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Organizational use of social media during a global health crisis

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The COVID-19 pandemic initiated new and unprecedented challenges that required organizations to curate timely, accurate and engaging public health information to communicate to local communities during a health crisis. Guided by the social media typology, content analysis was used to analyze tweets from six organizations located in a predominantly Hispanic community responsible for managing the pandemic. Findings revealed that these organizations have actively used Twitter (now known as “X”) to inform local residents about COVID-19 at the beginning of the pandemic and guided them how to respond to this health crisis by providing content with health-related actions. The analysis indicated that redundant digital content without using the local language of the community did not help public health officials communicate effectively to their citizens, thereby increasing their level of engagement and eliciting behavior changes. We suggest that public organizations, government, and healthcare organizations within a minority community need adopt social media strategies that incorporate the local community’s language in content generation to foster ongoing conversations, mobilize actions, and elicit behavioral changes within their local communities.

KEYWORDS

social media, COVID-19, Hispanic community, public health communication, public administration

Introduction

Social media platforms offer an easy, cost-effective method to disseminate public health information to people of all demographics. Studies have shown that more individuals are turning to these platforms to seek information about health and medicine related information (Vraga and Bode, 2017). According to the National Health Interview Survey (Wang and Cohen, 2023), 46.2% of Hispanics used the Internet to look for health or medical-related information. More importantly, in 2021, 80% of Hispanics reported using at least one social media site compared to 77% of African Americans and 69% of Caucasians. Further, 23% of Hispanics reported using Twitter compared to 29% of African Americans and 22% of Caucasians when considering race and social media platform usage (Flores and Lopez, 2018; Pew Research Center, 2021). The Center for Social Media and Politics (Abrajano et al., 2022) also reported that the Hispanic population is more likely to use social media to find information on COVID-19 compared to non-Hispanic groups.

The recent COVID-19 pandemic has shed light on the importance of sharing timely, accurate public health information to our communities. The pandemic has only further exposed the health and healthcare disparities of low-income, underserved,

and minority populations despite decades of recognition of this issue (Purnell et al., 2016). For example, African American and Hispanic communities have disproportionately carried the burden of COVID-19-related outcomes. We have learned from previous disease outbreaks that coordination, communication, and collaboration between various organizations is vital to stem the spread of disease (Dzigbede et al., 2020). Yet, communication inequalities disproportionately affect communities of color, limited English-speaking communities and communities of lower socioeconomic status. This communication inequality stems from a communication infrastructure that does not take into account the digital divide among racial/ethnic minorities' access to health information and the higher prevalence of low health and digital literacy among these groups (Goulbourne and Yanovitzky, 2021; Abrajano et al., 2022). According to Ballew et al.'s (2020) study, 39% of African Americans and 30% of Hispanic adults needed more knowledge about the COVID-19 virus compared to Caucasians (22%), so that they can take more protective actions for themselves and their families. Additionally, these population groups also indicated that they relied heavily on social media as a major source of obtaining this information (Ballew et al., 2020). Although all demographic groups had higher-than-normal increases in deaths during the pandemic, the increase in Hispanic deaths between 2019 and 2020 had a notable surge, compared to other demographic groups (Sabo and Johnson, 2023). As one of the largest minority groups in the U.S. with the second lowest literacy (the first being the Native Hawaiian/Pacific Islander population group), Hispanics may be more susceptible to health misinformation on social media in an English speaking dominated country. Therefore, this study aims to explore how governmental agencies and other health-related organizations use social media within a Hispanic community.

In the current digital era, many governmental organizations, non-profit organizations, and hospitals utilize social media, like Twitter (now known as X), to disseminate important public health information. A study showed that most local health departments nationwide have adopted at least one form of social media platform (Harris et al., 2013). Increased connectivity also serves as a mechanism of empowerment, enabling individuals and organizations to interact in new ways for positive change. During the COVID-19 pandemic, governmental agencies, non-profits organizations, and other organizations utilized social media platforms, like Twitter, to disseminate important public health information to their local communities.

Guided by the Lovejoy and Saxton's (2012) social media typology, this research examined how local governments, hospitals and nonprofit organizations located in a Hispanic/Latino community used Twitter to disseminate public health information during the COVID-19 pandemic from March to December 2020. These organizations were selected because (1) they play a critical role in managing and informing the public about the COVID-19 pandemic and (2) these organizations are integrated within the local community. Additionally, the study population offers a unique perspective on health equity concerns of minority populations in the U.S. as 95.4% of the residents identify as Latino/Hispanic and 26.7% of the population live below the federal poverty level (U.S. Census Bureau, 2024). For this research

project, the scholars applied a content analysis on tweets from selected organizations within the local government, hospitals, and nonprofit organizations. Focusing on these organizations, 3,152 tweets were analyzed and categorized based on the three levels of social media engagement and the following research questions were addressed:

- (1) How did the local government, hospitals, and nonprofit organizations utilize social media platforms to engage with a Hispanic/Latino population at the beginning of the COVID-19 pandemic?
- (2) What types of health-related information did these organizations disseminate via Twitter, and how did the public react to the content?

To our knowledge, few articles have explored the use of Twitter by organizations during the pandemic in a predominantly Hispanic/Latino community. This article seeks to narrow this gap by making specific contributions on exploring the use of social media during a health crisis in a Hispanic/Latino community. Results from the study demonstrate that many local organizations have adopted social media to deliver timely and abundant COVID-19 related information. However, these organizations failed to adopt appropriate language to interact with the local minority communities by using a two-way communication strategy. These organizations also used social media to promote health-related behaviors (i.e., mobilizing actions), such as wearing a mask, washing hands, and practicing social distancing in the local community. Yet, as shown in our analysis, the digital content delivered using Twitter was repetitive and redundant, consequently, did not engage the local community. Su et al. (2021) argued that social media should devote more resources for fact-checking, generating person-centered content, and producing collaborative responses during a global crisis. These resources include but are not limited to personnel, time, and financial support. Therefore, we propose that during a health crisis, organizations need to devote resources so that these organizations can monitor and respond to their online audiences' feedback in an accurate and timely manner. A more intentional and strategic approach is needed to create engaging digital content within these organization's social media accounts.

