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Disaster Movies and the Perception of Human Behavior Myths in Disasters

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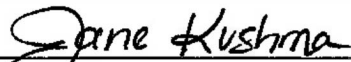
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Disaster Movies and the Perception of Human Behavior Myths in Disasters

A Dissertation Submitted to the
Graduate Faculty
of Jacksonville State University
in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Science
with a Major in Emergency Management

By

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Abstract

This study explored if disaster movies change the perceptions viewers hold regarding human behavior in disasters, and if so, whether these effects are observable six weeks after watching the disaster movie. The study documented the anticipation of disaster myths in human behavior for 121 respondents, providing data that can better inform the discussion of disaster myths and realities. The study found changes to anticipation of disaster myths in human behavior and realities across multiple categories, with statistically significant results related to the factor of Looting Myth. Limitations for this study include a small sample size, and the external influence of current events on research participants.

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Chapter 1: Introduction

When the COVID-19 pandemic emerged, the public searched for guidance on what to expect in the coming months. Some people followed the guidance from public health experts and elected officials, some looked back in history to previous pandemics, while others turned to fiction.

As cases of COVID-19 spiked across the world so too did searches for the movie *Contagion*. From the beginning, many in the public began to seek guidance from fictional sources in an absence of known science (Montano & Carr, 2022). While the scientists in real life were cautious in their predictions of how the pandemic would unfold, the movie *Contagion* (2011) offered a succinct story of how a modern-day pandemic could unfold. While the masses turned to Hollywood, so too did some key decision-makers. For example, Matt Hancock, the United Kingdom's former Secretary for Health and Social Care from 2018 to 2021, cited *Contagion* as guiding his decision-making on supply purchasing for their national vaccine rollout (Forrest, 2021):

In the film, it shows that the moment of highest stress around the vaccine program is not in fact before it's rolled out, when actually it is the scientists and the manufacturers working together at pace. It's afterwards when there is a huge row about the order of priority. So not only did we in this country did we, I insisted that we order enough for everybody to have, every adult to have their two doses, but also we asked for that clinical advice on the prioritization very early and set it out in public, actually I think for the first time we set it out in August or September so that there was no big row about the order of priority, but instead we asked the clinicians, and we do it on the basis of how we save the most lives. (p. 6)

The pandemic was not the first time that popular culture influenced decision-makers' perceptions of disasters. During an interview on *Late Night with Seth Meyers*, former President Bill Clinton highlighted how reading a non-fiction novel about a pandemic led to the creation of the United States' Strategic National Stockpile (Meyers, 2021):

On occasion I would read fiction books, because I thought they might be an omen of what to do. And I read *The Hot Zone*, Richard Preston's *The Hot Zone*, and it really accelerated my efforts to get the White House to set up a special unit on dealing with biological and chemical outbreaks. We hatched a lot of plans out, and we did a lot of kind of war gaming, I mean real efforts with security people all over America, and we set up the first stockpile. So, I have been waiting for what happened with COVID. (3:36)

After watching *The Day After* (1983), a film about a nuclear attack on the American Midwest, then President Ronald Reagan wrote in his diary (Reagan, 1983):

In the morning at Camp D. I ran the tape of the movie ABC is running on the air Nov. 20. It's called "The Day After." It has Lawrence Kansas wiped out in a nuclear war with Russia. It is powerfully done—all \$7 mil. worth. It's very effective & left me greatly depressed. So far, they haven't sold any of the 25 spot ads scheduled & I can see why. Whether it will be of help to the "anti nukes" or not, I cant say. My own reaction was one of our having to do all we can to have a deterrent & to see there is never a nuclear war.
Back to W.H.

Despite being fictional, films and books can reshape the way leaders prepare for and respond to disasters. Likewise, the average person's risk perception (Haney et al., 2019) and how they understand disasters (Quarantelli, 1985) can be shaped by the content they consume. It is clear that these movies can affect a viewer's perception of disasters, but to this point few studies have

measured the degree to which these perceptions are changed and if perceptions created by fictional content reflects reality. Understanding this potential difference in perception is the focus of this study.

Problem

Disaster movies offer viewers a way to experience disasters from a safe distance (Keane, 2006; Selbo, 2014). Part of the allure of cinema is this escapism, being able to step out of our lives for a couple hours and walk in someone else's shoes (Selbo, 2014) to help us better understand an environment different from our real-life experience. Stephen Couch (2000) wrote on the importance of popular culture channels, such as movies, in forming our perception of disasters:

Arguably, popular culture greatly influences our norms, beliefs, and subsequent actions about everything, including disasters. It helps us frame disasters, give them meaning, and make them understandable, intelligible, and perhaps controllable. It gives us the cultural tools and collective visions through which meaning is constructed and blame assigned. It tells us how we are supposed to act under duress and how we supposedly do (p. 25).

Disaster movies offer an immersive emotional experience. Viewers may feel their pulses increase as tensions rise, can empathize with the loss of a loved one, or sit in awe of the daunting spectacles presented on screen (Selbo, 2014). Disaster movies create an opportunity to ride a sensory roller coaster, while also exploring disasters that viewers are unlikely to have experienced first-hand (Kendra et al., 2018).

The disaster movie experience also provides an important opportunity for people to learn about hazards and disasters. Individuals learn from first-hand experiences as well as observations (Bandura, 1971). For individuals who have not experienced a major earthquake (*San Andreas*,

2015) or a severe tornado (*Twister*, 1996) in real-life may be able to gain an understanding of these types of events vicariously through their depiction in popular culture. Research has found that people retain these observations of behavior and later mimic them (Bandura, 1971).

Disaster movies may be a source of learning, but they are also typically fictional and may not accurately display the reality of these types of events as they occur in real-life. While scholars have cited the potential for a problematic outcome of disaster movies (Couch, 2000; Haney et al., 2019; Jones, 1993; Kendra et al., 2018; McEntire, 2008; Tierney et al., 2006; Quarantelli, 1985), only a single study has considered what information (both accurate and inaccurate) viewers retain from these films related to disaster myths. This study focused on the extent to which the movie *San Andreas* (2015) influenced viewers' perceptions and intentions related to protective actions during earthquakes after watching the film (Seipel, 2017). Viewers with less disaster experience or training reported that they would follow the example of the film in real life as a safety measure. The actions taken by characters included both safe (e.g., drop, cover, and hold on) and unsafe tactics (e.g., the "Triangle of Life" myth, standing next to a solid building during an earthquake). Seismologist and disaster researcher Lucy Jones said it was "a lousy documentary, but a good movie" (Rice, 2015, p. 1). If people take what is depicted in disaster films as fact and mimic that behavior in real life, there is the potential that this genre of entertainment may cause harm.

Media outlets often interview scientists about new disaster movies to inquire about their accuracy. For example, interviews can be found of volcanologists and seismologists discussing *Volcano* (1997) (Reich, 1997a) and *Dante's Peak* (1997) (Reich, 1997b), meteorologists discussing *Into the Storm* (2014) (Smith-Strickland, 2014) and *Twister* (1996) (Adler, 1996), and most recently virologists and public health experts discussing *Outbreak* (1995) and *Contagion*

(2011) (Sarkisian, 2020). All have found a range of inaccuracies represented in these films from the perspective of their respective fields.

