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Minnesota State Parks and Trails' use of Facebook to Communicate Health and Safety Information During the COVID-19 Pandemic

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Abstract

During the COVID-19 pandemic, state park visitation increased to levels above previous years. While navigating the pandemic, natural resource communicators took to social media to communicate about how COVID-19 was impacting park services and operations. We examined how the Minnesota State Parks and Trails (MSPT) engaged in health communication using Facebook over the first two years of the COVID-19 pandemic. We used quantitative content analysis to measure content and engagement on the N = 105 posts made by the MSPT from 2020 - 2022 regarding COVID-19. Results provide an understanding as to how natural resource communicators engaged in health communication during a pandemic. While natural resource communicators were tasked with communicating about an unfamiliar issue, appropriate science communication principles should be incorporated into all science communication plans. MSPT and communication staff at other state parks agencies should ensure they are prepared to communicate about health issues in times of crisis.

Keywords

COVID, health communication, natural resources, social media, state parks

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Introduction

COVID-19 is an illness caused by the infection of an individual with the acute respiratory syndrome coronavirus 2 (Mayo Foundation for Medical Education and Research, 2022). On January 29, 2020, the United States established the White House Coronavirus Task Force to foster a nationwide response to the disease and on March 13, 2020, announced that COVID-19 was a national emergency (CDC, 2022). Over the next years, the United States and the world were challenged with fighting a global pandemic that was impacting the physical and psychological wellbeing of people everywhere (Mayo Foundation for Medical Education and Research, 2022).

Stay-at-home orders and lockdowns became terms heard regularly in the media and these restrictions were experienced at varying levels depending on the actions taken by federal and state governments (Mayo Foundation for Medical Education and Research, 2022). On March 25, 2020, Governor Tim Walz declared a "Stay at Home" order to help limit the spread of COVID-19 across the state of Minnesota (State of Minnesota, 2020). While this order required residents to primarily shelter in place in their homes, it did allow for residents to participate in outdoor activities such as walking, hiking, running, biking, hunting, and fishing (State of Minnesota, 2020).

With residents sheltering in place, people began experiencing restlessness and boredom, causing many to explore the outdoors in ways they had not in the past (Naomi, 2020). State and National Parks across the country saw increases in visitorship during the pandemic, with State and National Parks located closer to metropolitan areas seeing the greatest uptick in visitation (Alba et al., 2022). During the initial stages of the stay-at-home order, the Minnesota State Parks and Trails (MSPT) saw state park visits increase by 50% (Gray, 2021). One state park in Minnesota saw over 68,000 visitors in April 2020 while in all of 2019 the state park had just over 31,000 visitors (Gray, 2021).

With this sudden increase in visibility and visitorship, the natural resource communicators with MSPT were tasked with harnessing all communication channels when communicating with this new and growing audience about health and safety while visiting these state parks. In this study we evaluated how MSPT utilized Facebook, its most followed social media platform, to communicate health and safety information to visitors.

Review of Literature

During times of crisis, state and national parks have employed various strategies to communicate with their audiences. Effective communication is crucial in crisis situations to ensure the safety of visitors, maintain public trust, and provide accurate information (Coombs, 2007). In the face of crises, parks have utilized different communication channels to reach their audiences.

Online engagement and news media have played a significant role in disseminating information during park crises (Rim & Sung, 2019). News media has actively framed crisis responses, sometimes focusing on defensive strategies rather than accommodative ones (Rim & Sung, 2019). Social media and other online platforms have also been utilized to provide updates,

share safety guidelines, and address visitor concerns (Page, et al., 2013). Furthermore, crisis communication in national parks has been influenced by factors such as visitor patterns, attitudes toward protected area management, and national park affinity (Arnberger et al., 2023; Arnberger et al., 2012).

Understanding visitors' perceptions and attitudes toward park regulations and nature conservation measures can facilitate effective communication and management during crises (Arnberger et al., 2023). In the context of the COVID-19 pandemic, parks faced unique challenges in communicating with their audiences. Public parks, which serve as recreational spaces for diverse communities, were affected by COVID-19 policies and restrictions (Volenec et al., 2021). Parks have had to adapt their communication strategies to ensure visitor safety, enforce social distancing measures, and provide information on park closures and reopening plans (Volenec et al., 2021; Alba et al., 2022).