Literature review

The next section presents a literature review germane to the importance of public dissemination of information and community engagement during a health crisis. Further, it reviews the current literature on social media use during prior health crises events.

Community engagement and health crisis

Public health issues in modern society are complex. Health agencies are seeking new ways to promote and disseminate public health information by actively engaging with their local communities (Morgan and Lifshay, 2006). Swainston and Summerbell (2008, p. 11) defined community engagement as

involving “communities in decision-making and in the planning, design, governance and delivery of services.” Within the health crisis management context, community members can help by identifying their own emergent health needs and provide valuable first-hand information within their community. Scholars suggest several strategies to engage different communities of varying degrees during a health crisis (Boote et al., 2002; Wilcox, 1994). Brunton et al. (2017) summarized these strategies into two general categories. The first takes on a utilitarian perspective where health experts and public administrators observe and evaluate their community’s health needs before inviting community members’ involvement.

The second approach suggests that community engagement should be implemented from a social justice perspective (Morgan, 2001; Wallerstein et al., 2015). The social justice perspective believes that community engagement is built on empowered citizens (Brunton et al., 2017). Scholars have long found that the power of local citizens’ involvement was critical in their local community during a post-disaster period (Palen and Liu, 2007). When a major crisis happens, local members with first-hand information can provide help and relief efforts (Palen and Liu, 2007). Scholars have recognized the importance of collaborating with communities in response to a public health emergency. The collaboration process involves building effective communication with the public to exchange information, share decision-making steps and develop strong partnerships (Malmusi et al., 2022). De Vries et al. (2020) developed a community engagement framework (Figure 1) used in a public health crisis. The framework demonstrates how each step depends on some level of communication with community members, especially in the first three steps: (1) Outreach—provision of information, one way; (2) Consultation—information and feedback, connections, and (3) Involvement—participation, two-way flow information. For example, Ji et al. (2014) found that this framework allowed authorities to take a proactive role within the community during the human H7N9 outbreaks. It helped to deliver information and mitigate rumors effectively amongst community members. Furthermore, Chen et al. (2020) confirmed

that active engagement from local agencies with their communities offers comfort to the public’s concerns, addresses their interests, and enhance their sense of belonging to the communities during a public health crisis.

Social media and health crisis

When a health crisis happens, it is critical for health professionals and administrators to disseminate, communicate, and guide communities to take actions. Social media can be a useful tool in building community engagement during emergencies. Social media allows organizations and health experts to “go where the people are, tailor health messages, facilitate interactive communication and empower people when making health decisions (Reynolds, 2010).” Empirical research on using social media in past health crises provides insight into the dynamics associated with the COVID-19 pandemic. For example, during the Ebola outbreak from 2013 to 2016 in the West African nation of Guinea, scholars learned that the CDC, World Health Organization (WHO) and Médecins Sans Frontières (MSF, also known as Doctors without Borders) have used social media like Twitter and Instagram to disseminate accurate information to local communities (Guidry et al., 2017). The Central States Center for Agricultural Safety and Health (CS-CASH) following recommendations on physical distance had to perform their outreach efforts virtually rather than the traditional face-to-face and in-person training because of the COVID-19 pandemic. Their effort to reach and communicate to agricultural workers on how to reduce their risk for contracting or transmitting COVID-19, which is largely made-up of Hispanic workers required them to shift to virtual means of communication using social media platforms like Facebook, Twitter, and YouTube (Ramos et al., 2020). In general, several studies found that migrants and minority groups used social media as a major source of information about COVID-19 related health information (Despres et al., 2020; Goldsmith et al.,

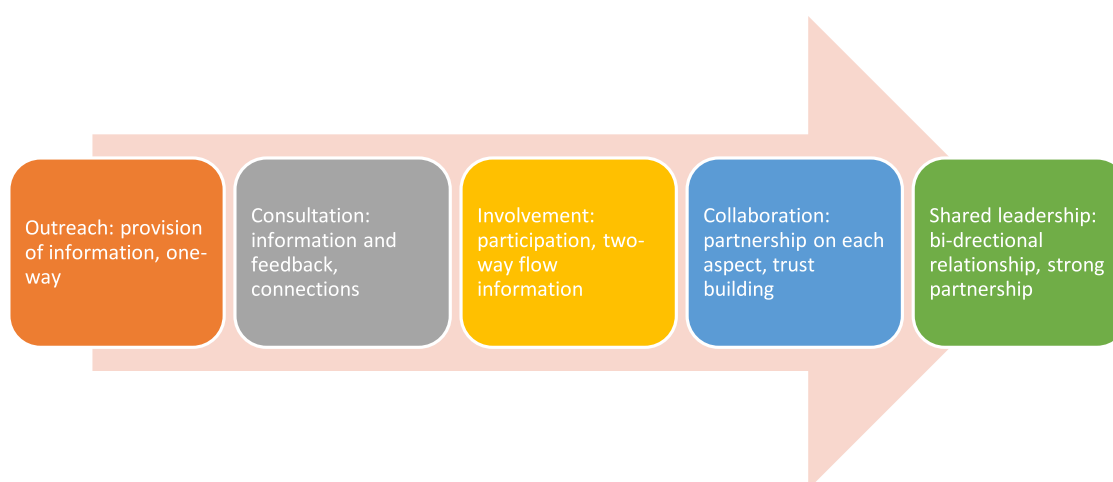


FIGURE 1
Levels of community engagement (De Vries et al., 2020).

2022; Woko et al., 2023). These studies revealed that migrants and minority groups obtained information from a variety of social media platforms, such as Facebook, YouTube, and Twitter. However, different migrants and minority groups experienced their own set of challenges when utilizing social media for consumption of COVID-19 information. For example, Chandler et al. (2021) reported that due to the extensive history of systemic racism and marginalization, African American communities had mixed feelings of the COVID-19 related information being published by the government. Many of them reported that they were both confused and distrusted the information from social media. Within the Hispanic community, they experienced language barriers, which raised concerns of receiving misinformation. Although these studies provided useful examples on how social media have been used to deliver health crisis related information to different communities, they did not evaluate how specific digital content can influence people's attitudes and behaviors during a health crisis. Governments and public organizations have multiple goals of employing social media during a health crisis, which can be but not limited to disseminating information, educating, and preventing more disease outbreaks (Górska et al., 2022).