In addition to these inaccuracies in fictional depictions of disasters, there are also frequent misunderstandings of human behavior in real-life disasters. Disaster researchers have long found that similar inaccuracies can be observed related to the reporting of human behavior in disasters (Couch, 2000; Haney et al., 2019; Jones, 1993; Kendra et al., 2018; McEntire, 2008; Tierney et al., 2006; Quarantelli, 1985). For example, the belief that there is widespread anti-social behavior and looting during disasters has long been dispelled in the United States (Tierney et al., 2006). These misunderstandings about human behavior in disasters are so engrained into disaster movies that children's comedies such as *Cloudy with a Chance of Meatballs* (2009) include myths in their Monty Python-esque shtick. The film depicts a "food hurricane" swarming the local community, where a resident is seen breaking into an electronics store to steal a television. Seconds later a sentient television with legs (a failed creation of the *mad scientist* main character) breaks into the same electronics store to steal a human. The presence of these narratives in disaster movies are not simply a perpetuation of myths but have become features of the genre; present in children's animations and blockbuster action films alike.

The protective actions and science that disaster movies teach range widely: how to stay warm in a blizzard (*The Day After Tomorrow* (2004)), the importance of social distancing in a pandemic (*Contagion* (2011)), how to escape from a large structure (*Poseidon* (2006)), the vulnerability of technology to electromagnetic pulses (*The Core* (2003)), the increasing frequency and intensity of meteorological events due to climate change (*Into the Storm* (2014)), how to use a wildland firefighting fire shelter (*Only the Brave* (2017)), and correctly identifying the signs of an imminent volcanic eruption (*Pompeii* (2014)). When accurate, these are important

insights for a general audience to be able to take away from these fictional disaster movies.

However, disaster movies often also depict narratives that may cause harm if believed to be true in real-life. For example, a common concern explored in disaster movies is the potential for social unrest after disasters. Movies such as *Contagion* (2011), *San Andreas* (2015), *Hurricane Heist* (2018), and *This is the End* (2013), prominently feature civil unrest, gunfire, and threats to the lives of the main characters as a plot mechanism to increase the tension in the film. Many American disaster films feature a “gun grab” moment where the main character hears the initial commotion of an event and rummages through their drawers or a car’s glove box to grab a pistol. Looting has consistently been a concern for media, residents, and local elected officials. Plywood yard signs reading “YOU LOOT, WE SHOOT” are often featured in the background footage of disaster news stories (Brown, 2020; WSOC-TV9, 2018). Being exposed to repeated scenes like this may have very real outcomes for viewers who find themselves in similar circumstances.

As researchers contend with the widespread misunderstandings of the realities of disasters in real-life and seek to educate the public on disaster science, looking to popular culture, and disaster movies specifically, as a source for these misunderstandings is logical. Developing a body of empirical research to understand the effect disaster movies may have on individuals’ perceptions of disasters is needed. A better understanding of the role these movies play in the perpetuation of disaster myths can inform the work of filmmakers seeking to reduce the negative impacts of their films, as well as the public outreach work of emergency managers and disaster researchers attempting to better prepare the public for disasters.

Purpose

The purpose of this study is to examine the degree to which individuals’ perceptions of

disasters are influenced by Hollywood disaster movies. Movies have the potential to change the perceptions of the viewer by showcasing contexts and stories the viewer can connect to (Bandura, 1971). It is possible that viewers go beyond connecting to the film in the moment and may retain information that may be recalled at a later point. This study investigated how this process occurs with the information provided to viewers about disasters in disaster movies, specifically human behavior myths as highlighted in the disaster studies and emergency management research literature. This study also investigated how variables such as experience, pre-existing knowledge, and demographic data may influence this process.

Relevance and Importance

Hazard and disaster scientists have found climate change has ushered in a new age where hazards are likely to continue to grow in frequency and intensity (Smith, 2023). Hurricanes are becoming stronger and wildfire season continues to grow longer, creating more dangerous conditions (United Nations, 2021; USGS, 2022). These changes to the hazards themselves come at the same time as trust in public officials is deteriorating (Brenan, 2021; Perry, 2021; Pew Research Center, 2019); individuals are increasingly putting their trust in informal sources based on personal preference (American Press Institute, 2017; The Media Insight Project, 2014). The combination of these conditions has been at the forefront of disasters in recent years. For example, during the 2020 wildfire season President Trump and wildland fire officials were at odds over the source of the worsening fire conditions in California (Let al., 2020). President Trump attributed the conditions to a lack of forest management on the part of state agencies, while the wildland fire officials cited increasing temperatures and an extended fire season caused by climate change, and a lack of sufficient resources coming from the federal government. This put the American public in the position of choosing whom to trust, the head of the country or

leading hazard experts.

When there is a gap of reliable information, people seek out either trusted sources or easily accessible sources (Funk et al., 2020; Lowe, et al., 2006; Perkowitz, 2007; Silver & Matthews, 2017). Researchers have noted the contradictory potential for these movies to both be used as trusted sources of information, and also mislead viewers who are unable to distinguish between fact and fiction (Couch, 2000; Haney et al., 2019; Jones, 1993; Kendra et al., 2018; McEntire, 2008; Tierney et al., 2006; Quarantelli, 1985).

To this point, research on the topic of disaster myths in movies and their influence on viewers has been scattered and largely anecdotal. There is only a single study providing empirical evidence that these movies change viewers' perceptions (Seipel, 2017). If these movies *do* influence viewers' perceptions, then the potential exists for movies to correct their narratives and positively influence the accuracy of the public's perception. If these films *do not* influence viewers' perceptions, then researchers' focus would be better shifted towards other sources of information (e.g., news media and social media) as the primary source for misinformation.

Research Questions

To better understand the context and potential source of these issues, the following research questions were proposed:

RQ1: Do disaster movies change the perceptions viewers hold regarding human behavior in disasters?

RQ2: If so, is this change in perception observable six weeks after viewing?

Overview of Methodology

This study used a traditional quasi-experimental design to compare the effect of disaster movies on viewers' perceptions. The sample for this study included college students enrolled in

gcourses from the disciplines of geography, geology, psychology, political science, and other disciplines closely related to but not including emergency management. These disciplines were chosen for the researcher's ability to recruit participating courses, while minimizing the effect of a student's course work to influence their responses within the experiment.

The treatment for the experiment consisted of watching disaster films. All participants completed pre-tests, immediate post-tests following the viewing of their final movie, and a long-term post-test (6 weeks). The immediate post-test assessed the influence of a movie immediately after viewing, while the long-term post-test measured the effect of the films six weeks after viewing.

Defining "Disaster Movie"

From the perspective of the discipline of emergency management, the term "disaster movie" is problematic. Emergency management scholars view "emergencies", "disasters", and "catastrophes" as categorically different hazard event types. However, filmmakers, audiences, and the public generally, use these terms interchangeably. Within this study "disaster movies" and "disaster films" will be referencing terminology borrowed from the film studies literature (Sanders, 2009), while the terms "emergency," "disaster," and "catastrophe" will be referencing terms from the emergency management literature (Quarantelli, 1985).

Within the realm of film studies and popular culture, there are numerous definitions with significant differences. Quarantelli (1985) and Mitchell et al. (2000) all observed the lack of consistency in definition, as well as a lack of a comprehensive list of these films, leading each to set their own definition and selection criteria. Quarantelli (1985) required movies to have "substantial scenes or footage of disaster happenings" (p. 33) while Michell et al. (2000) required the hazard to be featured prominently in the film (i.e., prominently featured as a plot mechanism,

driving the main storyline of the movie).

