

“I SIGNED UP FOR TWITTER. REASON? FLOOD NEWS.”: AN ANALYSIS OF
PRE-CRISIS TWEETS MADE BY DECISION-MAKERS, MEDIA, AND THE PUBLIC.

A Thesis
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Jenna Lee Currie-Mueller

In Partial Fulfillment
for the Degree of
MASTER OF SCIENCE

Major Department:
Communication

April 2014

Fargo, North Dakota

North Dakota State University
Graduate School

Title

“I Signed up for Twitter. The Reason? Flood News.”: An Analysis of Pre-Crisis Tweets Made by Decision-Makers, Media, and the Public.

By

Jenna Lee Currie-Mueller

The Supervisory Committee certifies that this *disquisition* complies with North Dakota State University’s regulations and meets the accepted standards for the degree of

MASTER OF SCIENCE

SUPERVISORY COMMITTEE:

Dr. Robert Littlefield
Chair

Dr. David Westerman

Dr. Nan Yu

Dr. Yue Ge

Approved:

4/9/2014
Date

Dr. Mark Meister
Department Chair

ABSTRACT

This study examines the use of Twitter by decision-makers, the media, and the public during the pre-crisis stage of the 2013 Fargo-Moorhead flood. Three research questions guide this study in order to gain understanding of the content and assumed motives that drive users to utilize Twitter prior to a crisis. Data analysis revealed that decision-makers and the media active in tweeting were consistent with what would have been expected in a crisis situation. Additionally, the public were driven by the assumed motive of sharing and seeking information during the pre-crisis stage, consistent with previous research regarding the crisis stage.

ACKNOWLEDGEMENTS

I am so grateful for this experience and the individuals that helped me along the way.

First, I would like to thank my advisor, Dr. Robert Littlefield. As an undergraduate, you exposed me to crisis communication, prior to that class I was unaware that crisis communication existed as a field. You encouraged me to attend graduate school, and have pushed me in my writing, my thinking, and encouraged me along my journey, thank you. I would also like to thank my committee, Dr. David Westerman, Dr. Nan Yu, and Dr. Yue Ge. Each of you has provided me direction, guidance and material during this process. I may be bias, but I am pretty positive that I had the greatest committee assembled in the history of committees.

Next, I would like to thank my coder, Logan. Logan, you rock. Your excitement only fueled more excitement; I am so glad that we are able to continue working together and that you like Dr. Who!

Additionally I would like to thank my computer programmer, Benjamin. Ben you have been the greatest throughout this project, and throughout my graduate experience. You support me in every decision, make me dinner when I return home from class, and put up with my endless talking about research, and what I learn in class. You really should receive an honorary degree when I receive my degree; you learn almost everything I learn in school. I am the luckiest. I love you; also, Pi really likes you.

I also would like to thank my family, I love you all. To my programmer's family, thanks for being there throughout this process, and asking me how it is going. To my parents, I am far away but I always know that I am supported and loved. Dad, I have never been more compelled to call and talk to you than this year, and when Mom would let me talk to you, everything would be better. Mom, thanks for letting me talk to Dad every now and then. To my brother Justin, if

you had not surprised me for my birthday, I really do not think I would have finished this in time. To my sister Kayla, I cannot wait until we start conducting research together, until that day comes, I expect a Maddie picture every day!

To my Aunts and Uncles, nothing cheered me up more than receiving packages or cards in the mail. Now that I have finished writing this, you will all have to read it! To my grandparents, I cannot wait until you read this. I finally have tangible proof of what I have been doing. Grams, now we can play Scrabble online, Papa, now Grams has someone to play Scrabble with! Babcie, I need to learn all the Polish recipes now and Papa, your name is in print (it is hyphenated, but “what can you do?”). To all four of you, I have the fondest memories of learning from each of you. You each have fueled my passion for learning, reading, and consuming knowledge.

To Amorette, thank you. This was the farthest thing from my mind when we met, and now I cannot imagine myself doing anything other than this.

Onward to the dissertation!

TABLE OF CONTENTS

ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	iv
LIST OF TABLES.....	viii
CHAPTER 1: INTRODUCTION.....	1
Significance.....	2
Rationale.....	5
Purpose.....	7
Twitter Background and Definitions.....	7
Conclusion.....	10
CHAPTER 2: LITERATURE REVIEW.....	11
Risk and Crisis Communication.....	12
Risk and Crisis Communication and Social Media.....	17
Uses and Gratifications Theory.....	23
Conclusion.....	29
CHAPTER 3: METHODOLOGY.....	30
Research Design.....	30
Data Collection.....	31
Conclusion.....	39
CHAPTER 4: RESULTS AND DISCUSSION.....	40

Results	40
Discussion	55
Conclusion.....	62
CHAPTER 5: IMPLICATIONS, LIMITATIONS, AND DIRECTION FOR FUTURE RESEARCH.....	63
Implications.....	64
Limitations	65
Direction for Future Research.....	66
Conclusion.....	67
REFERENCES	69

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Inter-coder Reliability and Drift.....	39
2. Decision-makers' and the Media's Classification and Data Representation.....	42
3. Decision-makers' and the Media's Tweets Represented by Content.....	45
4. Decision-makers' and the Media's Tweets Represented by Assumed Motive.....	46
5. Decision-makers' and the Media's Tweets Represented by Tone and Expression.....	47
6. Public Tweets, and Retweets Represented by Assumed Motive.....	51
7. Public Tweets, and Retweets Represented by Tone and Expression.....	52

CHAPTER 1: INTRODUCTION

In recent years, social media increasingly has become an essential piece of individuals' lives; enabling users to make connections with one another as they participate in an expanding virtual community. In 2013, 72% of online adults were social media users (Brenner & Smith, 2013). Echoing only 31% four years earlier in 2009 (Smith, 2010a), this rapidly growing figure will continue to increase as communication technologies evolve. Though social media is constantly changing, its core reflects characteristics of human communication that transcend time, characteristics such as participation, community, connectedness, conversation, and openness (Mayfield, 2006). These characteristics, coupled with the freedom for social media's users to choose what to devote their attention to, enable social media's popularity.

Social media users can decide what experiences or information to share with others. This decision propels private individuals to be sources for online information (Marken, 2007). In risk and crisis situations, social media enables the general public to interact and exchange information at each stage of the crisis (Malizia, Bellucci, Diaz, Aedo, & Stefano, 2011), accelerating and making information concerning risk and crises more accessible to individuals than ever before. As communication technologies rapidly change, and continue to develop, this trend will only continue (Veil, Buehner, & Palenchar, 2011). Due to social media's speed, it is important that the correct information is available.

Decision-makers, such as elected officials, city boards or services, need to be aware if the public uses Twitter or other social media channels to obtain information. Knowing what channels publics rely on aids decision-makers in ensuring their messages are reaching their intended audiences. Additionally, understanding how the characteristics of the channel engender certain messages assists message development and supports decision-makers' transitions to

similar channels in the future. Further, it is essential that decision-makers understand how their publics receive and respond to their messages using a certain channel. What messages will their publics deem crucial enough to share with others? What messages will their public heed? Understanding the answers to these questions enables decision-makers to take their publics' input and reception of risk and crisis messages in social media into account (Fugate, 2011). Likewise, understanding how publics perceive risk and crisis messages through different channels is imperative to ensuring decision-makers are delivering appropriate messages.

Using Katz, Blumler, and Gurevitch's (1974) uses and gratifications theory, this study aims to understand what motivates decision-makers, the media, and the public to use Twitter during the pre-crisis stage, including how decision-makers and the media use Twitter to communicate risk and crisis messages to their publics, and if the public considers the messages to be of the same importance as decision-makers and the media do during the pre-crisis stage of the crisis cycle. Twitter is one of the most widely used and popular channels of social media. In the United States, Twitter boasts one in five adults as users (Brenner & Smith, 2013). Worldwide, Twitter is "well-established as the world's second most important social media platform, after Facebook" (Bruns, 2012, p. 1323). As Twitter is both widely used and popular, understanding if the public deems risk and crisis messages with the same degree of importance as decision-makers and the media is vital in communicating during risk and crisis situations.

Significance

Academic research involving Twitter is at an early stage. Since its debut in 2006, Twitter has consistently evolved as Twitter's users continuously develop new ways to interact and utilize the social media channel. Rather than using traditional channels, individuals use social media, like Twitter, to connect and find what they need (Li & Bernoff, 2008). Though this study

focuses on Twitter, it is important to recognize Twitter's characteristics that transcend to other social media channels. This way, decision-makers will be able to adopt new social media channels in the future.

Social media is likely to become an essential means to convey risk and crisis communication as it provides additional message distribution channels, instant feedback, and can address concerns quicker than other formats (Lundgren & McMakin, 2013). Twitter is an noteworthy channel to analyze for risk and crisis communication as users have shaped the tool as a way to communicate during man-made disasters, natural disasters, and other crises. Studies recently have begun to look at the public's use of Twitter during post-crisis and crisis stages. An example of a post-crisis focus is Acar and Muraki's (2011) examination of post-earthquake, and tsunami Japan. Post-crisis Twitter utilization is relatively new as the majority of the research lies within Twitter's use during the crisis stage.

Studies have explored how the public used Twitter during crises such as the US Airways Flight 1549's crash into the Hudson River (Kwak, Lee, Park, & Moon, 2010; Lenhart & Fox, 2009), the Seattle Shootings (Heverin & Zach, 2010), the Tunisian Uprisings (New American Media, 2011), the Mumbai Massacre (Beaumont, 2008), the 2007 and 2008 California Wildfires (Poulsen, 2007; Sutton, Palen & Shklovski, 2008), the 2010 Port-Au-Prince earthquake in Haiti (Robinson, 2010; Smith, 2010b), and the public's response when an American student's only form of contact was Twitter while en route to jail in Egypt for protesting (Arceneaux & Weiss, 2010).

As much as researchers have focused on Twitter use during and after a crisis, there seems to be a gap in the research when looking at how the public uses Twitter before a potential crisis, during the pre-crisis stage. Research reveals the public uses Twitter, but it does not disclose the

type of messages used before an impending potential crisis. What are the messages that come from decision-makers or the media? What motivates decision-makers or the media to use Twitter? Does the public pay attention to certain messages? What information does the public share with one another? What motivates the public to use Twitter? How does the public find their information? The answers to these questions are essential to scholars and practitioners in the communication field.

The pre-crisis stage is an essential part of the crisis cycle demanding further exploration than what has been represented in the literature. If crises are cyclical, there should exist an effort to understand each specific stage more clearly as part of a larger effort of understanding the cycle holistically. Currently, literature does not provide answers for questions, or deliver helpful suggestions surrounding the pre-crisis stage. This stage remains unexplored, leaving a noticeable gap in the research that must be addressed.

Areas that are more prone to natural disasters, such as flood plain areas, stand to benefit from examining this gap in research. As a disaster is the reality of a hazard, these areas are accustomed to preparation, and in the case of recurring flooding, the community is often aware of a hazard. When a community develops a resilience to a specific type of crisis, the management of the crisis, or hazard, reflects more of a routine to the community. Mileti (1999) revealed that individuals with prior disaster experience is a key indicator of higher preparedness levels, and more effective responses. This is due to a greater awareness of a disaster's impact, and the demand that disasters generate. This means the community expects the pre-crisis stage, defining the time period before the crisis and not solely in hindsight once the crisis is over. Individuals in hazard prone areas are aware of oncoming crisis, often at times making the pre-crisis stage longer than what is experienced in other crises, or longer than the actual crisis itself.

The community spends a larger amount of time communicating, and preparing in the pre-crisis stage than other communities not typically exposed to recurring crises.

Mitigation and preparedness efforts through risk and crisis communication are essential to prevent unnecessary loss and damage (Sellnow, Seeger, & Ulmer, 2002). One of the aspects of preparedness concerns “communicating with the public and others about disaster vulnerability and what to do to reduce it” (Mileti, 1999, p. 215). This is why it is significant to study and understand what motivates decision-makers, the media, and their publics to communicate via social media during the pre-crisis stage, and how each group uses social media. The 2013 Fargo-Moorhead Red River flood season provides an opportunity to explore this research gap and scrutinize how the public responds to decision-makers’ messages and the media’s messages through using social media channels in mitigating a potential crisis.

Rationale

Typically, the field of emergency management concerns natural hazard or natural disaster preparedness. Though communication research involving risk perception, and risk communication is rooted in studying risk assessment (Covello & Mumpower, 1985), most research does not focus on the communicative actions surrounding a natural hazard. In the communication field, risk and crisis research tends to examine organizations, and their response to a crisis or man-made disaster. Although natural hazards or natural disasters are studied, they are rarely examined from a crisis communication standpoint (Sellnow et al., 2002).

Man-made disasters, natural disasters, and natural hazards differ from one another. Man-made disasters can often be traced to an organization or a person as the cause. In a man-made disaster, someone or something can be blamed. In a natural hazard or natural disaster, blame cannot be placed on an agency, organizations, or official. As blame cannot be directed, decision-

makers involved with a natural hazard or natural disaster embody a different role than decision-makers involved with a man-made disaster (Waymer & Heath, 2007). In a man-made disaster, decision-makers and subsequent spokespersons will spend a large amount of time protecting or restoring an organization's image or reputation. Whereas, those involved in a natural hazard are empowered to focus on mitigation and preparedness as they are not responsible for protecting an organization. Risk and crisis communication usually focuses on organization; however, contemporary risk communication research is expanding to include natural hazards and natural disasters (Cole & Fellows, 2008; Venette, 2008).

Risk is the probability that an event will occur (Phillips, Neal, & Webb, 2011) or the socially-constructed perception of the potential for a negative event occurring (Venette, 2003). Floods are considered known risks as they display repetitive behavioral patterns (White, 1942). Each year, the risk that the Red River will flood is a high probability. Regardless of how high the water level crests, the river meets or exceeds the official flood stage of 18 feet each spring (Fargo Geology, 2013). In recent years, the Red River experienced multiple historic-level flood events. As flood season began in 2013, the Red River exhibited familiar historic-level behavioral patterns and began a journey to rival the previous historic-level flood of 2009 that experienced a crest of 40.84 feet (City of Fargo, 2013), the highest crest on record.

Floods differ in a variety of ways. However, a main difference between the 2009 and 2013 flood seasons was social media. In 2009, social media was neither accessible nor widely used as it was in 2013. Social media is changing how researchers approach risk and crisis communication. Audiences already utilize Twitter to communicate and share information during natural hazards and natural disasters. Twitter can be seen as a main source of information for individuals during the 2013 Colorado floods, 2010 Haiti earthquake, 2009 Oklahoma grass fires,

and both 2007 and 2008 California wildfires (Corvey, Vieweg, Rood, & Palmer, 2010; Epatko, 2010; Ostrow, 2013; Poulsen, 2007; Rael, 2013; Robinson, 2010; Smith, 2010b ;Sutton et al., 2008).