Online engagement strategy

Previously, scholars criticized that many public organizations adopted their social media as a one-way communication but failed to incorporate a two-way dialogue strategy to interact with the public (Bryer and Zavattaro, 2011; Lee and VanDyke, 2015). Bonsón et al. (2015) found that citizens tend not to engage with their government organizations for topics that were random with no relevance, such as cultural activities, sports, and marketing. Effective social media engagement involves a multi-dimensional approach comprising of cognitive, emotional, and behavioral reactions (Trunfio and Rossi, 2021). To date, most studies have evaluated the behavioral reactions of users, such as liking, commenting, and sharing (Vander Schee et al., 2020; Rietveld et al., 2020; Trunfio and Rossi, 2021), which is consistent with previous studies, that examined engagement in a social media context (Azer et al., 2021; Chen et al., 2020).

Among the nonprofit organizations that used Twitter, Lovejoy and Saxton (2012) found that some nonprofit organizations solicited conversational responses through their Tweets. These tweets showed that these organizations were looking for public input by including polls, surveys, contests, direct questions and requests of leaving a comment from their online followers. Thus, trying to build a conversation on social media to encourage citizens to participate and be more engaged during a health crisis. For example, during the COVID-19 lockdown mandate, many organizations asked their online followers to share their social activities at home in a way to encourage people to remain engaged while following safety guidance. It is believed that such a strategy would encourage and increase citizens' online engagement with public organizations social media accounts (Špaček, 2018; Bonsón et al., 2015). Thus, we hypothesized that:

H₁: If organizations used tweets to build a conversation with their audiences, they would receive more online engagement.

Building dynamic conversations with citizens via social media is important to public organizations that are responsible for the management of a health crisis. However, it is not the main goal for many public organizations. Ultimately, organizations want to see the public act by following the policies and guidance being delivered on social media. While Neiger et al. (2012) argue that social media is a communication and promotion tool and not a causal factor in eliciting behavioral change or improved health status, we would argue that, in fact, social media can be used as a tool to influence attitude and behavior. Studies have shown that online information on social media could indirectly motivate people's offline actions (Lane et al., 2017). Lee et al. (2021) recently observed that social media could strengthen citizens' preventative actions toward COVID-19. Lovejoy and Saxton (2012, p. 345) explained that nonprofit organizations can create "outcomes-oriented" content on social media to mobilize their stakeholders to "do something" for the organizations' missions. To do so, many times organizations need to tell their stakeholders directly what actions to take on their social media content. Therefore, we hypothesized that:

H₂: If organizations used tweets to guide their audiences with specific actions, they would receive more online engagement.

Social media and digital content features

Social media as a communication platform allows for a variety of content to be disseminated to the general population. Using Twitter as an example, individuals can generate their own tweets by including pictures, videos, and external links to disseminate and interact with their followers. Several studies have found that different types of content generate different levels of engagement. For example, Strelakova and Krieger (2017) gleaned from their study that Facebook posts containing photos received significantly more likes, comments, and shares than videos on the National Cancer Institute's Facebook page. Further, the study found that compared with plain text, audiovisual content with accurate health-related descriptions could remain longer in one's memories.

According to the theory of information richness, it postulates that audiovisuals, such as pictures and videos, provides the richest information to the audience, pictures provide less richness, and text provides the least (Guidry et al., 2017; Trevino et al., 1987). Consequently, Rahim et al. (2019) observed that audiovisuals on social media received the highest engagement from audiences who were looking for health information. Considering these findings, delivering public health information utilizing different formats could attract different levels of online engagement from the public. Therefore, we hypothesize the following:

H₃: Tweets including audiovisuals will have higher reactions than those with plain text.

A feature that makes Twitter unique compared to other social media platforms is the 140-character maximum limit. Because of this limitation, many individuals and entities include a hyperlink. The hyperlink can convey a greater magnitude of information in each tweet (Hsu and Park, 2011; Sedhai

and Sun, 2014). Including a hyperlink offers an opportunity for the public to receive additional information to justify the content of the tweet (Morales-i-Gras, 2020; Jakob, 2020). Hyperlinks on the tweets could help users access information with context and promote their knowledge acquisition (Holton et al., 2014; Hughes and Palen, 2009). Several scholars believe that tweets with hyperlinks can play a gatekeeper role by filtering accurate news and information (Dimitrova et al., 2003; Russell, 2019), which is crucial when disseminating public health-related information on Twitter. Park et al. (2016) have observed that hyperlinks were the most frequently used feature within some public health organizations, including the American Cancer Society, the American Heart Association, and the American Diabetes Association.

Using hyperlinks in tweets promotes information and knowledge to users and enhances the interactivity between organizations and their followers. Holton et al. (2014) argued that Twitter users might add hyperlinks on their tweets to spark conversations with followers or direct their audience to similar information for more awareness. Sedhai and Sun (2014) have also found that Twitter users were more willing to share a tweet with a hyperlink than tweets without the link. Shahin and Dai (2019) suggested that organizations adopt hyperlinks on their tweets to mobilize and engage in conversations with the public rather than to simply transmit information about itself. Based on the literature review, we proposed the following hypothesis:

H₄: Tweets containing hyperlinks will receive more online engagement than tweets without containing any hyperlinks.