Based on these definitions, Montano and Carr (2022) created a more inclusive sampling strategy using the movie rating site IMDB (Internet Movie Database). This site compiles user-generated content to organize movies by factors such as average user score, actor, genre, and specific keyword tags. Two tags, “disaster movie” and “disaster film”, were used to deduce how the average user defined “disaster”. This led to a nuanced set of variables that had not previously been observed. For example, monster movies such as the *Godzilla* franchise were tagged as disaster movies, presumably because of the destruction of public infrastructure and presence of similar stakeholders (first responders, national guard, etc.). However, movies about terrorist attacks were divided. Most September 11th movies were tagged as disaster movies, but other movies based on real life terrorism events, such as *Patriots Day* (2016) about the Boston Marathon Bombing, did not receive a disaster tag. This may be because the viewers did not see the same infrastructure damage in *Patriots Day* as with the other films, or viewers’ conceptualization of disaster may not include terrorism.

For inclusion in this study, films must have been feature-length for theaters or streaming services (as opposed to television episodes, mini-series, or made-for-tv-movies) and initially created for a North American audience. This stipulation allows for control over cultural differences from country to country. Documentaries are excluded as they are created for information and education purposes as opposed to a fictional or dramatized narrative. Finally, it is important to note that the terms “disaster film” and “disaster movie” are largely interchangeable (specific discussion of this difference is explored in Chapter Two).

Organization of the Dissertation

Chapter two will discuss the genre of disaster movies, reviewing how these movies have

evolved over the last 120 years and what features are required for inclusion in this genre. Next, chapter three will review how individuals learn from films, the degree of effect on viewers that films have, and the challenges of comparing the effects of non-fiction versus fictional works on viewers. Chapter four will outline the research design, sampling strategy, and methods of analysis that were used in this experiment. Chapter five will outline the results for both Survey 1, as well as the results across the three surveys. Finally, Chapter six will discuss these results and identify future opportunities for research.

Chapter 2: The Disaster Movie Genre

Disasters have been a popular subject for films since the earliest days of cinema (Keane, 2006). The genre ranges from early works like the *Last Days of Pompeii* (1908 and 1913) and *In Old Chicago* (1938), to “golden age” blockbusters like *Towering Inferno* (1974) and *Earthquake* (1974). It also includes modern classics like *The Day After Tomorrow* (2004) and *San Andreas* (2015).

Audiences are drawn to disaster films because of their familiar storylines of families surviving near death experiences, ‘love on the rocks’ being mended by a courageous rescue, and the family dog tagging along for the ride. Filmmakers have re-packaged the excitement and conventions of these films using the latest filmmaking technology, allowing audiences to experience these thrilling events from a safe distance (Keane, 2006; Selbo, 2014).

To understand the place disaster films hold in society, it is necessary to discuss the concept of genre and conventions, and the history of these films. It is also important to look at these films as products of society’s perceptions and expectations. As will be discussed, genre is a product of the relationship between viewer and filmmaker (Friedman et al., 2014; Selbo, 2014). A film therefore represents the perceptions of the viewer, the perceptions of the filmmaker, the previous films that were used as templates for newer creations, and the zeitgeist within which these movies were created. Without an understanding of each of these compounding factors, it is easy to claim that one of these pieces predetermine the entirety of the process. The goal of the following sections is to articulate the relationship between these factors and the influence each has on the others.

The concept of genre also serves as the foundation for films, with filmmakers seeking to produce movies that offer something new while including elements familiar to the viewer

(Friedman et al., 2014). Genres may change over time based on the elements of blockbuster films that are repeated by other filmmakers in hopes of finding similar success, as well as changes in society and the interests of viewers (Selbo, 2014).

This context of change is critical in understanding the claims of emergency management researchers at various times. For example, there are significant differences between Quarantelli's observations in the 1970s, and the observations of Haney et al. in 2019. Disaster movies, like most popular media, reflect the priorities, culture, and anxieties of the era for which they are created. The plot of *Dr. Strangelove* (1964) reflects the anxieties of the Cold War, while *Cloverfield* (2008) makes use of post-9/11 imagery, both connecting with their respective audiences' experiences.

It is also important to understand the tropes used within the disaster movie genre, and recognize what is featured out of tradition and what is an arbitrary creative decision. Take for example *Skyscraper* (2018), a modern movie about a security specialist (Dwayne Johnson) saving his wife (Neve Campbell) and his children from terrorists and a structure fire. On its own the movie can be criticized as showing looting, widespread anti-social behavior, and demonstrating elements of an unrealistic response. At the same time, it is important to recognize that this movie comes from a line of genre movies, with tropes that are included to give viewers the experience they desire, and occasionally outright reference previous films as a nod to previous filmmakers. *Skyscraper* (2018) is considered to be a revamp of the 1988 movie *Die Hard* (Leadbeater, 2018). *Die Hard* was inspired when a novelist fell asleep during the classic disaster film *The Towering Inferno* (1974) and dreamed up the plot of his next novel (Sommerlad, 2018). Without understanding this near fifty-year process of mimicry and metamorphosis, it would be easy to make subjective claims that fail to recognize this evolution.

Lastly it is important to establish this history and context in order to establish the definition of a disaster movie. As will be discussed, the concept of the “disaster movie” has changed from biblical epics, to monster movies, to alien movies- films that many emergency managers would not include if they were asked to place films into categories. While emergency management researchers may not make this distinction, the average moviegoer does (Montano & Carr, 2022). If average citizens feel that a movie warrants this label, there must be sufficient context provided in order to truly understand how these individuals came to establish that definition.

This chapter is divided into four sections. The first section provides a brief history of disaster movies, connecting changes in culture and technology to the progression of films. The second discusses the concept of genre, how genre frames the making of other movies, and conventions, and how those concepts have shaped disaster movies. The third section discusses the conventions of current disaster movies. Lastly the fourth section discusses in detail the definition of disaster movies and establishes a working definition to be used within this study.

History of Disaster movies

Keane (2006) notes that the evolution of disaster movies can be observed in twenty-year cycles, starting with the 1910s to 1930s. Early silent films like *Last Days of Pompeii* (1913) showed audiences cities burned to ash, buildings turned to rubble, and families running for their lives. Biblical and Roman epics offered ample stories that incorporated these elements. Viewers flocked to theaters not only for the films, but for the novelty of cinema as theaters opened across the country (Keane, 2006). As these films succeeded, Hollywood began to back bigger disaster films complete with star-studded casts and impressive special effects budgets. This boost led to a series of disaster films in the 1930s including a remake of *Last Days of Pompeii* (1935), *San*

Francisco (1936), *The Good Earth* (1937), *The Hurricane* (1937), *Old Chicago* (1937), *Suez* (1938), and *The Rains Came* (1939). With this collective, the genre began to take form.

The 1950s brought about a new breed of disaster film, spurred on by an attempt to pull audiences away from their new in-home television sets and back to theaters (Keane, 2006). Hollywood doubled down on spectacle to produce a second generation of Roman and biblical epics including *Quo Vadis* (1951) and *The Ten Commandments* (1956). These films were a call back to Christian narratives as they connected damage and destruction to the angry wrath of God punishing his sinful flock (Keane, 2006). They were also an answer to the perceived threat of atheist/communist sentiment during the cold war (Keane, 2006). So called “monster films” also tapped into cold war anxiety, using monsters and razing of cities as an allegory for fears of nuclear warfare. The *Godzilla* franchise (1954-present) is based on the narrative that man’s nuclear ingenuity will lead to destruction and loss of innocent lives, punctuating the experience of post-war Japan (Kalat, 2017). While unintended by the filmmakers at the time, films like *Invasion of the Body Snatchers* (1956) tapped into the anti-communist anxiety of Americans who were being told *any of your neighbors could be one of them* (Mirisch, 2008).

