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**AN ANALYSIS OF RISK  
COMMUNICATION BY THE FINNISH  
AND SCOTTISH GOVERNMENT ON  
TWITTER DURING THE COVID-19  
PANDEMIC**

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## ABSTRACT

Sainab Mohamed: An analysis of risk communication by the Finnish and Scottish government on Twitter during the COVID-19 pandemic

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*Background:* The scale and nature of the unprecedented COVID-19 pandemic demonstrated the importance of timely and immediate information dissemination to mitigate the transmission of the highly infectious virus. Governments have begun to utilize various social media platforms to provide useful and up-to-date information to the public. Although social media platforms are being increasingly utilized for risk communication, a limited amount of studies, particularly within Europe, have studied how stakeholders, such as governments, use social media to communicate risks, and the content that is communicated by these actors.

*Aims:* The current study aimed to gain an insight in the ways the Scottish and Finnish government used their Twitter platforms to communicate the risk of COVID-19 and how their communication developed overtime. Drawing on the Crisis and Emergency Risk Communication framework (CERC), the author aimed to explore to what extent communicated risk messages aligned with CERC's six principles (be first, be right, be credible, express empathy, promote action and show respect).

*Methods:* Twitter posts published between March 1, 2020 and June 30, 2020 by the Finnish and Scottish governments communicating the risk of COVID-19 were manually retrieved using Twitter's advanced search engine. 146 Finnish tweets and 330 Scottish tweets were deemed relevant and manually coded separately using principles from both content- and qualitative content analysis.

*Results:* Both governments predominantly used Twitter to share key messages regarding COVID-19, explain what they were doing or going to do to mitigate the situation, and promote action. The findings illustrate that both governments published the greatest number of tweets communicating the risk of COVID-19 when the number of new cases were significantly starting to rise, almost at their peak. All six CERC principles were reflected in the Finnish and Scottish government's Twitter posts during the study period although, some to limited extents.

*Conclusion:* *The findings of the study suggest that social media is a useful tool for risk communication, however, from a CERC prospective, gaps in risk communication strategies were identified. False information regarding COVID-19 has been rampant, however both the Finnish and Scottish government hardly used their Twitter platforms to address misinformation or rumors. This study has the potential to serve as a roadmap for strengthening the social media risk communications of government organizations, providing lessons learnt and areas within risk communication that need improvement.*

Keywords: risk communication, COVID-19 pandemic, social media, Twitter, Finnish government, Scottish government, crisis and emergency risk communication (CERC)

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## LIST OF ABBREVIATIONS

|          |   |
|----------|---|
| CDC      | Centers for Disease Control and Prevention                                  |
| CERC     | Crisis Emergency Risk Communication   |
| COVID-19 | Coronavirus disease   |
| ECDC     | European Center for Disease Prevention                                      |
| EVD      | Ebola Virus Disease   |
| NHS      | National Health Service   |
| THL      | Terveyden ja hyvinvoinnin laitos (Finnish Institute for Health and Welfare) |
| WHO      | World Health organization   |

## 1. INTRODUCTION

In the past few years, a number of infectious diseases outbreaks such as Influenza, Zika, and Ebola have exemplified the significance of effective risk communication strategies in regard to infectious diseases. In 2020, the world faced one of the worst global health crises initiated by the spread of the novel coronavirus disease. The unprecedented pandemic, declared a global pandemic by the World Health Organization (WHO) in March 2020, has brought a standstill to the ‘normal’ regular lives of people within all societies and continues to represent a global threat to public health. As Akbari et al. (2021) state well, many public systems were challenged during the COVID-19 crisis, as government organizations immediately facilitated measures to prevent the spread of the virus such as the closing of all educational, and recreational centers and non-emergency retailers. As a result of government mandated social distancing and lockdown measures, dependence on social media platforms for health purposes has increased substantially (Malik et al., 2021). Due to the nature of the novel coronavirus, the rapid delivery of reliable information was deemed to be extremely crucial to mitigate the transmission of the infection (Lima et al., 2020).

Empirical studies have shown that social media can be utilized for communicating infectious disease outbreak-related updates and information during a crisis to improve both response and understanding (Lwin et al. 2018). For instance, Ding and Zhang (2010) discovered that the outbreak of H1N1 was first reported on social media. Social media has played an essential role during the ongoing COVID-19 pandemic, providing up-to-date health information and shaping public attitude. Nevertheless, with its rapid-paced information dissemination, social media has proven to be prone to misinformation. According to Kemp (2020), the latest estimates indicate that approximately 3.8 billion people use social media, making up almost 60% of the world’s population. As Lima et al. (2020) well elaborated, we are currently not only living in a pandemic, but we’re also going through an ‘infodemic’, as the spread of fake news has become rather popular. Henceforth, the active presence and participation of governments and public health authorities on social media platforms is critical at a time like this.

The ongoing COVID-19 pandemic has shown to be a great challenge for many government organizations. Governments have had to make rapid decisions and impose strict restrictions for the public, unaware of what the social and economic consequences could be (Nutbeam, 2020). As primary means of communication, world leaders, governments, and public health institutions used various social media platforms to disseminate information regarding COVID-19 rapidly and to keep the public updated during the pandemic (Li et al. 2021; Rufai and Bunce 2020). Wang et al. (2021) claim that among all social media platforms, Twitter, the leading microblogging platform globally, has played an essential role in communicating COVID-19 information.

Existing studies regarding risk communication have mainly focused on environmental public health: disaster and emergency management during man-made and natural hazards (Wang et al., 2021). Research on the risk communication of communicable diseases is still developing, however the body of research lacks rigorous empirical evidence and evaluation research on event-specific risk communication efforts (Glik, 2007). Although the use of social media in public health emergencies has received interest in the research field the past few years, many of these studies focused on social media as a tool for health information diffusion (e.g., Leung and Leung, 2020), as an early detection of infectious disease outbreaks (e.g., Yousefinaghani et al., 2019; Kostkova et al, 2010; Velasco et al., 2014), and its effects on preventative health behaviours (e.g., Arif and Ghezzi, 2018). Fewer studies have evaluated risk messages disseminated by stakeholders such as governments, during a public health emergency. As Reuter et al. (2012) further state, numerous research articles published on this phenomenon focus on social media use by the public during a crisis. Moreover, although there have been studies conducted in European settings addressing organizational use of social media in times of crisis (e.g., Tirkkonen and Luoma-aho, 2011), they are fewer in number.

To fill the gap in knowledge regarding the topic at hand, this study aims to explore how Twitter, as a social media platform, was used by both the Scottish and Finnish government to communicate the risk of COVID-19 during the first wave of the pandemic. In addition, the study aims to assess how these risk messages align with the Crisis and Emergency Risk communication (CERC) framework, more specifically their six CERC principles. The CERC framework was selected as it has been widely adopted

for strategic risk communication in various public health emergencies, with its recommendations of best practices during each stage of a crisis (Reynolds & Seegar, 2014). Alongside being situated in Europe, the Scottish and Finnish government were selected as they acquire official, verified Twitter accounts and were active on Twitter prior to the COVID-19 crisis. Furthermore, both governments acquired high levels of public trust during the COVID-19 pandemic (University of Helsinki, 2020; University of Edinburgh, 2020).

## **2. LITERATURE REVIEW**

### **2.1 Defining risk communication**

The literature demonstrates several definitions of risk communication (Hampel, 2006). According to the the European Centre for Disease Prevention and Control (ECDC) (2013), the term risk communication, in the field of public health, commonly refers to the exchange of information regarding health risks or threats to health, social- or economic wellbeing among individuals, groups and institutions. This form of communication commonly occurs between experts and those individuals facing the threats. The overall aim of risk communication is to deliver relevant, accurate and timely information to the public, in regard to the risks of the exposure (ECDC, 2013).

When defining risk communication, it is imperative to distinguish its meaning from crisis communication, as they differ in various aspects. Using time, method and content to clarify the distinction between working definitions of both terms, ECDC (2013), states that risk communication is known to start before the crisis occurs and continues throughout and even after a crisis. In contrast, crisis communication focuses on the communication during a crisis situation, for instance an outbreak, when individuals are in need of rapid guidance if affected regarding how to protect themselves and others. Crisis communication messages tend to focus on what is known and not known about a current condition or situation (for instance, its cause, magnitude, cause, blame, consequences, control); risk communication messages, on the other hand, aim to reduce the chances of a crisis event transpiring in the long run (Seegar et al., 2003; Sellnow et al., 2009). According to the Sandman (2003) category, risk communication during an outbreak or serious pandemic, can be referred to as crisis communication. Evidently, crisis communication makes up a significant part of the main activities of risk communication. Although this research study assumes a distinction between the two concepts, it is important to note that the terms are frequently used interchangeably in scientific literature (Infanti et al., 2013).

As a technical term, risk communication surfaced in the early 1970's during the environmental health debates associated with toxic chemicals nuclear power, waste disposal, heavy metals and biotechnology, hence why there is minimal consensus about

its meaning, impact and methods (Fischhoff, 1995). Numerous studies have highlighted the vast discrepancies in the way “risks” are defined, understood and evaluated (Fischhoff, 1995; Hampel, 2006). In the field of social sciences there are two broad models of risk used commonly: the “realist” approach and the “social constructionist” approach. According to Smith (2006) within the “realist” approach, risk is perceived to be an objective threat that can be measured independently of the social context within which it transpires. On the other hand, within the “social constructionist” approach, risk is seen as a threat that is constructed through both social and cultural processes. Slovic (1997), who has done extensive research on risk perceptions, argues that “risk” includes both objective and subjective qualities and that risk judgement results from social, cultural and psychological influences, to a certain extent.

## **2.2 Theoretical models of risk communication**

According to Covello et al. (2001), risk communication is constructed of four models (also referred to as theories) demonstrating how risk information is managed, how risk perceptions are formed and how risk decisions are made. These four theories are known to provide a basis for coordinating effective risk communication during high-concern circumstances. In terms of promoting and regulating health and safety, it is essential to understand the ways in which individuals perceive and respond to risk. Each theoretical model will be addressed briefly below.

The majority of the empirical research conducted on the *risk perception model* involves how the public perceive the risks of modern technologies. Risk perception is influenced by a series of characteristics; in figure 1, a table of the 15 risk perception factors are demonstrated that have been identified to have direct relevance to risk communication. According to Covello (2009, p.144), the paradox that the risks which can kill or harm people and the risks that upset people are very different, is known to be one of the most important paradoxes recognized in the literature of risk perception. For instance, there are numerous risks that make people upset and anxious but are known to cause little harm, and at the same time there are risks that can kill individuals or cause significant harm, but do not make individuals so upset or worried. The following paradox can be partly clarified by the risk perception factors indicated in figure 1.

| TABLE. Risk perception factors   |
|----------------------------------|
| 1. Voluntariness.                |
| 2. Controllability.              |
| 3. Familiarity.                  |
| 4. Equity.                       |
| 5. Benefits.                     |
| 6. Understanding.                |
| 7. Uncertainty.                  |
| 8. Dread.                        |
| 9. Trust in institutions.        |
| 10. Reversibility.               |
| 11. Personal stake.              |
| 12. Ethical/moral nature.        |
| 13. Human versus natural origin. |
| 14. Victim identity.             |
| 15. Catastrophic potential.      |
| (Covello et al., 2001)           |

Figure 1: Risk Perception Factors (Covello et. al, 2001)

As Slovic (1987) states, these mentioned risk perception factors have a significant influence in determining the levels of concern, anxiety, worry, anger, outrage and fear, consequently changing behaviors and attitudes. According to Covello et al., (2001), levels of public concern are regarded to be higher if the risk is associated with dreaded irreversible and adverse outcomes and untrustworthy institutions or individuals.

Furthermore, levels of concern, fear, worry, anxiety, anger and outrage tend to be more intense when the risk is perceived to be inequitable, involuntary, not beneficial, managed by untrustworthy organizations or individuals and not under an individual's personal control. Literature regarding risk communication often refers to the intense feelings that such perceptions can generate as "outrage" factors (Covello et al. 2001).

Evidently, public conceptions of risk are complex and are influenced by numerous factors. As Slovic (1997) emphasizes, many of the public's perceptions and concerns regarding risks cannot be merely blamed on unreasonableness or ignorance, however instead early studies have proven that a large extent of the public's reactions to risk can be attributed to a sensitivity to technical, social and psychological characteristics of

hazards (e.g. qualities mentioned in figure 1). A significant finding involving risk perception research, associated with Paul Slovic (2000), is that scientific experts and lay people perceive the concept of risk differently. As Hampel (2006) argues, past research has shown that the public acquire their own way of dealing with risks and that risk perception by lay people cannot be necessarily deemed less “rational” than the risk estimates presented by scientific experts. For instance, there are studies that have shown that lay people are capable of estimating the outcome of risky activities fairly well and their estimates are highly correlated with the estimations from experts (Hampel 2006). Whilst the scientific understanding of risk tends to focus on one risky activity omitting its concept from risk analysis, factors such as institutional and cultural values play a key role in the public’s understanding of risk.