The COVID-19 pandemic has not only impacted the physical health and well-being of individuals, but it has also undoubtedly harmed the mental and psychological health of individuals as well. As lockdowns went underway in many states, individuals were forced to social distance themselves (CDC, 2022). Isolation from others and loneliness can be a causal factor leading to stress development, depression, anxiety, and mortality (Hawkley & Cacioppo, 2010).

A series of online mental health surveys between June 24 and June 30, 2020, were conducted on the effects of COVID-19 on the mental health of Americans, finding that 40.9% of respondents experienced a negative mental health effect, 30.9% experienced anxiety/depressive disorders, and 26.3% experienced trauma/stressor-related disorder (Czeisler, 2020). A survey from the Kaiser Family Foundation (KFF) found that approximately 32% of Americans had a negative mental health consequence because of COVID-19 between March 11– March 15, 2020 (Lopes et al., 2020). Around 21% of Americans have experienced high levels of distress, and approximately 28% have stated that the pandemic has changed their lives significantly (Keeter, 2021). Further, approximately 39% of low-income individuals have experienced high levels of distress related to the COVID-19 pandemic (Keeter, 2021).

Previous studies have indicated that outdoor recreation spaces and access to nature have positive effects on mental and emotional health on individuals during the COVID-19 pandemic (Geng et al., 2020; Dhzambov et al., 2021; Pouso et al., 2021; Soga et al., 2021). A survey conducted in Spain revealed that when individuals were under strict lockdown due to COVID-19, contact with nature helped improve their mental well-being (Pouso et al., 2021). A survey conducted in Tokyo, Japan found that individuals who had a certain level of exposure to nature and greenspaces experienced decreased levels of anxiety and depression, while also having higher levels of happiness (Soga et al., 2021). Additionally, a survey from Bulgaria on 323 students found that greater access to indoor and outdoor nature correlated with diminished levels of anxiety and symptoms of depression (Dhzambov et al., 2021).

Accordingly, there has been an increase in interest for outdoor recreation during the pandemic (Kleinschroth & Kowarik, 2020). Urban forest visit attendance almost doubled since the beginning of the pandemic (Derks et al., 2020). A study conducted on the usage of urban green spaces in Oslo, Norway found that it increased approximately 291% compared to previous years (Venter et al., 2020). Urban greenspace visitation across 12 US cities saw an uptick in visitation since March 2020 compared to levels in previous years (Preitzger et al., 2020).

As the limitations on social gathering places, workplaces, and formal public venues became stricter, the number of visitations to parks generally increased (Geng et al., 2021). Park

visitation during the initial onset of COVID-19 increased to above levels from previous years in places with less intensive initial responses to the pandemic such as in Canada and Denmark (Geng et al., 2021). Park visitation initially decreased, then slowly increased in countries with strict lockdown measures and a high number of cases during the preliminary stages of the pandemic such as in Italy (Geng et al., 2021). Visitation to various parks generally increased compared to the levels of visitation seen pre-pandemic years (Geng et al., 2021).

Nevertheless, a key component and critical factor of all the studies about park visitation during the COVID-19 pandemic was the government response to the pandemic, such as the closing of parks and recreational areas, as well as the number of cases present within the country/state at that time (Geng et al., 2021). Depending on the number of cases and restrictions placed on individuals by the government, the park visitation fluctuated (Geng et al., 2021). Consequently, marketing and messaging of parks plays a critical role in maintaining visitor safety, while retaining the social and emotional benefits offered by greenspaces (Geng et al., 2021; Slater et al., 2020; Perry et al., 2021).