The *Golden Age of Disaster films* began in the 1970s. In a period of just 10 years over 50 disaster films were released (Keane, 2006) including the *Airport* franchise (1970-1979), *The Poseidon Adventure* (1972), *The Towering Inferno* (1974), *Earthquake* (1974), *The Hindenburg* (1975), *The China Syndrome* (1979), and *Beyond the Poseidon Adventure* (1979). This prolific series of films enabled critics like Nick Roddick (1980) to analyze them against the existing theorization of the genre. This era formalized the genre with common character archetypes, plot devices, and an expansion in the range of destructive hazards depicted. Roddick (1980) notes that the films were focused on hazards as either being “Acts of God” (i.e., natural hazards) or human

caused events, shying away from the monsters and biblical epics of the previous disaster film cycles. These films combined large casts of recognizable Hollywood stars with massive sets and budgets for physical effects including fires, destruction, and explosions. The cast billings included the most recognizable talent of the time, with actors like Charlton Heston, Steve McQueen, Paul Newman, and Ernest Borgnine, and actresses like Shelly Winters, Ava Gardner, Faye Dunaway, and Linda Blair. Increasing film budgets enabled blockbuster levels of popularity, which in turn led to more disaster films being made as filmmakers attempted to capitalize on the genre's success (Keane, 2006).

By the late 1970s and continuing into the 1980s, the trend started by *Airport* (1970) began to lose steam (Sanders, 2009). Filmmakers were confined by their attempts to make more spectacular movies while avoiding moving into science fiction (Keane, 2006). The genre began to move away from pure disasters, to more abstract cross-genre films. Keane (2006) notes that films like *Superman* (1978) included elements of earthquakes and helicopter crashes but added the superhero and action film elements to distinguish it from the fading trend.

The late 1990s saw a reinvigoration of disaster films with *Twelve Monkeys* (1995), *Outbreak* (1995), *Twister* (1996), *Independence Day* (1996), *Volcano* (1997), *Dante's Peak* (1997), *Titanic* (1997), *Armageddon* (1998), *Deep Impact* (1998), and an American reboot of *Godzilla* (1998). The disaster films of the 1990s were powered by another advancement in technology. With the development of computer-generated imagery (CGI), filmmakers were no longer limited in what special effects teams could physically create (Sanders, 2009). There were now no limits to the disasters that could befall the country. Instead of a model boat sinking in a pool on a film lot, a team of CGI artists could now recreate every jagged shard of metal and flickering lightbulb of the sinking *Titanic* (1997) (Keane, 2006). Tornadoes could be upgraded

from wind machines on set and campy dollhouses swirling on a cable, to a swarm of increasingly violent tornadoes complete with menacing strength and haunting animalistic roars (Keane, 2006). The 1990s cycle happened almost entirely in the late nineties, with disasters focused on natural hazards and science fiction events (Keane, 2006).

The most recent cycle of disaster films (2000 to 2020) echoes the global concerns for the future of the planet (Montano & Carr, 2022). Films such as *The Core* (2003), *The Day After Tomorrow* (2004), and *2012* (2009) depict disasters that break the bounds of a single city or state, to cause regional and global turmoil. Films like *Into the Storm* (2014) and *Geostorm* (2017) acknowledge the relationship between climate change and individual disasters. A secondary feature of this cycle is the dominance of dramatizations of real-world events such as *Only the Brave* (2017), *The 33* (2015), *Unstoppable* (2010), and *The Impossible* (2012).

The attacks of September 11th had a particularly notable impact on the current cycle. Multiple dramatizations of 9/11 were created in quick succession. Two films, *United 93* (2006) and the made-for-television film *Flight 93* (2006), both depicted the story of United Airlines Flight 93 that crashed in a field in Pennsylvania before reaching its intended target in Washington, D.C. A third film, *World Trade Center* (2006), told the story of first responders trapped in the rubble of the World Trade Center, surviving multiple days before they were rescued. In 2017, another film titled *9/11* was made about individuals trapped in an elevator during the attacks. Despite starring big names (i.e., Charlie Sheen, Gina Gershon, and Whoopi Goldberg), the film was considered a flop, making less than \$200,000 at the box office (Mendelson, 2017). In addition to these films with a larger audience, a number of made-for-TV films were also produced, such as *DC 9/11: Time of Crisis* (2003).

Similar imagery is seen in other movies of this time period. Filming and production for

War of the Worlds (2005) fell in the same shadow of the terrorist event, with filmmakers well aware that they were handling charged content. Director Steven Spielberg and Screenwriter David Koepp worked to handle delicate content with sensitivity, while also recognizing the realities of the time (Freer, 2005). “Once we decided to neither deliberately remove or deliberately add anything relating to 9/11 or Iraq, or the world we live in today, then it just was itself because we all live in the same world, same year, so it should look like that.” (Freer, 2005, p. 1). This is highlighted with dialog like Dakota Fanning asking, “Is this the terrorists?!” in response to the alien attacks. This same dialog happened for other films in this period, either between the teams of filmmakers, or amongst viewer and critic reviews (Flood & Frank, 2021; Morgenstern, 2021). The imagery that is typically called out includes buildings collapsing, people covered in dust walking through clouds of debris, walls for posting photos of the missing, even verbal references of people asking if this is more terrorism (*War of the Worlds* (2005), *Cloverfield* (2008)).

Other real life terrorist events (e.g., The Boston Marathon Bombing) have received the Hollywood treatment, but none have inspired a wave of films depicting the same event from different perspectives (e.g., filmmakers’ approach to World War II or the Vietnam War).

Current events are likely signaling the end of the post-9/11 era, and the start of something new. While movies such as *Contagion* (2011) covered the pandemic, a new wave of movies on the subject were quickly produced and released. Movies like *Songbird* (2020) and *Alone* (2020) leveraged the concern of the worsening pandemic, while some took a lighter view with heists (*Locked Down* (2021)) or the situational humor of living life during the pandemic (*Recovery* (2021)). A threshold has been crossed both with regards to how movies were made during the pandemic era (smaller crews, atypical recording styles, etc.), as well as the content that they

feature.

Genre, Genre Movies, and Conventions

The concept of genre is a key element when understanding the driving plot of a movie. Genre is commonly understood to be the way we “identify, classify, and differentiate” films (Moine, 2009), and a form of shorthand we use to communicate what someone will experience when watching the film. Viewers going to see what they were told is a “western” might expect the plot to be about cattle drives, overcoming the lawlessness of the wild west, or battles between gunslingers (Friedman et al., 2014). If they are going to see a “romantic comedy,” they will expect to watch a movie about two lovers brought together after a series of misunderstandings, unfortunate events, and moments of sincere affection between the couple (Friedman et al., 2014). Genre can also be shorthand for the visuals of a movie, such as the setting, props, and wardrobe. A western will often have cowboy hats, gun belts, and be set in the American West (Grant, 2007), while a science fiction movie will typically include technology far beyond what the world currently possesses (Friedman et al., 2014).

The disaster movie (or disaster film) genre is anchored by the depiction of a disaster as a central plot point. In contrast, films where disasters are sub-plots rather than the focus typically fall into larger more foundational genres like horror or comedy. For example, *Clueless* (1995) would not be considered a disaster film despite one of the movie’s fundamental scenes being written around the main character’s reaction to a landslide. Similarly, some films can take place in the wake of, or even in the middle of a disaster, but not actually be about the disaster itself. *Interstellar* (2014) is primarily about a space journey seeking to find a new planet for humans, while the cause of this need for a new planet, global warming and associated events, is largely in the background. The actual source of the hazard has ranged widely from traditional natural

hazards like earthquakes and tornados, to man-made hazards such as skyscraper fires and dam failures, interplanetary shifts, aliens, monsters, and the paranormal (Montano & Carr, 2022).