Recent studies call for research to examine how social media channels impact audiences' perceptions of risk, and risk and crisis messages (Palen, Vieweg, Sutton, Liu, & Hughes, 2007; Shankar, 2008; Veil et al., 2011). Identified as useful in understanding the public's perception of risk (Goolsby, 2009), Twitter is an excellent channel to explore as individuals already utilize Twitter during a crisis.

Purpose

Using content analysis, this study investigates how risk messages from decision-makers and the media are received and accepted by the public using Twitter. Acceptance is measured in the public's retweets, mentions, replies, and quoting tweets disseminated by decision-makers and the media. In order to find out if decision-makers, the media, and their publics view the same information with equal importance, this study examines activity on Twitter leading up to the crisis stage during the 2013 Red River flood season via content analysis and through the theoretical lens of uses and gratifications (Katz et al., 1974). Developed as a way to explain how media functions for and how individuals, organizations, and society use media, uses and gratifications' heuristic value continues to expand as new media evolves and develops.

Twitter Background and Definitions

A popular channel of social media, Twitter's users comprise of one in five adults (Brenner & Smith, 2013). Defined as a smaller and quicker version of the blog, Twitter is often referred to as a microblog. Microblogs are mini-blogs that allow for smaller messages or comments to be sent to a specific network (Larsson & Moe, 2012). When a user on Twitter

sends a message, or Tweet, the user's message is sent to a network of followers. Unlike other popular social media channels, like Facebook or Instagram, Twitter accounts are not exclusive to other users on the website. Twitter users are not required to "friend" another user. It is not mandatory for users to follow their followers or vice versa. Definitions specific to Twitter are discussed below.

Tweets

The official name for messages sent via Twitter is Tweets. To ensure brevity in a Tweet, users are limited to 140 characters. Tweets can be private or public. When a user creates an account, the user can choose for their Tweets to be private; private tweets appear only on the user's homepage and to their followers. If a user's tweets are public, their tweets appear on Twitter's homepage as well as the user's homepage and to the user's followers.

Users can send tweets in a variety of ways. Several third-party clients provide mobile, and desktop applications for users to send their tweets through. Additionally, Twitter offers official mobile applications, website, and text-messaging options for users to utilize (Honeycutt & Herring, 2009).

Tweets are classified into different categories: (1) singletons; (2) mentions or replies; and (3) retweets (Kwak et al., 2010). Each tweet is classified by different characters used in each; however, hashtags (#) are universal and can be utilized in any tweet. Hashtags and each tweet classification are further discussed below.

Hashtag (#). A hashtag serves as a form of an identifier, usually related to a user's tweet. A hashtag is placed in front of a word or phrase and creates a theme to the user's tweet. A hashtag attached to a word or phrase creates a hyperlink that any user can click. This hyperlink "allows users to search the Twittersphere for specific topics of interest and to follow

threads of discussion related to those topics” (Larsson & Moe, 2012, p. 731). Hashtags are universal and can be utilized in any type of tweet.

Singletons. A single statement made by a user is referred to as a singleton. Singletons are not directed towards another user and will not include the @ symbol (Kwak et al., 2010).

Mentions or replies. Twitter was never designed as a way for users to interact with one another (Honeycutt & Herring, 2009). However, as with all forms of social media, Twitter has evolved in its utility. Users can interact with one another by using the @ symbol to address other users in their Tweets. When a user tweets either a mention or reply towards another user, the @ symbol is followed by another user’s username (Kwak et al., 2010; Larsson & Moe, 2012). Mentions will simply mention another user or direct a tweet to another user and replies are directed towards another user’s mention. Often, replies include quotations from the original tweet.

Quoting. When tweeting a reply, users often choose to quote the user from the original tweet in their message. The @ symbol is utilized to denote the original sender, followed by the quotation, and then the user’s reply.

Retweets (RT). Messages that originate from a different user than the user that is sending the tweet are retweets. Retweets are marked “RT” at the beginning of the tweet to distinguish the tweet as being different from a singleton, mention, or reply. Retweets automatically include the @ symbol, followed by the original user’s username. Any and all tweets are eligible to become retweets.

Decision-Makers

For the purpose of this study, decision-makers are defined as those within a community responsible for communicating necessary and important information, or those who make

decisions for the larger public. Examples of decision-makers are individuals who hold public office, such as local, state, or national representatives; cities or towns, for example, Fargo or the surrounding areas; and city boards and services, like the fire or police department.

The Media

For the purpose of this study, the media are defined as media and news stations, for example, local television or radio stations, or newspapers; and media figures, such as television anchors, or journalists.

Conclusion

This chapter emphasized the importance of risk and crisis communication during a natural hazard or natural disaster. Recent usage of Twitter during crises and the need for decision-makers and the media to understand the different channels of social media their publics are utilizing provides rationale for undertaking this study. Further, this study answers the call for additional research into the realm of audience risk perceptions in social media (Palen et al., 2007; Shankar, 2008; Veil et al., 2011). Understanding how audiences use social media and view risk messages during the pre-crisis stage is essential for decision-makers and the media in creating effective risk messages.

Chapter two provides a literature review that defines risk and crisis communication. The chapter explores social media, and social media's previous use in risk communication; Katz et al.'s (1974) uses and gratifications theory; and the chapter provides three research questions that further guide this study. In chapter three, a description of the methodology is delineated. Chapter four reveals and discusses this study's findings and results, followed by chapter five with discussion of implications, limitations, and suggestions for future research.

CHAPTER 2: LITERATURE REVIEW

The field of risk and crisis communication enables scholars to explore the messages produced and received during a risk or crisis by decision-makers and their publics. This examination has led scholars to identify that crises follow a cyclical pattern. There are three stages within the crisis cycle; each stage produces appropriate communication that reflects what occurs and is experienced at each specific stage, via different modes.

In more recent years, risk and crisis communication has explored the use of social media during various stages of the crisis cycle. The crisis stage of the cycle has experienced more exploration than the pre-crisis and post-crisis stages of the cycle. This exploration reveals individuals interact and communicate via social media channels during crises to seek out and share information involving their situations. However, the attention researchers devote to social media use and the crisis stage leaves a gap in research concerning the pre-crisis stage and social media use.

A useful framework to aid in exploring this gap is Katz et al.'s (1974) uses and gratifications theory. Uses and gratifications theory posits that individuals use media to gratify certain needs. In other words, an individual will use a form of media with a certain outcome in mind to fulfill a specific need or needs.

Uses and gratifications has recently experienced a resurgence of popularity in the communication field with the onset of new media and social media. Researchers are using this framework in analyzing several varieties of social media; varieties such as blogs, online gaming communities, and social networking sites. Uses and gratifications repeatedly proves to be beneficial in examining these areas, especially Twitter.

As introduced in the previous chapter, and previously mentioned above, this study utilizes uses and gratifications theory to examine how decision-makers, the media, and individuals use Twitter during the pre-crisis stage of the crisis cycle. This study relies on three key areas of research: risk and crisis communication, risk communication and social media, and uses and gratifications theory.

Risk and Crisis Communication

In the past 30 years, the communication field has expanded to incorporate the study of risk and crisis messages into its discipline (Olaniran & Williams, 2012). Risk and crisis communication research's roots are attributed to the study of risk assessment (Covello & Mumpower, 1985). A continuously growing area of research, risk and crisis communication research has developed into an area that is concerned with various types of crises. Although crises differ from one another, they cluster into identifiable types (Coombs & Holladay, 2001). Coombs (2007) offers a "master list" of crises that includes natural disasters, rumors, workplace violence, malevolence, challenges, technical-error accidents, technical-error product harm, human-error product harm, human-error accidents, and organizational misdeeds. In addition to this list, contemporary risk and crisis communication research includes terrorism-related crises (Palenchar, Heath, & Oberton, 2005; Reynolds & Seeger, 2005).

Phillips et al. (2011), defined risk as the probability that an event or crisis will occur. Therefore, risk communication involves the anticipation of a crisis and evaluating what would happen if the event does occur. Risk communication also considers how the public may anticipate or view the event, and how to address any actions that may be necessary or required at various stages of the event (Palenchar & Heath, 2002).

Risk and crisis communication is an intricate and delicate process as the public's perception of a risk will often change at varying stages of the crisis cycle. Perceptions frequently change due to competing messages that derive from new calculations and interpretations of a risk delivered close together. These multiple messages compete against each other for the public's attention (Sellnow, Ulmer, Seeger, & Littlefield, 2009) and serve as a reminder to decision-makers to be coherent and consistent in all stages of the crisis cycle.

Crisis Cycle

In an attempt to understand what happens during a crisis, and the timeframe surrounding a crisis, scholars have conceptualized different models throughout the evolution of risk and crisis communication research. Turner's (1976) six-stage model approached crisis in a way that organizations were able to identify and monitor certain patterns for future potential crises. Fink (1986) viewed crisis as a linear progression with a four-stage model beginning with the signs of a potential crisis and ending with the crisis' termination. Similarly, Mitroff (1994) posited a five-stage model with a starting point and ending point.

Seeger, Sellnow, and Ulmer's (2003) discussion of the three-stage model is the most widely accepted and used model in crisis communication research (Coombs, 2007; 2010; Olaniran & Williams, 2012). This model differs from earlier models as it portrays a crisis as an ongoing, cyclical process. Composed of three separate stages: pre-crisis, crisis, and post-crisis (Coombs, 2010; Seeger et al., 2003), this "general analytic framework" (Seeger et. al, 2003, p. 97) broadly approaches crisis. In taking this approach, the three-stage model is enable to adapt and accompany a variety of different types of crises (Seeger et al., 2003).

The three-stage model is both academically and professionally used; its utility due to the model's clear and parsimonious layout. Within the model, each stage progresses into the next

stage, the pre-crisis stage develops into the crisis stage, and the crisis stage moves into the post-crisis stage. Essentially, the model is unending as when the post-crisis stage is concluding, the stage progresses into the pre-crisis stage along with a wealth of hindsight and information.

Pre-crisis stage. The pre-crisis stage is an essential component of crisis communication research. Olaniran and Williams (2012) refer to the pre-crisis stage as the “driving force or foundation for successful crisis management” (p. xvii) as this stage involves the details and actions that must be undertaken prior to encountering a crisis (Coombs, 2007). Crises occur due to a trigger event, the pre-crisis stage precludes this trigger. Seeger et al. (2003) define this stage as “the time of normal operation, preparation, and sensing before the onset of a trigger event” (p. 97).

The pre-crisis stage is reflective of the mitigation, and preparedness stages of the hazard cycle, commonly used in emergency management and disaster research. Tierney, Lindell, and Perry (2001) define the mitigation stage as the time period prior to a disaster where actions are taken to decrease vulnerability. Furthermore, Tierney et al., (2001) define preparedness is defined as the time period where necessary actions are undertaken before the disaster’s impact.

Pre-crisis planning is imperative since it prepares decision-makers in handling a potential crisis. Crises happen and not all are avoidable. However, some risks never progress into the crisis stage due to communication efforts by decision-makers. This scenario is ideal as “the best-managed crisis is the crisis that is prevented” (Coombs, 2007).

The pre-crisis stage is particularly helpful in handling known risks. White (1942) refers to floods as known risks as floods emit repetitive behavioral patterns. In a later work, White (1945) states that “floods are ‘acts of God,’ but flood losses are largely acts of man” (p. 2). White’s (1942; 1945) research created the foundation for flood management (Macdonald,

Chester, Sangster, Todd, & Hooke, 2011). Decision-makers that contend with potential flooding regularly understand that flooding is a known risk and therefore must be proactive during the pre-crisis stage. Approaching crisis communication through an organizational lens, Coombs (2007) further broke the pre-crisis stage into three sub-phases: “(1) signal detection, (2) prevention, and (3) crisis preparation” (p. 18).

Signal detection. Crises frequently produce warning signs. Warning signs differ according to different crises, and can vary in their length of existence. However, warning signs are similar in that they typically accommodate crises. If decision-makers heed a crisis’ warning signs and take appropriate action early enough, the crisis can be avoided (Gonzalez-Herrero & Pratt, 1995). Coombs (2007) described the timeframe in which warning occurred as the signal detection phase. Describing this phase as a puzzle, Coombs (2007) illuminated the puzzle is not equipped with a guiding photo, revealing the end result. Therefore, decision-makers must anticipate how events interact with one another and judge whether that interaction will lead to a potential crisis.

Coombs (2007) explained signal detection as being composed of three parts: (1) scanning, (2) collecting, and (3) evaluating. Scanning involves decision-makers identifying sources of information. This step is a “systematic search and analysis of events” (p. 22), where decision-makers need to be aware of the origin of their information. Information that is sourceless is unreliable. The collecting phase includes decision-makers collecting information and deciding how they proceed in collecting the information. The last phase requires decision-makers to evaluate the information they have collected. Here, decision-makers consider how “likely the situation is to develop into a crisis” (p. 22).

Prevention. Once decision-makers detect warning signals and agree on the possibility of a potential crisis, decision-makers take the appropriate actions to prevent the crisis.

Communication is essential during the prevention process as communication enables decision-makers and key players to be on the same page. Coombs (2007) identifies three sub-phases within the prevention phase: (1) issues management, (2) risk aversion, and (3) reputation management. Issues management involves organizations and decision-makers taking the right “steps to prevent a problem from maturing into a crisis” (p. 18). Levitt (1997) describes risk aversion as taking actions to eliminate or reduce the risk to the lowest level as possible, similar to the goal of the mitigation stage in the hazard cycle. Reputation management, the last sub-phase, requires building and maintaining a positive and favorable perception for stakeholders. Ulmer (2001) indicated establishing positive value positions with stakeholders prior to a crisis happening would affect responses during the crisis and post-crisis stages.

Crisis preparation. Decision-makers cannot assume their preventive measures will offer sufficient protection for a crisis and must prepare for a crisis’ manifestation. During crisis preparation, organizations prepare for the inevitable. Crisis preparation’s goals are similar to the goals of the preparedness stage in the hazard cycle. Coombs (2007) posited six concerns that organizations and decision-makers need to consider during this phase: (1) diagnosing vulnerabilities, (2) assessing crisis types, (3) selecting and training a crisis team, (4) selecting and training a spokesperson, (5) developing a crisis management plan (CMP), and (6) reviewing the communication system.