Minnesota is colloquially known as the "The Land of 10,000 Lakes" and its topography is critical for a variety of state managed outdoor recreation facilities. Across Minnesota, there are 66 state parks, 4,466 campsites, 9 recreation areas, 108 water access sites, and 244 horse camp sites (Minnesota Department of Natural Resources [DNR], 2022). On average, there are an estimated 1,049,382 campers who visit campsites across the state annually, and an average of 9,857,793 people who visit Minnesota Parks annually (Minnesota DNR, 2022).

The Minnesota DNR uses various social media platforms to communicate information with its audiences; specifically, the Minnesota DNR uses Facebook, Twitter, Instagram, and LinkedIn (Minnesota DNR, n.d.). With over 150,000 followers, Facebook is the most popular social media platform utilized by the Minnesota DNR.

Social media usage in the United States has drastically increased over the years, with it being a primary source for information for Americans during the COVID-19 pandemic (Venegas-Vera, Cobert, & Lerma, 2020). Approximately 70% of Facebook users go on the site daily, and around 49% of Facebook users use the site more than once a day (Auxier & Anderson, 2021). Of the adults who frequent the internet, approximately 52% of them use two or more social media sites (Duggan et al., 2015).

Social media has played a critical role in health communication in natural resource spaces during the 21st century. Ruth and colleagues (2020) evaluated the use of Twitter to discuss mosquito-borne diseases before, during, and after Hurricane Michael hit Florida in 2018. Additionally, Mcleod-Morin and colleagues (2020) evaluated the efficacy of a social media campaign aimed at combating mosquito-borne diseases in Florida.

Social media and its role as a method of crisis communication was exacerbated during the COVID-19 pandemic. A study between August 31, 2020, and September 7, 2020, found that about 53% of adults in the United States use social media to get their news "often" or "sometimes" (Shearer & Mitchell, 2021). Of the 53% of American adults who use social media to get their news, approximately 36% of them get their news directly from Facebook, 23% use YouTube, and 15% use Twitter (Shearer & Mitchell, 2021). Moreover, of the 53% of Americans who use social media to get their news, approximately 30% of them have gotten a lot of news about COVID-19 vaccines from social media, and approximately 43% of them have gotten some news about COVID-19 vaccines from social media (Mitchell & Liedke, 2021). Kandzer and colleagues (2022) identified how the Center for Disease Control and Prevention framed social

media communication during the COVID-19 pandemic and recommended the use of organization-public relationship (OPR) indicators in social media content, specifically videos.

There are a multitude of benefits as well as consequences of social media health communication by individuals. Some benefits include the greater access of health information, the increasing dialogue and interactions between individuals, and the increase in availability of emotional and social support amongst individuals (Moorehead, et al., 2013). Some of the consequences/limitations of using social media as a means for health communication include widespread misinformation, lack of privacy, and the lack of reliability of the information (Moorehead et al., 2013). Some conclusions deduced from these benefits and consequences of health communication on social media are that posts should have quality assurance as well as maintain individual confidentiality (Moorehead et al., 2013). With this in mind, the content of these messages becomes increasingly important. Previous scholars have investigated the content of social media posts from governmental agencies communicating about COVID-19 (Chen et al., 2020) and when communicating about climate change (Ferndandez et al., 2016). These scholars found that the inclusion of salient scientific information was important for connecting with the target audience and bringing about social media engagement (Li & Xie, 2019; Ferndandez et al., 2016). Additionally, Chen and colleagues (2020) found that image content positively impacted likes and retweets on Twitter.

Previous literature on health communication across social media platforms by government agencies has been studied with varying degrees and technicalities. A study on the Macao Special Administrative Region (SAR) government Facebook data regarding COVID-19 found that posts can be categorized into “Plans and Measures”, “Public Health Messages”, “Rumor Control”, “Latest News”, “Appreciation”, “Community Resilience”, and “Press Conference Live” (Pang et al., 2021). Moreover, it was found that engagement on the social media posts by individuals increased heavily during the “acute stage “of the COVID-19 pandemic as restriction measures were coming to fruition and COVID-19 cases were increasing (Pang et al., 2021). However, there was considerably less engagement during the “prodromal stage” – before the first case of COVID-19 was confirmed – and during the “chronic stage” as the pandemic began to decrease in spread (Pang et al., 2021).