*The mental noise model* is known to concentrate on how individuals process information when stressed (Covello et al. 2001; Covello, 2009, p.146). When people are stressed, upset or in a state of high concern as a result of significant danger, their ability to process information efficiently and effectively becomes significantly impaired. As Covello et al. (2001) elaborates, the strong emotions and stress associated with the exposures of risk are known to generate emotional arousal and/or mental agitation creating what is known as mental noise. Furthermore, exposure of risks which are linked to negative psychological attributes, such as risks perceived as inequitable or dreaded, are known to be accompanied by strong mental noise. Henceforth, one can state that mental noise has the ability to interfere with the way an individual engages in rational discourse. According to Covello (2009, p.146), as a result of mental noise, people’s ability to understand, hear and remember information is significantly reduced.

An extremely important aspect of successful and effective risk communication *the trust determination model*, which is a central theme within the literature of risk communication (Bickerstaff, 2004; Frewer 2004; Cope et al., 2010; Covello, 2009, p.146). According to Slovic (1993) the following model was mostly unappreciated in risk management efforts, until somewhat recently. He also brought light to how even the most well thought out and developed risk messages are destined to fail if people don’t have trust in the messengers or risk management institutions. Building trust is not an easy process, it is a cumulative, lasting process. In addition, it’s important to keep in mind that it can be easily lost and once lost, trust is very hard to regain. Research

indicates that the most important determinants of trust are: (1) caring, listening and empathy; (2) expertise and competence (capability and knowledge to be able to manage the risk in question); (3) openness, honesty and transparency and acting in the public interest (Covello, 2009, p.146; Covello et al., 2001, Bickerstaff, 2004; Cope et al., 2010). Perceptions of trust can be decreased by several actions that demonstrate disagreements among experts; lack of coordination within risk management authorities/organizations; unwillingness to disclose important information in a timely manner; the insensitivity and lack of effective listening, dialogue, and public participation by risk management authorities (Covello et al. 2001).

The processing of both positive and negative information during high-concern scenarios is described by *the negative dominance model*. According to Covello et al. (2001), although there is an asymmetrical relationship between negative and positive information in high stress situations, negative information tends to significantly receive greater weight. Furthermore, the author elaborates that the following model is coherent with a central theorem of modern psychology that individuals tend to put more value on losses (negative outcomes) than on gains (positive outcomes). As a result of this, one of the practical implications of this model is that it takes numerous positive or solution-oriented messages to counterbalance the one negative message. In accordance to Covello (2009, p.146), on average it takes around two to three positive messages to counterbalance a negative message during high concern scenarios. The use of avoidable 'negatives' during high concern situations can have the involuntary effect of submerging positive messages and solution-oriented information.

### **2.3 Risk communication via social media**

Since the emergence of social media, around the late 90's, the new social media not only altered the perception of risk and crises, but also the public's expectations towards emergency response officials (Wendling et al. 2013; Beneito-Montagut et al. (2013). Additionally, due to the rapid development of the web 2.0 and its applications, social media platforms, such as Facebook and Twitter, were vastly utilized to communicate about emergency events and risks, for example, the 2010 Haiti earthquake. As Glik (2007) claims, the utilization of media sources increases exponentially during a disaster or health crisis. Due to the increase in attention towards the usage of social media

platforms during times of extreme events, such as crises, more case studies on social media risk communication are emerging across various hazard types: hurricane, earthquake, environmental events, and infectious diseases (Wang et al. 2021). However, existing studies on risk communication mainly focus on emergency and disaster management during natural or man-made hazards, such as earthquakes or hurricanes (Beneito-Montagut et al., 2013; Wang et al. 2021).

Social media is a great platform in terms of offering opportunities for both experts and the general public to rapidly disseminate information to a vast number of individuals, which is critical during a time of crisis (Beneito-Montagut et al., 2013; Ophir, 2018). However, according to Malecki et al. (2020), this quality of social media poses to be both an asset and barrier to developing effective risk communication responses and strategies. Social media platforms, particularly micro-blogging sites such as Twitter, allow individuals to share short messages, whereas news reporting and accurate advice may entail more detail. Whereas response time via social media is known to be fast, the provision of up-to-date advice may be slow, which is a factor that can lead to rumors (Hornmoen and McInnes, 2018 p. 256).

Provision of correct information is regarded to be vital to prevent illness and death or mitigate fear during a pandemic, however social media is common for misinformation. Henceforth, it is essential for trusted parties and experts to use social media to quickly contradict misinformation with accurate information (Malecki et al., 2020). During the COVID-19 pandemic, several theories involving the virus, such as its origin, started to take hold on the internet, which originated from social media accounts with no credible evidence supporting their statements. Furthermore, essential information regarding ways to reduce the transmission and exposure to the virus have been jumbled by uncredited sources on various social media platforms (Mian and Khan, 2020).

According to Wang (2021), within the field of public health, several crisis and risk communication policies and guidelines published in the past decade have included a general introduction of the importance of social media in regard to communication. For instance, CDC's crisis and emergency risk communication manual has acknowledged the important role social media plays in information dissemination and its advantages in quick communication: providing accurate and valid information, and dispersing rumor

(Reynolds and Seegar, 2014). Furthermore, one of the guidelines for emergency risk communication policy and practice issued by WHO (2017), emphasizes social media's role in facilitating engagement with the public and peer-to-peer communication, responding to rumors, concerns and public concerns and reactions during a crisis, and creating situational awareness. Social media has always played a critically significant role in informing the public during times of crisis and emergencies; however, it now also has a growing role in shaping outrage (Glik, 2007; Ophir, 2018). Henceforth, effecting both the public's perceptions of risks and mitigation.

As mentioned previously, social media platforms have the potential to provide risk communicators advantages and this is due to their greater immediacy in comparison to traditional practices of communication. Since the number of public and professionals utilizing social media as a source of information and news is increasing, it is becoming more important for risk communicators to engage with this technology to efficiently deliver what is deemed important in ultimately saving lives (Glik, 2007; Hornmoen and McInnes, 2018 p. 257).

## **2.4 Governmental risk communication & Social media**

In critical events such as pandemics, government organizations play a key role in managing the crisis. Furthermore, due to governmental power increases during national public health crises, the presence of effective government communication becomes much more important to stabilize the society and combat pandemics (Shuaib, 2014). As Panagiotopoulos et al. (2016) state, the management of risk during emergency events is one of the major challenges in emergency risk communication. This is because the process involves various strategies such as setting standards, gathering information, and enforcing and proposing behaviors to mitigate the risks (Sellnow and Seegar, 2013). Furthermore, government organizations must demonstrate that they have the situation in control, by providing reliable and timely information to the public. Since authorities, public health emergency managers and other risk communicators face challenges with the demand to deliver accurate information quickly, the immediacy of social media is an essential feature during a public health crisis (Reynolds & Seegar, 2014). During times of crisis, stakeholders tend to be the ones with first-hand knowledge, hence they become the key sources of information and facilitators of a broader comprehension of the event.

Coordination of risk communication on social media is essential during crises among stakeholders, as an individual actor is incapable to acquire all the necessary resources needed to address unprecedented problems, such as infectious disease outbreaks (Wang et al. 2021). Social media is a great platform for organizations, such as governments, to gain an insight and monitor the environment, as communication information can be difficult to gather during a public health emergency (Reynolds & Seegar, 2014). Furthermore, utilizing social media platforms, governmental organizations are able to scan for areas of misinformation and gain an informal insight into what risk bearers are perceiving, feeling and sharing. According to CDC's CERC framework (2014), organizations should be regular users of social media prior to a crisis, hence social media relationships should be established early. If relationships have not been earlier established, social media users will go to other sources with whom they already have relationships for information regarding crises and risk.

Risk communication's impact can be mediated by social trust (Slovic, 1993; Löfstedt, 2005). For instance, according to Bargain and Aminjonov (2020), trust in government was found to be highly correlated with the public's agreement to preventative measures designed to flatten the infection curve. Although other factors are at play (e.g., health system capacity), this could indicate that governments facing lower degrees in trust, may face difficulty in enforcing containment measures and ensuring the populations compliance with public health measures to mitigate the COVID-19 outbreak.

## **2.5 Guidelines for effective risk communication via social media**

During a time characterized by rapid change, uncertainty and globalization, with the borders between nations providing no barrier to the transmission of infectious diseases, the emergence of new diseases and other re-emerging diseases, the need for both guidelines and models of effective risk communication is extremely essential (Infanti et al., 2013; Reynolds and Seegar, 2005). Within the field of health communication, particularly risk and crisis communication, there has been a lack of guiding theoretical frameworks (Veil et al., 2008). When their feasibility has been put to test, numerous risk and crisis communication frameworks and models developed by both scholars and organizations have often fell short (Malik et al., 2021). However, the CERC framework

which has been adopted widely for strategic communication in various crises, provides an evidence and theory-based framework for leaders to communicate benefits and risks under critical time constraints, avoid uncertainty surrounding risk through the various stages of a crisis and raise public awareness. The CERC model also incorporates social media into health crisis communication. Furthermore, it considers various social media platforms to communicate risk messages during a crisis.

The CERC model was developed in 2005 by the CDC after the events of the 9/11 and anthrax crises, once CDC realized that a more integrative approach to crisis, risk and emergency response communication was required, especially within an era where other global threats to public health were emerging (Reynolds and Seegar, 2005). As Manuel (2014) states, CERC's cohesive model acknowledges that a crisis is progressive and can affect different stakeholders at different times. The CERC model includes intensifying communication through five common stages of the crisis lifecycle: pre-crisis stage, initial event, maintenance stage, resolution and evaluation (Manuel, 2014; Reynolds & Seegar, 2014).

The Crisis and Emergency Risk Communication Model is based on six main principles to disseminate information during a crisis: be first, be right, be credible, express empathy, promote action, show respect (Reynolds & Seegar, 2014). To be the first source of information is regarded to be critical as it often becomes the favored source; being right involves delivering accurate facts regarding the crisis; being credible entails being honest; expressing empathy involves addressing the emotional level and challenges faced by the public; promoting action gives individuals something to do; and showing respect involves promoting cooperation.

Research that explores the application of the CERC model through social media has been applied in public health contexts, for instance in the 2009 H1N1 pandemic (Reynolds and Quinn, 2008), Zika epidemic in Singapore (Lwin et al., 2018), Hurricane Maria in Puerto Rico (Andrade et al., 2020), and Hurricane Katrina (Vanderford et al., 2007). However, as Bernard et al. (2021) state, research examining the application of CERC in a political context is quite limited. The study by Andrade et al. (2020), evaluated crisis communication by the Puerto Rican Government regarding Hurricane Maria and found that ineffective implementation of the CERC principles and themes

contributed to negative public perception, especially surrounding credibility and trust. Another study demonstrated that applying the six CERC principles through social media during the H1N1 pandemic increased public trust in the government's recommendations (Reynolds and Quinn, 2008).

## **2.6 Infectious disease outbreaks, social media & risk communication**

According to Li et al. (2021), several research papers have identified the potential of social media as a platform for risk communication, a source of early warning in regard to pandemics, and to keep track of the source and spread of misinformation. Within the field of public health, social media as a phenomenon, has been examined for early detection of epidemic outbreaks as a part of the web surveillance system, and to also predict infectious disease outbreaks (e.g., Kostkova et al, 2010; Kostkova et al. 2014; Yousefinaghani et al. 2019). Many of these studies started to emerge when infectious outbreaks started to occur within the past decades, such as H1N1, Ebola, MERS and SARS COV.

### **2.6.1 Lessons learnt from past infectious disease outbreaks & social media**

Various social media platforms, such as Instagram and Twitter, played an essential role in guiding the public during past infectious disease outbreaks such as the Zika virus outbreak and the Ebola Virus Disease (EVD) outbreak (Guidry et al., 2017). A study conducted by Guidry and coauthors (2017), demonstrated that WHO, CDC and Médecins Sans Frontières (MSF, also referred to as Doctors without Borders), incorporated the use of strategic risk communication principles, such as acknowledgement of concern and fears, and solution-based messaging, on both Twitter and Instagram. Furthermore, their results showed that all three organizations used their Twitter and Instagram platforms to post messages aiming to combat Ebola-related misinformation, although these messages were limited. Similarly, during the EVD outbreak, government organizations also used social media for crisis communication to promote preventative methods and public common responsibility (Lwin et al., 2018).

In a study conducted by Chew and Eysenbach (2010), findings from a content analysis of tweet messages during the 2009 H1N1 outbreak demonstrated how tweets provided a rich source of opinions and experiences, which can be used for content and sentiment

analysis in real time, permitting (health) authorities to better respond to public concerns. Moreover, the results of a study regarding the Zika virus outbreak by Seltzer et al. (2017) revealed that the use of image-based social media such as Instagram, can be a useful tool to characterize public sentiment and further highlight areas of focus for public health. For instance, correcting incomplete information or misinformation or expanding messages to reach varied audiences.