Diagnosing vulnerabilities requires organizations and decision-makers to assess the likelihood of a crisis and the severity of the crisis’ impact. Crises are not uniform and come in a variety of types, therefore, decision-makers need to determine what type of crisis they are

encountering. Knowing the type of crisis decision-makers are dealing with is important, as it aids in selecting a crisis team. Decision-makers need to be confident in their decision to choose the appropriate team members with the necessary skill levels to combat the crisis. Next, decision-makers must choose a spokesperson who will represent their organization and be the face their publics will see. The spokesperson must be credible and someone that the public can identify with. The fifth step involves developing a crisis management plan, or CMP. A CMP needs to balance detail and brevity while containing the information that decision-makers need in order to manage the crisis (Barton, 2001; Coombs, 2007). The last step requires decision-makers to review their communication system. Reviewing the communication system entails decision-makers securing the communication structure and ensuring the correct individuals are in the proper positions for contacting.

The steps taken during the pre-crisis stage affect the events that occur during the crisis and post-crisis stages. Though not all of the steps involved in the sub-phases may be visible to the public, they are indispensable to the pre-crisis stage. Organizations and decision-makers that follow these maneuvers establish credibility with their audiences. This established credibility can impact later stages of the crisis and can directly affect whether the public will participate in requested actions. How an organization or decision-maker influences stakeholders during the pre-crisis stage will impact mitigation efforts later (Sellnow et al., 2009).

Risk and Crisis Communication and Social Media

Technology is rapidly changing and advancing, enabling individuals to connect with one another more than in any other period in history. Communication is instantaneous, occurring via several different platforms or channels. One popular platform communication transcends is social media.

Social media use is continually increasing. In less than five years, social media use by online adults increased 41%. Meaning, 72% of online adults use and access social media through mobile devices and computers (Brenner & Smith, 2013). Contributing to this increase are mobile devices that offer the opportunity to connect to social media via applications, as well as social media's appeal to users. Social media is appealing to many individuals as its core reflects the basic characteristics of human communication (Mayfield, 2006). Additionally, social media enables users to be "in charge of what they look at and listen to" (Ludgren & McMakin, 2013, p. 262).

New technologies, such as social media, offer new opportunities for outreach in risk and crisis communication. Informal technologies are useful for decision-makers and the media to "engage persons at risk, to convey warning information, and to relay informational updates over the course of a disaster event" (Sutton, Spiro, Butts, Fitzhugh, Johnson, & Greczek, 2013, p. 58). Crisis communication often utilizes several different modes to communicate with different publics. For example, broadcast television, radio, or mobile alert systems. Social media, especially Twitter, is an useful mode during all crisis stages. Research reveals individuals are actively using Twitter, therefore, decision-makers need to adopt Twitter as a mode of communication. During a crisis situation, the public often turns to social media to interact and engage in information exchanges at all stages of the crisis (Malizia et al., 2011). According to Veil et al. (2011), this trend will only continue as new communication technologies debut.

When a crisis occurs, individuals are able to become a part of the immediate crisis response through social media. Individuals are able to report, and share their experiences, providing information about the crisis or responding to other individual's reports of the crisis. The physical response to the crisis and social media response to the crisis are not independent of

one another. Research indicates that both of these responses are happening at the same time and often are dependent upon one another (Palen et al., 2007).

Twitter During a Crisis

Individuals responding to a crisis in real time is evident on Twitter. Users quickly exchange information in the heat of a crisis. For example, users uploaded information during the 2013 Colorado floods, 2011 Tunisian uprisings, 2010 Port-Au-Prince earthquake in Haiti, 2009 Oklahoma grass fires, 2008 Mumbai massacre, both the 2007 and 2008 California wildfires, the Seattle shootings, and during the U.S. Airways Flight 1549's crash into the Hudson River (Beaumont, 2008; Corvey et al., 2010; Epatko, 2010; Heverin & Zach, 2010; Kwak et al., 2010; Lenhart & Fox, 2009, New American Media, 2011; Ostrow, 2013; Poulsen, 2007; Rael, 2013; Robinson, 2010; Smith, 2010b; Sutton et al., 2008).

Individuals that experienced or witnessed one of these crises were able to directly share their experience via Twitter. Once an individual tweets on Twitter, rapid, up-to-date, information exchange ensues as the individual's followers disseminate the original tweet to their followers, and so forth, and so forth. During the California wildfires, Sutton et al., (2008) found that residents uploaded pictures of the fire, and the locations, to Twitter. These actions allowed residents to report how the fires were moving and spreading before journalists were able to reach the scene. In turn, authorities and firefighters were able to send response units quicker, and more precisely to specific areas. Similarly, the response for the Oklahoma grassfires in 2009 became more accurate and precise because of individual's tweets. Users uploaded the location and pictures of where the fires were spreading to Twitter, empowering the response units to fight the fires accurately (Corvey et al., 2010).

First hand reporting in real time by those who are witnessing and experiencing a crisis allow for a more detailed response by authorities. As individuals in the immediate geographical space, and those outside the space provide, seek, and broker information online, new roles begin to shape and emerge (Palen et al., 2007). Disaster organizations and individuals can participate in response and relief efforts without setting foot where the disaster occurred (Palen & Liu, 2007). However, when a crisis occurs in a disadvantaged country, its citizens may not have access to technological resources that are common in other countries, such as mobile devices. In the previous examples, a multitude of individuals relied on their mobile devices to upload and exchange information via Twitter. However, when the 2010 Port-Au-Prince earthquake in Haiti occurred, the majority of individuals did not have the resources to interact and report information. Nevertheless, Twitter still played a key role in this crisis as the few individuals who had access relied on sending tweets. These individuals were able to connect the outside world to what was happening in Haiti when other forms of communication were down. This prompted live mapping efforts of tweets based on geo-location to assist response teams (Meier, 2012), pointing response teams to the highest priority locations and fielding aid to those in need (Epatko, 2010; Smith 2010b). No matter the location, or the number of users tweeting about a crisis, Twitter is an influential tool for crisis communication.

More recently, individuals turned to Twitter during the devastating 2013 Colorado flash floods. Residents uploaded photos of individuals assisting one another, areas to avoid, and areas that authorities needed to quickly respond. Additionally, tweets distributed by authorities and key decision-makers were collected by a single user account and then re-tweeted for ease of access by other users (Ostrow, 2013). Users were able to follow one account and not worry

about missing important information by authorities. Each tweet was available to read and linked back to the original decision-maker's account.

User-generated Media

Social media, especially Twitter, enables individuals to become sources of information. Individuals who chose to share information or an experience propels the user to be a source for online information (Marken, 2007). Users who seek and review the information or experience that is shared, are able to contribute by either responding or submitting the information to their own followers. Veil et al. (2011) defined this as the foundation for user-generated media. User-generated media facilitates information to reach millions of individuals with the possibility of users never seeking or looking at a traditional news outlet.

The scope of users reached through user-generated media is essentially endless. However, not all sources are trustworthy. Competing messages, especially messages from the media, are common and can lead to uncertainty and potential life threatening situations, especially during a natural hazard or natural disaster (Phillips et al., 2011). If false information concerning a crisis is widely shared, the effects could be devastating. Particularly if the information discloses the crisis as less severe than what the crisis truly is. Decision-makers need to ensure the correct information is presented to the public through all possible channels, as individuals not only seek out user-generated media to gather and share information, but also to verify other user-generated information (Sutton et al., 2008).

Twitter, along with other forms of social media, has the ability to provide meaningful access during all stages of a crisis. Sellnow et al. (2009) defined meaningful access as opportunities the public have to interact with key decision-makers, and retrieve the necessary information needed to make assessments about a risk issue. Twitter provides the opportunity for

decision-makers to interact with their publics and for individuals to interact with their decision-makers. Decision-makers that provide information regarding a crisis, or potential crisis, aid their public as users can respond to the information and gather the information before making an informed assessment about the crisis or potential crisis.

Decision-makers must be aware their messages are not the only messages being delivered. Twitter provides a platform that enables individuals to form connections with thousands of other individuals who share common interests and goals in real time (Sarno, 2009). Therefore, individuals are interacting with other users who are not decision-makers. Meaningful access can be harder to obtain through Twitter and other forms of social media. Decision-makers must contend with other user-generated information for the public's attention. Sellnow et al. (2009) postulated that in order for crisis communication to be effective, relationships must be developed and maintained during non-crisis times. By creating and maintaining relationships with their followers during all stages of the crisis cycle, decision-makers can combat this competition.

Twitter's utility during a crisis, no matter where the crisis is occurring, is appealing to risk and crisis communication as individuals actively seek out information on Twitter. The majority of research explores Twitter's use during the crisis stage. Research concerning Twitter use during the post-crisis exists, but remains few (Acar & Muraki, 2011). However, research involving the pre-crisis stage and Twitter, or any other form of social media, is non-existent. Crises vary in length of duration, and so does the accompanying pre-crisis stage. Very few crises have a substantial period of time for interaction during the pre-crisis stage. This could explain why there is gap in research concerning this stage.

In areas and communities that are susceptible to reoccurring or known risks such as flooding, exploring how social media is used during the pre-crisis stage can provide valuable insight into the sustainability of the population, the area, and community resilience. Approaching this gap through the lens of uses and gratifications theory will further understanding of communication exchanges, the assumed motives that drive decision-makers, the media, and the public to use Twitter, and whether decision-makers' and the media's messages are well received, during the pre-crisis stage.

Uses and Gratifications Theory

In an attempt to better understand what individuals do with media, Katz et al. (1974), developed uses and gratifications theory. In its' simplest definition, uses and gratifications theory states that individuals deliberately consume media for a specific reason. Whatever reason an individual consumes media for will garner an effect. The effect the media has on the individual can vary according to the reason why the individual is using the media. Therefore, the effect is highly unlikely to be the same for everyone who uses the same media.

Uses and gratifications emerged as a theory after Katz et al. (1974) observed research trends examining how people were using media to meet their needs. Developed with radio and television in mind, uses and gratifications existed prior to the Internet and social media. Falling out of favor with researchers, uses and gratifications remained idle for several years in its application in explaining communication phenomena. However, uses and gratifications has experienced a resurgence in popularity in recent years, with researchers extending this theory to the Internet, social media, and new media.

Katz et al. (1974) grounded uses and gratifications' foundation in the following statement:

(1) the social and psychological origins of (2) needs, which generate (3) expectations of (4) the mass media or other sources, which lead to (5) differential patterns of media exposure (or engagement in other activities), resulting in (6) need gratifications and (7) other consequences, perhaps mostly unintended ones. (p. 510)

This enumerated statement isolates the basic themes of the theory's framework. According to Miller (2005), research utilizing uses and gratifications tends to focus on numbers (2) through (6). This is due to researchers being interested in the different avenues an active audience chooses and how the audience reacts to the chosen media.

Uses and gratifications theory requires an active audience, demanding cognitive and participatory actions. Katz et al. (1974) frame the audience as active, as the audience chooses the form of media to use and connects the chosen media to its needs. As the audience is active in deciding what media it wishes to consume, and the effect the media is to have, the media is unable to impose a uniform effect on an audience as a whole. A uniform effect would require a passive audience.

Katz et al. (1974) outlined a typology of four uses an audience may have for media: (1) diversion; (2) personal relationships; (3) personal identity; and (4) surveillance. Diversion involves individuals using media to "escape from a routine" (p. 512), to emit an "emotional release" (p. 512), or to unburden themselves from problems. When individuals use media for personal relationships, individuals may use media to "substitute companionship" (p. 512), or for other reasons involving social utilities. Personal identity refers to individuals using media to

reinforce values, as a “personal reference” (p. 512), or exploring reality, and surveillance regards informative uses.

Audience gratifications are linked to three sources, (1) media content; (2) exposure to the media; and (3) the “social context that typifies the situation of exposure to different media” (p. 514). However, just because individuals use media for a particular purpose, does not mean they will obtain what they expected to receive. Extensions of uses and gratifications theory reveal there is a difference between gratifications sought, and gratifications obtained: “what an individual wants from the media is not always what an individual gets from the media” (Miller, 2005 pp. 257-258). Gratifications sought refer to an individual’s motives, or expectations, for using a particular form of media (Dobos, 1992; Palmgreen, 1984; Rubin, 2002). Whereas, gratifications obtained refer to how individuals perceive their outcome of media use (Rubin, Sypher, & Palmgreen 1994; Rubin, 2002). If individuals perceive that their gratifications sought are obtained through their media consumption, their level of satisfaction will be higher than if they perceive their gratifications sought were not obtained.

Uses and gratifications theory aids researchers in understanding the appeal of new media and how audiences use media to satisfy their needs. One of the assumptions Katz et al. (1974) make in uses and gratifications, is an active audience. This framework is particularly attractive to social media research as social media requires an active audience. Therefore, several research studies utilize this approach when examining social media.

Social Media and Uses and Gratifications Theory

Since its creation, uses and gratifications theory has proved beneficial as a “perspective through which a number of ideas and theories about media choice, consumption, and even impact can be viewed” (Baran & Davis, 2009, p. 241). Originally conceived to understand

individuals' consumption of radio and television programming, uses and gratifications theory has expanded to include social media and Internet use. Uses and gratifications theory is increasingly proving to be beneficial in mass communication research as researchers realize uses and gratifications theory's value in exploring the motives and communication behaviors of internet users.

The Pew Research Center for Internet and American Life Project's annual reports reveal the rapid growth of social media use (Brenner & Smith, 2013; Smith, 2010a). Social media usage will only continue to grow as new social media options debut and become available to users. Progressing into a useful framework for studying the Internet and new media (Rubin, 2002; Ruggiero, 2000), in recent years, uses and gratifications theory frequently has been used to "examine needs gratified through use of online applications, such as social media" (Chen, 2011, p. 759).

Uses and gratifications has been used to study general Internet use and social media such as, blogs, online gaming communities, and social networking sites like Facebook and Twitter (Bumgarner, 2007; Chen, 2011; Chung & Kim, 2008; Erlandson & Elmi, 2013; Hambrick, Simmons, Greenhalgh, & Greenwell, 2013; Hollenbaugh, 2010; Johnson & Yang, 2009; Joinson, 2008; Ko, 2000; Ko, Cho, & Roberts, 2005; LaRose & Eastin, 2004; LaRose, Mastro, & Eastin, 2001; Sherry, Lucas, Rechtsteiner, Brooks, & Wilson, 2001; Stafford, Stafford, & Schkade, 2004; Webster & Lin, 2002; Wu, Wang, & Tsai, 2010). At the core of social media's development is human communication (Mayfield, 2006), and the interpersonal aspect of social media enables uses and gratifications to be a fitting approach. Rubin (2009) states uses and gratifications theory is a fitting approach for Twitter research as uses and gratifications focuses

on individual's psychological and social needs while exploring how a specific medium gratifies the individual's needs and motives to communicate.