A study on the United States State Park Systems’ COVID-19 messaging revealed that most communications entailed limiting use or reducing the impact of use across a variety of activities (Perry et al., 2021). The COVID-19 communication posts were categorized into 7 different strategies utilized by state parks: Information/Education, Rationing/Allocation, Rules/Regulations, Law Enforcement, Zoning, Facilities/Development, and Influence Pre-visit Decisions (Perry et al., 2021). Each of these practices were coupled with a strategy of either limiting use or reducing the impact of that use (Perry et al., 2021). It was found that the use of these strategies, especially the influencing of pre-visit behavior, coupled together with effective communication allowed state parks to allow individuals to recreate safely while managing the stressors induced by COVID-19 (Perry et al., 2021).

Communication throughout the COVID-19 pandemic continues to be a topic of scholarly inquiry. One way the COVID-19 pandemic has impacted lives is through access to recreational activities. Health restrictions and guidance have allowed the public to have some semblance of normalcy in the outdoors thanks to the lowered transmissibility of COVID-19 outdoors. The value of social media for health communication can be examined using the conceptual framework, *Leveraging Internet for Knowledge Sharing* (LINKS) model (Abidi, 2012). Grounding in *Community of Practices* (Lave & Wenger, 1991), the model has been used to

evaluate the effectiveness of and conversations that take place on the internet (Stewart & Abidi, 2012). Previous studies have used this framework to examine Twitter-based health conversations surrounding breast cancer, PTSD, and Alzheimer's disease (Xu et al., 2017). The present study sought to understand how COVID-19 health and safety knowledge was shared on the Facebook page of the MSPT.

Theoretical Framework

We used Situational Crisis Communication Theory (SCCT) as the theoretical lens of this study. It was developed to provide crisis managers with evidence-based recommendations for crisis response strategies (Coombs, 2006). SCCT suggests that crisis managers should make informed choices about crisis response strategies based on theoretical and empirical evidence, rather than relying on hunches or recommendations from simple case studies (Coombs, 2006). According to SCCT, the selection of crisis response strategies should be based on the nature of the crisis and how stakeholders perceive the crisis response strategies (Coombs, 2006). Previous scholars have used SCCT to evaluate health communication in times of crisis used by the Red Cross (Sisco, et al., 2010), chain hotels during the COVID-19 pandemic (Atasoy, Turkay, & Sengul, 2022), and high-profile food poisoning incidents (Dulaney & Gunn, 2017). However, in the context of natural resource communication the literature is silent.

The theory proposes that crisis response strategies should be matched to the specific crisis situation (Coombs, 2006). These strategies range from denying any responsibility to accepting full responsibility for the crisis (Coombs, 2006). The specific communicative strategies to be used in a crisis depend on three main factors: initial crisis responsibility, crisis history, and prior reputation/relation history (Dardis & Haigh, 2009). Depending on these factors, the literature suggests responding with a particular message type, each of which is encamped within one of several overall strategy categories (Dardis & Haigh, 2009). SCCT aims to provide organizations with guidelines for how to respond to various public reactions to a crisis according to different crisis types (Zimand-Sheiner et al., 2021). While the MSPT was not responsible for the COVID-19 crisis, its impact on the operations of the organization puts crisis communication at the forefront of communication challenges during this time.

The theory also assesses the impact of the crisis on the organization's long-term reputation (Zimand-Sheiner et al., 2021). It is based on attribution theory, which explains how people assign causes to events and accounts for emotional experiences and subsequent behaviors (Zimand-Sheiner et al., 2021). While SCCT has been widely used in crisis communication research, it has its limitations in explaining factors that could potentially affect the reputation of an organization (Jamal & Bakar, 2017). However, it has been applied in various contexts, such as the food industry (Zimand-Sheiner et al. 2021) and during the COVID-19 pandemic (Utami et al., 2022). Organizations can use SCCT to develop a tactical, planned, measurable, and evaluable crisis communication strategy (Utami et al., 2022). With state and national parks being some of the only outdoor and perceived "safe" activities to participate in during the pandemic, the reputation of the MSPT must certainly be considered both during and after the crisis.