Ding and Zhang (2010) conducted a study exploring the use of social media and participatory risk communication during the H1N1 epidemic in China and the United states. Their study found that the outbreak of the H1N1 flu was first stated via social media; hence social media platforms functioned as immediate channels from which the public obtained infection-related information and exchanged it with others (e.g., family and friends) in real time. During the 2009-2010 H1N1 flu outbreak, the U.S. Department of Health and Human Services and CDC collaborated to create social media tools that provided the public with accurate and credible information (CDC, 2014). The reasoning behind this initiative was to encourage participation and achieve the ultimate goal of communicating key messages to impact health decisions. Furthermore, CDC's Facebook page was used to provide social media tools (e.g., widgets and badges for users to share) and disseminate H1N1 and seasonal flu updates. By using the social media platform, Facebook, CDC were able to reach a younger audience than they reach with their main website (CDC, 2014).

As social media offers the opportunity for anyone, both experts and the general public, to disseminate information quickly to a number of individuals, social media can create both fear and misinformation. During the EVD outbreak, there were misinformation about the intentions of health workers for Ebola patients circulating (Cheung, 2015). Furthermore, there were rumors regarding false treatments and the Ebola epidemic being a hoax going around. These in turn had a hampering effect on public health measures communicating effecting preventative methods. Studies regarding Ebola-related misinformation demonstrated that rumors, misinformation and inaccurate information about experimental Ebola vaccines were common on social media during the EVD outbreak and were seen to be associated with decreased chances of adopting preventative behaviors (Sell et al. 2020). The spread of misinformation regarding vaccines has thrived on social media, including belief in alternatives, conspiracy

theories, concerns about safety and distrust which has further elicited to vaccine hesitancy (Sell et al. 2020). Consequently, this contradicts evidence-based information and leads to false beliefs.

## **2.7 Governmental risk communication of COVID-19 via social media**

Taking into account the risk perception factors proposed by Covello et. al, 2001 (see figure 1), COVID-19 can be characterized as a dread risk with catastrophic potential, with arguable levels of controllability and as involuntary (Cori et al., 2020).

Furthermore, due to the virus's novelty, COVID-19 was regarded to be an unknown risk, especially during the initial stages of the pandemic, with high scientific uncertainty and low knowledge levels in regard to its impacts and transmission. Therefore, COVID-19 has received a tremendous amount of public attention, resulting in extensive policy and restrictions. The uncertainty of it's the spread and impact has led to mixed messages, which have demonstrated the importance of active and effective government risk communication.

As a result of the COVID-19 pandemic, various social media platforms were adopted by governments to keep the public informed in real-time about the status of the pandemic and government measures to control the virus, such as new restrictions (Li et al., 2021; Haman, 2020; Rufai and Bunce, 2020). Haman (2020) conducted a study exploring the use of Twitter by 143 state leaders on Twitter. The study demonstrated a significant increase in the number of followers to these twitter accounts during the COVID-19 pandemic compared to prior periods, revealing the growing interest of the public for updates from these state leaders. Another study conducted a content analysis to analyze posts from 10 Chinese government accounts that were active on Weibo (one of the biggest social media platforms in China (Liao et al., 2020). Their study showed that the main thematic categories of these posts were general information regarding the virus, the epidemic status, policies and guidelines, and official actions.

As mentioned previously, social media usage during the COVID-19 pandemic has been widely studied for diffusing health information, in particular misinformation (Mian and Khan, 2020). A few studies have explored how various social media platforms have been utilized by leaders, governments and public health agencies during the COVID-19

pandemic. However, studies examining how governments used social media platforms for risk communication specifically, during the COVID-19 pandemic has been limited (Wang et al., 2021).

Overall, the following literature review has helped highlight the importance of social media in emergencies, however there is still a lot to learn about how social media platforms enable or limit risk communication, and how its best implemented at various stages in the development and management of a crisis. In addition to the lack of research regarding governmental risk communication via social media during health disease outbreaks, as Meadows et al. (2019) and Bernard et al. (2021) claim, very little research has been conducted on how organizations and leaders apply the CERC model on social media during public health crises. Henceforth, the following study aims to address these research gaps by exploring how the Scottish and Finnish government used their twitter platforms to communicate the risk of COVID-19 during the pandemic and to what extent these communications aligned with the six CERC principles.

### 3. RESEARCH AIMS AND QUESTIONS

The overall aim of this research study was to gain an insight in the ways the Scottish and Finnish government used their twitter platforms to communicate the risk of COVID-19 in the initial and maintenance phases of the global pandemic and to what extent these aligned with CERC's six principles. The author also aimed to examine how risk communication changed and developed overtime during the marked phases of the COVID-19 pandemic. Consequently, the following research questions were formulated:

- 1) How do the two governments utilise their twitter platforms to communicate the risk of COVID-19?
  - a) What type of content/information was shared to the public to communicate the risk of COVID-19?
  - b) To what extent do the tweets communicating the risk of COVID-19 align with CERC's six principles: Be first; be right; be credible; express empathy; promote action; show respect?
  
- 2) How have risk communications developed and changed over the course of the pandemic; during the marked initial and maintenance phases?

## **4. MATERIALS AND METHODS**

The following study undertook a content analysis of the tweets published by the Scottish (@scotgov) and Finnish (@FinGovernment) governments to explore how both governments used their Twitter platforms to communicate the risk of COVID-19. All tweets used in the study were publicly available. No attempt was made to interact or get in contact with either of the users of both Twitter accounts. As the current study did not require human subjects, it was not necessary for the author to obtain a permission grant or ethical approval to conduct the present study. The following sub-chapters further discuss the data collection process and the analysis method, and approach utilized in this study in more detail.

### **4.1 Data source and collection**

As noted previously, the data source that was analyzed in this study was Twitter data. Twitter is a well-known and popular social media platform. The online social networking service is recognized for enabling their users to send short (max. 280-character) messages referred to as tweets. Twitter is known to offer a rich environment to examine social practices within the digital world and furthermore, generate public data that can be analyzed through a range of methodological approaches and methods. Although social media as research tool can be referred to a non-traditional approach to research design and data collection, it has opened many opportunities for researchers to explore and make sense of the social world. Tweets can be extracted from the Twitter website (<http://www.twitter.com>) freely, as the social media platform is free of charge for all users.

Purposive sampling was conducted in the current study, in order to provide in-depth and detailed information regarding the research topic area at hand. The Scottish and Finnish governments were selected as the study subjects as both governments had official, verified Twitter accounts and were active on Twitter prior to the COVID-19 crisis. To further justify why these two countries were selected, according to studies conducted in both Finland and Scotland evaluating the public's trust in the Scottish and Finnish governments during the COVID-19 pandemic, the majority of the respondents demonstrated to believe in their governmental institutions. According to the University

of Helsinki (2020) approximately 70% of the respondents within their study considered the Finnish government a useful and reliable source of information. Within the Scottish study, conducted by the University of Edinburgh (2020), 62% of the respondents reported to have trust and confidence in the government to prevent a second wave of the virus.

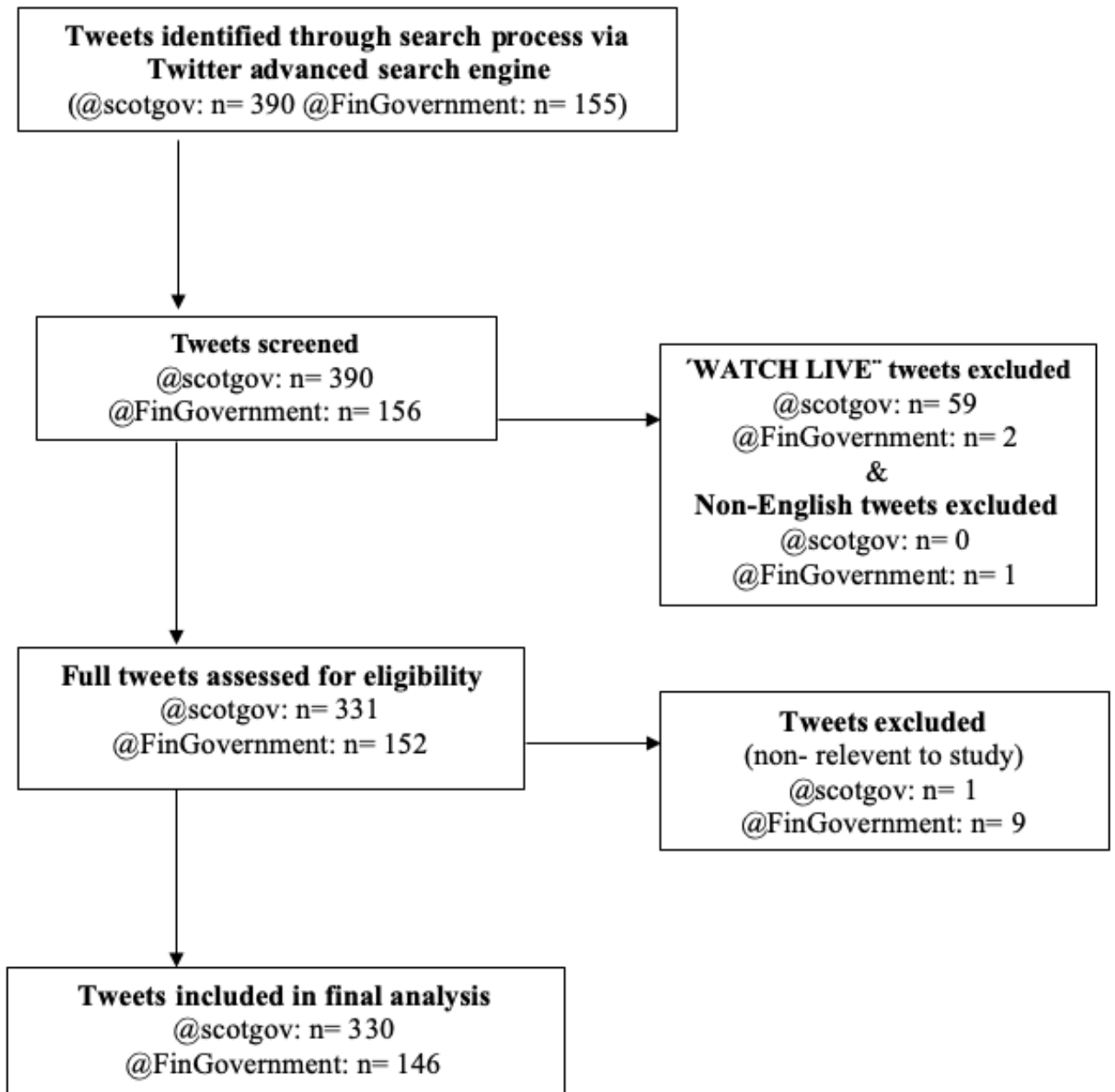
Since the Finnish government acquires two active Twitter accounts: one where interactions are made in Finnish and Swedish language, and within the other, interactions with their followers are made in the English language. The following research study utilized the Finnish government's English Twitter page for data collection, which included almost all the tweet posts posted in their other account though, translated into English.

Tweets published throughout the period March 1, 2020 to June 30, 2020 were deemed relevant for the study and applicable for analysis. These dates were deemed appropriate as they involved the initial and maintenance phases of the COVID-19 outbreak in both Finland and Scotland. In both Scotland and Finland, the number of cases were very minimal during the beginning of March and starting to rise significantly after that. However, towards the end of May and beginning of June, the number of confirmed COVID-19 cases started to decrease in both countries. Hence why, these selected dates would help highlight how the government's messages evolved within the different phases of the infectious disease outbreak.

Data was collected directly from the Twitter social media platform retrospectively. Tweets were extracted directly from the Scottish and Finnish government accounts manually using the advanced search option tool of Twitter's search engine. When conducting research using Twitter, it is possible to retrieve data by the use of hashtags and/or keywords. Tweets were filtered using the following COVID-19 relevant keywords: "corona", "coronavirus", "covid-19", "pandemic", and "epidemic". Additionally, using the same advanced search tool, the following hashtags were used to retrieve relevant data: #coronavirus, #COVID-19, #corona. The Boolean operator 'OR' was used as a conjunction between each of the keywords to help broaden and expand the number of tweets to come up during data collection. As a process, data collection was conducted twice by the researcher over a span of 3 months (March 2021 to June

2021). This was executed to ensure that no data deemed relevant was omitted and to additionally guarantee that all data counts were done correctly. Figure 2 demonstrates the research search process in detail.

Figure 2: Data collection process for the current study



Of all the tweets directly sourced from the Finnish government’s Twitter page using the advanced search tool, 146 tweets were included for analysis. Of all the tweets sourced from the Scottish government’s Twitter page, 330 tweets were deemed appropriate for

analysis. All relevant tweets were assigned an ID number and copied and pasted into a Microsoft Office Word 2019 file for analysis during the data collection process. Tweets omitted from analysis included non-English tweet messages and tweets which did not adhere to the basis of the study context. Furthermore, “watch LIVE” video tweets of press releases published by subject accounts were also disregarded as they did not include any messaging (worded content). Public engagement (likes, comments and shares) of the tweets included in the study were not observed as the sole purpose of the thesis was to explore the content of the tweet messages rather than the public engagement they attracted.

## **4.2 Content analysis & elements of qualitative content analysis**

Content analysis was deemed the most appropriate research approach to provide answers and understanding for the research questions formulated. According to Wright (1986, p. 126), many researchers have used content analysis to not only study the characteristics of communication content, but to also draw inferences about the nature of the communicator. Furthermore, as Azungah (2018) claims, overall, content analysis is predominantly useful for assessing social media posts, which was the sole purpose of the current study. As a research method, content analysis provides an ideal way to explore and assess media messaging. Previous research aiming to explore the twitter usage and messaging of world leaders, health institutions, and government organizations during the COVID-19 pandemic have demonstrated the use of content analysis as a research method to identify and categorize tweets into appropriate themes (e.g., Rufai and Bunce, 2020; Sleight et al. 2021).