Twitter and uses and gratifications theory. Studying Twitter through the lens of uses and gratifications has helped researchers understand Twitter's popularity and usefulness as a tool for communication. Johnson and Yang (2009) explored how individuals use Twitter, finding that when using Twitter, individuals are driven by informational and social motives. Though driven by both motives, individuals prioritize seeking information over social needs. Users primarily seek news and information on Twitter and will occasionally use Twitter to meet a social need.

Similarly, Erlandson and Elmi (2013) found that individuals consider social media channels to be useful in obtaining news or exchanging news and information. Their study revealed individuals who joined Twitter increasingly consumed more news than before joining the social media site. Within a short period of time, participants of the study received most of their daily news from Twitter, actively seeking out information and gratifying their search.

The studies produced by Johnson and Yang (2009) and Erlandson and Elmi (2013) explore how individuals use Twitter, but not why individuals use Twitter. Chen (2011) explored the why aspect and discovered that individuals use Twitter to form connections with others that share similar or common interests. Echoing Johnson and Yang's (2009) study, Chen (2011) found that users seek out information on certain interests. In a similar finding, Hambrick et al., (2010) found that users' interactions were dependent upon similar interests. Once users find information, they begin to participate in sharing information, and form connections in real time with one another. As users become more active on Twitter, they begin to feel more connected and start to use Twitter more frequently to gratify their need for connectedness.

Twitter, Uses and Gratifications, and Crisis Research

Uses and gratifications theory is a fitting framework to approach communication research involving social media. Research shows that individuals use Twitter to seek out information, especially news, and to feel connected with other individuals who share common interests. As users are already seeking out and sharing information via Twitter during a crisis, decision-makers should incorporate Twitter into their crises strategy and use the channel to connect with their public and deliver information.

However, as there is a gap in research involving the pre-crisis stage and social media use, research does not reflect whether the public is paying attention to decision-makers or the media during this stage. It is necessary to identify the types of messages decision-makers and the media disseminate during the pre-crisis stage. Identifying these messages will uncover the topics decision-makers and the media propagate the most and therefore deem the most important to convey to their publics. Furthermore, examining decision-makers and the media's messages that are re-tweeted, quoted, or replied to by their publics will reveal messages audiences perceive as important. Knowing this information is insightful and helpful in gaining a more robust understanding of whether pre-crisis communication via social media is beneficial. This study provides insight into this research gap by examining Twitter use by decision-makers, the media, and their publics, during the pre-crisis stage of the 2013 Fargo-Moorhead Red River flood event. This study asks the following research questions:

RQ1: What topics were tweeted by decision-makers and the media during the pre-crisis stage?

RQ2: What messages did decision-makers deem the most important to tweet during the pre-crisis stage?

RQ3: Which messages did the public perceive most important?

Conclusion

This chapter provided a review of literature relevant to the current study. Within this chapter, a brief review of the study of risk and crisis communication, and the crisis cycle was discussed. This discussion progressed into the topic of social media and how researchers are examining social media's use during a crisis. Research focuses intently on Twitter and other forms of social media during the crisis stage, leaving the pre-crisis and post-crisis stages unexplored. Uses and gratifications theory (Katz et al., 1974), posits that individuals use media for certain reasons, and is a useful framework to explore this existing gap in research and examine the role Twitter plays during the pre-crisis stage.

Chapter three delineates the methodology used in this study, explaining how the data were collected and analyzed. Chapter four reveals this study's findings, and discusses the results in more detail. Finally, chapter five provides implications, limitations, and suggestions for future research.

CHAPTER 3: METHODOLOGY

This study explored messages disseminated by decision-makers and the media via Twitter during the pre-crisis stage of the crisis cycle. Analyzing the varieties and frequencies of the messages used by decision-makers and the media provides valuable insight into the types of messages decision-makers and the media consider the most pertinent to distribute. In addition, exploring the messages decision-makers and the media's audiences share, yields a rich understanding of what messages publics deem important during these early stages of a crisis. This study utilizes content analysis, focusing on tweets collected during the pre-crisis stage of the 2013 Fargo-Moorhead Red River flood event. The data used for this study is a portion of a larger data set spanning the complete crisis cycle of the flood event.

The data collected during the 2013 flood event is significant as early flood predictions reflected a scenario that warranted little to no concern and quickly developed into predictions that anticipated a similar flood to that experienced by the Fargo-Moorhead community in 2009. Although the 2013 and 2009 Red River floods differ in several ways, there are two specific differences to note. For the first time in recorded history, the Red River crested in May, yielding a late and unprecedented flood event (City of Fargo, 2013). Additionally, social media use was more popular in 2013 than in 2009, providing a channel to communicate flood risks to a larger population than in previous years. This chapter provides this study's research design, data collection, and data analysis.

Research Design

This study utilizes content analysis. Holsti (1969) defined content analysis as a “technique for making inferences by objectively and systematically identifying specified

characteristics of messages” (p. 14). Krippendorff (1980) further defined this method as “a research technique for making replicative and valid inferences from data to their context” (p. 21).

Content analysis is a popular method for analyzing media messages and often used in studies researching Twitter or other social media channels. This method permits the researcher to draw conclusions from the communication without needing to access the communicator, therefore, enabling the researcher to analyze large amounts of information (Riffe, Lacy, & Fico, 1998).

Data Collection

Tweets were collected during the course of the 2013 Fargo-Moorhead flood event with TweetCollector, a custom built Twitter mining program. Data collected for this study were a part of a larger data collection spanning just under a two month period, for a total of 7.5 weeks. Complete data collection began on March 25, 2013, the day city leaders convened to begin preparations for the flood after the National Weather Service in Grand Forks, ND issued a significant flood warning four days prior (Burgess, 2013). Data collection ended on May 15, 2013, two weeks after the Red River crested and six days after the river receded under the flood stage level. Once a crisis timeline was mapped, the pre-crisis stage was determined to begin on March 25, 2013, and end on April 24, 2013. The Red River officially exceeded flood stage on April 25, 2013, registering a water level of 18.35 ft.

TweetCollector

TweetCollector is built from Twitter’s search application programming interface, or API. Twitter’s search API “allows queries against the indices of recent or popular tweets and behaves similarly to, but not exactly like the search feature available in Twitter mobile or web clients” (Twitter Developers, 2013). TweetCollector gathers and stores tweets according to the user’s

designated search term or terms. The program requires manual operation in regards that a user must initiate the program to collect the data. Once the program downloaded the data, the data were automatically exported into an excel spreadsheet that organizes the data by timestamp, username, display name, geological coordinates and geological location (if enabled by the user to be visible), language, url link to the user's profile picture, source (if tweet was sent via mobile device, computer, social media management platform, or other avenue), and the tweet's text.

TweetCollector includes the ability to collect tweets in real time that include single and multiple word queries. Additionally, the program collects tweets that are both location based and non-location based. During the data collection timeframe, TweetCollector was run twice daily. This ensured the program retrieved all tweets and did not encounter Twitter's API limitations.

Search terms. TweetCollector gathered any tweet that was within a hundred mile radius of latitude 46.874399 and longitude -96.787945, the center of Fargo, North Dakota for the following terms: flood, flooding, crest, sandbag, sandbags, sandbagging, and diversion. These search terms were relevant to the immediate area. Therefore, location was added to the search terms to prevent unnecessary data from being collected that used these words in a manner the irrelevant to the study.

Non-location based search terms included multiple and single word queries. The following single word queries were included: Fargo-Moorhead, FargoMoorhead, SandbagCentral, CityofFargo, @CityofFargo, #flood13, #flood2013, #Fargo, #Moorhead, and #FMFlood. Multiple word queries require that all words are included in the tweet. There is no specific order, and the words do not need to be present next to each other. Multiple word queries included: flooding Fargo, flooding Moorhead, flooding RedRiver, flooding Red River, flood

Fargo, flood Moorhead, flood RedRiver, flood Red River, Sandbag Central, Red River, Red River Valley, Hoeven flood, Dalrymple flood, and Walaker flood.

Data Sample

A total of 43,003 tweets were collected during the previously established timeframe. The data set was systematically cleaned of all non-relevant tweets yielding 6,941 total tweets.

Examples of non-relevant tweets removed included tweets regarding other floods, non-flood related tweets, and tweets related to popular culture. Of the 6,941 tweets in the data set, 4,476 tweets were specific to the pre-crisis stage, these tweets were dated from March 25, 2013 to April 24, 2013 and were selected for analysis.

An examination of the population (N=4,476) revealed 33.10% (N=1,482) of the population were tweets sent from decision-makers and the media, and 66.90% (N=2,994) of the population were tweets sent from the public. Literature reflecting content analysis of Twitter supports samples ranging from 10% to 30% of the population (see Chew & Eysenbach, 2010; Hambrick, et al, 2010; Sullivan et al., 2012). Using supporting literature as a guide, a random sample of 25% (N=1,119) of the population was chosen. Prior to random sampling, quota sampling ensured the sample reflected the population with 33% (N=369) of the sample comprised of the media and decision-makers' tweets and 67% (N=750) of the sample representing tweets members of the public sent.

Coding Scheme

A multi-level coding scheme was developed from previous literature examining Twitter through the lens of uses and gratifications and via open coding methods. Prior to coding, the data sample was read twice in its entirety to identify themes and categories, emerging themes

drove certain coding categories. Tweets were coded according to whether they belonged to a decision-maker or the media, or the public.

Prior to quota sampling, each Twitter account was identified as a decision-maker, member of the media, or belonging to an audience member. Account names belonging to decision-makers and the media were listed in a separate document for coding purposes later. Upon coding, each tweet was identified as belonging to a decision-maker, media or a member of the public. If the tweet was identified as belonging to a decision-maker or media representative, the tweet required additional codes than that of a tweet belonging to the public.

Public coding scheme. First, tweets were identified as belonging to a leader or the public, if identified as belonging to the public the tweet was then coded for the following categories: (1) type of tweet; (2) source of tweet; (3) action or assumed motive for tweet; (4) tone or expression of tweet; and (5) whether the tweet included a link.

After identifying as belonging to the public or decision-maker or media, the tweet was then coded for the type of tweet it represented. As there are only four categories of tweets identified in literature and by Twitter, this category was pre-established and deductive. This category included five codes: (1) singleton; (2) retweet; (3) quote; (4) reply or mention; and (5) other. The fifth code, other, was included in case a tweet was unidentifiable.

The second category in the coding scheme involved the source of the tweet. TweetCollector identified the tweet's origin and provided this information in the data output. This category developed from open coding methods and accounted for TweetCollector's identification of information and included seven codes: (1) Twitter website; (2) mobile application ; (3) tablet or computer application; (4) blog feed or link from other social media source; (5) social media management provider; (6) link from a news source; and (7) other. The

first code identified whether a user utilized Twitter's website to send a tweet. The second code acknowledged if a tweet was sent from a mobile device. The third code identified if the tweet was sent using an application developed for a tablet or computer. The fourth code identified if the tweet was a result of a user updating another social media site such as Instagram, Vine, or Facebook. The fifth code allotted for tweets delivered by social media management providers, such as Hootsuite, or Tweet Deck. The sixth code identified if the tweet was sent as a result of a user utilizing a tweet button on a news source, such as the New York Times', or Reuters' website, and the seventh code provided classification for those tweets whose source was unable to be identified.

The third category, action or assumed motive, was developed from uses and gratifications theory and previous literature examining Twitter through the lens of uses and gratifications. This category included five codes: (1) interactivity; (2) diversion; (3) information sharing; (4) promotional; and (5) other. Hambrick et al. (2010) identified these motives prior to studying communication of professional athletes on Twitter. The definitions of each category were slightly modified to meet the needs of this study and motive was adjusted to assumed motive as data from Twitter is unable to identify the driving motive for a user to tweet. The first code, interactivity was defined as users connecting with other users to engage in communication; tweets belonging in this category often include the @ symbol. The second code, diversion, served as a way for a user to divert attention away from the oncoming crisis and involved tweets that used flood identifiers but did not refer to the flood. The third code allotted for tweets that shared information regarding the flood, predictions, personal experiences, or news information. The fourth code, promotional, accounted for tweets that promoted others helping in the

community, or asking for help, and the last code provided an option for tweets that did not fit into any of the previously mention categories.

The fourth category, tone or expression of tweet, was developed from open coding methods and Chew and Eysenbach's (2010) identification of tones in tweets during the 2009 H1N1 crisis. This category included ten codes: (1) humor or sarcasm; (2) relief; (3) downplaying risk; (4) concern; (5) frustration; (6) misinformation; (7) question; (8) social support; (9) helpful or informative; and (10) other. Codes developed from Chew and Eysenbach's (2010) scheme were humor or sarcasm, relief, downplaying risk, concern, frustration, misinformation, and question; each code was adapted and defined for the purposes of the specific study.

The first code in the tone or expression category involved humor or sarcasm. This code was defined as tweets that reflected sarcastic or comedic tones, and included parody accounts. The second code, relief, identified tweets that reflected a sense of peace, joy, or relief concerning the oncoming crisis. The third code, downplaying risk, allotted for tweets that tried to de-emphasize the hazard. The fourth code, concern, accounted for tweets that expressed worry, anxiety or fear. The fifth code, frustration, included tweets that expressed anger or annoyance at the situation. The sixth code, provided an area for misinformation or rumors to be accounted for. The seventh code, question, allotted for tweets that asked questions that sought out additional information. The eighth code, social support, accounted for tweets that reflected encouragement, or were supportive of the community or community efforts. The ninth code, helpful or informative, was defined as tweets providing information, assistance, or direction, the last code, other, provided an area for tweets that did not fit the previous categories.

The fifth category allotted for whether the tweet included a link in its communication. This category was coded as either yes or no. If the tweet did include a link, the tweet then was coded for the type of content the link led to, this additional category included four codes: (1) news source; (2) photo; (3) video, live cam or live stream; and (4) other.

Decision-maker/media coding scheme. First, tweets were identified as belonging to a leader, in this case a decision-maker or media representative. If the tweet was identified as so, the tweet was coded for the codes previously explained in the publics coding scheme section and then was coded for additional categories: (1) type of decision-maker or media; (2) pre-crisis sub-phase; and (3) tweet content.