The theory provides a foundation for crisis communication strategies and can be used in conjunction with other theories, such as public relations and cyber public relations, to effectively manage crises (Jamal & Bakar, 2017). SCCT considers factors such as initial crisis responsibility, crisis history, and prior reputation/relation history in determining the appropriate

crisis response strategies. While it has its limitations, SCCT has been widely applied in various contexts and can serve as a foundation for developing crisis communication strategies.

Purpose and Research Objectives

The purpose of this study was to investigate the use of Facebook by the State Parks and Trails system of Minnesota when communicating about health and safety related to the COVID-19 pandemic. The following research objectives guided this study:

> RO1: Describe the Facebook posts shared by MSPT related to the COVID-19 pandemic between March 2020 - March 2022.
>
> RO2: Describe the engagement of Facebook posts shared by MSPT related to the COVID-19 pandemic between March 2020 - March 2022.

Method

In order to address the research objectives, we employed quantitative content analysis. We collected posts from the MSPT Facebook page in April 2022 and screenshots of the individual posts, post reactions, and post comments were saved. A census of posts made from March 1, 2020, to March 31, 2022, that addressed health and safety related to COVID-19 were collected, with a total of $N = 105$ posts making up the sample for this study.

The unit of analysis was the individual Facebook post. General attributes of each post were coded including month the post was made and day of the week the post was made. This allowed us to better understand how much the MSPT communicated over the first two years of the ongoing COVID-19 pandemic well as which days of the week MSPT used Facebook to communicate health and safety information related to COVID-19 in natural resources. Additional variables include:

Word Choice/Use: The post used either the word “COVID”, “Coronavirus”, both “COVID” and “Coronavirus”, or neither “COVID” nor “Coronavirus” in the post.

Reaction Numbers: The total number of reactions on the post including “Like”, “Love”, “Care”, “Haha”, “Wow”, “Sad”, and “Angry”.

Comments: The total number of comments on the post.

Shares: The total number of times the post was shared.

Image Use: Did the post include an image?

Graphic Use: Did the post include a graphic?

Tags: Did the post tag any other person, page, group, etc. on Facebook?

Links: Did the post provide one or more links to an external website?

Hashtag Use: Did the post include any hashtags?

Disease Information Present: Did the post include scientific information regarding COVID-19?

Disease Mitigation/Safety Guidelines: Did the post include any information about how individuals might protect themselves from COVID-19 such as taking precautions, increased safety measures, etc.?

Park Accessibility: Did the post include information that communicates about the accessibility of the park to the public?

Land, Water, & Wildlife Safety/Protection: Did the post include information about how the park system is working to protect land, water, and wildlife during COVID-19?

Reliability in content analysis is the level of agreement between how two or more coders categorize content (Riffe et al., 2014). Coder training took place in June 2022 using Facebook posts from a state parks and trails page from a neighboring state that offers similar natural resource exploration experiences as Minnesota. Guided by Wimmer and Dominick (2003), we both analyzed 10% of the total content in order to determine intercoder reliability. Krippendorff's alpha was used to determine intercoder reliability as it is most appropriate with small sample sizes (Riffe et al., 2014). After coding, we determined that all variables had an acceptable (Riffe et al., 2014) Krippendorff's alpha level of .821 - 100% agreement. After completing coder training, one member of the research team analyzed the remaining content. Descriptive statistics were determined using Jamovi, a point-and-click extension for R (R Core Team, 2020).

Results

RO1: Describe the Facebook posts shared by MSPT related to the COVID-19 pandemic between March 2020 - March 2022.

Over the course of the first two years of the ongoing COVID-19 pandemic, MSPT posted 105 times on its Facebook page with information related to COVID-19. We identified which days of the week the MSPT posted content related to the ongoing COVID-19 pandemic. Fridays had the greatest number of posts each week with $n = 25$ total posts over the 25-month period. This accounts for 23.80% of the totals posts made. Tuesdays and Sundays were the two days of the week with the fewest number of posts. Each day had a total of $n = 8$ posts each, accounting for 7.60% of total posts made over the 25-month period. Table 1 outlines the post frequency across all days of the week.