Although tweet posts are qualitative in nature, content analysis relies on comparing and counting frequencies of coded data of interest and thus, reporting quantitative analysis statistics (Picardo et al., 2020). In the present study, content analysis was used to count the frequency of the tweet messages in order to give an overview on how the frequency and contents of the tweets varied during the research period. Firstly, an inductive content analysis was performed to get an insight of the content of the tweet posts and begin to create categories from the relevant data. Once these initial categories were formed, the author then grouped these categories to a broader classification of sub-themes and finally combined the sub-themes into overarching themes using the CERC

framework manual. Hence, the principles of qualitative content analysis were used in the second phase to help classify the subthemes into main themes. This form of analysis, combining both principles of content and qualitative content analysis, was conducted to further help the researcher analyze how the content of the tweets aligned with the six CERC principles. No computer software was used by the researcher to conduct data analysis. The data analysis steps are described in detail in the next sub-chapters.

#### 4.2.1 Development of coding frame

In terms of selecting data to build a coding frame, it is essential to select material that reflects the full diversity of the data at hand. In the current study, the author selected 10 random tweets from each of the months deemed relevant to the study (March-, April-, May-, June 2020), to represent data from all four time periods. This was done for both the Scottish and Finnish government tweets; hence 80 tweets were used altogether to develop the coding frame.

After rigorous highlighting and thorough reading, data was coded into relevant categories. As mentioned previously, sub-themes were formed using the data only and based on comprehensive reading of the data material, whereas the main themes were broadly classified using knowledge from the CERC framework manual. This process was implemented using an online mind mapping application (Mind Meister). The author made sure to assign preliminary names to each sub- and main theme to provide a clear description of what the theme referred to. To help the author illustrate the main- and subtheme definitions, examples from the data were saved into a separate Microsoft Office Word 2019 file. Once this process was completed, the researcher continued to review, refine and ‘tidy up’ the coding frame: for instance, similar subcategories were combined, and any overlap between coded categories was assessed.

#### 4.2.2 Trial coding

Prior to conducting the main analysis of the tweets published by the Finnish and Scottish governments, the researcher made sure to test the coding frame via trial coding. During this phase 6 tweets were selected randomly from the data material from each of the four months to cover all time periods. Additionally, similarly to before, this was

done for the Scottish and Finnish government tweets, hence 48 tweets were coded altogether using the coding frame developed. This was executed twice (coding and recoding of the data) within a two-week time frame. Since only minimal changes were done to the coding frame, the researcher decided to proceed to the main analysis phase. The coding frame developed for the current study is illustrated in table 1. Table 1 demonstrates the sub-themes and their overarching (main) themes, that were classified using the CERC framework.

#### 4.2.3 Main data analysis

Analysis of all the data material was conducted during this phase, in other words all data was coded. The relevant tweets published by the Finnish government (n=146) and Scottish government (n= 330) were coded independently by the author over a 6-week period. This was done to reduce fatigue and provide focus. The Finnish government tweets were coded first and then the researcher proceeded to code the Scottish government tweets. Henceforth, analysis was performed separately for both parties. During the main data analysis, all data was entered into a Microsoft Office Excel 2019 spreadsheet for analysis. The Scottish and Finnish tweets were stored separately. As mentioned previously, each tweet can only contain 280 characters, hence a maximum of three themes could be assigned to each tweet. The primary analysis involved the generation of frequency counts. As the current author was conducting this research alone, approximately one third of the data material was recoded.

Table 1: Coding frame for present study

| <b>Themes</b>  | <b>Sub-themes</b>                      | <b>Description of content data</b>  |
|--|--|---|
| <b>(1) Key messages regarding COVID-19</b>             | Background information                 | <i>The nature of the coronavirus; updates on the situation, effects and impact of the COVID-19 pandemic; To what extent the virus has spread and the seriousness of it</i>      |
|  | Prevalence & severity of risk          | <i>Information and updates regarding the symptoms of coronavirus and guidance regarding treatment options</i>   |
|  | Symptoms & Treatment of COVID-19       |   |
| <b>(2) Promoting action</b>                            | Social distancing & Stay at home       | <i>Promoting the avoidance of close body contact and unnecessary travel. Adhering to social distancing and stay at home protocols in place to protect one's self and others</i> |
|  | Hand-hygiene & mask-wearing            | <i>Promoting, and providing information and guidance regarding the use of facemasks and thorough hand hygiene</i>   |
|  | Self-care                              | <i>Advice and guidance on self-care methods (e.g., sticking to a routine) for those suffering from fear, worry or mental health symptoms.</i>                                   |
| <b>(3) Government Activities</b>                       | Actions currently being taken          | <i>Explanations of what the government is doing to control the virus</i>  |
|  | Actions that will be taken             | <i>Explanations of what the government is going to do to control the virus</i>  |
| <b>(4) Expression of commitment &amp; Truthfulness</b> | Statements of commitment & reassurance | <i>Reassuring the public and commitments to protect the public and provide information when possible</i>  |
|  | Addressing the unknown & unclear facts | <i>Uncertainty is addressed (what is unknown about the coronavirus)</i>   |
| <b>(5) Expression of Empathy</b>                       | Understanding one's discomfort         | <i>Addressing and acknowledging the validity of the public's feelings</i>   |
|  | Expressing gratitude/care              | <i>Appreciation towards the public and those risking their wellbeing and protecting the public</i>  |
| <b>(6) Segment Audiences</b>                           |  | <i>Provision of information and guidance for high risk groups</i>   |
| <b>(7) Collective Responsibility</b>                   |  | <i>Encouraging involvement and cooperation with response to COVID-19 crisis</i>   |

To further examine the content of the tweets published by the Scottish and Finnish government communicating the risk of COVID-19 (RQ1), the types of visualizations shared alongside the relevant tweets were considered, however the content of the visuals themselves were not analyzed. Visualizations were labeled using Saunders’s (1994) visual type framework as a guide. Moreover, if URL links were shared within the relevant tweet messages, they were also recorded. The researcher paid special attention to whether linking was used within the tweet posts to refer the public to government pages. The following step of coding took a dichotomous approach, assigning either yes or no for the presence or absence of visualizations and their type, and for URL links. This was done also independently for all tweets using a Microsoft Office Excel 2019 spreadsheet. The following process utilized the coding scheme demonstrated in table 2.

Table 2: Coding frame: visual content and URL link usage

|                       |                     |  |
|-----------------------|---------------------|--|
| <b>Visual Content</b> | <b>Moving</b>       | Animated (GIF, video)                        |
|                       | <b>Graphic type</b> | Visual filled with text                      |
|                       |                     | Visual with Caption                          |
|                       |                     | Photograph                                   |
|                       |                     | Composite graphics (multiple images)         |
|                       |                     | Symbol: pictographic or abstract             |
|                       |                     | Diagram                                      |
| <b>Linking</b>        | <b>URL link</b>     | A link is attached to the tweet text /visual |
|                       |                     | Government link                              |

To identify how risk communications had developed and changed over the course of the pandemic from 1 March 2020 until 30 June 2020 (RQ3), weekly case figures were accessed from reliable sources. Data regarding the Finnish weekly cases was accessed from the WHO COVID-19 Dashboard (2020) and data regarding the Scottish weekly cases were accessed from the Public Health Scotland (PHS) COVID-19 Daily Dashboard (2020).

## 5. RESULTS

A total of 476 tweets communicating the risk of COVID-19 were analyzed published from the beginning of March 2020 until the end of June 2020: of which 330 were published by the Scottish government and 146 by the Finnish government. Tweet posts relevant to the study published by both governments were analyzed separately, hence why the results presented below are predominantly organized in a manner that addresses each government separately. However, similarities and differences regarding the results of both governments will be addressed in the discussion chapter.

### 5.1 Main results: The Finnish government @FinGovernment

The Finnish government had published 146 messages via Twitter communicating the risk of COVID-19 to their followers from 1 March 2020 until 30 June 2020. Table 3 presents an overview of the frequency counts of the main themes and sub-themes that were identified concerning the risk communication of COVID-19. The most dominant main themes were ‘government activities’ and ‘key messages regarding COVID-19’. The Finnish government utilized their Twitter platform to mainly share their actions and efforts to control the COVID-19 pandemic and protect their citizens.

The ‘Government activities’ theme was the most dominant, which was identified in 88 (60.3%) of the published tweets analyzed. This theme was further coded into 2 different sub-themes as demonstrated in table 3. Out of the 88 tweets, 67 related specifically to what the Finnish government were currently doing to combat the coronavirus, whereas only 21 focused on actions they were going to implement. Descriptions of actions that were or would be implemented frequently involved agreements and discussions made within government and sometimes EU meetings, and highlighted activities that would help to reduce the burden of the coronavirus on the society. The topics of the tweets often related to economy policy implementation, implementation of restrictions and easing of restrictions during the coronavirus pandemic. For example:

*‘Today, the Government decided to extend until 13 May 2020 the duration of the previously imposed restrictions to slow down the spread of coronavirus infections and to protect those at risk.’ – @FinGovernment 30/3/2020*

*‘On Friday, the Government will decide on a supplementary budget due to the COVID-19 coronavirus outbreak. The Government will report on the supplementary budget and other financial measures at a press conference at around 11.00. #Coronavirus #COVID19’ – @FinGovernment 19/3/2020*

*‘As part of this composite strategy, the Government is continuing with preparations to introduce a mobile application for use in managing the epidemic. A precondition is that the application must be voluntary and must ensure privacy protection.’ – @FinGovernment 22/4/2020*

*‘Government agrees to ease restrictions on gatherings, operations of food and beverage service businesses and visits to care institutions and hospitals.’ – @FinGovernment 18/6/2020*

Table 3: Frequency count of tweet content @FinGovernment

| Theme   | Sub-theme                              | Frequency in Total |            | Rank |
|---|--|--------------------|------------|------|
|   |  | No.                | Percentage |      |
| <b>Government activities</b>                  |  | <b>88</b>          | 60.3%      | 1    |
|   | Actions currently being taken          | 67                 |            |      |
|   | Actions that will be taken             | 21                 |            |      |
| <b>Key messages regarding COVID-19</b>        |  | <b>42</b>          | 28.8%      | 2    |
|   | Background information                 | 30                 |            |      |
|   | Prevalence & severity of risk          | 11                 |            |      |
|   | Symptoms & Treatment of COVID-19       | 1                  |            |      |
| <b>Promoting action</b>                       |  | <b>11</b>          | 7.5%       | 3    |
|   | Social distancing & Stay at home       | 10                 |            |      |
|   | Hand-hygiene & mask-wearing            | 1                  |            |      |
|   | Self-care                              | 0                  |            |      |
| <b>Expression of commitment &amp; honesty</b> |  | <b>8</b>           | 5.5%       | 4    |
|   | Statements of commitment & reassurance | 5                  |            |      |
|   | Addressing the unknown & unclear facts | 3                  |            |      |
| <b>Segment audiences</b>                      |  | <b>5</b>           | 3.4%       | 5    |
| <b>Collective responsibility</b>              |  | <b>4</b>           | 2.7%       | 6    |
| <b>Expression of empathy</b>                  |  | <b>3</b>           | 2.1%       | 7    |
|   | Understanding one’s discomfort         | 2                  |            |      |
|   | Expressing gratitude/appreciation      | 1                  |            |      |

The ‘key messages regarding COVID-19’ theme was noted in 42 published tweets (28.8%) and was further coded into three different sub-themes: background information; prevalence and severity of risk; and symptoms and treatment of COVID-19. The most dominant sub-theme among the three included background information, which was in 30 out of the 42 tweets. This theme included messages regarding the nature of the coronavirus, and its effects and impacts on the society. These published tweets addressed the things that were known about the pandemic and also provided the public updates on the current situation. Out of the 42 tweets, 11 tweets were published capturing the extent to which the virus had spread in the country and explained the seriousness of the virus. The Finnish government published only one tweet pertaining to the symptoms and treatment of COVID-19, which addressed the Finnish government’s support towards the development of a vaccine as a treatment option to combat the coronavirus pandemic. Examples of the two most dominant sub-themes are given below.

*‘Ministries have published questions and answers on the effects of the coronavirus (URL link)’ - @FinGovernment 1/4/2020*

*‘Website @InfoFinlandfi has links to information released by Finnish authorities on coronavirus and its effects in Finland in following languages: English, Russian, Estonian, French, Somali, Spanish, Turkish, Chinese, Persian, Arabic (URL link)’ - @FinGovernment 14/4/2020*

*‘Assessment of COVID-19 situation: Epidemic continues to slow. The weekly average of cases reported to the communicable diseases register has clearly fallen for more than a month.’ - @FinGovernment 22/5/2020*

*‘The coronavirus epidemic has continued to slow down compared to the situation two weeks ago. Now the estimated basic reproduction number is 0.75–0.80. This means that in Finland the trend in the epidemic has been decreasing for quite some time.’ - @FinGovernment 4/6/2020*

The third most popular theme (7.5%, n= 11) was ‘promoting action’ and included messages regarding actions the public should take to reduce the threat of the virus from themselves and from spreading it to others. Although three subthemes emerged from this theme, the Finnish government tweets only addressed two: social distancing and stay at home, and hand hygiene and mask-wearing. None of the tweets published by the Finnish government promoted actions regarding self-care. 10 out of the 11 tweets promoting action addressed the importance of social distancing and staying at home.