The first additional category coded for the type of decision-maker or media representative account the tweet belonged to, and was developed from opening coding methods. This category included seven codes: (1) media station; (2) media person; (3) politician; (4) city or town; (5) city board; (6) city service; and (7) other. The first code represented local, regional, and national media stations or outlets. The second code represented media figures, such as news anchors or journalists. The third code accounted for mayors, senators, or other elected officials, the fourth code represented cities or neighboring towns. The fifth code provided a code for specific boards, such as the board of transportation. The sixth code allotted for services such as the police or fire department, and the seventh code, other, accounted for decision-makers or media representatives that did not fit into the previous categories.

Developed from Coombs' (2007; 2010) identification of three sub-phases of the pre-crisis stage, the second additional category was directly reflective of each sub-phase, as well as a code provided for tweets that may not have fit into each sub-phase: (1) signal detection; (2) prevention; (3) crisis preparation; and (4) other.

The last additional category coded for the tweet's content. This category developed from open coding and included seven codes: (1) tips; (2) resource; (3) closures; (4) preparation; (5) predictions/warnings; (6) general information; and (7) other. The first code was defined as tweets concerning what to do in a specific situation. The second code was defined as where to go for something, such as a tweet providing a number to the volunteer helpline. The third code regarded any road closures or disruption of normalcy. The fourth code dealt with any messages regarding preparation. The fifth code allotted for crest predications and flood warnings. The sixth code provided a code for general river levels without a warning attached, or information that included a flood identifier but did not really concern the flood, and the seventh code included a code for tweets that did not fit into the other designated code categories.

Coder Training

In addition to the researcher, an additional coder was trained to code the data set. Tweets excluded from the data sample were used for initial training. The coder was trained in the coding scheme and was provided with a code book. The trainee and researcher independently coded ten tweets after instruction, reliability on the practice data was acceptable and the researcher and coder moved forward and coded data set aside for reliability.

Data Analysis

A multi-step analysis was implemented using one tweet as a unit of analysis to answer each research question. The analysis included closed, open, and axial coding methods. Prior to coding, the data sample was read twice in its entirety. Themes and categories emerging from the data drove certain coding categories.

Randomly identified tweets representing 10% of the sample (N=56) were coded by two coders to establish inter-coder reliability. Table 1 reflects Cohen's *kappa* for each category's

reliability. An overall reliability was $k=.92$. According to Neuendorf (2002), inter-coder reliability of .75+ reflects excellent agreement beyond chance. Coders discussed differences until consensus was reached and set aside an additional 10% of the sample (N=57) to check for drift and reliability at the end of the coding process. Table 1 lists Cohen's *kappa* for the portion of the sample set aside for drift and reliability, an overall reliability achieved at the end was $k=.96$.

Table 1

Inter-coder Reliability and Drift

Category	Reliability	Drift
Audience	$k=1.00$	$k=.96$
Decision-Maker	$k=1.00$	$k=.96$
Type of Decision-Maker	$k=.95$	$k=.98$
Pre-Crisis Sub-Phase	$k=.84$	$k=.88$
Content	$k=.87$	$k=.95$
Type of Tweet	$k=.94$	$k=.98$
Tweet Source	$k=.94$	$k=1.00$
Action/Assumed Motive	$k=.97$	$k=.97$
Tone/Expression	$k=.93$	$k=.97$
Link	$k=.90$	$k=1.00$
Type of Content in Link	$k=.88$	$k=.93$
Overall reliability	$k=.92$	$k=.96$

Conclusion

Explaining the methods used to conduct this study, this chapter provided this study's research design, data collection, and data analysis. Additionally, this chapter discussed TweetCollector, the instrument used in data collection, in detail. Chapter four presents the results of the data analysis, offering discussion. Chapter five presents limitations, implications, and suggestions for future research.

CHAPTER 4: RESULTS AND DISCUSSION

This study explored the content of messages tweeted by decision-makers and the media during the pre-crisis stage of the 2013 Fargo-Moorhead Red River flood event. Grounding the study in uses and gratifications theory (Katz et al., 1974), decision-makers', the media, and both their publics' tweets were analyzed to identify if assumed motives were similar in using Twitter during the pre-crisis stage of the crisis cycle. Examining decision-makers', the media, and their publics' tweets yielded insight into communication strategies for recurring natural hazard prone areas, and provided a glimpse into an area of the crisis stage that remains to be thoroughly explored and understood.

Using content analysis, two coders analyzed the data sample using a multi-level coding scheme. Quota sampling ensured proper representation of decision-makers, the media, and the public in the data sample. The previous chapter further explained the coding scheme, and data sample. The following chapter reports and discusses the results emerging from data analysis.

Results

In an attempt to understand how decision-makers, the media, and their public use Twitter during the pre-crisis stage, this study posited three research questions. The questions ask:

RQ1: What topics were tweeted by decision-makers and the media during the pre-crisis stage?

RQ2: What messages did decision-makers and the media deem the most important to tweet during the pre-crisis stage?

RQ3: Which messages did the public perceive most important?

The results and discussion follow below.

Decision-Maker and the Media Tweets

RQs 1 and 2. Research question one explored the content of messages decision-makers and the media tweeted about during the pre-crisis stage. Open coding revealed that overall, decision-makers' and the media's messages concerned topics regarding preparations, general information, tips, resources, closures, and warnings and predictions. Messages not specific to these content areas were classified as other.

Data analysis revealed that 50.4% (N=186) of tweets belonging to decision-makers or the media (N=369) were disseminated by media or news stations, 29.3% (N=108) exemplified belonging to media figures, 11.1% (N=41) represented messages from cities, towns, and an account embodying the Red River, 6% (N=22) signified other accounts, 2.4% (N=9) were city boards, and services, and 0.8% (N=3) represented politicians. Table 2 (see p. 42) demonstrates examples of decision-makers or the media assigned to each category, the frequency of messages deriving from each grouping of decision-maker or the media, and the percentage of the data belonging to each classification of decision-maker or the media.

Table 2

Decision-makers' and the Media's Classification and Data Representation (N=369)

Decision-maker or Media classification	Example	Frequency	Percentage
Media/news station	Local television station, newspaper	186	50.4
Media figure	Television anchors, journalists, NPR representatives	108	29.3
Cities and towns	City of Fargo, Red River, surrounding areas	41	11.1
Other	City sponsored events	22	6
City boards/services*	Police department, Fire department	9	2.4
Politician	Local representatives, state representatives	3	0.8

**City boards and city services collapsed into one category after coding*

The second research question explored the content of messages decision-makers and the media deemed the most important to tweet during the pre-crisis. Examining the frequencies of each content area enabled ranking of content in order of importance.

Data analysis revealed that 39% (N=144) of all tweets made by decision-makers or the media were concerning preparation measures, 26.3% (N=97) regarded general information, 19.2% (N=71) related to warnings and predictions, and the remaining messages (N=57, 15.5%) accounted for resources (N=31, 8.4%), other (N=18, 4.9%), tips (N=4, 1.1%), and closures (N=4, 1.1%). Table 3 (see p. 44) provides an example of tweets in each category, the frequency of messages belonging to each grouping, and the percentage of data belonging to each classification.

Decision-makers' and the media's assumed motives were also coded during analysis. Table 4 (see p. 46) reveals the results of coding for assumed motive, providing examples of tweets belonging to the assumed motive associated with the tweet, the frequency of tweets belonging to each assumed motive, and the percentage of data each assumed motive represents. Analysis revealed that decision-makers' and the media used Twitter during the pre-crisis stage primarily to share information, with 84% (N=310) of messages related to information sharing. Promotional motivation represents 14.1% (N=52) of the data, and 1.9% (N=7) of messages were driven by interactivity.

Further analysis explored the overall tone and expression used in decision-makers' and the media's tweets. More than half of decision-maker and media tweets, 69.1% (N=255) exemplified a helpful or informative tone. Tweets demonstrating a concerning tone represented 13.6% (N=50) of the data, 6.8% (N=25) reflected expressions of social support, 5.7% (N=21) revealed relief, and the remaining 4.8% (N=18) of tweets displayed tones of frustration (1.9%,

N=7), questioning (1.4%, N=5), humor (0.5%, N=2), and downplaying risk (0.5%, N=2).

Tweets that displayed unidentifiable tones were coded as other, representing 0.5% (N=2) of the data. Table 5 (see p. 47-48) identifies the tone and expression of each tweet, providing examples of tweets belonging to each category, and reveals the frequency, and percentages of data each category represents.

Table 3

Decision-makers' and the Media's Tweets Represented by Content (N=369)

Content of Tweet	Example	Frequency	Percentage
Preparation	<p>“Flood protection will be raised to 43 feet”</p> <p>“Fargo will fill another 500,000 sandbags in response to increased flood threat brought by heavy snow.”</p>	144	39
General information	<p>“Flooding May Affect Fargo Marathon **”</p> <p>“A well known North Dakotan helps out at Sandbag Central on @WDAYnews at 5 with @TJNelsonWDAY & @robinhuebner1”</p>	97	26.3
Prediction/warning messages	<p>“Fargo mayor predicts flood to reach 3rd worst level ever **”</p> <p>“Prepare for flood of record INFORUM Fargo, ND ** via @sharethis”</p>	71	19.2
Resource	<p>“Sandbag hotline now open. Call 701-476-4000 to volunteer and help out. #VnlFloodAlert”</p> <p>“Craving summer? Thinking about the beach? Volunteer at Sandbag Central - we have tons of sand! Volunteers needed from 2-7 p.m. #FargoFlood.”</p>	31	8.4
Other	<p>“I'd like to invite all the N.D. senators who voted against the diversion bill to help us sandbag virtually EVERY YEAR.”</p>	18	4.9
Tips	<p>“Setting up a sandbag line – Figure out how far and the best way for the line to go, shorter is better. **”</p>	4	1.1
Closures	<p>“Road Closing Info For Fargo! **”</p>	4	1.1

***Denotes removed link*

Table 4

Decision-makers' and the Media's Tweets Represented by Assumed Motive (N=369)

Assumed Motive	Example	Frequency	Percentage
Share information	<p>“Red River @ Fargo is 17.32'. -0.68' flood stage. -23.5' record crest. Up 0.43' from last read. #fargo #moorhead”</p> <p>“National Weather service updated flood out look for Fargo .. crest of 39-41 feet .. #vnlloodalert”</p>	310	84
Promotional	<p>“First day at sandbag central and over 110,000 sandbags filled. Over 10% done of the 1 million sandbag goal for Cass County.”</p> <p>“RT @cityoffargo: A big shout out to thousands of volunteers who filled sandbags. This thank you is 4 you. #FargoFlood **”</p>	52	14.1
Interactivity	<p>“@MeganAtGlobal it's basically a large bag filled with clay/dirt. That sets up pretty much as a giant sandbag.”</p>	7	1.9

***Denotes removed link*

Table 5

Decision-makers' and the Media's Tweets Represented by Tone and Expression (N=369)

Tone/Expression	Example	Frequency	Percentage
Informative/Helpful	<p>“Remember to discharge sump pumps into a yard or storm sewer by 4/1. This keeps flows down in the sanitary sewer during flooding. #FargoFlood”</p> <p>“RT @cityoffargo: Neighborhood flood meetings have been scheduled for April 2, 3 & 4. Details at **”</p>	255	69.1
Concern	<p>“From Hutch: Time to get serious about a flood. More at **”</p> <p>“Flood trends are troublesome for Fargo-Moorhead: This computer simulation shows a 42-foot level for the Red Ri... **”</p>	50	13.6
Social support	<p>“Fargo South Bruins filled 92,000 sandbags today - the paw is the law! Thanks students. #FargoFlood”</p> <p>“RT @RedCrossNDMN: @cityoffargo reporting that 110,000 sandbags were made today! Great job to all volunteers!”</p>	25	6.8
Relief	<p>“Funds available for flood clean up assistance ** @tweetmeme”</p> <p>“Late melt helping reduce Fargo-Moorhead flood risk: MOORHEAD, Minn. The National Weather Service on Tuesday ... **”</p>	21	5.7
Frustration	<p>“RT @DaveKolpackAP: Fargo Mayor Walaker on possible flood: "This is getting to be an almost ridiculous process that we have to go through each and every year."”</p>	7	1.9

(continues)

Table 5. *Decision-makers and the Media's Tweets Represented by Tone and Expression (N=369) (continued)*

Tone/Expression	Example	Frequency	Percentage
Questioning	“Lunchtime poll: What's your flood crest prediction? **”	5	1.4
Humor/Sarcasm	“RT @MikeMcFeelyKFGO: My favorite part of Fargo flood press conference was Mayor Walaker's extremely thinly-veiled shot at Al Carlson.”	2	0.5
Downplaying risk	“@bryanwx article completely misses the point that the forecasted flood wouldn't touch a single home in Fargo Moorhead. There4 no local fear”	2	0.5

**Other represents 2 tweets, 0.5% of the data and has been removed from the table*

***Denotes removed link*

Public Tweets

RQ 3. The third question explored the messages the public perceived as the most important. Examining the number of retweets the public sent during the pre-crisis stage, and the assumed motives for retweeting enabled the determination of what the public perceived most important. Likewise, researchers identified assumed motives, and tone and expression for all tweets sent by the public during the pre-crisis stage.

Data analysis revealed the public's tweets consisted of singletons, retweets, quotes, and replies or mentions. Singletons accounted for 53.8% (N=404) of the data, retweets contributed to 37.2% (N=279) of the data, replies or mentions made up 8.1% (N=61) of the data sample, and quotes were responsible for 0.9% (N=7). Overall, the public's assumed motives for using Twitter during the pre-crisis stage were attributed to 82.8% (N=621) sharing information, 14% (N=105) interactivity 2.9% (N=22) diversion motives, and 0.3% (N=2) promoting. Table 6 (see p. 51) illustrates the frequency, percentage of data, and examples of public tweets for each assumed motive.

Additional analysis exploring the tone and expression in the public's tweets revealed that 45.6% (N=342) of tweets reflected a helpful and informative tone, 16.7% (N=125) conveyed concern, 11.6% (N=87) displayed social supportive tones, 9.6% (N=72) contained humor or sarcastic tones, 8.4% (N=63) communicated frustration, 2.5% (N=19) downplayed risks, 2.3% (N=17) offered questioning expressions, 1.9% (N=14) reflected relief, 0.2% (N=2) expressed misinformation, and 1.2% (N=9) of messages were unidentifiable in tone and expression and were coded as other. Table 7 (see p. 52-53) illustrates the public's frequency, percentage of data, and examples of tweets for each tone and expression.