While filmmakers have consistently returned to the genre of disaster movies over the past century, formal study of the genre has received surprisingly little attention from film scholars. Susan Sontag alluded to disaster films in a narrative about science fiction, in her landmark piece *The Imagination of Disaster* (1961). Sontag describes the formulaic storyline of a monster/science fiction film-- monsters arrive, politicians scramble to respond, heroes ready themselves for battle (Sontag, 1965). This is a narrative that overlaps with disaster films. Film scholar Maurice Yakowar wrote *The Bug in the Rug: Notes on the Disaster Genre* (1977) for an edited volume of film genre manuscripts. This piece is often cited as the first analysis of disaster film genre conventions, offering a discussion of the tenets and tropes of the genre, as well as a categorization to further breakdown the body of films. His discussion features extensive references to disaster films from the sixties and early seventies, including Hitchcock's *The Birds* (1963) to *The Poseidon Adventure* (1972).

Yacowar begins by identifying eight Basic Types of disaster films (i.e., natural attack, ship of fools, the city fails, the monster, survival, war, the historical, and the comic) which he determines on a basis of narrative style and hazard source. Some categories are straightforward. For example, "The Comic" includes disaster films of a comedic nature, and "The Historical" includes films about historical events. Others are not so clear. The "Natural Attack" category includes any film where humans face "a destructive form of nature." This includes a near infinite range of films spanning from expected hazards such as hurricanes and floods, to animal attacks. This category also includes "atomic mutation" which is defined as a scenario where the shrinking or growing of either humans or animals leads to a disaster. Another category, "The Monster",

includes such a broad range of examples that some hazards listed now warrant their own genre entirely (e.g., zombies or aliens). The types are written in such a way that some are mutually exclusive, while others have significant overlap between multiple categories, suggesting it may be more accurate to say that these are descriptors, rather than categories (Yacowar, 1977).

Table 1- Yacowar's (1977) Disaster film Genre Conventions

YC1	Occurs in the present, unless it is based on a historical disaster (e.g., Mount Vesuvius, Titanic)
YC2	Absent of Iconography, icons are of the present-tense of the film, and represent the zeitgeist of the time
YC3	The entire cross section of society is represented
YC4	Dramatized by class conflict between characters of different castes
YC5	Gambling is depicted (e.g., a poker game is occurring before the disaster hits)
YC6	A family, typically the main characters, is beset by disaster
YC7	Isolation- main characters are forced together, but separated by disaster
YC8	Isolation is exacerbated by the various interpersonal conflicts between them
YC9	Disasters breed savagery/lawless anarchy, but do not destroy the core group of characters
YC10	The Specialist- the person who knows the information needed to save the group
YC11	Lacks Religious Figures, unless they are atypical crackpots
YC12	All systems fail in disaster (e.g., politicians, police, army, science, church,
YC13	Hero is usually a layman with practical sense but without specialized knowledge.
YC14	There is a romantic sub-plot between a pair of the main characters
YC15	Contemporary Significance- metaphors for current society or mirroring of culture
YC16	Poetic justice- main or secondary characters are punished for their wrongdoings in the recent or distant past

Note: Abbreviations in left column were not included in Yacowar's pieces but were created by the author to allow for shorthand referencing.

Yacowar also identifies fourteen conventions of disaster films which are meant to be

representative of the most used narrative tactics and tropes within the genre. Table 1 summarizes the conventions.

Yacowar's work references over 130 films, which span films made from 1898 to 1976 and which feature hazards ranging from plane crashes to aliens, and monsters to earthquakes. Notably, his definition of the disaster genre reaches into adjacent genres such as science fiction, monster films, thrillers, and even horror films. Given the prevalence of the disaster genre, one would expect a subsequent robust body of research. While authors such as Keane (2006) and Sanders (2009) discuss the evolution of film, no scholar to date has reviewed and revised Yacowar's work at the granular level (Yacowar, 1977).

Genres are a product of the relationship between audience and filmmaker, with the most profitable approaches surviving the natural selection process (Freidman et al., 2014; Selbo, 2014). Companies take what is commercially successful, shuffle components, add in new elements, to create a product that is both familiar and unique to the viewer (Freidman et al., 2014; Selbo, 2014). While the change from one film to the next may be slight, this process replicated over decades has led to substantial shifts. This shift is particularly visible within the disaster genre as filmmakers have reacted to changing technology and the real-life changing hazardscape.

Viewers who have seen recent disaster movies will look at this list and notice many conventions still ring true. Modern movies often feature a family (YC6) that is experiencing some interpersonal conflict like a divorce or grief (YC8), who are saved by an every-day hero like the mom or dad (YC13), often with glimmers of the conflicts being experienced in society at the time the film was released (YC16). At the same time some conventions have gone out of style. Movies such as *Airport* (1970) had lengthy casts, with characters reflecting a wide range of

professions, classes, and backstories (YC3). Most disaster movies over the last couple decades, however, have opted for smaller casts, led by a handful of household names. For example, the cast for *The Day After Tomorrow* (2004) included Dennis Quaid, Jake Gyllenhaal, Emmy Rossum, Sela Ward, and Ian Holm, but few other names were recognizable to the average viewer. An exception to this trend is the recent release of *Don't Look Up* (2021), which features a long list of thespians, comedians, pop musicians, and other well-known faces (VanHoose, 2022).

The Modern Conventions of Disaster films

As society evolves, so do the movies being produced. Filmmakers adjust their work to meet the expectations of audiences (Selbo, 2014). In the context of disaster films this begins at the root of their major plot point- the disaster. The expectations of viewers have changed from disasters in single buildings (*The Towering Inferno* (1974), *Die Hard* (1988)) or a single plane (*Airport* franchise (1970-1979), *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb* (1964)), to massive CGI disasters like tornadoes (*Twister* (1996)) and the sinking of the Titanic (*Titanic* (1997)), to the present expectation of global destruction (*2012* (2009), *The Core* (2003), *Contagion* (2011), *Geostorm* (2017)).

The context surrounding the development of disaster films also changes. For example, filmmakers react to changing attitudes towards particular institutions (e.g., federal government, big business, political parties, international governments). The portrayal of characters from different demographic backgrounds (e.g., race, gender, socioeconomic status) also evolve along the lines of shifting national conversations.

Despite the evolving expectation of viewers, filmmakers keep the films rooted in the historical tradition of the genre. That being said, comparing the disaster movies Yacowar studied

to the modern equivalent would be like comparing a Ford Model-T to a Tesla-- both have their place in history, but only one meets modern expectations. This paradigm shift is not only present in what is missing from the old movies, but also what new conventions have been added.

A major convention that Yacowar did not highlight was greed, specifically capitalism and private industry being the cause of a disaster. This narrative is depicted in early movies (e.g., businesses cutting corners to save construction costs in *Towering Inferno* (1974), the businessman demanding the ship go faster in *The Poseidon Adventure* (1972)), but focus is often on the conflict between characters rather than highlighting the issues of the larger system. Newer films like *Deepwater Horizon* (2016) and *Unstoppable* (2010) show that big businesses prioritize self-preservation even if that leads to large scale pain and loss. Few pieces of symbolism are as striking as the final moments of *Contagion* (2011), when a bulldozer (personifying big business) disturbs a bat's nesting tree, setting off a domino effect that leads to the lethal global pandemic.