The majority of these tweets expressed the importance to avoid unnecessary travel. For example:

*'...the Government continues to recommend that all unnecessary travel, such as leisure travel, be avoided also in Finland' - @FinGovernment 15/4/2020*

*'This year, the authorities are encouraging people to spend vappu at home, in their yards or nearby. The restrictions on gatherings of more than 10 people are still in force.' - @FinGovernment 28/4/2020*

The 'expression of commitment and truthfulness' theme ranked fourth out of all seven themes. Out of all the 8 analyzed tweets under this theme, over half (n=5) fell under the subtheme involving tweets expressing the government's statements of commitment and honesty. These tweet posts described how the government committed to doing its best to control and contain the coronavirus. The remaining 3 tweets fell under the second subtheme which addressed uncertainty and unclear facts regarding COVID-19 and its risks. Examples of this main theme are given below:

*'Prime Minister @MarinSanna on the coronavirus situation: "If perfection is demanded, we cannot but fail. But I can assure you that the Government and our officials in the ministry and in the field are doing their very best to protect all of us and our health."' - @FinGovernment 2/4/2020*

*'...The Government is committed to protecting people's wellbeing and the ability of businesses to cope during the coronavirus crisis' - @FinGovernment 8/4/2020*

*'...As there is still a high degree of uncertainty regarding the virus, the strategy will be updated as necessary based on new research data' - @FinGovernment 18/5/2020*

Themes that were least prominent across the tweets published by the Finnish government communicating the risk of COVID-19 included 'expression of empathy' (2.1%), 'collective responsibility' (2.7%) and 'segment audiences' (3.4%). An example of each of these themes are demonstrated below:

*"What should I do if the situation makes me feel scared?" Ministers @MarinSanna, @liandersson and @KosonenHanna answered children's questions about the coronavirus outbreak on Friday 24 April...' - @FinGovernment 27/4/2020*

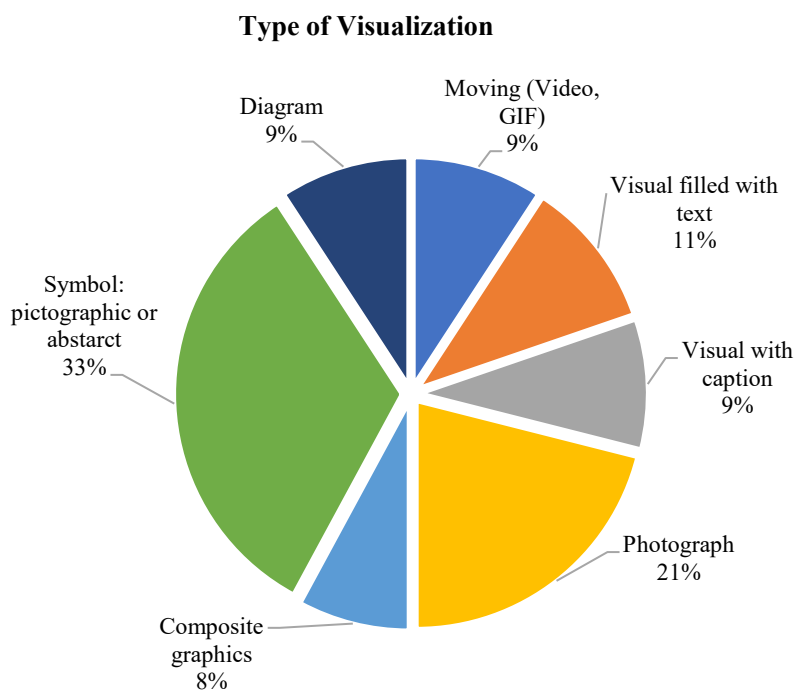
*'The fight against coronavirus is something we all need to tackle together. Each and every one of us can help by following the guidelines of the authorities and by passing on information to our friends and loved ones (URL link).'* - @FinGovernment 20/3/2020

*'The Finnish Institute for Health and Welfare @THLresearch has updated its guidelines for elderly people to protect themselves from the coronavirus (URL link).'* - @FinGovernment 20/5/2020

### 5.1.1 Finnish government's use of visualizations & linking

Of all the 146 analyzed tweets, 76 (52%) included some form of visualization further elaborating the content of the tweet messages. The types of visualizations shared alongside the tweets are illustrated in figure 3. The majority of the visualizations (33%) were in the form of symbols (pictographic or abstract), and these visuals were mainly used to illustrate restrictions and measures placed by the government to mitigate the coronavirus pandemic. The second most used visual type was photographs (21%) which were mostly used to depict images of the prime minister and other government members. These photographs were shared alongside tweets explaining the 'government activities' theme.

Figure 3. Visualization type chart (@FinGovernment)



In regard to linking, 104 (71%) of the relevant tweets published by the Finnish government shared URL links, to refer readers to further information regarding the content of the tweet. 92 (88%) of the shared links led to Finland's official government webpage. The remaining 12 URL links led to pages such as, the Finnish Institute for Health and Welfare (THL), and the government's official YouTube page.

## **5.2 Main result: The Scottish government @scotgov**

The Scottish government published 330 tweets communicating the risk of COVID-19 via Twitter from March to the end of June. Findings of the main themes and subthemes are discussed by commonality as shown in table 4.

The most common theme among the analyzed tweets was 'key messages regarding COVID-19 which was found in 182 tweets (55.2%). The majority of these tweets (129) emerged under the subtheme: prevalence and severity of risk. The Scottish government shared tweets, almost every day of each month analyzed in the present study, describing the number of newly confirmed cases and deaths that had occurred that day in Scotland. These tweets demonstrated how the coronavirus was spreading and the severity of the coronavirus outbreak. If there were any delays in the dissemination of these statistics, the government would publish tweets assuring the public that they were working hard to publish the statistics as soon as possible. The second most common subtheme was symptoms and treatment of COVID-19 which included 29 of the 182 tweets. Remaining tweets (n=24) fell under the subtheme: background information. Examples of each subtheme is shown below.

*'As of 28 March 2020, 40 patients who tested positive for coronavirus (#COVID—19) have sadly died...' -@scotgov 28/3/2020*

*'As of 2pm today 104,880 people in Scotland have been tested for #coronavirus 89,695 confirmed negative, 15,185 positive. 2,291 patients who tested positive have sadly died...' - @scotgov 26/5/2020*

*'Remember if you have symptoms of #coronavirus – a high temperature or new and continuous cough – go to (URL link). You only need to call 111 if your coronavirus symptoms worsen, or do not improve after 7 days. In an emergency, dial 999.' - @scotgov 7/5/2020*

*'If your work or education has been affected by #coronavirus, you can now access enhanced careers guidance from @skillsdevscot at (URL link)' - @scotgov 13/5/2020*

Table 4: Frequency count of tweet content @scotgov

| Theme   | Sub-theme                              | Frequency in Total |            | Rank |
|---|--|--------------------|------------|------|
|   |  | No.                | Percentage |      |
| <b><i>Key messages regarding COVID-19</i></b>         |  | <b>182</b>         | 55.2%      | 1    |
|   | Background information                 | 24                 |            |      |
|   | Prevalence & severity of risk          | 129                |            |      |
|   | Symptoms & Treatment of COVID-19       | 29                 |            |      |
| <b><i>Government activities</i></b>                   |  | <b>79</b>          | 23.9%      | 2    |
|   | Actions currently being taken          | 63                 |            |      |
|   | Actions that will be taken             | 16                 |            |      |
| <b><i>Promoting action</i></b>                        |  | <b>42</b>          | 12.7%      | 3    |
|   | Social distancing & Stay at home       | 28                 |            |      |
|   | Hand-hygiene & mask-wearing            | 3                  |            |      |
|   | Self-care                              | 11                 |            |      |
| <b><i>Expression of empathy</i></b>                   |  | <b>23</b>          | 7.0%       | 4    |
|   | Understanding one's discomfort         | 11                 |            |      |
|   | Expressing gratitude/appreciation      | 12                 |            |      |
| <b><i>Collective responsibility</i></b>               |  | <b>18</b>          | 5.5%       | 5    |
| <b><i>Expressions of commitment &amp; honesty</i></b> |  | <b>13</b>          | 4.0%       | 6    |
|   | Statements of commitment & reassurance | 10                 |            |      |
|   | Addressing the unknown & unclear facts | 3                  |            |      |
| <b><i>Segment audiences</i></b>                       |  | <b>10</b>          | 3.0%       | 7    |

The most common theme among the analyzed tweets was 'key messages regarding COVID-19 which was found in 182 tweets (55.2%). The majority of these tweets (129) emerged under the subtheme: prevalence and severity of risk. The Scottish government shared tweets, almost every day of each month analyzed in the present study, describing

the number of newly confirmed cases and deaths that had occurred that day in Scotland. These tweets demonstrated how the coronavirus was spreading and the severity of the coronavirus outbreak. If there were any delays in the dissemination of these statistics, the government would publish tweets assuring the public that they were working hard to publish the statistics as soon as possible. The second most common subtheme was symptoms and treatment of COVID-19 which included 29 of the 182 tweets. Remaining tweets (n=24) fell under the subtheme: background information. Examples of each subtheme is shown below.

*'As of 28 March 2020, 40 patients who tested positive for coronavirus (#COVID-19) have sadly died...' -@scotgov 28/3/2020*

*'As of 2pm today 104,880 people in Scotland have been tested for #coronavirus 89,695 confirmed negative, 15,185 positive. 2,291 patients who tested positive have sadly died...' - @scotgov 26/5/2020*

*'Remember if you have symptoms of #coronavirus – a high temperature or new and continuous cough – go to (URL link). You only need to call 111 if your coronavirus symptoms worsen, or do not improve after 7 days. In an emergency, dial 999.' - @scotgov 7/5/2020*

*'If your work or education has been affected by #coronavirus, you can now access enhanced careers guidance from @skillsdevscot at (URL link)' - @scotgov 13/5/2020*

The second most common theme among the analyzed tweets was 'government activities' which was found in 79 tweets (23.9%). Similar to the Finnish government tweets, the majority of these tweets (63) fell under the subtheme: actions currently being taken whilst the remaining 16 emerged under the subtheme: actions that will be taken. These messages often mentioned actions that the Scottish government were taking/would take to mitigate the coronavirus outbreak in Scotland. Descriptions of these actions frequently involved agreements made in the Scottish parliament and highlighted activities which would help reduce the burden of the coronavirus on the community. For example:

*'We are giving renters increased protection from eviction during the #coronavirus outbreak. New emergency powers will support private and social tenants if they go into rent arrears due to the impact of coronavirus...' - @scotgov 29/3/2020*

*‘Additional supplies of Personal Protective Equipment will be delivered directly to care homes across Scotland...’ - @scotgov 18/4/2020*

*Our £8 million of priority funding is supporting services like @scotwomensaid, whose crucial work ensures that people most at risk from the impacts of coronavirus can get the support they need. Find out who the funding will help (URL link)’ - @scotgov 6/4/2020*

The third most dominant theme was ‘promoting action’ which consisted of 42 tweets altogether (12.7%). The most common subtheme that had emerged within these tweets included social distancing and stay at home, which consisted of 28 tweets. 11 tweets promoted actions relating to self-care, whereas the remaining 3 fell under the subtheme: hand hygiene and mask-wearing. An example of each subtheme is listed below.

*‘We’re asking you to #stayathome to protect our NHS and save lives...’ - @scotgov 24/3/2020*

*‘Washing your hands is one of the key ways you can help to stop the spread of #coronavirus. Wash your hands regularly for 20 seconds and avoid touching your face to help prevent infection...’ - @scotgov 15/5/2020*

*‘Creating and sticking to a daily routine is one way we can take care of our #MentalHealth while we stay safe at home during the #coronavirus pandemic’ - @scotgov 9/5/2020*

The theme ‘expression of empathy’, consisting of 23 tweets (7%) ranked fourth among all the seven themes. The two subthemes that had emerged from the following theme included, understanding one’s discomfort and expressing gratitude. The Scottish government had shared 11 tweets acknowledging the distress and worry the public were facing during the course of the COVID-19 pandemic. Furthermore, they had published 12 tweets expressing their appreciation and gratitude, not only towards the public for adhering to the restrictions enforced by the government, but more so towards the frontline workers for risking their wellbeing to help those in need. Examples of this theme are listed below.