Further exploration into the public's retweets (N=279) revealed the public was primarily motivated by 68.5% (N=191) sharing information, 20.8% (N=58) promotional intent, 7.2% (N=20) interactivity, and 3.5% (N=10) diverting attention away from the oncoming crisis. Table 6 (see p. 51) illustrates the public's assumed motives for retweeting, frequency, and percentage of data for retweets.

The tone and expression of the public's retweets consisted of 44.8% (N=125) helpful and informative tones, 18.6% (N=52) expressed concern, 15.8% (N=44) reflected social support, 10.8% (N=30) revealed humor or sarcasm, 6.1% (N=17) displayed frustration, 2.2% (N=6) demonstrated relief, 0.7% (N=2) downplayed risks, 0.7% (N=2) offered questions, and 0.3% (N=1) provided misinformation. Table 7 (see p. 52-53) illustrates the public's tone and expression of retweeting, frequency, and percentage of data for retweets.

Table 6

Public Tweets, and Retweets Represented by Assumed Motive (N=750)

Assumed Motive	Example	Frequency	Percentage	RT Freq	RT %
Share Information	<p>“Leave the levees alone! #floortips #fmflood #fargoflood #flood13”</p> <p>“RT @gundersondan: Fargo Moorhead flood outlook worsens. National Weather Service says prepare for a record river level in late April- early May.”</p>	527	70.3	191	68.5
Interactivity	<p>“Has anyone else noticed the #fargo tap water tastes different? Blech.”</p> <p>@DoaneAg Red River Valley has #flooding every year! We manage with it.</p>	105	14	20	7.2
Promotional	<p>“RT @NDNationalGuard: Sandbag Central is now open in Fargo, and volunteers are encouraged to call 701-476-4000 to schedule a shift as... **”</p> <p>“@SanfordHealth #Fargo's marketing team proudly sandbagged today.**”</p>	94	12.5	58	20.8
Diversion	<p>“RT @meidihoore: Man Candy Monday over at Sandbag Central with all the firefighters”</p> <p>“RT @jacksonmelissa1: Dear Fargo, FLOOD FLOOD FLOOD FLOOD FLOOD, I want my finals cancelled this year :)”</p>	22	2.9	10	3.5
Other	“sandbagging. -_-“	2	0.3	0	0

**Denotes removed link

Table 7

Public Tweets, and Retweets Represented by Tone and Expression (N=750)

Tone/Expression	Example	Frequency	Percentage	RT Freq	RT %
Informative/ Helpful	<p>“Sandbag Central is starting up! **”</p> <p>“RT @cityoffargo: The volunteer hotline is open! Please call 701-476-4000 to schedule a shift to help fill sandbags ** #FargoFlood”</p>	342	45.6	125	44.8
Concern	<p>“It's scary to think how long the spring melt has been put off this year for the Red River valley. Longer the wait, asking for trouble.”</p> <p>“RT @inforum: "We encourage people to prepare for a flood of record," Greg Gust, NWS meteorologist. More at **”</p>	125	16.7	52	18.6
Social support	<p>“Feelin pretty good about helpin out the great city of Fargo by sandbagging #communityservice”</p> <p>“RT @cityoffargo: Final sandbag count for day one at Sandbag Central: 110,000! What a great group of students and volunteers filling bags today! #FargoFlood”</p>	87	11.6	44	15.8

(continues)

Table 7. *Public Tweets, and Retweets Represented by Tone and Expression (N=750) (continued)*

Tone/Expression	Example	Frequency	Percentage	RT Freq	RT %
Humor/ Sarcasm	<p>“Gee, record heat, biting cold, drought and Spring floods. Doesn't #Fargo, North Dakota seem like a great place to retire to!”</p> <p>“RT @jacksonmelissa1: Dear Fargo, FLOOD FLOOD FLOOD FLOOD FLOOD, I want my finals cancelled this year :)”</p>	72	9.6	30	10.8
Frustration	<p>“Dear residents of the red river valley: PLEASE, FOR THE LOVE OF GOD, MOVE AWAY FROM THE FLOOD PLAINS. Sincerly, people who learn.”</p> <p>“Why should I flood fight? @cityoffargo Did it years prior, and there have been no improvements. #FargoFlood2013 #Fargo”</p>	63	8.4	17	6.1
Downplaying risk	<p>“@Carl_3096 It was up at forty a couple of years ago so it won't be so bad... But there will be some flooding... NDSU will still be here!”</p> <p>“@cecelsu hahaha flood stage is nothing not worried til it gets around 39-40 and still rising :p #BringitonRedRiver”</p>	19	2.5	2	0.7

(continues)

Table 7. *Public Tweets, and Retweets Represented by Tone and Expression (N=750) (continued)*

Tone/Expression	Example	Frequency	Percentage	RT Freq	RT %
Questioning	<p>“is going to spend some time sandbagging Thursday night, anyone want to join me? #Fargo”</p> <p>“So is it gonna flood this year or not?”</p>	17	2.3	2	0.7
Relief	<p>“Red River Resilience Helps Reduce Flood Anxiety **”</p> <p>“RT @MPRnews: Late spring melt could actually be improving the flood outlook for Fargo-Moorhead: **”</p>	14	1.9	6	2.2
Other	<p>“@JanelKlein I wrote & recorded this song about the Fargo flood in 09, **”</p>	9	1.2	0	0
Misinformation	<p>“@kstompro its Fargo putting chemicals in water in preparation for the flood. #TheMoreYouKnow”</p>	2	0.2	1	0.3

** *Denotes removed link*

Discussion

RQ 1: Decision-makers and the Media

The categories and content decision-makers and the media tweeted about are consistent with what is expected for an oncoming crisis. The majority of decision-makers' and the media's messages concerned preparation measures, general information, and messages regarding predictions and warnings. Other tweets included content regarding resources, tips, and closures.

One of the primary roles of a decision-maker during a crisis is to distribute information that their publics need to know. Whereas a designated spokesperson typically communicates this information, in natural disasters or natural events, an elected official, or an individual in a well-known role in the community tends to emerge as a spokesperson. This is evident in the aftermath of Hurricane Katrina with New Orleans Mayor, Ray Nagin, or more recently, in the emergence of New Jersey Governor Chris Christie as a representative during Hurricane Sandy. In a similar fashion, Fargo's mayor, Dennis Walaker, was consistently the individual the public and local media relied on during flood season, trusting his flood predictions even more so than the National Weather Service. Walaker's record of accomplishment and eerie ability to accurately gauge the flood levels in past years, enabled him to be a reliable source. However, what was interesting was the lack of this prominent key figure on Twitter. Media stations, and media figures accounted for more than half of the generated content on Twitter regarding the flood, whereas politicians had the smallest amount of content, practically absent from the data. Although the City of Fargo maintained a presence on Twitter, the presence was barely larger than that of political figures' presence.

This is surprising, especially as many politicians actively engage on Twitter with their constituents and provide necessary information for the public, politicians such as Senator Al

Franken from Minnesota or Senator Cory Booker from New Jersey. Prior to becoming senator, Booker was the mayor of Newark and boasted a larger following on Twitter than Newark had residents. Booker gained a large following as he posts political, informative, and personal tweets regularly and responds to users within a short time-frame. Regardless if a politician is at a local, state, or national level, Twitter is a useful channel that enables meaningful access during both non-crisis and crisis times; the lack of access observed on Twitter to leadership during the flood is disappointing.

Although city leaders have relied on traditional venues, such as press conferences, in the past, the lack of involvement by these specific decision-makers was observed limiting their ability to capitalize on the opportunity to connect with their public without a media intermediary. Social media provided a channel for decision-makers to communicate directly with their public, to provide meaningful access, engage in conversations, and provide transparency. However, in the case of local representatives, cities, and towns, these specific decision-makers did not elect to take advantage of this channel.

This could be specific to the pre-crisis stage or due to community fatigue and resilience. Without examining the other stages of the crisis cycle, one is unable to know if lack of involvement is reflective of representatives' behavior throughout the crisis, or reflective of only the pre-crisis stage. Therefore, the complete cycle must be examined to understand if this is stage specific.

However, repeated experiences of annual flooding resulting in simultaneous community resilience and fatigue may be to blame. The Fargo-Moorhead area has continuously experienced flooding for almost two decades and has been successful in warding off the flooding river each year. While this routine experience has generated a resilience in the community, the annual

exposure to flooding and potential flooding generates fatigue and complacency in flood fighting efforts. Leaders may not be utilizing Twitter because Twitter has not been used before in previous flood years, and therefore does not need to be used since previous flood years have been successful in flood fighting efforts. If a community is relives a natural hazard each year, protection measures become routine and may prevent incorporating new methods. This mindset becomes dangerous as technology evolves and newer options for communicating become available. Regardless of the reason, the lack of presence is apparent and somewhat disconcerting.

RQ 2: Decision-makers and the Media

Decision-makers and the media primarily disseminated tweets regarding preparatory measures, informing the public what measures were being enacted for protection. As the data set occurred during the pre-crisis stage of the crisis cycle, this finding was not surprising. One of the best practices for risk and crisis communication in organizations is transparency. It is important that the public is aware of what is happening in the event of a crisis. This notion extends to natural hazards as well. The public needs to know what decision-makers are doing to prepare for an oncoming crisis. Decision-makers informing their public of necessary efforts, and measures does not only apply to the crisis stage, but as the data suggest, it also applies to the pre-crisis stage.

Secondary and tertiary content of decision-makers' and the media's tweets involved general information, and predictions and warnings. Consistent with Sutton et al.'s (2013) finding that social media enables decision-makers to inform and warn their public over the course of an event, the data suggest that decision-makers and the media were able to provide necessary

information and warnings via Twitter during the pre-crisis stage. This enabled meaningful access to the public during a stage that is fraught with unknowns.

However, what was surprising about the order of content was the higher frequency of general information over that of predictions and warning messages. The frequency of tweets regarding non-specific, general information was unexpected. Conversely, as media stations and media figures emerged as decision-makers who disseminated the most information, general information was no longer surprising, ranking in the top three areas of decision-maker and media content. Media outlets often promote upcoming news programs, including the top story in their communication. Flood predictions, and flooding outlooks frequently are covered throughout the pre-crisis stage by the news media. The majority of general information in the data consisted of media outlets attaching a promotion of an upcoming news program while associating with information surrounding the flood (see Table 2). As the media often report what is happening in natural disasters, it would be inaccurate to dismiss the content of general information.

Uses and gratifications focuses on why individuals use a form of media, and whether the use of the media gratifies the individual's decision to use the media. In this study, decision-makers and the media overwhelmingly used Twitter as a means to share information during the pre-crisis stage. The data suggest that both decision-makers' and the media's needs were gratified as the public retweeted many of these informative messages.

Another motivational force for decision-makers and the media was promotional intentions. In the days leading up to the opening of Sandbag Central, the main area for flood preparation, both decision-makers and the media promoted the opening date and the volunteer phone number for the public to call to schedule a sandbagging shift. Once Sandbag Central opened, decision-makers' and the media's tweets focused on volunteer efforts, and how to

volunteer. As the city quickly met the original goal, and new adjusted goal, of sandbags to be filled, one could suggest that decision-makers and the media used Twitter to promote the need for volunteers, resulting in that need being met, and the media's and decision-makers' original intent of using Twitter being gratified. Nonetheless, it is important to note that while decision-makers' and the media's primary assumed motive for using Twitter was to share information, less than a fifth of the data suggested that promotional motives drove decision-makers and the media.

Accompanying decision-makers' and the media's assumed motives, is the tone and expression decision-makers and the media used in their tweets. The primary tone reflected was an informative and helpful tone. As decision-makers' and the media primary assumed motive was to share information, an informative and helpful tone enforced this motive. Tweets that provided tips, or where to find information that would be helpful to residents were representative of this category. The secondary tone displayed in decision-makers' and the media's tweets reflected a tone of concern, conveying that a flood threat was real.

Decision-makers' and the media utilizing informative and helpful, and concerning tones, suggests that decision-makers and the media were working to provide correct information to the public. Knowing that the public turns to social media to engage and seek out information during a crisis (Malizia et al., 2011), the data suggest the public acts in the same way during the pre-crisis stage. Providing constant information to the public, the data suggest that decision-makers and the media were able to practically eliminate false, competing information that often emerges during a crisis (Phillips et al., 2011; Sutton et al., 2008).

RQ 3: The Public

Though the data suggest that audience members created more original tweets via singletons, the data also suggest that when audience members chose to retweet messages, they were driven primarily by the assumed motive of sharing information. Similarly, decision-makers and the media are driven by sharing information, suggesting that audience members and decision-makers and the media are similar in their primary assumed motives of using Twitter during the pre-crisis stage. This proposes that the audience perceives information concerning the on-coming crisis to be the most important to disseminate to their own followers.

Although Twitter use has not previously been explored during the pre-crisis stage, the audience's assumed motives for using Twitter during the pre-crisis stage is consistent with literature examining audience's uses during the crisis stage. Data analysis suggests that the audience primarily used Twitter to share information regarding the oncoming flood, with 70.3% of tweets devoted to information sharing; and secondly, to interact with other Twitter users. However, tweets motivated with interaction intent represented a small portion of the data, with 14% of audience tweets. Regardless of percentages of data represented, this was consistent with Johnson and Yang's (2009) findings that users prioritize seeking and sharing information over meeting social needs on Twitter; and Erlandson and Elmi's (2103) findings that users primarily use Twitter to exchange news and information.

Furthermore, Chen's (2011) findings that users actively seek information on certain interests and then share what they seek, can be extended to this particular study. As the audience's primary assumed motive for tweeting, and retweeting, was information sharing, it is safe to assume that audiences were actively using Twitter to seek out information. Although Katz et al.'s (1974) uses and gratifications theory was not constructed with social media in mind,

scholars have extended this theory to the Internet, especially with social media. Uses and gratifications can easily be extended to the pre-crisis stage as this study suggests that the audience used Twitter to seek information regarding the on-coming crisis, and their search was gratified through decision-makers' informative tweets, which then motivated the audience to share that information with their own followers.

What is interesting about this phenomenon is the audience becomes a part of the information dissemination process with each retweet, link, or share. This truly reflects the idea of user-generated media (Veil et al., 2011) as audience members become important participants in the pre-crisis conversation, becoming sources of information for others. Marken (2007) attests to users becoming sources of information on social media during the crisis stage, and the data suggest this extends to the pre-crisis stage as well.