Another break from Yacowar's conventions was the use of iconography (YC2), visual cues that signify the type of movie being viewed. The iconography of a western includes cowboy hats, horses, and landscapes from the American Southwest, while a science fiction movie may have space ships and technologies that are more advanced than what society currently has (Friedman et al., 2014). A small number of movies included iconography not of the present. These were typically films that featured an alternate universe with new technology (e.g., futuristic weapons, hovering transportation), or iconography that was attached to a particular monster's universe (e.g., Godzilla and associated monsters). A common feature in disaster films is the iconography of place. Filmmakers feature famous landmarks being destroyed to show the scale of the disaster and help the audience connect the fictional damage with familiar, real-life places. The Statue of Liberty is hit by a tsunami (*The Day After Tomorrow* (2004)), the Randy's

Donuts sign rolls through Los Angeles after an earthquake (*2012* (2009)), and electrical storms send lightning obliterating The Colosseum of Rome (*The Core* (2003)).

Another factor that was discussed but not clearly articulated was the meaning of a character's death in a movie. Yacowar was conflicted saying that "a person's due" is connected to "his or her doom", while later on saying that "often the good die with the evil" (Yacowar, 2012, p. 328). Expanding on this, the deaths of characters often fall into one of three categories: the good, the bad, and the plot devices. The first group, the good, is made up of heroic deaths of individuals sacrificing themselves for the greater good of the group. The second, the bad, largely follows Yacowar's claim that the sinners are more likely to die than the saints. The last group which Yacowar did not address is the mass deaths of characters used to show the scale of a disaster. This can partly be explained by logistics and expenses. In older movies more bodies meant more actors, more money, more costumes, etc. With advances in technology, these scenes of mass death can be scaled more easily. In *2012* (2009) the main characters fly through what can only be described as a cloud of debris, with hundreds of people falling through the pulverized remains of Los Angeles. Scenes like this were simply impossible prior to the advent of CGI.

Other changes in trends include the frequency of divorced or estranged families that lay the groundwork for forgiveness and resolution at the end of the film. Relatedly, crying children and lost family pets (typically dogs) are often used to turn a viewer's empathy for a helpless character into tension and anxiety, leading to greater investment in the film (Flavorwire, 2012).

Defining "Disaster movies"

As noted, the term "disaster movie" has changed over time, from biblical epics, to natural hazards, to monsters, to cross-genre films that include elements of action, adventure, and

traditional disaster movies. Setting a firm definition is difficult as the broader idea of genre is an ever-changing amorphous concept (Friedman et al., 2014; Grant, 2007). The conceptualization of a particular genre is a product of the relationship between moviegoers watching films that they are interested in, and filmmakers catering to the interests of moviegoers based on the financial success of films (Friedman et al., 2014; Grant, 2007). The lack of consensus on a definition of disaster movie poses a challenge in operationalizing “disaster movies” and their supporting tropes and structure.

Quarantelli, one of the earliest to study disaster movies through the lens of disaster research, noted that existing research on disasters in pop culture (inclusive of movies) was “unsystematic and unsophisticated” (1985). Researchers have bypassed the need for a definition by either hand picking a sample of movies based on their definition (e.g., Belmont, 2007), or studying a limited number of films at a time (e.g., Dixon, 1999; 2003; Perkowitz, 2007).

One of the greatest challenges faced in establishing a definition is the ability to operationalize and quantify the opinions of the viewers that lead to a genre’s definition. Montano and Carr (2022) observed that the only source of this sort of data that was also free for the public to access was the IMDB (<http://www.imdb.com>). This site allows the researchers to pull a list of movies based on the “flags” or categories that users had assigned to a movie. “Disaster movies” and “disaster films” yielded a refined list with a small number of outliers. The sample was further refined by the following criteria:

- 1. The film was made for a US-based audience. Foreign films were not included because perceptions of disasters may be unique from culture to culture. Like Quarantelli (1985) this study focuses on “the American scene”.*
- 2. The film had a theatrical release or was a made-for-TV movie. Researchers have*

recommended that future studies should include TV movies (Haney, Havice, and Mitchell, 2019).

3. *The film is either fictional or dramatized if based on a true story (i.e., documentaries are excluded).*
4. *Films in which the disaster, or more accurately the hazard event, is the central problem of the film regardless of the type of hazard depicted. This largely aligns with Quarantelli's (1985) requirement of films that depict "substantial scenes or footage of disaster happenings" (p. 33). Using IMDb's built-in search feature, a list of all films tagged with the keywords "disaster film" (Montano and Carr, 2022, p. 9)*

While admittedly flawed, this is the most rigorous sampling strategy used to date. For the purposes of this study, a **disaster movie** is a film 1) where the plot is primarily driven by the events surrounding a possible, imminent, or active disaster and, 2) where the disaster is recognized by viewers as being a "disaster" (as identified by the IMDB flagging system).

Lastly, unless otherwise noted this study focused on disaster movies that have been made with a US-based audience in mind. In recent years disaster movies have become more popular internationally, and these have slowly made their way to US audiences thanks to the availability of online streaming services. However, these international movies are typically designed for their home audience, with significant differences in the cultural references and tropes used in the film. This study will focus on films that were made with a US audience in mind.

Summary

This chapter has discussed the interconnected nature of films, filmmakers, and viewers, and how the relationships between these three elements are responsible for creating the template for the disaster movies within each cycle of films. This chapter also discussed how this template

has changed and repeated over the years, explaining the evolution of the genre into the modern disaster movies we see today. Finally, this chapter identified a working definition of a “disaster movie” to be used within this study. The next chapter will discuss how individuals are influenced by the media they interact with and examine how the disaster movies discussed in chapter two influence viewers’ understanding of disasters and climate science.

Chapter 3: Influence of Media on the Public's Understanding of Science

This chapter will discuss the way individuals observe and retain information from media sources, with an emphasis on science-related media. This chapter will begin by discussing how individuals learn, followed by how learning differs by various sources, and finally will discuss the limited research available on the topic of learning from disaster and climate movies.

One of the greatest challenges facing emergency management is the ability to communicate critical situational and scientific knowledge succinctly and effectively to the public (FEMA, n.d.). Emergency management scholars have noted that this challenge is exacerbated by the low likelihood that the average person has experienced a disaster first-hand (Haney et al., 2019). However, there is evidence that this likelihood is changing. An analysis conducted by the *Washington Post* noted that roughly a third of the U.S. population lived in a county that experienced a presidentially declared disaster event in the summer of 2021 alone (Kaplan & Tran, 2021). In addition, people across the United States gained first-hand hazard event experience during the COVID-19 pandemic. At the same time, this experience is limited to one or two disasters, giving individuals a comparatively limited perspective of disasters faced nationwide.

Disasters and the responses to them are complex. At a basic level, there is the complicated socio-political process of the country responding to and recovering from an event. Equally complicated is the understanding of the hazard, ranging from geological, to meteorological, to highly complicated incidents related to industrial engineering and cyber security. The public rarely has an opportunity to learn even the basic concepts of emergency management. At most, students may learn about hazards in the basic earth science curriculum in high school, or possibly in college earth science courses. When the public is faced with these

complicated scenarios, they seek out the best sources of information they have available. As Kirby (2008) notes, “the public makes sense of science. . . in the context of their everyday lives, pre-existing knowledge, experience, and belief structures” (p. 41). The average person does not have knowledge of or access to academic research journals, or even expert advice. Instead, it is far more likely that individuals seek out television, films, magazines (Lowe et al., 2006; Perkwitz, 2007) and social media (Funk et al., 2020) or, more generally, the internet (National Science Board, 2018).