*‘There are lots of online resources to help you cope with anxiety caused by the #coronavirus outbreak...’ - @scotgov 12/4/2020*

*‘...If the #coronavirus pandemic is making you feel worried and you want some support, take a look at these organisations (URL links).’ - @scotgov 24/5/2020*

*'Today FM @NicolaSturgeon met with @NHS24 staff supporting Scotland's public information response to coronavirus (#COVID—19), to thank them for their hard work in keeping the public informed' - @scotgov 4/3/2020*

*'Tonight we're saying thank you to our #NHSHeroes and all those working across the health and social care frontline in Scotland. We appreciate the tireless work you are doing.' - @scotgov 2/4/2020*

The less common themes within the tweets published by the Scottish government included 'collective responsibility' (5.5%), 'expression of commitment and truthfulness' 13 (4%) and 'segment audiences' 10 (3%). An example of each of these themes are demonstrated below.

*'We all need to take part in social distancing – and household isolation where necessary – to help slow the spread of #coronavirus. Help us protect ourselves, others and Scotland's NHS...' - @scotgov 10/3/2020*

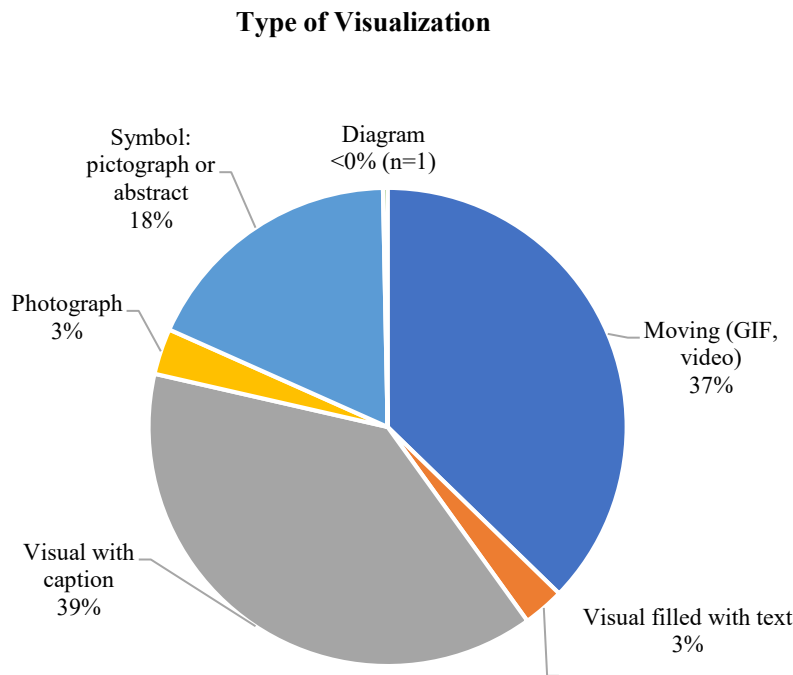
*'The NHS and government are well-prepared to deal with coronavirus (#COVID—19) ...' - @scotgov 19/3/2020*

*'From today, people in Scotland at highest risk of severe illness from #coronavirus can sign up to receive home deliveries of essential items through a new text message service...' - @scotgov 3/4/2020*

### 5.2.1 Scottish government's use of visualizations & linking

Among the 330 tweets the Scottish government had published communicating the risk COVID-19, 322 (96.6%) tweets included some form of visualization further elaborating the content of the tweet post. Figure 4 illustrates the types of visualizations that were shared alongside the tweets, in addition to their frequency. The most common forms of visualizations included visuals containing just a caption (39%) and moving visuals (37%) such as, short video clips and GIFs. The most dominant visual type, visual with a caption, was utilized almost always alongside the tweets discussing the prevalence and severity of the coronavirus, which was a subtheme that emerged from the most dominant theme amongst the analyzed tweets. The caption that was used alongside these tweet messages was 'Coronavirus Update'. Moving visuals (videos and GIFs) were frequently used alongside tweets promoting actions such as, social distancing and staying at home, and explanations regarding the symptoms and treatment of the coronavirus.

Figure 4: Visualization type chart (@scotgov)



292 (88.5%) out of the 330 analyzed tweets by the Scottish government shared URL links, referring individuals to sources for more information. 230 of these tweets shared links to the official Scotland government webpage. A significant number of tweets (n= 178) also shared links to the official National Health Service (NHS) of Scotland webpage.

### 5.3 Themes and their alignment with CERC principles

The main results of the current study were assessed by the researcher in order to observe to what extent the tweets communicating the risk of COVID-19 aligned with CDC's six CERC principles: Be first (communicating information quickly); be right (sharing information on what is known/unknown and what is being done to fill the gaps); be credible; (honesty and truthfulness); express empathy (addressing what people are feeling and challenges they may face); promote action (giving people meaningful things to do); show respect (respectful communication).

In regard to the first CERC principle 'be first', both the Finnish and Scottish government started to disseminate greater number of tweets communicating the risk of

the coronavirus during the beginning stages of the pandemic, just before the COVID-19 outbreak hit its peak in both countries. This phenomenon is explored further in the next sub-chapter. In regard to being right and credible (principle two and three) the ‘key messages regarding COVID-19’ was one of the most dominant themes among the tweets published by both governments, which shared fundamental information regarding what was known about the coronavirus. The Finnish government emphasized more on sharing background information about the virus and outbreak, whereas the Scottish government focused more on disseminating tweet messages relating to the prevalence and severity of the virus.

As demonstrated in Table 3 and 4 (subtheme: addressing the unknown & unclear facts), sharing information that was unknown about COVID-19 was much less visible within the tweets disseminated by both governments. Although both the governments did not publish much tweets relating to what was unknown about the pandemic, credible information was shared throughout the 1<sup>st</sup> wave of the pandemic (March-June 2020), as described by the main themes and subthemes that emerged from the analyzed tweets. Additionally, both governments established their organizations credibility by explaining what they were doing or going to do to respond to the COVID-19 crisis.

Aligning with fourth CERC principle, expressing empathy was identified to be one of the common themes within the tweets published by the Scottish government, however it was the least visible theme within the analyzed tweets disseminated by the Finnish government. The fifth CERC principle ‘promoting action’ was identified to be one of the most dominant themes within the analyzed tweets by both governments. However, as mentioned previously, the Finnish government did not promote any ‘self-care’ actions for those suffering from anxiety, worry or fear as a result of the pandemic.

According to the CDC CERC manual (2018, update) the sixth CERC principle, show respect, involves acknowledging the public and being considerate of their feelings and opinions. One of the subthemes that had emerged from the main theme ‘expression of empathy’ involved the understanding of one’s discomfort. This subtheme was among the more prevalent within the analyzed Scottish government tweets but among the least prevalent within Finnish analyzed tweets. Both the Finnish and Scottish governments published tweets encouraging public involvement with the response to the COVID-19

pandemic, however these were amid the least common main themes ('collective responsibility').

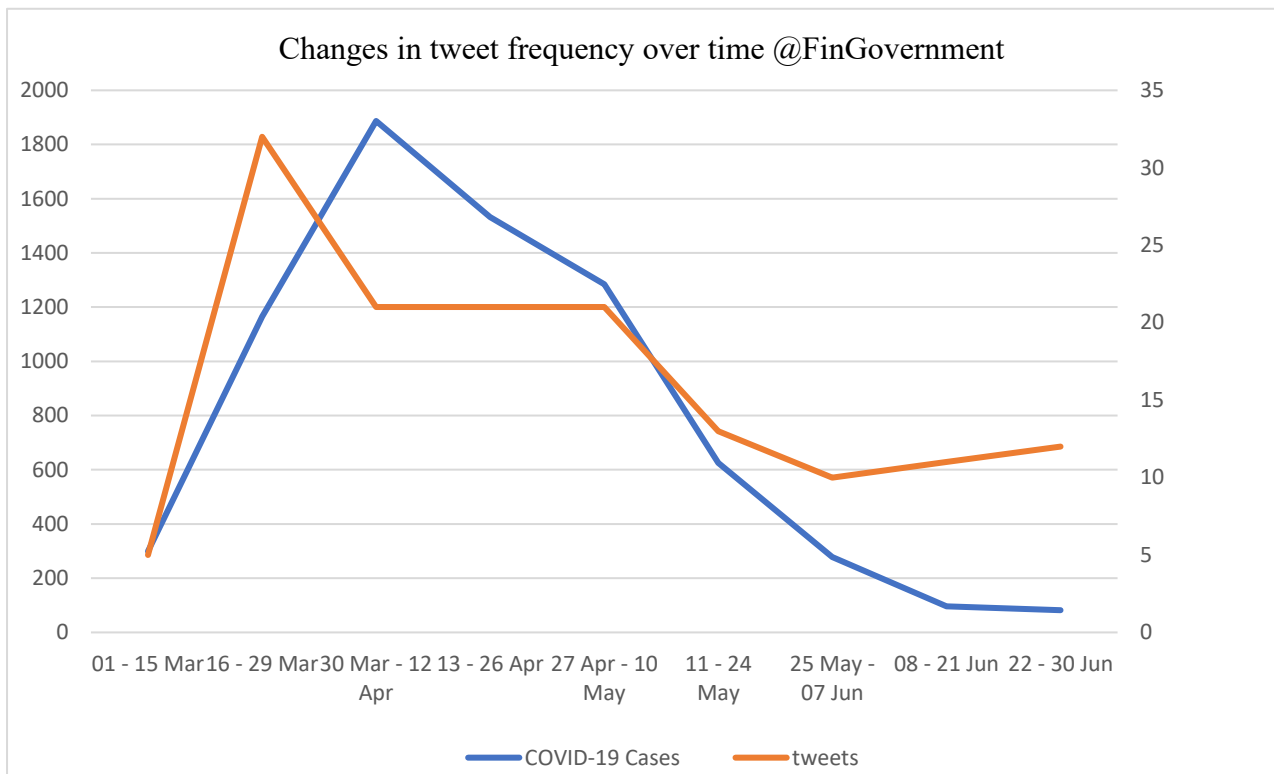
#### **5.4 Changes & development of COVID-19 risk communication**

To gain an understanding in the ways risk communication evolved during the first wave of the pandemic (1 March 2020 to 30 June 2020) by both the Finnish and Scottish government via Twitter, the number of new confirmed cases were used as a comparison. The following sub-chapters provide an overview of this phenomenon.

##### **5.4.1 Analysis of risk communication over time: @FinGovernment**

As mentioned previously, 146 tweets were analyzed in the present study which had been published in the chosen time period of the present study. Figure 5 illustrates how these tweets were published over time in comparison to the number of newly confirmed COVID-19 cases on a biweekly basis (apart from 22-30 June). As shown in the line graph, the majority of the tweets were published towards the end of March, during the initial stage of the pandemic, at what time the number of coronavirus cases started to increase dramatically. However, prior to this in the beginning of March, the Finnish government only shared 5 analyzed tweets. As the number of newly confirmed cases reached their peak in the first few weeks of April, the Finnish government continued to share tweets in a steady manner. Towards late April and beginning of May (27 April to 10 May), the number of confirmed cases and the number of tweets communicating the risk of COVID-19 started to decrease simultaneously. However, in the month of June there was a slight increase in risk communication, when the number of coronavirus were at their lowest.