Supporting the primary assumed motive of the public using Twitter to share information, is the primary tone and expression the data suggest are present in the majority of the public's tweets. Regardless if the public's tweets were singletons or retweets, the messages conveyed an informative or helpful tone. Providing a resource to others to obtain information from the tone of the tweets yet again reflects the idea of user-generated media (Veil et al., 2010) and extends user-generated media past the crisis stage, into the pre-crisis stage. Furthermore, the tone and expressions of the public's tweets support previous literature that users are primarily using Twitter for information.

Another area of tone and expression worth discussing is the public's tone of concern. Here the data reveal that the public tweeted or retweeted messages conveying concern over what might occur; drawing on experiences of previous floods, and making comparisons of previous years to the current flood season. Differing from frustration, tweets conveying a concerned tone

did not reflect a desire to not assist in upcoming flood fighting efforts, or disgust. Although frustration was present in some tweets, this tone accounted for a very small portion of the data. This could be attributed to the public accepting the flood as an annual routine, developing a sense of community resilience in a hazard prone area.

The lack of misinformation present in the sample was also an interesting finding. One could attribute this to the City of Fargo's active attempt to prevent false information. Another possibility may be due to the pre-crisis stage itself. As the pre-crisis concerns the time period prior to the crisis occurring, there may be less misinformation as there may not be as many voices present during the pre-crisis as there is during a crisis. If the lack of misinformation is connected directly to city efforts, the data reflect the need for decision-makers to heed Sutton et al.'s (2008) call for decision-makers to ensure the correct information is available to their publics to prevent the spread of false information.

Conclusion

Revealing the results of data analysis, this chapter provided answers to the research questions presented in chapter two. The data revealed that the categories and content decision-makers and the media active in the tweeting process were consistent with what would have been expected in a crisis situation. Additionally, the publics were driven by the assumed motive of sharing and seeking information during the pre-crisis stage, consistent with previous research regarding the crisis stage. The final chapter, focuses on implications, and limitations of this study, and offers direction for future research.

CHAPTER 5: IMPLICATIONS, LIMITATIONS, AND DIRECTION FOR FUTURE RESEARCH

This study explored actual messages disseminated via Twitter by decision-makers, and their public during the pre-crisis stage of the 2013 Fargo-Moorhead Red River flood event. Grounded in uses and gratifications theory (Katz et al., 1974), both decision-makers' and their publics' tweets were analyzed to identify if both groups shared similar assumed motives in using Twitter during the pre-crisis stage. By exploring the varieties of content, and the frequencies of messages produced by decision-makers, insight was gained regarding what type of messages decision-makers and the media consider the most important to dispense during the pre-crisis stage. Furthermore, examining the messages the public elected to disseminate provided an understanding of what messages the public deemed important during the pre-crisis stage.

Employing content analysis, this study used two coders who focused on tweets collected during the pre-crisis stage. A quota sample ensured accurate representation of both decision-makers, and the public in the data sample. This research study asked the following research questions:

RQ1: What topics were tweeted by decision-makers and the media during the pre-crisis stage?

RQ2: What messages did decision-makers and the media deem the most important to tweet during the pre-crisis stage?

RQ3: Which messages did the public perceive most important?

Concerning the first research question, data analysis revealed that decision-makers and the media tweeted messages regarding preparations, general information, tips, resources, closures, and warnings and predictions. In regards to research question two, data analysis

discovered decision-makers and the media primarily tweeted about preparation measures, and general information. Additionally, decision-makers and the media reflected a primary assumed motive of sharing information, and echoed a helpful or informative tone as the primary tone or expression of the tweet. In relation to the third research question, the public's assumed motives for using Twitter were primarily concerned with sharing information. Additionally, the public's tone and expression of tweets primarily reflected a helpful and informative tone, or a tone of concern. Analysis of messages retweeted by the public reveal an assumed motive of sharing information, and helpful and informative, and concerning tones.

This chapter discusses this study's implications, and presents some limitations this study encountered. Furthermore, directions for future research are suggested before concluding.

Implications

Prior to conducting this study, researchers understood that individuals used Twitter during a crisis to seek out information, and transmit information. The findings of this study are equally as important as understanding why individuals use social media during a crisis. This study suggested that individuals are using Twitter in a similar fashion during the pre-crisis stage as they are during the crisis stage. These findings are useful for decision-makers to understand, especially decision-makers functioning in hazard prone areas.

Decision-makers' audiences pay attention on social media, and redistribute decision-makers and the media's messages. Social media provides decision-makers with the opportunity to communicate directly with the public during the pre-crisis stage, and subsequent stages of the crisis cycle. Decision-makers need to take advantage of this opportunity and establish their presence on social media early on. Decision-makers that establish a presence prior to a crisis, create credibility with the public. The likelihood is great that these decision-makers will develop

a larger following than those who only establish a presence during a crisis. As a result, the larger following will enable decision-makers to reach a larger audience when communicating crucial information.

Another implication of this study is the extension of Katz et al.'s (1974) uses and gratifications theory into crisis research. Although designed prior to the development of the Internet, and social media, researchers continuously apply this theory to communication phenomena regarding the Internet, and new technologies. Uses and gratification has experienced a resurgence of popularity in media research. This study suggested uses and gratifications theory as a useful framework to study media and crisis research, providing a structure in understanding why decision-makers, the media, and the public, chose to use a specific medium, and how both groups' needs were gratified by using the medium.

Limitations

One of the limitations of this study was the availability of literature involving messages conveyed during the pre-crisis stage. This is primarily due to the length of time involved in the pre-crisis stage varying from crisis to crisis, often being determined in hindsight by researchers after a mapping of the crisis timeline. As research tends not to explore the pre-crisis stage as often, or as in depth as the crisis stage, this study drew on the literature of social media and the crisis stage. Literature solely regarding social media and the pre-crisis stage could have yielded a more deductive approach to coding, or provided a developed coding scheme to apply in addition to the open coding scheme developed for this study.

Another limitation of this study was a consistent limitation faced by those found in many studies exploring Twitter or similar social media. Twitter users generate large amounts of data. However, lack of resources, whether funding or time, prohibit a full census analysis. As there is

no established standard validation sampling method for Twitter provided in literature, each study is reflective of a different sampling method. While this study relied on quota sampling, and random sampling, these options may not be the optimal sampling methods in all cases studying Twitter. However, for the purposes of this study, the selected methods provided an acceptable dataset.

Direction for Future Research

The pre-crisis stage is an area of risk and crisis communication research that is essential to understand, especially in hazard prone areas. This area is not fully understood and demands further exploration. Understanding the communication that transpires during the pre-crisis stage can aid in understanding the next two stages more clearly. Effective communication may even yield to more preventative measures and more accurate handling of the crisis stage, and cleanup efforts during the post-crisis stage.

Furthermore, it is essential to understand how decision-makers, the media, and the public use Twitter throughout the entire crisis cycle. Are the results of this study specific to the pre-crisis stage only? Are these results foretelling of how decision-makers and the public use Twitter during the crisis stage, and post-crisis stage? Further analysis and exploration of the full crisis cycle will enable comparisons between stages, and provide insight to see if there are any similarities or differences. Further, incorporating statistical tests, such as chi-square, could provide greater understanding into this area.

Specifically, mapping the complete crisis by exploring frequencies of messages with corresponding dates will generate great insight. Utilizing the crisis timeline and matching real time data will yield greater information on what events propel individuals to use Twitter more than other events. Moreover, this research study coded for each sub-phase of the pre-crisis stage,

however the results were inconclusive without a complete mapping of the event and therefore were not included in the results. A complete map of the pre-crisis stage would provide the necessary information to explain the results of the coded sub-phases.

Additionally, this study deductively examined community decision-makers, and did not explore grassroots leadership. Further research is needed to explore whether grassroots leadership emerges via social media during the pre-crisis stage. Social media enables any individual to embody the role of a leader, if that individual commands an audience, and has an influence on their followers. This area was not examined in this current study, but deserves further exploration in future studies.

Another focus for future research is exploring the function of parody or novelty accounts during the pre-crisis stage, or any crisis stage. During data analysis, the coders discovered two parody accounts. These accounts solely disseminated humorous or sarcastic tweets, in all capital letters. Often the accounts asked others to retweet messages to make the river levels higher, or manipulated recent events in pop culture to reflect the river's situation. Parody or novelty accounts usually appear after a crisis occurs, such as the Twitter account @ExxonCares appearing after the 2013 Mayflower, Arkansas oil disaster, or the @BPGlobalPR account after the Gulf oil spill in 2010 (Gentilviso, 2010; Graves, 2013). It would be interesting to investigate the function parody accounts serve for the public, and if they serve different purposes according to the type of crisis the account is parodying.

Conclusion

This chapter discussed the implications and limitations of this study, while providing directions for future research. The implications for decision-makers included and limitations

were highlighted focusing on what may have hindered the study in certain areas. Directions for future research provided areas that need further exploration, or confirmatory examination.

Overall, this study examined why decision-makers and the media, and the public used Twitter during the pre-crisis stage of the flood. Data analysis suggested that decision-makers, the media, and the public were driven by similar assumed motives in using Twitter, and that social media provided a platform for decision-makers and the media to capitalize on communicating crisis information to their publics. Further research is needed within pre-crisis research to determine if these results are generalizable to all pre-crisis situations, or applicable to hazard prone areas where the pre-crisis timeframe tends to be longer in duration.

REFERENCES

- Acar, A., & Muraki, Y. (2011). Twitter for crisis communication: Lessons learned from Japan's tsunami disaster. *International Journal of Web Based Communities*, 7(3), 392-402.
- Arceneaux, N., & Weiss, A. S. (2010). Seems stupid until you try it: Press coverage of Twitter, 2006-9. *New Media & Society*, 12(8), 1262-1279. doi: 10.1177/1461444809360773
- Baran, S. J., & Davis, D. K. (2009). *Mass communication theory: Foundations, ferment, and future*. Belmont, CA: Wadsworth.
- Barton, L. (2001). *Crisis in organizations II* (2nd ed.). Cincinnati, OH: College Divisions, South-Western.
- Beaumont, C. (2008). Mumbai attacks: Twitter and Flickr used to break news. *The Telegraph*. Retrieved from <http://www.telegraph.co.uk/news/worldnews/asia/india/3530640/Mumbai-attacks-Twitter-and-Flickr-used-to-break-news-Bombay-India.html>
- Brenner, J., & Smith, A. (2013). *72% of online adults are social networking site users*. Pew Research Center's Internet & American Life Project, Washington D.C.
- Bruns, A. (2012). How long is a tweet? Mapping dynamic conversation networks on Twitter using Gawk and Gephi. *Information, Communication & Society*, 15(9), 1323-1351.
- Bumgarner, B. A. (2007). You have been poked: Exploring the uses and gratifications of Facebook among emerging adults. *First Monday*, 12(11).
- Burgess, E. (2013, March 20). NWS: 'Significant flood' expected in April, near 2010 and 2011 levels. *The Forum of Fargo-Moorhead*. Retrieved from www.inforum.com/event/article/id/393814/
- Chen, G. M. (2011). Tweet this: A uses and gratifications perspective on how active Twitter use gratifies a need to connect with others. *Computers in Human Behavior* 27, 755-762. doi: 10.1016/j.chb.2010.10.023

- Chew, C., & Eysenbach, G. (2010). Pandemics in the age of Twitter: Content analysis of tweets during the 2009 H1N1 outbreak. *PLoS ONE*, 5(11), 1-13.
doi:10.1371/journal.pone.0014118
- Chung, D. S., & Kim, S. (2008). Blogging activity among cancer patients and their companions: Uses, gratifications, and predictors of outcomes. *Journal of the American Society for Information Science and Technology*, 59(20), 297-306.
- City of Fargo (2013, Summer). The unpredictable job of predicting the Red. *City Snapshot*, 1-2.
- Cole, T. W., & Fellows, K. L. (2008). Risk communication failure: A case study of New Orleans and Hurricane Katrina. *Southern States Communication Journal*, 73(3), 211-228.
- Coombs, W. T. (2007). *Ongoing crisis communication: Planning, managing, and responding*. Thousand Oaks, California: Sage.
- Coombs, W. T. (2010). Parameters for crisis communication. In W. T. Coombs & S. Holladay (Eds.), *The handbook of crisis communication*. Malden, MA: Wiley-Blackwell.
- Coombs, W. T., & Holladay, S. J. (2001). An extended examination of the crisis situation: A fusion of the relational management and symbolic approaches. *Journal of Public Relations Research*, 13, 321-340.
- Corvey, W. J., Vieweg, S., Rood, T., & Palmer, M. (2010). *Twitter in mass emergency: What NLP techniques can contribute*. Proceedings of the NAACL HLT 2010 Workshop on Computational Linguistics in a World of Social Media, Los Angeles, CA. Retrieve from <http://acl.eldoc.ub.rug.nl/mirror/W/W10/W10-0512.pdf>
- Covello, V. T., & Mumpower, J. (1985). Risk analysis and risk management: An historical perspective. *Risk Analysis*, 5(2), 103-119. doi: 10.1111/j.1539-6924.1985.tb00159.x

- Dobos, J. (1992). Gratification models of satisfaction and choice of communication channels in organizations. *Communication Research*, 19(1), 29.
- Epatko, L. (2010). Haiti quake propels use of Twitter as disaster-relief tool [Blog post]. Retrieved from <http://www.pbs.org/newshour/rundown/2010/02/haiti-quake-propels-twitter-community-mapping-efforts.html>
- Erlandson, R., & Elmi, E. (2013). *News on social media: Twitter's impact on user's news consumption*. (Dissertation). Retrieved from <http://nu.diva-portal.org/smash/get/diva2:645176/FULLTEXT01.pdf>
- Fargo Geology. (2013). *Red River: Flood stages versus geographic locations, Fargo*. Retrieved from http://www.ndsu.edu/fargo_geology/floodgeography.htm
- Fink, S. (1986). *Crisis management: Planning for the inevitable*. New York: AMACOM.
- Gentilviso, C. (2010, June 9). BP gets @BPGlobalPR to clear up its Twitter. *Time*. Retrieved from <http://newsfeed.time.com/2010/06/09/bp-gets-bpglobalpr-to-clean-up-its-twitter/>
- Gonzalez-Herrero, A., & Pratt, C. B. (1995). How to manage a crisis before-or whenever-it hits. *Public Relations Quarterly*, 40(1), 25-29.
- Goolsby, R. (2009). Lifting elephants: Twitter and blogging in global perspective. In H. Liu, J.J. Salerno & M.J. Young (Eds), *Social Computing and Behavioral Modeling* (pp. 2-7). New York: Springer.
- Graves, L. (2013, April 5). Exxon fake Twitter account mocks response to Arkansas spill. *The Huffington Post*. Retrieved from http://www.huffingtonpost.com/2013/04/05/exxon-fake-twitter-account_n_3024663.html
- Heverin, T., & Zach, L. (2010). *Microblogging for crisis communication: Examination of Twitter use in response to a 2009 violent crisis in Seattle-Tacoma*. Paper presented at the Seventh