Finally, it is important to highlight the written language being used on social media, especially when disseminating health communication in a largely minority community. To effectively engage with a variety of online audiences, the local government, hospitals, and nonprofit organizations need to consider including appropriate written language within their digital content (i.e., Spanish, Creole, etc.). Thon and Jucks (2017) also found that the type of online language being used in health information plays an important role in building public trust. Online users consciously seek and accept health information that uses “everyday language,” that is close to their own cultural and community’s backgrounds (Thon and Jucks, 2017, p. 834). O’Mara (2013) suggests that public health professionals adopt dynamic and linguistic characteristics to engage with diverse communities. Scholars believe that such a strategy can contribute significant exploration of community identity and cultural participation on social media (De Choudhury et al., 2007; Russo, 2011). Therefore, in a largely Hispanic and Latino community, it is important to adopt digital content in bilingual languages (Russo, 2011; De Choudhury et al., 2007). It should be noticed that many social media platforms, like Twitter, have the auto translation function. Nevertheless, studies have learned that these translations are not always accurate, which could influence the effectiveness of health-related messages being delivered to non-English speakers in the U.S. (Ramos et al., 2020). Therefore, we argue that the local government, hospitals, and nonprofit organizations from these communities should use bilingual content on social media during a health crisis.

H₅: If organizations used bilingual tweets in this minority community, these tweets would receive more online engagement than tweets in English only.

Methods

Sample

This research collected tweets from six organizations in a U.S.-Mexico border town, Laredo, Texas, from March 14th to December 14th, 2020. These organizations include three governmental organizations (City of Laredo, Webb County Government and the City of Laredo Health Department) responsible for handling the COVID-19, two nonprofit organizations (Gateway Community Health Center, Inc. and Alzheimer’s Association San Antonio and South TX) that were identified on the [GuideStar.org](https://www.guidestar.org) database whose missions are related to health issues and finally one public hospital (Doctors Hospital of Laredo) in the region that was active on Twitter.

Active Twitter accounts are measured by the activity level of each account and whether they have made a post at least one tweet per month. The study does include a small number of organizations, however, these organizations selected were active and provided critical and essential communication in disseminating public health information within the community. Laredo, located in the U.S.—Mexico border is a relatively small city in Texas. 95.5% of the city’s population identified as Hispanic or Latino Origin (U.S. Census Bureau, 2024). According to Garza (2021), the city government and the Webb County government took primary responsibilities on providing press briefings, daily updates on social media, and other public health support. Further, during the pandemic, local citizens also wanted to interact with their physicians. In Laredo, there are five major hospitals, and only two of them have varying levels of capacities (e.g. number of beds, personal protective equipment, and other essential resources) to handle COVID-19 cases (Texas Department of State Health Services, 2022). The Doctors Hospital of Laredo was selected because it had an active Twitter account during our study period. Nonprofit organizations were another sector of focus in this study as they provided support to communities during the pandemic (Yu et al., 2021). The researchers used [GuideStar.org](https://www.guidestar.org), a nonprofit database to identify the non-profit organizations used in the study. In our search, there were only 12 nonprofit healthcare organizations in good standing and with strong assets and revenues (total assets and revenue are more than \$1). Among these 12 nonprofit organizations, there were only two that had active Twitter accounts during the selected period. Due to these rationales, these six organizations fit into the scope of our study.

The researchers then used NVivo to collect tweets from these organizations between March 14th to December 14th, 2020. We selected March 14th as the starting point, because it was the official date when the COVID-19 pandemic was declared as a national emergency. When this study was conducted, no one could foresee how long it could last. Therefore, we were hoping to capture how health information was disseminated and exchanged at the early stage of the pandemic on Twitter in the targeted community. This protocol resulted in the collection of 3,159 tweets.

Dependent variables

Social media can facilitate online engagement by using interactive and synchronous communication with numerous participants. Scholars emphasized that social media engagement is about “social” (Heldman et al., 2013; Neiger et al., 2013). The #SMMStards coalition was the first organization that proposed the appropriate evaluation standards and metrics to measure social media engagement (Neiger et al., 2013; Shearer and Mitchell, 2021). The coalition suggested that the engagement on social media platforms should be measured by different online interactions. Several studies have adopted this suggestion and measure public engagement on Twitter by measuring several indicators, such as the number of likes, retweets, and replies (Guidry et al., 2017; Park et al., 2016; Tang et al., 2021). To be consistent, in this article, we also used those three indicators as the dependent variables to determine public reactions on different Tweets. For the total engagement measure, a proxy for media consumption, we used a summative metric of the total number of likes, comments, and retweets.¹

Independent variables

This research was interested in studying the use of Twitter in the selected organizations during a public health crisis (e.g., the COVID-19 pandemic). The first independent variable focuses on the three different strategic approaches utilized within the tweets by the selected organizations. We adopted this categorical variable based on the social media typology (Lovejoy and Saxton, 2012), which identified three major social media strategic approaches: dissemination of information, building a community, and two-way communication. Figure 2 presents the typology from Lovejoy and Saxton’s (2012) work. It should be noted that their typology was initially designed in nonprofit organization’s context. Many following studies have adopted and applied this typology with modification in different contexts. For instance, Park et al. (2016) took on this typology and argued that health organizations implemented social media as a critical information dissemination tool, especially during a health crisis; fostered a healthy community by educating the public, answering questions/comments, and receiving recognition/appreciations; and solicited people to take action for prevention or maintaining their health behaviors. Based on these studies, we developed a coding scheme, which fits in this study’s context.

The second independent variable aims to observe if the selected organizations adopted the local community’s language on their social media content. Scholars have argued that language is one of the most prominent factors within any culture, which serves as the main tool to help new members exchange ideas, knowledge, and their needs within the community (Fishman, 1989; Lee, 2002).

Additionally, previous findings show that using bilingual or non-English digital content in certain minority communities could create a virtual space where members have a sense of belongingness, which helps to promote community engagement and resistance during crisis situations (Algesheimer et al., 2005; Villegas and Marin, 2021). The selected organizations in this study are in a largely predominant Hispanic community where the primary language spoken is Spanish.

Finally, this article includes a set of independent variables to analyze the public’s reaction when information is delivered via Twitter in either plain text, tweets containing any audiovisual information (e.g., pictures or videos), and tweets with a hyperlink.