Table 1
Frequency of Posts Regarding the Ongoing COVID-19 Pandemic on MSPT Facebook Page from March 2020 – March 2022 (N = 105)

Day	Total	%

Friday	25	23.80
Thursday	19	18.10
Saturday	19	18.10
Monday	13	12.40
Wednesday	13	12.40
Tuesday	8	7.60
Sunday	8	7.60

We additionally analyzed the frequency of posts per month across the 25-month period. April 2020 was the month with the greatest number of Facebook posts with 21 total posts throughout the month. There were three months over the two-year period where health and safety information regarding COVID-19 was not communicated on the Facebook channel including March 2021, and March and April 2022. There were 3 months where only 1 post was shared related to health and safety regarding COVID-19. The mean number of posts per month was M = 4.2 (SD = 4.25).

Next, we analyzed the content of each post. We first determined the word use in each post by determining if MSPT used "COVID-19", "Coronavirus", both, or neither term in its communication on Facebook. The vast majority of posts n = 96 (91.4%) did not use either term in its communication, while n = 9 (8.6%) posts used the term "COVID-19". We next analyzed each Facebook post for the inclusion of a photograph or a graphic. Most posts n = 94 (89.5%) included an image in the post, while only n = 9 (12.4%) included a graphic.

Tags, links, and hashtags are common ways Facebook users link information and connect audiences to resources. We found that very few n = 9 (8.6%) of posts tagged any other Facebook account and only n = 6 (5.7%) posts included a hashtag of any kind. However, MSPT used its Facebook posts a great deal to link its audience to external resources and information. Finally, n = 89 (Almost 85% of posts (n = 89) included a link to resources outside of Facebook.

Finally, we analyzed message content of the Facebook posts. Across all N = 105 posts, no post communicated disease-related information including signs and symptoms. Just over a third (35.2%, n = 37) of posts outlined steps visitors could take to help mitigate coming into contact with COVID-19 and/or protecting themselves. MSPT did use Facebook to communicate a great deal about park accessibility related to COVID-19 during the 25-month period as n = 86 (81.9%) of posts clearly discussed park accessibility. However, very few posts communicated about land, water, and wildlife safety and protection during the 25-month period as only n = 6 (5.7%) of posts communicated these messages. Table 2 outlines the message content of the Facebook posts.

Table 2
Message Content of Facebook Posts Regarding the Ongoing COVID-19 Pandemic on MSPT Facebook Page from March 2020 – March 2022 (N = 105)

Message Content	Total	%
Park Accessibility	86	81.9
Mitigation/Protection Information	37	35.2
Land, Water, & Wildlife Safety & Protection	6	5.7
Disease-Related Information	0	0

RO2: Describe the engagement of Facebook posts shared by MSPT related to the COVID-19 pandemic between March 2020 - March 2022.

Post reactions across all Facebook posts ranged from as low as *n* = 18 "like" and *n* = 0 "love", "care", "Haha", "Wow", "Sad", and "Angry" to as high as *n* = 1,200 "like" and *n* = 337 "angry". Table 3 outlines the descriptive statistics related to Facebook post reactions.

Table 3
Facebook Post Reactions Regarding the Ongoing COVID-19 Pandemic on MSPT Facebook Page from March 2020 – March 2022 (N = 105)

	Mean	Median	SD	Minimum	Maximum
"Like"	191	147	167.01	18	1,2000
"Love"	19.1	11	33.84	0	306
"Sad"	7.37	0	36.62	0	264
"Angry"	6.43	0	40.51	0	337
"Haha"	0.71	0	3.11	0	27
"Care"	0.31	0	0.78	0	4

We additionally determined the total number of comments and shares on each post. The mean number of comments per post was *M* = 38.3 (SD = 123) and the average number of shares per post was *M* = 50.1 (*SD* = 97.2). With such large standard deviations, Table 4 outlines the comments and shares across all Facebook posts.