While substantial study has been given to the way this range of non-fiction mass media has influenced individuals, emergency management researchers have largely ignored the influence of popular culture (Webb et al., 2000; Webb, 2007). Despite the lack of empirical evidence for the extent to which popular culture influences behavior related to disasters, emergency management researchers have consistently noted that some influence does occur. As Couch (2000) summarizes:

Arguably popular culture greatly influences our norms, beliefs, and subsequent actions about everything, including disasters. It helps us frame disasters, give them meaning, and makes them understandable, intelligible, and perhaps controllable. It gives us the cultural tools and collective visions through which meaning is constructed and blame assigned. It tells us how we are supposed to act under duress and how we supposedly do. (p. 25)

More specifically, popular culture can be a conduit for sharing critical information about disasters or filling in gaps left in existing sets of knowledge (Webb et al., 2000). Popular culture has influenced the geography of settlement locations, the way land is used, and the advancement of technology (Webb et al., 2000). For example, the Kom people of Cameroon told a story of a lake that would explode and kill all those close to shore, and that the Kom people should move

higher in the mountains to avoid this fate (Witze & Kanipe, 2014). This narrative was a mythicized version of the science of a real hazard, used to protect the Kom people. The lake from the story, Lake Nyos, routinely “exploded” with deadly carbon dioxide created by volcanic and seismic activity (Witze & Kanipe, 2014). While the source of the hazard was fictionalized, the story’s memorable narrative likely saved thousands of lives in the centuries since it was created.

In a modern context, people often internalize lessons and perceptions from movies and television, especially when the viewer considers the characters to be knowledgeable or actions to be credible (Barnett et al., 2006; Kirby, 2011). This could be somewhat trivial, such as learning how to spell the word beautiful (*Bruce Almighty* (2003)), or the importance of not getting your hair wet after a perm (*Legally Blonde* (2001)). It could be something as important as American history. The musical *Hamilton* (available on demand through Disney’s streaming platform) teaches viewers factual information about the American Revolutionary War, while dramatizing certain elements for the sake of entertainment (Harbert, 2018). It could be something as applied as the use of cardiopulmonary resuscitation (CPR). The television show, *The Office*, has been cited with saving multiple lives because of a scene where the business’ staff are trained in CPR (Holohan, 2021; Kreps, 2019). The episode features a CPR instructor teaching the class to provide compressions to the beat of the popular disco song *Staying Alive* by the Bee Gees. The scene itself is a farce, with some characters singing the song while others dance, while Dwight (the office odd ball) takes it upon himself to harvest the CPR mannequin’s organs, ending with him impersonating the serial killer Hannibal Lector from the movie *Silence of the Lambs* (1991). As strange as this scene is, it has been cited multiple times for being the memory lay responders recall when administering CPR (Kreps, 2019, Holohan, 2021).

Works of fiction can also spread inaccurate or outright false claims and information. When the television show *This Is Us* killed off a main character in a house fire started by a faulty Crock Pot brand slow cooker, viewers' perceptions of the appliance's safety were changed (Foss, 2020; Hornsby & Groover, 2020). Fans began throwing out their branded Crock Pot appliances, and Crock Pot's parent company's stock dropped twenty four percent in two days (Foss, 2020). It took a concerted effort between the show's network, NBC, and Crock Pot to recover the brand, including promotional videos on NBC's YouTube Page (NBC, 2018), the branded hashtag *#CrockPotIsInnocent*, and the creation of a Twitter account, all coordinated by a crisis communications consulting firm (Edelman, n.d.).

The repercussions of throwing out a perfectly good appliance are minimal compared to the potential for harm in trusting lessons from fictional disaster films, given that plots are centered around a series of life-or-death decisions made by the main characters. Disaster films often show people how to recognize hazards, the appropriate responses, and what responses to anticipate from their community and responding government agencies. For example, during the waterborne evacuation of Manhattan during the 9-11 attacks, some boat crews were calling out to evacuate "women and children first" (Kendra & Wachtendorf, 2016). When asked why this was the case, no crew members had a good answer. When pressed, one admitted "I think we've seen too many movies" (Kendra & Wachtendorf, 2016, p. 120). Kendra & Wachtendorf (2016) noted this response was likely caused by the various films and books about the sinking of the RMS Titanic, especially given the recency of the 1997 blockbuster, *Titanic*. The film shows similar scenes with lay rescuers calling out "women and children first." It is difficult to study, but certainly possible, that disaster movies have had a similar trickle-down effect into the choices and actions of emergency managers and first responders.

Depiction of Disaster movies and the Frequency of Disaster Myths

Disaster researchers have long noted the prevalence of The Disaster Myths, inaccurate but commonly believed perceptions related to human behavior in disasters. The most common of these myths include looting, anti-social behavior, civil unrest, and powerless survivors who wait helplessly for assistance (see Table 2 below for myths featured in disaster movies).

Table 2- Frequently Cited Human Behavior Myths in Disasters

Human Behavior Myth and Description	Citation
Looting- Individuals stealing merchandise from retail stores and other locations	Couch, 2000; McEntire, 2008; Tierney, Bevc, and Kiligowski, 2006; Quarantelli, 1985
Helplessness of Survivors- Survivors do not participate in the response and instead wait on assistance from government agencies	Jones, 1993; Kendra, Siebeneck, and Andrew, 2018; Mitchell, Thomas, Hill, and Cutter, 2000; Tierney, Bevc, and Kiligowski, 2006
Widespread Antisocial Behavior- There is an increase in hurtful or aggressive behavior in a community that has experienced a disaster	McEntire, 2008; Tierney, Bevc, and Kiligowski, 2006; Quarantelli, 1985
Civil Unrest- Communities experience social unrest until formal structures like law enforcement are back in place	Couch, 2000; Tierney, Bevc, and Kiligowski, 2006
Panic- Survivors are overtaken with sense of uncontrollable fear or anxiety, and make choices they would not typically make	McEntire, 2008; Quarantelli, 1985
Role Abandonment- First responders do not show up for work due to fear or anxiety over responding to a large-scale event	McEntire, 2008; Trainor & Barsky, 2011
Price Gouging- Businesses increase their prices to capitalize on increased demand	Quarantelli, 1985
Martial Law- Martial law is declared to ensure safety of survivors and responders	Quarantelli, 1985

Disaster movies have frequently been cited as not only featuring but perpetuating The Disaster

Myths (Couch, 2000; Haney et al., 2019; Jones, 1993; Kendra et al., 2018; McEntire, 2008;

Tierney et al., 2006; Quarantelli, 1985). Quarantelli's 1985 article started this discussion with a review of thirty-six films, primarily from the 1970s, referred to by most disaster film enthusiasts as the *Golden Age of Disaster Movies* (Keane, 2006). This era was characterized by leveraging advanced special effects technologies to create bigger and bolder spectacles. The more extraordinary the spectacles became, the further divided the films were from what was known about disasters at the time. Movies like *Towering Inferno* (1974) were prime examples, showing panicking masses, antisocial behavior, and other behavior known to be atypical in disasters. This observation of inaccuracy is not limited to emergency management and disaster research. Similar observations have been made by academics across scientific fields as they reflect on how Hollywood films represent their disciplines (Kirby, 2008; Szu et al., 2017). Since Quarantelli's article, emergency management researchers have continued the assertion that myths are prominent in Hollywood films (Haney et al., 2019; McEntire, 2008; Tierney et al., 2006), but there is a dearth of empirical research to support this claim.

For the better part of the last century, a thorough review of disaster films posed significant logistical challenges. Prior to the availability of on-demand streaming services, researchers had to go to theaters to view disaster films, which meant they were limited by what films were showing at the time. Rental movies became available in the 1980s and 1990s, allowing for a greater but still limited selection. A second limiting factor for conducting a systematic review was the lack of a reputable database or list of disaster films. Disaster movies are a niche genre, often falling under the larger genres of action/adventure, science fiction, and occasionally monster movies. Without a unified genre, a classification system could not be created.