Coding scheme and process

The coding scheme in this study contains three steps. First, the researchers checked if each tweet included any audiovisual content (picture or video), since social media scholars agree that audiovisual content can attract more online engagement from followers (Guidry et al., 2017; Sleight et al., 2021). Additionally, we checked if each tweet contained a hyperlink. Then, the researchers reviewed every tweet to determine if the content was published in English or Spanish.

Second, the researchers adopted the Lovejoy and Saxton typology (Lovejoy and Saxton, 2012; Park et al., 2016) and modified it to fit into the scope of this study. In Lovejoy and Saxton’s typology, social media content primarily offers three functions: information dissemination, building a community, and taking actions. In our research context, the researchers coded those tweets into three categories (1) “information dissemination” (e.g. news, updates, and announcements about the pandemic); (2) “building conversation” (e.g. a tweet encouraged users to ask questions, make comments, or give feedback to the organizations); (3) “promoting actions” (e.g. if the tweet encouraged the public to take specific behavioral action, such as to wear a mask, encourage hand washing, or practice social distancing).

Lastly, the researchers checked if the tweets showed appreciation to public health professionals or administrators in order to gain community support. We also controlled for “appreciation,” which was dichotomously coded as tweets that expressed gratitude or not. Table 1 presents the coding scheme.

After the coding scheme was developed, two coders worked independently on coding 100 tweets, which were randomly selected from the database. The coders then met together to discuss any disagreements based on the coding scheme. After the discussion, two coders finished coding the rest of the tweets and the intercoder reliability (Krippendorff’s alpha) is 0.87. Based on previous studies, when the Krippendorff’s alpha between 0.70 to 0.90, the reliability coefficient can be accepted (Lombard et al., 2002).

Analytic strategy

We employed hurdle models for the multivariate analysis. Because within our sample, a higher number of tweets have zero likes, retweets or overall reactions, greatly exceeding the expected

¹ We also ran a model using Number of Comments as the dependent variable, but that model was poorly specified, likely due to low levels of variation. Within our sample, most tweets did not receive comments, with likes or retweets being the preferred method of reacting.

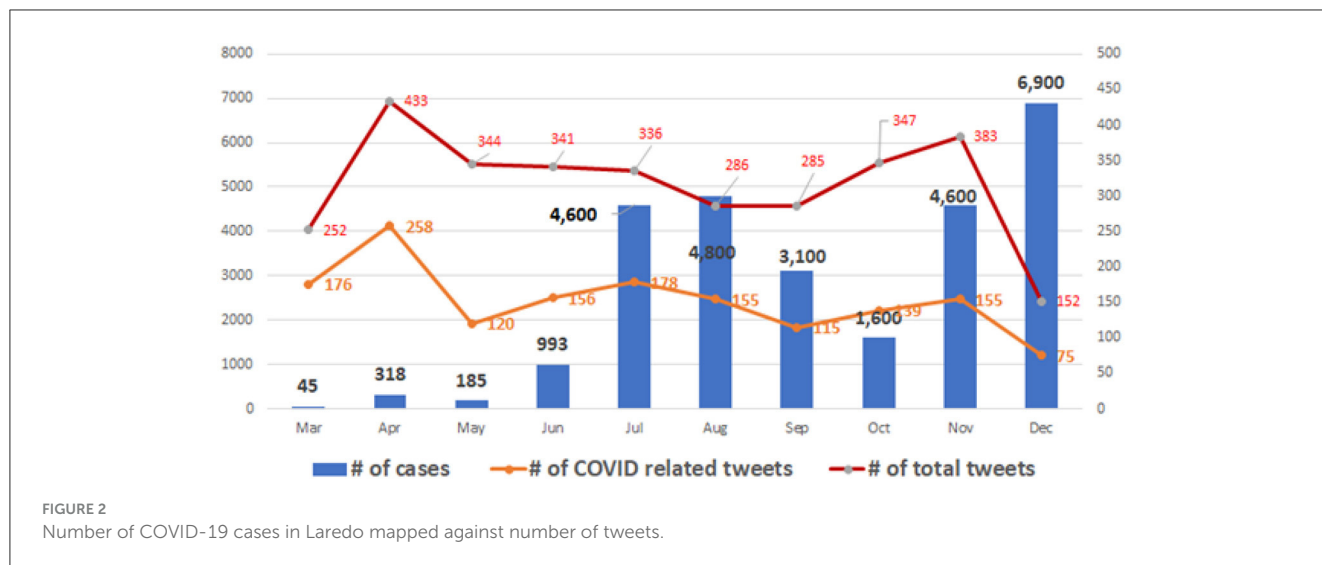


TABLE 1 Coding scheme with examples.

Categories	Narrative	Example tweet
Using picture	A picture can be included in a tweet	A picture of health professionals wearing masks and other protections and working in the local community
Using video	A video (or a link to a video) can be embedded in a tweet and can be played in users' Twitter feed	The city of Laredo posted a video link, which provided a press about the specific situation in the community during the pandemic
Using hyperlink	A link can be incorporated to direct other users to content outside of Twitter	The City of Laredo has amended its Emergency Ordinance. The updated ordinance is effective immediately. Read full ordinance: https://t.co/TGuhJUHgGo
Including Spanish	A tweet is written in Spanish language	ESTAMOS ABIERTOS Estamos tomando todas las precauciones necesarias para protegerlo a Usted y a su familia. #gatewayfamily #holalaredo #laredotx #zapatatx #hebbbronvilletx (We are open and we are taking every precaution to keep you and your family safe) #gatewayfamily #holalaredo #laredotx #zapatatx #hebbbronvilletx
Information dissemination	Informing people about the news, updates, information, or knowledge about the COVID-19 pandemic	In light of the situations posed by COVID-19 in Texas and across the United States, both Mayor Pete Saenz and Webb County Judge Tano Tijerina issued emergency declarations for the City of Laredo and the County of Webb, respectively
Building conversation	A tweet encourages users to ask questions, make comments, or give feedback to the organizations	Have questions about COVID19? Our public health professionals are here to help
Promoting actions	A tweet encourages people to make specific actions to prevent or protect themselves from the COVID-19 virus	For many, the holidays are going to look a little bit different this year. Keep yourself and those around you safe by avoiding large gatherings and remembering these tips
Appreciation	Giving recognition and thanks to people from the local community during the pandemic	This week, we also take a moment to recognize National Hospital Week. The dedication of our health care workers, first responders and all hospital staff is now more important than ever as we all come together to combat COVID-19