- International ISCRAM Conference, Seattle, WA. Retrieved from
http://www.thomasheverin.com/uploads/4/6/5/8/4658640/heverin_iscram_2010.pdf
- Hambrick, M. E., Simmons, J. M., Greenhalgh, G. P. & Greenwell, T.C. (2010). Understanding professional athletes' use of Twitter: A content analysis of athlete tweets. *International Journal of Sport Communication*, 3, 454-471.
- Hollenbaugh, E. E. (2010). Person journal bloggers: Profiles of disclosiveness. *Computers in Human Behavior*, 26(4), 1657-1666. doi: 10.1016/j.chb.2010.06.014
- Holsti, O. R. (1969). *Content analysis for the social sciences and humanities*. Reading, MA: Addison-Wesley.
- Honeycutt, C., & Herring, S. C. (2009). Beyond microblogging: Conversation and collaboration via Twitter. *Proceedings of the Forty-Second Hawaii International Conference on System Sciences*. Los Alamitos, CA: IEEE Press. Retrieved from <http://ella.slis.indiana.edu/~herring/honeycutt.herring.2009.pdf>
- Johnson, P. R., & Yang, S. (2009). *Uses and gratifications of Twitter: An examination of user motives and satisfaction of Twitter use*. Paper presented at the Communication Technology Division of the annual convention of the Association for Education in Journalism and Mass Communication in Boston, MA. Retrieved from <https://umdrive.memphis.edu/cbrown14/public/Mass%20Comm%20Theory/Week%207%20Uses%20and%20Gratifications/Johnson%20and%20Yang%202009%20Twitter%20uses%20and%20grats.pdf>
- Joinson, A. N. (2008). *Looking at, looking up or keeping up with people? Motives and use of*

- Facebook*. Paper presented to the conference on human factors in computer systems (CHI) at the 26th annual SIGGCHI conference in Florence, Italy. Retrieved from http://digitalinnovationtoday.com/downloads/Joinson_Facebook.pdf
- Katz, E., Blumler, J. G., & Gurevitch, M. (1974). Uses and gratifications research. *The Public Opinion Quarterly*, 37(4), 509-523.
- Ko, H. (2000). *Internet uses and gratifications: Understanding motivations for using the Internet*. Paper presented at the 83rd Annual Meeting of the Association for Education in Journalism and Mass Communication, Phoenix, AZ.
- Ko, H., Cho, C., & Roberts, M. S. (2005). Internet uses and gratifications: A structural equation model of Internet advertising. *Journal of Advertising*, 34(2), 57-50.
- Krippendorff, K. (1980). *Content analysis: An introduction to its methodology*. Beverly Hills, CA: Sage.
- Kwak, H., Lee, C., Park, H. & Moon, S. (2010). *What is Twitter, a social network or a news media?* Paper presented at the 19th International World Wide Web (WWW) Conference, Raleigh, NC. Retrieved from <http://an.kaist.ac.kr/traces/WWW2010.html>
- LaRose, R., & Eastin, M. S. (2004). A social cognitive theory of Internet uses and gratifications: Toward a model of media attendance. *Journal of Broadcasting and Electronic Media*, 48(3), 358-377.
- LaRose, R., Mastro, D., & Eastin, M. S. (2001) Understanding Internet usages: A social-cognitive approach to uses and gratifications. *Social Science Computer Review*, 19(4), 395-413.
- Larsson, A. O. & Moe, H. (2012). Studying political microblogging: Twitter users in the 2010 Swedish election campaign. *New Media & Society*, 14(5), 729-747.

- Lenhart, P. & Fox, S. (2009). *Twitterpated: Mobile Americans increasingly take to tweeting*. Pew Research Center Publications, Washington D.C. Retrieved from <http://www.pewinternet.org/Reports/2009/Twitter-and-status-updating.aspx>
- Levitt, A. M., (1997). *Disaster planning and recovery: A guide for facility professionals*. New York: John Wiley.
- Li, C., & Bernoff, J. (2008). *Groundswell: Winning in a world transformed by social technologies*. Boston, MA: Harvard Business Press
- Lundgren, R. E. & McMakin, A. H. (2013). *Risk communication: A handbook for communicating environmental, safety, and health risks*. Hoboken, NJ: Wiley.
- Macdonald, N., Chester, D., Sangster, H., Todd, B., & Hooke, J., (2011). The significance of Gilbert F. White's 1945 paper 'human adjustment to floods' in the development of risk and hazard management. *Progress in Physical Geography*, 36(1), 125-133. doi: 10.1177/0309133311414607
- Malizia, A., Bellucci, A., Diaz, P., Aedo, I., & Stefano, L. (2011). eStorys: A visual storyboard system supporting back-channel communication for emergencies. *Journal of Visual Languages and Computing*, 22(2), 150-169.
- Marken, G. A. (2007). Social media... The hunted can become the hunter. *Public Relations Quarterly*, 52(4), 9-12.
- Mayfield, A. (2006). What is social media? *Spannerworks*. Retrieved from http://www.spannerworks.com/fileadmin/uploads/eBooks/What_is_social_media.pdf
- Meier, P. (2012). How crisis mapping saved lives in Haiti [Blog post]. Retrieved from <http://newswatch.nationalgeographic.com/2012/07/02/crisis-mapping-haiti/>

- Mileti, D. (1999). *Disasters by design: A reassessment of natural hazards in the United States*. Washington, D.C.: Joseph Henry Press.
- Miller, K. (2005). *Communication theories: Perspectives, processes, and contexts*. New York, NY: McGraw Hill.
- Mitroff, I. I. (1994). Crisis management and environmentalism: A natural fit. *California Management Review*, 36(2), 101-113.
- Neuendorf, K. A. (2001). *The content analysis guidebook*. Thousand Oaks, CA: Sage.
- New America Media. (2011). Social media made Tunisian uprising possible. *New America Media*. Retrieved from <http://newamericamedia.org/2011/01/social-media-made-tunisian-uprising-possible.php>
- Olaniran, B. A., & Williams, D. E. (2012). Introduction. In B. A. Olaniran, D. E. Williams & W. T. Coombs (Eds.), *Pre-crisis planning, communication, and management* (xvi-xxiii). New York: Peter Lang.
- Ostrow, J. (2013, September 16). Colorado floods: Social media play key role in news coverage. *The Denver Post*. Retrieved from <http://blogs.denverpost.com/ostrow/2013/09/16/social-media-plays-key-role-in-co-flood-coverage/16485/>
- Palenchar, M. J., & Heath, R. L. (2002). Another part of the risk communication model: Analysis of risk communication process and message content. *Journal of Public Relations Research*, 14(2), 127-158.
- Palenchar, M. J., Heath, R. L., & Oberton, E. M. (2005). Terrorism and industrial chemical production: A new era of risk communication. *Communication Research Reports*, 22(1), 59-67. doi:10.1080/00036810500059886
- Palen, L., & Liu, S. (2007). *Citizen communications in crisis: Anticipating a future of ICT-*

- supported participation*. Proceedings of the ACM Conference on Human Factors in Computing Systems CHI 2007, 727-736.
- Palen, L., Vieweg, S. Sutton, J., Liu, S. B., & Hughes, A. (2007). *Crisis informatics: Studying crisis in a networked world*. Paper presented at the Third International Conference on e-Social Science, Ann Arbor, MI. Retrieved from <http://ess.si.umich.edu/papers/paper172.pdf>
- Palmgreen, P. (1984). Uses and gratifications: A theoretical perspective. In R. N. Bostrom (Ed.), *Communication yearbook 8* (pp. 20-55). Beverly Hills, CA: Sage.
- Phillips, B. D., Neal, D. M., & Webb, G.R. (2011). *Introduction to emergency management*. Boca Raton, FL: CRC Press
- Poulsen, K. (2007, October 23). Firsthand reports from California wildfires pour through Twitter. *Wired*. Retrieved from <http://www.wired.com/threatlevel/2007/10/firsthand-repor/>
- Rael, A. (2013, September 13). Colorado flooding photos: 50 Twitter pics show the devastating damage around the state. *The Huffington Post*. Retrieved from http://www.huffingtonpost.com/2013/09/13/colorado-flood-pictures_n_3922581.html
- Reynolds, B., & Seeger, M. W. (2005). Crisis and emergency risk communication as an integrative model. *Journal of Health Communication, 10*, 43-55.
doi:10.1080/10810730590904571
- Riffe, D., Lacy, S., & Fico, F. (1998). *Analyzing media messages: Using quantitative content analysis in research*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Robinson, E. (2010, January 13). Following the earthquake in in Haiti on Twitter. *Washington Post*. Retrieved from <http://voices.washingtonpost.com/postpartisan/2010/01/>

following_the_earthquake_in_ha.html

- Rubin, R. B., Sypher, H. E., & Palmgreen, P. (1994). *Communication research measures: A sourcebook*. New York, NY: The Guilford Press.
- Rubin, A. M. (2002). The uses-and-gratifications perspective of media effects. In J. Bryant & D. Zillman (Eds.), *Media effects: Advances in theory and research* (pp. 525-548). Mahwah, NJ: Erlbaum.
- Ruggiero, T. W. (2000). Uses and gratifications theory in the 21st century. *Mass Communication and Society*, 3(1), 3-37.
- Sarno, D. (2009, March 11). On Twitter, mindcasting is the new lifecasting. *Los Angeles Times*. Retrieved from <http://latimesblogs.latimes.com/technology/2009/03/on-twitter-mind.html>
- Seeger, M. W., Sellnow, T. L., & Ulmer, R. R. (2003). *Communication and organizational crisis*. Westport, CT: Praeger.
- Sellnow, T. L., Seeger, M. W., and Ulmer, R. R. (2002). Chaos theory, informational needs, and natural disasters. *Journal of Applied Communication Research*, 30(4), 269-292.
doi:10.1080/00909880216599
- Sellnow, T. L., Ulmer, R. R., Seeger, M. W., & Littlefield, R. S. (2009). *Effective risk communication: A message-centered approach*. New York, NY: Springer.
- Shankar, K. (2008). Wind, water, and wi-fi: New trends in community informatics and disaster management. *The Information Society*, 24(2), 116-120.
- Sherry, J., Lucas, K., Rechtsteinger, S., Brooks, C., & Wilson, B. (2001). *Video game uses and gratifications as predictors of use and game preference*. Paper presented at the annual meeting of the International Communication Association, Washington, DC. Retrieved from <http://icagames.comm.msu.edu/vgu%26g.pdf>

- Smith, A. (2010a). *Government online: The internet gives citizens new paths to government services and information*. Pew Research Center's Internet & American Life Project, Washington D.C.
- Smith, B. G. (2010b). Socially distributing public relations: Twitter, Haiti, and interactivity in social media. *Public Relations Review*, 36(4), 329-335.
- Stafford, T. F., Stafford, M. R., & Schkade, L. L. (2004). Determining uses and gratifications for the Internet. *Decision Sciences*, 35(2), 259-288.
- Sullivan, S. J., Schneiders, A. G., Cheang, C., Kitto, E., Lee, H., Redhead, J.,...McCrary, P. R. (2012). 'What's happening?' A content analysis of concussion-related traffic on Twitter. *British Journal of Sports Medicine*, 46, 258-263. doi:10.1136/bjism.2010.080341
- Sutton, J., Palen, L., & Shklovski, I. (2008). Backchannels on the front lines: Emergent uses of social media in the 2007 Southern California wildfires. Proceedings of the 5th International ISCRAM Conference. Washington, DC. 1-9.
- Sutton, J., Spiro, E., Butts, C., Fitzhugh, S., Johnson, B., & Greczek, M. (2013). Tweeting the spill: Online informal communications, social networks, and conversational microstructures during the deepwater horizon oil spill. *International Journal of Information Systems for Crisis Response and Management (IJISCRAM)*, 5(1), 58-76. doi:10.4018/jiscrm.2013010104
- Tierney, K. J., Lindell, M. K., & Perry, R. W. (2001). *Facing the unexpected: Disaster preparedness and response in the United States*. Washington, D.C.: Joseph Henry Press.
- Turner, B. (1976). The organizational interorganizational development of disasters. *Administrative Science Quarterly*, 21, 378-397. doi:10.2307/2391850
- Twitter Developers. (2013). *Using the Twitter search API*. Retrieved from <https://dev>.

twitter.com/docs/using-search

Ulmer, R. R. (2001) Effective crisis management through established stakeholder relationships.

Management Communication Quarterly, 14(4), 590-615.

doi: 10.1177/0893318901144003

Understanding the power of social media as a communication tool in the aftermath of disasters:

Hearing before the Subcommittee on Disaster Recovery and Intergovernmental Affairs of the Committee on Homeland Security and Governmental Affairs, *Senate*, 112th Cong. 1 (2011) (testimony of Craig Fugate). Retrieved from <https://www.dhs.gov/news/2011/05/04/written-statement-craig-fugate-administrator-federal-emergency-management-agency>

Veil, S. R., Buehner, T., & Palenchar, M. J. (2011). A work-in-process literature review:

Incorporating social media in risk and crisis communication. *Journal of Contingencies and Crisis Management*, 19(2), 110-122. doi: 10.1111/j.1468-5973-2011.00639.x:

Venette, S. J. (2003). *Risk communication in a high reliability organization: APHIS PPQ's inclusion of risk in decision making*. Ann Arbor, MI: UMI Proquest Information and Learning.

Venette, S. (2008). Risk as an inherent element in the study of crisis communication. *Southern*

Communication Journal, 73(3), 197-210. doi:10.1080/10417940802219686

Waymer, D., & Heath, R. L. (2007). Emergent agents: The forgotten publics in crisis

communication and issues management research. *Journal of Applied Communication Research*, 35(1), 88-108. doi:10.1080/00909880601065730

Webster, J. G., & Lin, S. F. (2002). The internet audience: Web use as mass behavior. *Journal of*

Broadcasting and Electronic Media, 46(1), 1-12.

White, G. (1942). *Human adjustment to floods*. Research paper 29. Chicago, IL: University of Chicago, Department of Geography

Wu, J., Wang, S., & Tsai, H. (2010). Falling in love with online games: The uses and gratifications perspective. *Computers in Human Behavior*, 26(5), 1862-1871.

doi: 10.1016/j.chb.2010.07.033