Figure 5: Relationship between COVID-19 cases & tweet frequency @FinGovernment

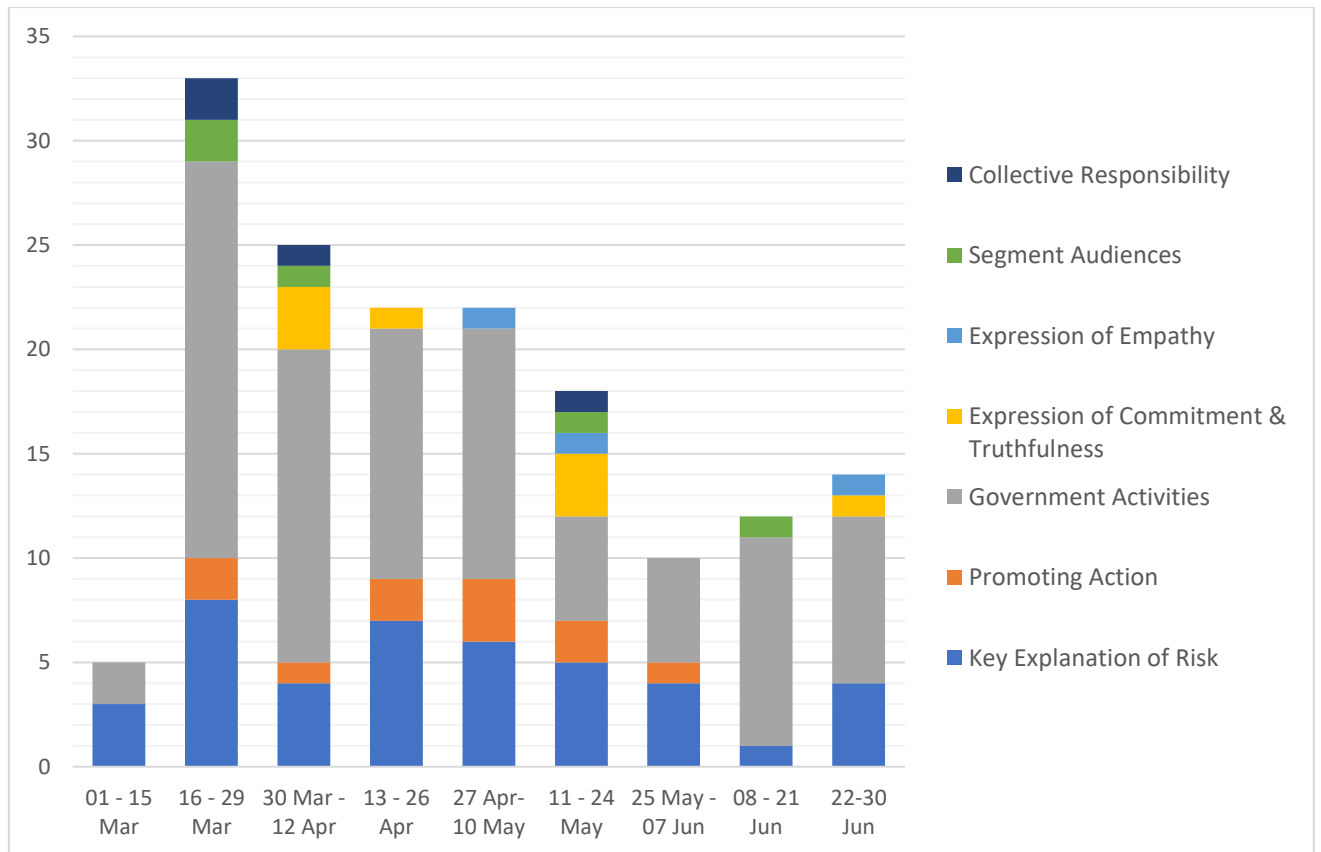


In order to observe how risk communication evolved, figure 6 illustrates the occurrence of main themes during different stages of the pandemic (also on a biweekly basis). As demonstrated, ‘government activities’, ‘key messages regarding COVID-19’ and ‘promoting action’ remained to be the most dominant themes throughout all stages of the pandemic. In regard to the ‘government activities’ theme, in the initial stage of the pandemic, the government shared tweets addressing measures and restrictions they were putting in place to control the outbreak. However, towards the late maintenance stage (June) when the number of cases was falling, tweets relating to restriction easing and recovery plans were frequently shared. Henceforth, although the number of new coronavirus cases were significantly lower than before in June, the number of tweets the government was disseminating started to slightly increase.

The Finnish government began to share tweets promoting actions to protect oneself and others from contracting the coronavirus towards the end of March when the number of cases started to increase, however these messages started to decrease and eventually end towards the beginning of June when the number of cases significantly decreased. As shown in figure 6, tweets expressing commitment and truthfulness first appeared when

the number of newly confirmed cases were the highest in Finland (30 March to 12 April). Moreover, both the ‘collective responsibility’ and ‘segment audience’ themes first appeared during the initial stage (16-29 March) when the number of cases started to rapidly increase and also when the number of newly confirmed cases were at their highest in Finland.

Figure 6: Tweet content & frequency overtime @FinGovernment

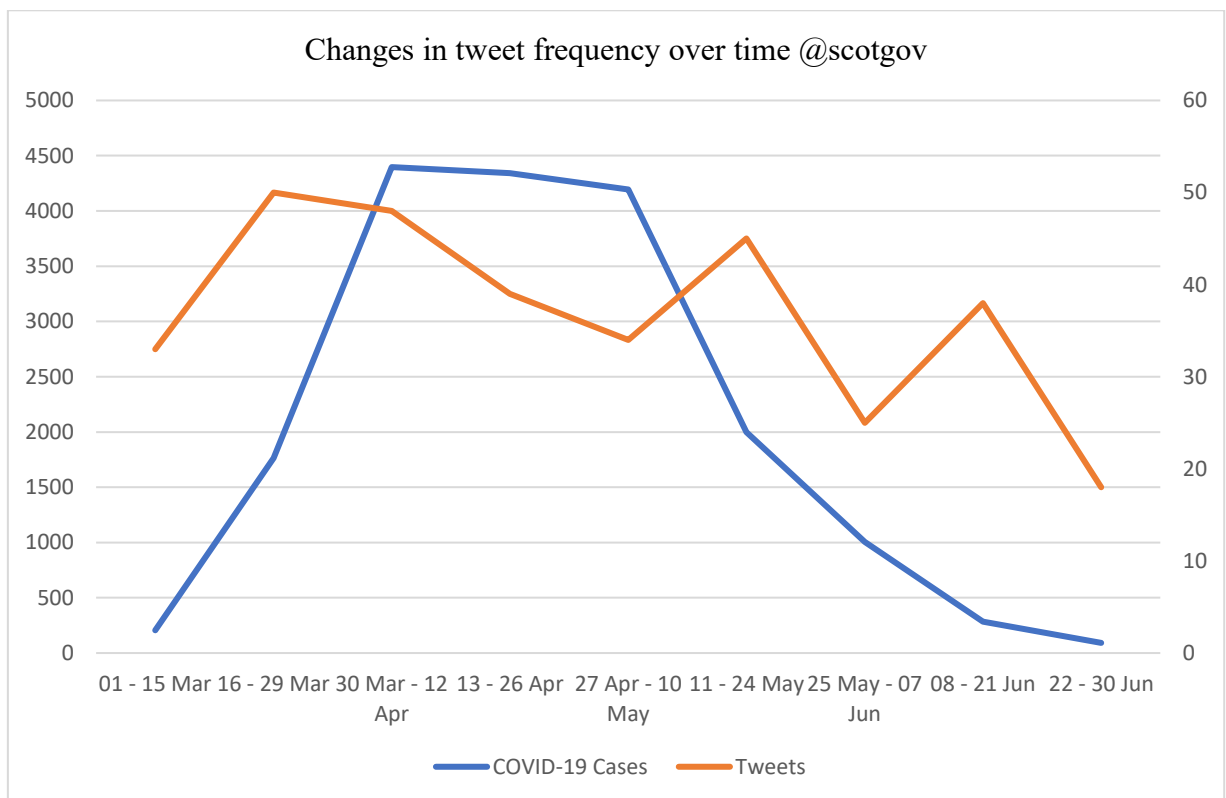


#### 5.4.2 Analysis of risk communication over time: @scotgov

The Scottish government had shared 330 tweets from 1 March to 30 June communicating the risk of the coronavirus, which were analyzed in the present study. Figure 7 demonstrates the changes in tweet dissemination by the government overtime in relation to the number of newly confirmed COVID-cases in Scotland. As we can see from the graph, the Scottish government shared the greatest number of tweets towards the end of March, during the initial stage of the virus when the number of coronavirus cases were starting to drastically increase. Later, once the number of newly confirmed

coronavirus cases reached their peak (mid-March to beginning of April), the number of tweets started to decrease as the number of newly confirmed coronavirus cases somewhat stabilized. Eventually towards mid-May, the number of newly confirmed cases started to rapidly decrease, however the Scottish government continued to disseminate tweets actively regarding the risk of COVID-19. As observed in figure 7, these tweets were communicated in an irregular pattern.

Figure 7: Relationship between COVID-19 cases & tweet frequency @scotgov

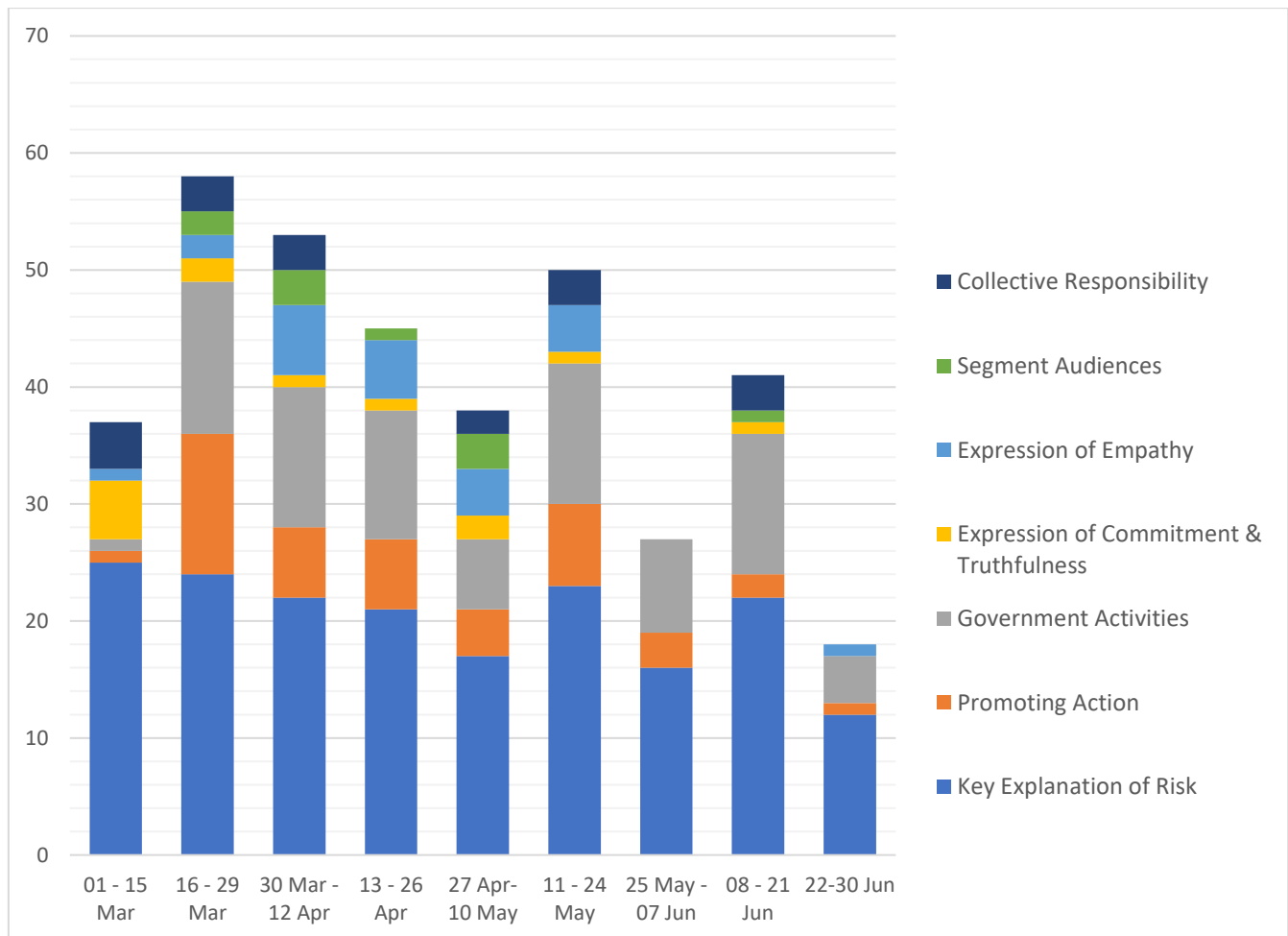


To further explore how risk communication evolved by the Scottish government, the occurrence of the main themes and the subthemes during the different stages of the pandemic (March-June) were observed. The results of these are illustrated in Figure 8. As shown, the three most dominant main themes (‘key messages regarding COVID-19’, ‘government activities’ and ‘promoting action’) were apparent throughout all the phases of the pandemic. The majority of the key messages regarding the risk of COVID-19 were disseminated during the beginning stages of the pandemic, when the number of cases were started to increase. Moreover, the greatest number of tweets expressing commitment and appreciation towards the public were shared during this time. The

Scottish government made sure to reassure the public and let them know that they were committed to protect the public.

As illustrated in figure 8, the Scottish government tweeted the most messages promoting action from 16-29 March, when newly confirmed cases were drastically increasing. Furthermore, the government published the greatest number of tweets expressing empathy towards the public and those willing to risk their wellbeing to protect the lives of the public during the beginning stages of the pandemic.

Figure 8: Tweet content & frequency overtime @scotgov



## 6. DISCUSSION

In the following section, the key findings will be highlighted and discussed thoroughly. Moreover, the limitations of the current study will be addressed.

### 6.1 Summary of main findings

Effective risk communication entails strategic communication across the various phases of a crisis. As established within the literature review, it is evident that an increasing body of research has suggested that social media is an essential tool in risk communication. Moreover, the number of government organizations and agencies utilizing social media platforms to communicate disease outbreak is increasing, hence why it is important to adopt risk and crisis communication frameworks and models in a social media context to guide their strategic communication (Elgammal, 2021).

Although the CERC framework was not originally developed for online context, it has been expanded and adapted to fit online-based platforms, such as social media (Lwin et al. 2018). This study demonstrates how two government organizations used Twitter as a tool for risk communication during the 1<sup>st</sup> wave of the COVID-19 pandemic.

Furthermore, drawing on the CERC framework, the extent to which risk messages aligned to the CERC's six principles were also explored.

Several findings emerged from the current study. Firstly, Twitter was utilized consistently by both the Finnish and Scottish government to disseminate risk communication messages during the COVID-19 pandemic. Secondly, in regard to the major study aim, this study found that the three most-discussed themes during the COVID-19 pandemic for both governments were: (1) key messages regarding COVID-19 risk, (2) government activities, (3) promoting action. Thirdly, all six CERC principles were reflected in the Finnish and Scottish government's Twitter posts during the study period, although to various extents. Lastly, the frequency of postings disseminated by the Finnish government demonstrated to correspond more to the development of the pandemic in comparison to the Scottish government's posts; however, both governments shared the greatest number of risk communication messages just before the number of new COVID-19 cases hit their peak, as demonstrated in Figures 5 and 7.