count, hurdle models are more appropriate for this analysis than other forms of regression, such as ordinary least squares or Poisson (García, 2013). This approach allows us to more accurately explore the multivariate relationship for this type of data by analyzing the dependent variables in two parts: (1) the probability of attaining a value of 0, or no interaction, (interpreted as binary logistic regression results) and (2) the probability of the non-zero values (interpreted as count regressions—we use negative binomial regression to account for overdispersion in our dataset) (see García, 2013). Three regression models were conducted, varying the dependent variables: (1) Number of Likes, (2) Number of Retweets, and (3) Total Reactions.

Findings

Descriptive findings

The descriptive findings (see Table 2) suggest that the local government, hospitals, and nonprofit organizations in a predominantly minority community have actively used social media during a major health crisis. During the 9-month data collection period, the six selected organizations published 3,159 tweets, with 1,527 (48%) tweets related specifically to COVID-19. On average, each tweet received six likes and three retweets. Figure 2 presents the frequency of the total number of tweets and

COVID-related tweets by month during the sample period (i.e., mid-March through the first part of December in 2020). The bars on the figure represent the number of positive COVID-19 cases identified in the local community. On March 13, 2020, COVID-19 was declared a national emergency and the selected organizations across all sectors became extremely active on Twitter up until May 2020. In July of 2020, the number of COVID-19 cases spiked within the community and as shown in the figure, the selected organizations continued posting tweets at a relatively steady pace, even as COVID-19 cases decreased in October and then rose again toward the end of the year. Figure 2 demonstrates that at the onset of the unexpected and emerging pandemic, the selected organizations used social media immediately and frequently to communicate to their local community. However, as the pandemic continued beyond everyone’s expectations, public organizations restored their pre-pandemic frequency of using social media and not as a health crisis management tool.

The descriptive findings also show that most tweets ($n = 2,243$, 71%) were focused on information dissemination, which includes giving daily COVID-19 case updates, public health announcements, or the selected organization’s public policies addressing the pandemic. These organizations have also used Twitter to provide health and safety guidance to the public in response to the pandemic such as hand washing, mask wearing, and following social distancing guidelines. These types of tweets occupied 24.2% of our total sample. Lastly, the results demonstrate that the selected organizations in this community failed to build

ongoing and interactive conversations via Twitter with the public during the pandemic. In our sample, only 3.7% of tweets used this function to interact with the users. These tweets occasionally asked the public if they had any questions or difficulties.

Our findings revealed that although the selected organizations were from a minority community primarily Spanish-speaking, most tweets (96.5%) were published in English only. Only 3.7% of tweets from the sample were written in Spanish. Interestingly, organizations have overwhelmingly used audiovisual, especially pictures on their tweets. 89.9% of tweets included some picture as part of their content, while 4.8% of tweets included videos, and 5.1% of tweets did not use any audiovisual digital content. Finally, 49.3% of tweets included a hyperlink on their content, which can provide additional information beyond the 140 characters allowed per tweet.

Regression analysis

Results from our hurdle models suggest that both content and formatting of social media content impact overall public consumption of the media. More specifically, we found that posts including an audiovisual component (i.e., either a picture or video) were more likely to have increased likes and retweets.

The first step of a hurdle model yields a binomial regression output, evaluating the likelihood of engagement through interaction (see Table 3). Not including a picture in a tweet, vs.

TABLE 2 The descriptive findings.

Variable	Measurement	Categories	Mean/freq.	SD	Obs.
Dependent variables					
Likes	The total number of “like” under each tweet		3.89	10.187	3,156
Retweets	The total number of “retweets” under each tweet		2.37	6.761	3,159
Engagement	The total number of “likes” + the total number of “retweets” + total number of comments under each tweet		6.39	16.774	3,156
Independent variables					
Strategic approach	Derived from the content analysis (1 = information dissemination; 2 = building conversation; 3 = promoting actions)	1 = information dissemination	2,243 (71%)	0.859	3,122
		2 = building conversation	116 (3.7%)		
		3 = promoting actions	763 (24.2%)		
Language	Derived from the content analysis (0 = English; 1 = included Spanish)	0 = English	3,043 (96.3%)	0.247	3,159
		1 = included Spanish	116 (3.7%)		
Using audiovisual	Derived from the content analysis (0 = no audiovisual; 1 = picture; 2 = video)	0 = no audiovisual	161 (5.1%)	0.402	3,153
		1 = picture	2,841 (89.9%)		
		2 = video	151 (4.8%)		
Using hyperlink	Derived from the content analysis (0 = no hyperlink; 1 = with a hyperlink)	0 = no hyperlink	1,598 (50.6%)	0.511	3,156
		1 = with a hyperlink	1,558 (49.3%)		
Appreciation	Derived from the content analysis (0 = no appreciation; 1 = showed appreciation)	0 = no appreciation	2,941 (93.2%)	0.318	3,156
		1 = showed appreciation	179 (6.8%)		

TABLE 3 Binomial regression analysis.

	Likes	Retweets	Reactions
Intercept	-0.209** (0.073)	-1.447*** (0.084)	-0.016 (0.073)
Audiovisual			
Plain text	-0.908*** (0.184)	-1.284*** (0.226)	-0.885*** (0.180)
Video	-0.034 (0.183)	0.311 ⁺ (0.187)	-0.104 (0.185)
Hyperlinks	0.068 (0.083)	0.675*** (0.085)	0.031 (0.085)
Appreciation	-0.045 (0.158)	-0.086 (0.186)	-0.009 (0.157)
Language	-0.158 (0.209)	-0.030 (0.226)	-0.202 (0.210)
Tweet primary function			
Building conversation	-0.925*** (0.211)	-0.417 ⁺ (0.226)	-0.862*** (0.207)
Promoting actions	-0.790*** (0.093)	-0.564*** (0.097)	-0.750*** (0.093)

⁺p < 0.1.
 **p < 0.01.
 ***p < 0.001.