Table 4
Shares and Comments on Facebook Posts Regarding the Ongoing COVID-19 Pandemic on MSPT Facebook Page from March 2020 – March 2022 (N = 105)

	Mean	Median	SD	Minimum	Maximum
Shares	50.08	22	97.22	0	596
Comments	38.28	6.00	123	0	957

Conclusions, Discussion, and Recommendations

Quantitative content analysis such as this provides us with a great deal of information regarding how MSPT navigated using its Facebook platform to communicate with its audience throughout the first two years of the COVID-19 pandemic. Previous literature has been silent regarding how state-level natural resources organizations communicate health information to audiences, but the COVID-19 pandemic brought out unexpected challenges specifically for natural resources communicators. In this study we specifically focused on the most used social media platform for MSPT, Facebook. We found that while MSPT posted content each day of the week, Friday was the day with the greatest number of posts across the two-year period. This comes as no surprise as MSPT sees visitor traffic increase on weekends (Minnesota DNR, 2022). Communicating with this in mind is key for the target audience as exposure to outdoor spaces has been found to have a positive impact on the mental and physical wellbeing of the public (Geng et al., 2020; Dhzambov et al., 2021; Pouso et al., 2021; Soga et al., 2021). Further, by

communicating with this in mind during the crisis, MSPT could benefit the long-term reputation of the organization (Zimand-Sheiner et al., 2021).

SCCT proposes that crisis response strategies should be matched to the specific crisis situation (Coombs, 2006). These strategies range from denying any responsibility to accepting full responsibility for the crisis (Coombs, 2006). While the COVID-19 pandemic was certainly not the fault/responsibility of the MSPT, MSPT does hold the responsibility of communicating sound information regarding public health to those who use its spaces. Therefore, it is important that natural resource communicators view crisis communication in this context as a responsibility despite the lack of ownership of the crisis.

We additionally analyzed which months across the two-year period saw the greatest number of Facebook posts. April 2020 was the month with the greatest number of posts at $n = 21$ posts, almost 1 post per day during this month. April 2020 stands in stark contrast to the other 24 months analyzed as it had 10 more posts than the next most populated month, November 2020. However, the greatest and quickest shifts in MSPT operations happened during April 2020 as it was the first full month of the COVID-19 pandemic (Minnesota Public Radio, 2021). As many people's go-to source for information regarding the MSPT, the agency appropriately used its social media platform to connect with its audiences early during the pandemic.

Coombs (2006) recommends that crisis managers make informed decisions about the crisis response based on stakeholder needs. The greater information communicated earlier during the pandemic indicates that the MSPT prioritized its stakeholder needs in this communication, but we saw this wane throughout the rest of the 2-year period of study. We recommend natural resource communication practitioners maintain communication throughout the crisis response despite the sometimes-redundant nature of the communication we see in instances such as the COVID-19 pandemic. In doing this, MSPTs can communicate to stakeholders that it continues to value the health and safety of its stakeholders and makes communications decisions based on sound scientific information in each crisis situation. Future research in this area should identify how other crises were communicated in natural parks that were less polarizing (i.e. wildfires, zoonotic disease, flooding, etc.).

Next, we analyzed the content of the Facebook posts. In this portion of the study, we found that over 90% of posts did not use the term "COVID" or "Coronavirus", but instead illuded to the pandemic through references to social distancing, keeping each other safe, protecting oneself, etc. The omission of clear terminology fails to align with recommendations from previous scholars regarding the use of terminology in science communication (Chen et al., 2020; Ferndandez et al., 2016; Xu et al., 2014). Future research should qualitatively investigate how the COVID-19 pandemic was communicated to audiences while omitting the terminology of "COVID" and "Coronavirus."