## 6.2 Risk communication messaging & alignment with CERC principles

It has been established through previous research that one of the most common ways of using social media for crisis-related purposes involves the provision of key background information about crises and their risks to the public (Plotnick et al., 2015; Haataja et al., 2016). The findings of the current study displayed to be largely consistent with this statement. Throughout the study period, the Scottish government consistently shared key statistics regarding the prevalence and severity of COVID-19, hence why the ‘key messages regarding COVID-19 risk’ was their most dominant theme. As claimed by Hagen et al. (2018), social media serves as a valuable gateway to scientific information aiding to debunk the spread of misinformation.

In regard to scientific (epidemiological) information, the Finnish government less frequently shared tweets discussing the prevalence and severity of the virus. Comparably to the Scottish government, the ‘key messages regarding COVID-19 risk’ was also one of the dominant themes found in the Finnish government messaging, however their messages related more to the nature of the coronavirus, it’s impacts and effects on society, and situational updates (sub-theme 1). This content of information was critical, especially during the beginning stages of the pandemic, as COVID-19 was characterized as a dread -, involuntary-, uncertain-, and uncontrollable risk with catastrophic potential, in terms of risk perception factors (Waaren & Lofstedt, 2021).

As risk and crisis communication literature recommends, organizations should communicate their intentions to the public/audience regarding their actions and objectives for emergency response (CDC, 2014). Tweets regarding actions being taken or going to be taken by the Scottish and Finnish government to control the coronavirus infection were commonly communicated throughout the study period. It was the most dominant theme among the Finnish tweets (60.3%) and the second most common among the Scottish tweets (23.9%). Likewise, studies by Liao et al. (2020) and Lwin et al. (2018) found that government agencies utilized social media to inform the public about government actions/interventions and policies during infectious disease outbreaks. As Bernard et al. (2020) explain, COVID-19 has impacted both global and national economies due to the need for numerous strict restrictive measures to control

the transmission of the coronavirus, hence why many government communiques involved actions governmental organizations were taking to mitigate the impacts of the pandemic.

The findings discussed above highlight how both governments utilized Twitter well to share what was known about the situation at the given time and what was being done, embodying major principles of CERC: be first, be right and be credible. The third most common theme for both governments, ‘promoting actions’ also emphasizes the dissemination of credible information to the public. Furthermore, both governments shared URL links alongside risk communication messages, referring readers to further information in regard to the content of the tweet. The majority of the links used by both parties led the public to the official government pages, hence credible sources. Both accountability and transparency are key components of CERC, and these were demonstrated through messages expressing commitment and honesty. Messages reassuring the public and expressing commitment were more apparent among the Finnish government tweets.

Risk messages regarding what was unknown, ‘addressing the unknown and unclear facts’ in the form of addressing fake news, myths and misconceptions were limited for both governments, despite the fact that WHO had warned about an “infodemic” having been linked to COVID-19 (Kouzy et al. 2020; Cinelli et al., 2020). This finding resonates with past studies involving social media messaging by CDC, WHO and MSF (Médecins Sans Frontières), more specifically the lack of clarification messages combating misinformation during the EVD outbreak (Guidry et al., 2017).

Furthermore, the study by Li et al. (2021), also demonstrated that governments and public health agencies less frequently utilized Twitter to disseminate messages combatting misinformation during the COVID-19 pandemic. Tomkins (2020) claims that many leaders are trained to maintain tones of certainty and confidence even in times of uncertainty, which can reduce both credibility and trust, and lead to false hope.

Evidently, this finding demonstrates that there is much opportunity to strengthen the role of government organizations in countering misinformation via social media. The infrequent appearance of messages explaining ‘what is not known about a risk’ can be counterproductive to other risk communication messages, such as the encouragement of self-protective behaviors (Gyamfi and Amankwah, 2021).

During a crisis, the use of empathetic and honest language is regarded to be very important, also being one of the six principles of CERC. As mentioned in the theoretical models of risk communication chapter, in addition to openness and transparency, empathy, caring and listening are key determinants of *the trust determination model* (Covello, 2009, p.146; Covello et al., 2001). Furthermore, as stated by Seegar (2006), expressing empathy through communication can improve the credibility of the communicator significantly. Display of empathy through expression of compassion (understanding one's discomfort) and gratitude was the least common theme within the messages disseminated by the Finnish government and ranked as fourth common within messages published by the Scottish government.

The ongoing COVID-19 pandemic has impacted the mental health of millions of people through increased levels of anxiety, stress, depression, uncertainty and fear (Serafini et al. 2020). The use of empathetic language has been found to help manage distress and anxiety and include the public in the process of understanding (CDC, 2014). The findings illustrated that the Scottish government understood and acknowledged the feelings of discomfort the public were or could be feeling as a result of the pandemic. They shared tweets promoting 'self-care' activities, providing advice and recommendations on self-care methods to those suffering from fear, anxiety and other mental health symptoms as a result of the pandemic. These findings show that the Scottish government's communiques aligned much more with the fourth CERC principle, expressing empathy, in comparison to the Finnish government. According to Bernard et al. (2021), many female leaders have been praised during the COVID-19 pandemic for their empathetic but yet evidence-backed communication styles. For instance, German Prime Minister Angela Merkel and New Zealand Prime Minister Jacinta Arden have communicated messages which demonstrate the acknowledgement of the public as part of the solution, in return fundamentally building confidence.

Both government communiques displayed to show respect, aligning with the sixth CERC principle. According to CDC (2014), showing respect is essential when people are vulnerable, for instance during an infectious disease outbreak or when there are high levels of uncertainty. Encouraging public support and promoting actions beyond individual behavior are indicators of respectful communication. The findings of this

study found that risk messages promoting collective responsibility was one of the least prevalent themes for both the Scottish and Finnish government. In contrast, a study conducted by Elgammal (2021) found that Instagram posts highlighting expression of common responsibility were one of the most common identified post categories by the Bahraini ministry of health, during the COVID-19 pandemic. Furthermore, these posts were identified to receive a greater level of public engagement. Similarly, the study conducted by Lwin et al., (2018) found that one of the common uses of Facebook for outbreak communication involved promoting public common responsibility for disease prevention and encouraging public cooperation during the Zika outbreak.

### **6.3 Developments in risk communication**

The nature of the content of tweet messages reflected the way the Scottish and Finnish government were managing the public health crisis during the period under study. During month March 2020 until the beginning of May 2020, tweets disseminated by the Finnish and Scottish government focused on key messages regarding COVID-19 risk, promoting actions to prevent virus transmission and sharing information on what the government was doing to address the outbreak crisis, which consisted of for instance, restrictive measures (e.g., lockdown regulations). Towards the end of May and the month of June 2020, when the number of cases were significantly decreasing, both governments began planning for return to normal life gradually, sharing tweets regarding the easing of restrictive measures and lockdown rules. Less tweets were also disseminated by both governments regarding the promotion of activities such as face mask use and social distancing during this time. These findings were highly consistent with Elgammal's (2021) study, which investigated social media usage by the Bahraini ministry of health during the COVID-19 pandemic.

The presentation of government risk communication in Finland and Scotland in the context of biweekly COVID-19 cases demonstrate that different communication methods were adopted during the initial- and maintenance phases. The findings of the current study demonstrated that the majority of the tweets communicating the risk of COVID-19 were published during the initial stage of the pandemic, when the number of new cases were increasing rapidly (mid-March- beginning of April). Likewise, Chen et

al. (2018) found that the CDC's response to the Zika virus outbreak was focused in the first quarter of year 2016, during which over 80% of their tweets were posted.

According to the CDC's CERC manual (2014), during the initial stage, communicators should express empathy, provide key explanations of risks, promote action and establish their organizations credibility by explaining what they're doing to respond to the emergency. The findings demonstrate that the both the Scottish and Finnish government mainly shared what they were doing or going to do to control the virus and its spread and key explanations regarding the risk of the coronavirus during the initial stage of the first wave of the COVID-19 pandemic. However, the Finnish government failed to disseminate any tweets expressing empathy during the initial stage, whereas the Scottish government disseminated the majority of their tweets expressing empathy during this stage.

In regard to the maintenance stage, according to the CDC's CERC manual (2014), it is critical for communicators to continue to provide background information regarding the crisis and its risk, and ways in which they can protect themselves, address segment audiences (those most at risk), encourage public cooperation and address unclear facts and misinformation. The findings showed that both governments published tweets addressing all of these factors, however tweet posts addressing segment audiences and misinformation were very limited.

#### **6.4 Limitations**

Similar to much research, this study acquires a number of limitations. An important limitation is that the author only analyzed data from March 1 to June 30, 2020. As the COVID-19 pandemic is still ongoing, findings of this study are limited to just the 1<sup>st</sup> wave of the pandemic in Scotland and Finland. Additionally, as the current research is about COVID-19, initially a novel infectious disease to experts and the public, the strategies used by both governments to communicate the virus's risk may be different from those communicating a steady disease threat, such as influenza. The present study focused on the risk (and crisis) communication of government organizations, thus tweets posted by their official accounts were only studied. Factors such as the public engagement of tweet posts and public behavioral impacts responding to risk

communication during the COVID-19 pandemic were not investigated as this research was an observational study of Twitter-based risk communication.

The study was based on the analysis of a single social media platform, hence the lessons learned may be more applicable to Twitter in comparison to other social media platforms. The subjects of the study were the Finnish and Scottish governments, which are institutions that were already active users of Twitter and acquired increased percentages of public trust during the initial stages of the ongoing pandemic. Moreover, both countries can also be regarded to be internet-intensive countries. These factors may limit the generalizability of the current study in global settings; thus, it is necessary to investigate how risk is communicated via social media in a less internet-covered society and among governmental institutions that don't acquire much public trust.

The in-depth literature review of the present study was conducted using peer-reviewed research articles from numerous electronic databases (e.g., ScienceDirect, ProQuest, Wiley Online Library and EBSCOhost and Ebook Central) which were identified using several appropriate search terms and combinations. Additionally, the snowballing method was adopted, hence new relevant articles relevant to the topic were found from reference lists of already found research articles. However, the literature review was limited to articles published in academic journals in the English language and to the availability of full articles either on the internet or in the Tampere University database. Henceforth, there is a possibility that not all relevant studies on the topic were included into the grounding of this research study. Furthermore, since the pandemic is ongoing, the author may have missed newer studies conducted on the topic.

In regard to the methodology, the current study acquires few constraints, some of which are linked explicitly to challenges associated generally with conducting social media research (Sloan & Quan-Haase, 2018). Moreover, the author recognizes that there is also a probability that not all applicable tweets were represented in the tweet database as some tweets may not have included the keywords and may have used other terminology to refer to the risk communication of COVID-19.

## 7. CONCLUSION

This study is among the few to reveal how Twitter, as a social media platform, can be strategically utilized for risk communications by government organizations. Both the Finnish and Scottish governments disseminated tweets consistently and in a timely manner communicating the risk of COVID-19 and established the credibility of their organizations well, by regularly sharing what they were doing or going to do to control the situation. The implementation of the CERC principles were reflected within the tweet posts disseminated by both government organizations at different stages of the pandemic during the study period however, from a CERC perspective, the current study has identified a few gaps in the risk communication strategies.

This research has demonstrated that although misinformation has been a substantial issue during the ongoing pandemic, government organizations scarcely used social media to address rumors, myths or misinformation regarding COVID-19. Evidently, government organizations should begin to evaluate, to what extent they should address misinformation and rumors, rather than merely circulating evidence-based information on social media. This study has the potential to serve as a roadmap for strengthening the social media risk communications of government organizations during public health emergencies, such as the ongoing COVID-19 pandemic, providing lessons learnt and areas within risk communication that need improvement.

As the following study solely focused on risk communication on Twitter, future research should be implemented exploring the use of other social media platforms, such as Instagram and Facebook. The field of risk communication is still growing, hence further research can be conducted to investigate how other vital stakeholders such as, national health ministries and public health institutions, utilize their social media platforms to disseminate risk messages in times of a public health crisis. Lastly, as this study helped highlight how two various government organizations used social media to communicate the risk of COVID-19, further research is needed to evaluate how risk messaging content can impact public attitudes, thinking and behaviors. The investigation of public reactions to government risk messaging during an outbreak crisis would have substantial implications on evaluating the effectiveness of an organization's risk communication approaches.

## **8. IMPLICATIONS**

Overall, the present study provides insights on risk communication through social media during the COVID-19 pandemic, specifically regarding the use of social media by government organizations. As research involving social media-based risk communication during infectious disease outbreaks is quite limited, this study provides practical insights into the nuanced use of social media to disseminate risk messaging. The findings of the study provide valuable information for communication and social media professionals within the government organizations studied on how social media was utilized during the pandemic and how their messaging aligned with the CDC's CERC principles. Furthermore, the findings of this study provide other government stakeholders, public health institutions and first responders with an updated understanding of their role in sharing risk information on social media. Moreover, demonstrating how to improve risk communication strategies to be more comprehensive.

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