TABLE 4 Truncated regression analysis.

	Likes	Retweets	Reactions
Intercept	-10.880 (77.815)	-9.064 (68.034)	-8.591 (76.200)
Audiovisual			
Plain text	-0.924*** (0.279)	-0.421 (0.406)	-1.008*** (0.270)
Video	0.651* (0.261)	0.537 ⁺ (0.314)	0.616* (0.263)
Hyperlinks	0.443*** (0.117)	0.336* (0.150)	0.602*** (0.119)
Appreciation	-0.424 ⁺ (0.223)	-1.173*** (0.319)	-0.646** (0.216)
Language	-0.372 (0.345)	-0.178 (0.359)	-0.288 (0.289)
Tweet primary function			
Building conversation	0.034 (0.345)	-0.090 (0.406)	0.010 (0.339)
Promoting actions	-0.401** (0.140)	-1.119*** (0.173)	-0.555*** (0.140)
Log(Theta)	-13.114 (77.815)	-11.419 (68.035)	-11.288 (76.201)

⁺p < 0.1.
 *p < 0.05.
 **p < 0.01.
 ***p < 0.001.

including a picture, lowers the log odds of interaction (i.e., likes, retweets, and reactions; $p < 0.001$). We further found that tweets including an external link, vs. those that do not, raises the log odds of retweets ($p < 0.001$), in support of H_4 . This finding is contrary to previous research suggesting that the inclusion of hyperlinks “reduces the reach of a message” and “loses the opportunity to provide immediate, actionable information” (Vos and Buckner, 2016). Finally, significant differences were observed based on primary tweet function, with the models indicating that higher levels of engagement (e.g., call for actions) yields lower odds of consumption.

The second output from the hurdle analysis are the truncated models, which estimated the probability of non-zero values (i.e., accounting for tweets that had no interaction), as shown in Table 4. Consistent with significance in the binomial estimations, the truncated models indicate that the difference in the logs of

expected counts for both likes and reactions is expected to be lower for tweets with no picture compared to those with a picture, while holding the other variables constant in the model, with an inverse effect observed for videos. We further found that the difference in the logs of expected counts for interactions is expected to be higher for tweets with a hyperlink compared to those without one, while holding the other variables constant in the model. These findings further bolster the logic from the truncated models, suggesting that these characteristics impact not just *if* there will be engagement but the extent or severity of interactions as well.

However, we also found elements of appeal to the community to be significant in these models. For example, the difference in the logs of expected counts for interactions is expected to be lower for tweets promoting action compared to those primarily disseminating information, while holding the other variables constant in the model. The greater the tweet’s intended purpose in terms of action-oriented results, the less likely an individual is to interact. This is against H_2 , because when individuals are given information, they are more likely to disseminate to broader audiences, rather than interacting with tweets that advocate action.

Discussion

This article explored how the local government, hospitals, and nonprofit organizations used social media to interact with a largely Hispanic population during a major health crisis. To answer our research questions, we collected the first 9 months (from the declaration of the national emergency in 2020 until the end of that year) of Twitter data from the selected organizations after COVID-19 was declared a nationwide emergency. The findings revealed that these organizations have adopted social media as a mechanism to primarily deliver public health information, which is consistent with previous studies (Ben-Mussa and Paget, 2018; Lee et al., 2021). These organizations also used social media with different strategies to mobilize the public to take actions to mitigate the health crisis, although the effort fell short. Based on the findings, there are several issues that have been identified when using social media during a health crisis that should be considered.

First, we observed that the selected organizations failed to promote a two-way conversation strategy via Twitter. Our data revealed that the selected organizations published an extremely small number of tweets (3.7%) that aimed to build a conversation with their followers. And under these tweets, people were less likely to provide any interactions. One possible explanation could be that because there is a limited number of conversational tweets, a level of trust has not been formed with the public, thus lessening these types of interactions. This is further supported by previous scholars (Mergel, 2013; Bonsón et al., 2015; Lovejoy and Saxton, 2012) who argued that if an organization used social media mainly as a one-way communication tool, the levels of interactivity would be low. In other words, the local government, hospitals, and nonprofit organizations cannot expect their online followers to react to their tweets if these organizations primarily have sent very few tweets aimed at building a conversation.

It is also worth mentioning that in analyzing tweets that sought to disseminate information, several citizens asked questions

or left comments. Yet, we did not capture any responses from those selected organizations. This could have potentially discouraged citizens from engaging with those organizations. It is unclear why the selected organizations, including the local government, did not provide timely responses to the public. One reason could be that these local organizations lack human and capital resources to monitor and manage their social media channels. Falco and Kleinhans (2018) found that the availability of human resources, intra-organizational culture, and institutional framework are potential challenges of using social media in local governments and other organizations. We suggest that public organizations devote more resources to monitoring their citizens' interactive behaviors. Furthermore, organizations need to develop a substantial strategy that mixes different content approaches (information dissemination, building conversation, and promoting actions) to guide the public during a health crisis. Future research should investigate the ratio of this mix using different research designs (e.g., the experimental design).

Another significant observation is the importance of a continuous and consistent presence in using Twitter to disseminate health-related information, especially during a health crisis. Through our analysis, we found that the selected organizations did maintain a high level of activeness at the beginning of the pandemic (March and April 2020). Thus, it is not surprising that tweets about COVID-19 had a greater log odd of interaction and higher logs of expected counts. As shown in Figure 2, although the number of COVID-19 cases continued to increase until September, we observed a decrease in the number of tweets from the selected organizations. More importantly, the scholars noticed a pattern of repetition and redundancy of tweets (i.e., reporting the number of active cases, mortality rate, etc.), which results in inattention from the public and experience a possible burn-out effect on their social media accounts. The scholars recommend a more intentional and strategic approach that produces social media content that seeks to engage and appeal to their audience.

