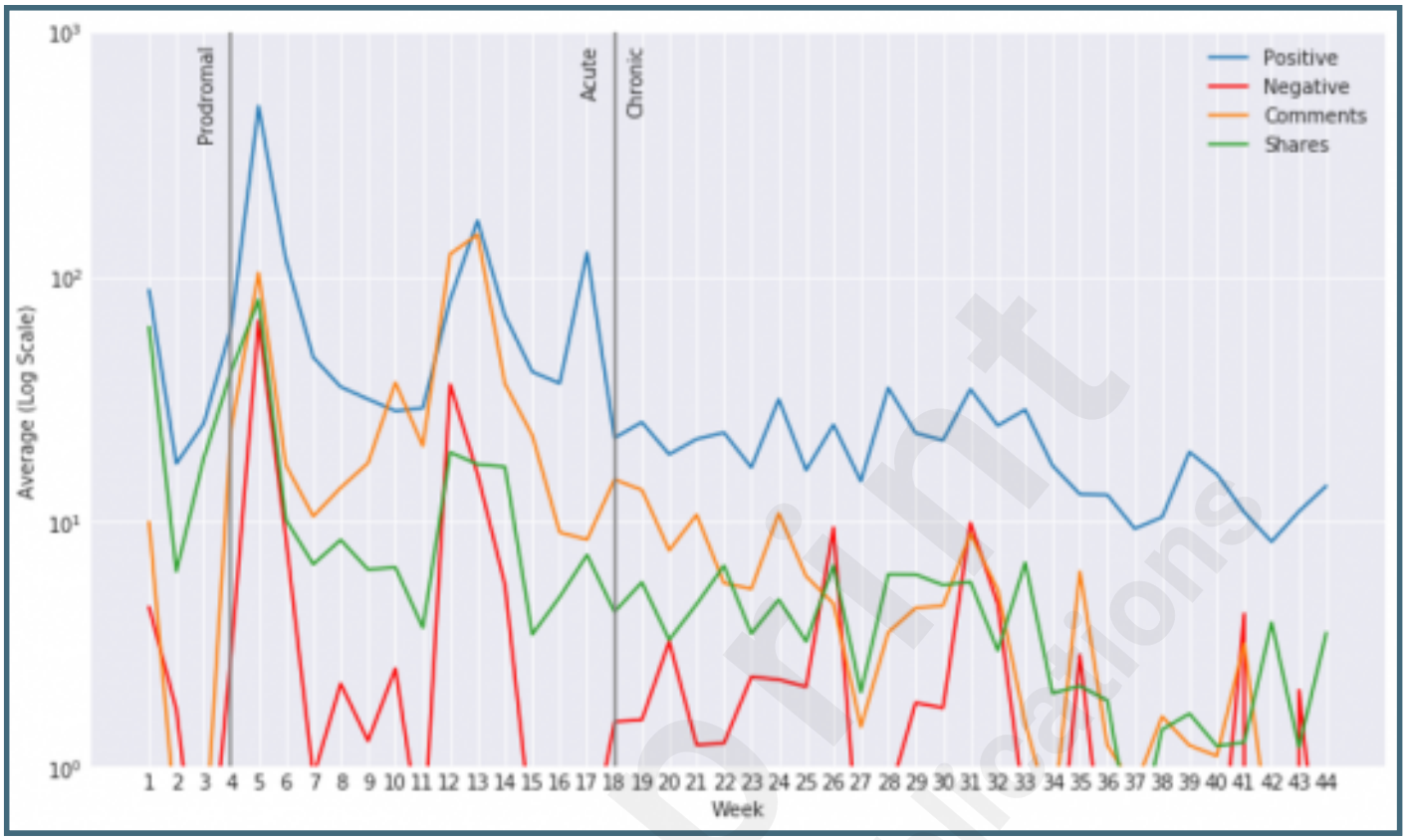
Supplementary Files

Figures

Trend of Facebook engagement in crisis stages.



Trend of Facebook engagement of different post categories.