Tags, links, and hashtags are additionally common ways Facebook users can grab the attention of their audience. While the MSPT included links to external resources in 85% of its posts, less than 10% of posts included hashtags or tags of other individual or page accounts. As a short form of communication, social media often relies heavily on the inclusion of links to connect audience members to information and resources outside of that included in the social media message (Freberg, 2019). However, hashtags and tags allow readers to connect with messages and conversations surrounding topics internally on Facebook (Freberg, 2019). The omission of hashtags and links in the vast majority of posts certainly puts MSPT Facebook visitors at risk for not getting all of the information available to them on Facebook surrounding this issue. Future research should investigate how MSPT and other state parks agencies

leveraged internet resources when communicating about COVID-19 on social media platforms. This information could be beneficial in shaping future use of social media in health communication for MSPT and other state park agencies. Clear communication is important during a time of crisis and keeping stakeholders up-to-date on key information should be prioritized by crisis managers (Coombs, 2006).

Further, posts were analyzed for the inclusion of disease information, disease mitigation and safety guidelines, park accessibility, and land, water, & wildlife safety and protection. Across all four key messages, park accessibility was the only message that was consistently communicated in MSPT Facebook messages with over 80% of all posts mentioning accessibility of the park. The stark omission of information regarding disease information, health and safety, and land, water, and wildlife protection could indicate that the natural resources communication staff at MSPT may not be equipped or prepared to communicate health information to its target audience. Natural resource communicators should be equipped with the knowledge, skills, and resources to communicate across a variety of scientific issues that might impact their audiences, especially those communicating on behalf of governmental organizations (Chen et al., 2020). Future research should investigate how these types of key messages were communicated across other state and federal-level natural resources organizations.

Finally, we analyzed engagement with Facebook posts throughout the first two years of the COVID-19 pandemic. Post engagement ranged from $n = 18$ "likes" on one post to $n = 1{,}200$ "likes" on another post. "Likes" were the most common reaction to posts, which have been found to most commonly indicate support for a post or acknowledgment of a post (Freberg, 2019). Over the two-year period, no post received zero interactions via the "like" button on Facebook. This can be an indicator for social media managers that Facebook content is reaching the audience (Freberg, 2019). Future research should qualitatively analyze content of messages that received a high number of significant support such as "love" or "care" and significant dislike such as "sad" or "angry."

Total number of shares and comments on Facebook posts was also analyzed in this study. On average, posts received 383.3 comments and 50.1 shares. Comments ranged from 0 – 957 and shares ranged from 0 – 596. Comments and shares on Facebook can provide a great deal of public opinion information to scholars and communicators. Comments can allow for the audience to feel as if they are contributing to the organization and are shaping opportunities and outcomes (Chen, 2020; Freberg, 2019). Future research should qualitatively analyze these Facebook comments to better understand what feedback is valuable for MSPT moving forward and which comments were just people sharing their opinions regarding COVID in general, state and federal level guidance/requirements, etc. Similarly, shares on Facebook can provide MSPT with a great deal of information regarding who is sharing their content, how they are adding to the conversation by adding a comment to the post they share, and who is sharing the information (Freberg, 2019). Future research should determine how MSPT messages are being shared with other audiences via the Share function on Facebook including analyzing message content from individuals sharing the posts as well as other agencies sharing posts. By doing this, we can also better gauge MSPT's reputation management during the crisis (Coombs, 2006).

Few state-level agencies have ever been challenged with a health communication issue such as the one brought on by the COVID-19 pandemic. This exploratory study sought to understand how one state-level natural resource agency used its Facebook platform to communicate during this trying time. While natural resource communicators were tasked with communicating about an issue unfamiliar to most, appropriate science communication principles

should be incorporated into all science communication plans. MSPT communication staff and communication staff at other state parks agencies should ensure their staff are adequality prepared to communicate about health issues in both times of crisis and outside of times of crisis. Future research should investigate how natural resource agencies communicate during times of crisis and how this communication varies between natural resource crises (floods, wildfire, etc.) and health crises. Additionally, since SCCT specifically relates to stakeholder reactions and response, future research should examine social media responses of stakeholders during times of crisis. This could include analyzing copy added when sharing a status, analyzing the comments section under posts, and sentiment analysis surrounding the agency during the time of crisis.

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