This study also found that the digital content of social media did significantly influence citizens' engagement in times of uncertainties. Compared with plain text and video, including pictures in tweets encourages more likes and retweets, which have been observed by other scholars (Guidry et al., 2017; Rahim et al., 2019). However, Chen et al.'s (2020) recently argued that including pictures was not a predictor for citizen engagement on Sina Weibo (one of the most popular Chinese social media platforms) during the COVID-19 crisis. It should be noted that Chen et al.'s study was conducted in a Chinese community, which is different from a Hispanic community in the U.S.-Mexico border area. Different communities contain different cultural norms and behaviors, which may reflect how people use social media.

Interestingly, this study found that there were low levels of digital content in the Spanish language, especially given that the population largely speaks Spanish. This may explain why including pictures attracted more engagement within this community because some local citizens were not able to understand the English language used in the Tweets. This finding is significant in that it should inspire organizations to devote more resources in developing more audiovisual content to engage with the public with a diverse cultural background.

Finally, although not significant in our models, we would be remiss to not discuss the significant role of language. As mentioned previously, given that 91.3% of the population speaks Spanish (InfoPlease, 2020), the use of Spanish language content was incredibly low within the dataset. The lack of usage of the Spanish language likely explains why the variable did not rise to the level of significance in our estimation procedures. Research has found that addressing populations in their localized contexts, such as native languages and associated linguistic idioms, and integrating bilingual language habits is critical for the creation of an inclusive environment (Blackburn, 2021). Thus, it is possible that content generation that uses phraseology germane to a specific language would bolster responsiveness of audiences resulting in an increase in interactions. For example, instead of simply translating a Tweet posted in English into Spanish, as was the case for many of the Spanish-language tweets in our dataset, content creators could use phrasing and word choices in Spanish that may not have direct translations in English but that would be more relatable and understandable to Spanish-speaking audiences (Ramos et al., 2020).

Limitations

There are several limitations to this article. First, we only collected data during the first 9 months of tweets published after the COVID-19 pandemic was announced as a national emergency in 2020 of March. When this research study was conducted, there was no foreseeable end to the pandemic. We felt that 9 months of data collection and analysis (March to December of 2020) was sufficient because the aim of the study was to evaluate the extent of the use of social media in disseminating health-related information during a health crisis. Subsequent studies should continue to study how health professionals and related agencies use social media to address COVID-19 related issues or future health crises by expanding the data collection since COVID-19 is still affecting people across all communities.

Second, this article includes a limited number of organizations in our analysis. This is due to the limited number of active Twitter accounts being operated among the qualified organizations in this minority community. Conversely, this also reveals a community shortage of internet communication technology. Chunara et al. (2021) have also observed that several innovative technologies, such as telemedicine, and other health-related communication tools were not accessible in minority groups in New York City during COVID-19. Future studies should expand the investigation of using social media in other minority communities, which can identify if certain types of social media or content is more effective at engaging their residents during a health crisis.

Third, the analysis in this article was conducted in a largely predominantly Hispanic community. We assumed that most followers on the selected organizations' Twitter accounts were also from the local community. We did not use any filtering mechanism to ensure all these followers were exclusively from the Hispanic population. Future studies should consider using a more advanced method, which can identify social media users' demographic information more accurately. Although this article

focused on a small region at the border of Texas, the findings and results lend us social media strategies to other minority communities throughout the U.S. For instance, our finding about the lack of inclusive language on social media could be a general issue in most minority communities, where the primary language is not in English. Currently, more than 67 million Americans speak a foreign language at home (Hong et al., 2021). Future studies need to emphasize more on investigating how to help these vulnerable, non-English speaking groups to minimize the digital health disparities in the U.S.

Conclusions and practical implications

This study explored and analyzed how public health-related organizations used social media to disseminate health-related information during a health crisis (i.e., the COVID-19 pandemic) in a predominantly Hispanic community located in a border town. Social media, such as Twitter, can be an effective health communication tool if it is used to engage with the local community. This engagement needs a substantial strategy, which includes a mixture of different approaches, such as information dissemination, building conversations, and mobilizing actions. Additionally, the strategy shall also consider using audiovisual content, such as pictures to elicit more public engagement. This can enhance the influence on changing the public's attitudes and behaviors toward health issues.

Further, organizations need to consider using multi-language content in their social media strategy. According to the U.S. Census data (Zeigler and Camarota, 2018), there are at least 85 cities and Census Designated Places in which most residents (over 50%) speak a foreign language at home (Laredo is the 2nd on the list with 92%). The findings in our study revealed that local government agencies and other organizations have not fully considered communicating with their social media users in their home language, which could potentially cause information asymmetry and health disparities.

We hope this study will inspire more local governments and health-related organizations to actively create social media content that is created in multiple languages and is culturally-sensitive. Further, future studies in public health communication should explore and examine if using bi- or multi-lingual digital contents is more effective within these communities during a health crisis. Our study also highlighted the need to provide consistent and frequent social media content in the local community. But being consistent does not mean being redundant. One way is to have the local government and health professional invite their residents to a townhall to generate creative and inclusive public health information together. It is the collective actions of community members that will help to slow and mitigate future health crises. Future studies may use both qualitative and quantitative methods to justify if this collaborative effort could help to reduce health misinformation on social media in these unique communities. As demonstrated in this research, with such a diverse population like that of the U.S., local organizations responsible for the health of the public need to invest more resources (i.e., human

capital) in leveraging social media as an effective health crisis communication tool.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the study involving human data in accordance with the local legislation and institutional requirements. Written informed consent was not required, for either participation in the study or for the publication of potentially/indirectly identifying information, in accordance with the local legislation and institutional requirements. The social media data was accessed and analyzed in accordance with the platform's terms of use and all relevant institutional/national regulations.

Author contributions

WS: Conceptualization, Data curation, Investigation, Project administration, Supervision, Writing – original draft, Writing – review & editing. TY: Data curation, Investigation, Project administration, Writing – original draft, Writing – review & editing. JD: Formal analysis, Methodology, Writing – original draft, Writing – review & editing.

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