To address this issue Montano and Carr (2022) used the website IMDB.com which

allowed movies to be organized by factors such as year, user rating, and categorical keywords such as “disaster films” and “disaster movies”. Prior to this 2021 article, researchers had subjectively selected movies they deemed “disaster movies”. For example, Quarantelli’s 1985 article selected 36 movies ranging in years from 1938 to 1980, while Haney et al. (2019) selected twelve. In contrast, Montano and Carr’s sample included 173 movies from a twenty-year period, reflecting Keane’s observation of 20 cycles (see previous chapter) (2006). If the twenty-year restriction was removed, this sample would be closer to 400 films (depending on other selection factors), ten-fold greater than Quarantelli’s study, and thirty times greater than Haney et al. (2019).

When the most popular 50 disaster movies of the last twenty-year cycle (2000-2020) were reviewed, disaster myths were observed far less than expected (Montano & Carr, 2023). Antisocial behavior, one of the most cited myths observed in films, was only observed in 7 (14%) of the 50 movies. To the contrary, pro-social behaviors in response were observed in 25 (50%) of films. Looting was observed with greater frequency appearing in 12 (24%) of the 50 movies. However, when this was redefined as “looting for greed” (e.g., theft of televisions, high end products, etc.) and separated from “looting for survival” (e.g., gathering food, supplies, and other essentials), this number was cut in half, with only 6 (12%) of films showing looting for greed. One in ten movies is still noteworthy, but not as prevalent as suggested in the literature. Other myths were likewise infrequent (see Table 3).

Although this represents the findings of only a single study, it is to date the only study that has approached assessing the frequency of disaster myths portrayed in disaster films systematically. Importantly, these numbers only reflect the most popular fifty movies of the twenty-year cycle (with popularity measured by viewer responses on IMDB).

Table 3- Myths appearing in Disaster Movies

Myths appearing in Disaster Movies (Montano and Carr, 2023)	%	N=
Widespread Antisocial Behavior	14	7
Looting for greed	12	6
Panic	12	6
Price gouging	4	2
Declaration of martial law	2	1
Role abandonment of first responders caused by fear	2	1
Survivors are helpless and waiting on assistance	2	1

Although golden age classics such as *Towering Inferno* (1974) and *Airport* (1970) were more egregious with their erroneous portrayals of human behavior in disasters, popular, modern disaster films do seem to be hitting closer to reality on this point. The film *Only the Brave* (2017), which depicted the Yarnell Hill Fire and the story of the Granite Mountain Hotshots, is widely regarded as a relatively accurate depiction of the experience of wildland firefighters, as well as the specifics of the Yarnell Hill Fire itself (Gabbert, 2017; Whittington, 2021). While the characters and plot were adjusted in the creative process, the fire behavior, culture of wildland firefighting, visual representations, and emotional and psychological burdens of the responders resonated with wildland firefighters as an accurate representation of their experiences.

Influence of Films on Viewers' Perceptions and Learning

The most frequent assertion of disaster researchers is that the *presence* of disaster myths is correlated with audiences *being influenced* by those disaster myths (Haney et al., 2019; Mitchell et al., 2000; Quarantelli, 1985). However, there is a lack of empirical evidence to support this claim. Researchers tend to cite anecdotes experienced in the field as evidence but the science of what goes into the *influence* of films proves more complicated. The following section

focuses on how we learn through observation, how learning works within films and television, and research that informed the current study.

How Individuals Learn

This section primarily focuses on the learning theories of Albert Bandura, the Canadian American psychologist and the originator of Social Learning Theory and Social Cognitive Theory (Bandura, 1971). These theories, discussed later, provide a unique view of learning with regard to how individuals learn through observation. Bandura's (1971) theories fit well as foundational theory as this study focuses on learning through the observation of film. Also considered for this section were Constructivism and Behaviorism theory. Constructivism theory is based on the assumption that individuals learn through interactions and experiments throughout their life (Boekaerts et al., 1999; Fincher et al., 2000; Kay & Kibble, 2016). As movies are primarily observational, and the opportunities to interact are minimal, the theory does not translate well to this environment. Behaviorism theory was also considered, which focuses on a stimulus and response model, much simpler than Bandura's theories, or Constructivism (Boekaerts et al., 1999; Kay & Kibble, 2016; Wood & Bandura, 1989). Behaviorism is limited as, again, it requires an opportunity for interaction between the subject (viewer) and the stimulus (the film), making the observation-only learning a difficult fit.

Humans have the capability to learn in different ways. Bandura's (1971) *Social Learning Theory* and later his *Social Cognitive Theory* (1986) note that individuals can learn by direct experience or vicariously through observing the experiences of others. If individuals are learning through direct experience, their learning process involves trial and error, followed by reinforcement through rewards and punishment, either physical or notional. Individuals also learn behaviors by watching those around them, such as parents or peers (Bandura, 1971;

Bandura, 1986). People observe the world around them, combining their prior experiences with new observations to make hypotheses about which actions will result in reward, which will result in no changes, and which will lead to punishment or negative outcomes.

As part of their learning, people work to build symbolic representations that can serve them beyond their specific situation (Bandura, 1971). For example, while a child may learn to eat with a spoon, the symbolic representation of a utensil means they can easily transition to forks, different shaped spoons, or other options that still fit the child's understanding of using an eating utensil. The process of creating these symbolic meanings involves four steps:

- Attentional Process- the behavior is recognized by the learner
- Retention Process- the learner remembers the imagery and the verbal content
- Motoric Reproduction Process- the learner performs the behavior
- Reinforcement- the learner is incentivized through reward or punishment

(Bandura, 1971).

This cycle repeats over and over, as new behaviors are learned, applied, and incentivized. As the individual grows, they also start to diversify what they have learned and within which environments they apply that information. Cognitive psychologists note that applying, or transferring, knowledge is most successful when the type of knowledge being applied and the environment or context it is being applied to are both similar to the conditions within which the information was learned (Barnett & Ceci, 2002). For example, if a child learned how to divide a circle into four equal pieces, it will be easier for that child to divide a circular pie equally than it would be for them to divide a rectangular babka, a shape that does not resemble a perfect circle. When the contexts and knowledge being applied are similar, such as the circle and the pie, it is known as a *near transfer* (Barnett & Ceci, 2002). When the contexts and knowledge being

applied are dissimilar, such as the circle and the babka, it is known as a *far transfer* (Barnett & Ceci, 2002). Individuals are far more likely to be able to recall and apply information in a near transfer, as opposed to far. This is particularly important in the realm of observing films and television.

Learning through Science Media

It is important to review how viewers learn from fact-based information such as science media and news, to establish how learning varies when processing fictional information. As of 2017, over half of Americans have reported that the news media was their primary source of science information (Funk et al., 2020). Maier et al. (2014) articulates the relationship between science communication and viewer's learning of that information, showing a process that moves from science being represented by journalists, to viewers selecting and processing that depiction, to the individual learning and creating a representation of this knowledge (See Figure 1). This relationship has the potential to affect the cognitive information processing, beliefs, affective reactions, attitudes toward science, interest in science, and the behaviors of the viewer (Maier et al., 2014), however this section will focus on the cognitive behavioral processing as it is the focus of this study.

Individuals seek out information to fill voids in their current set of knowledge (Blumler & Katz, 1974; Maier et al., 2014; Rayburn & Palmgreen, 1984). Individuals pursue specific information that is useful to their purposes (Atkin, 1973) and continue to seek out information until they feel they have enough knowledge to meet their needs (Griffin et al., 1999). This process has been found to be true at a broad level, as well as specifically in relation to "climate change communication, . . . communication of industrial hazards, . . . and health communications" (Maier et al., 2014, p. 91).

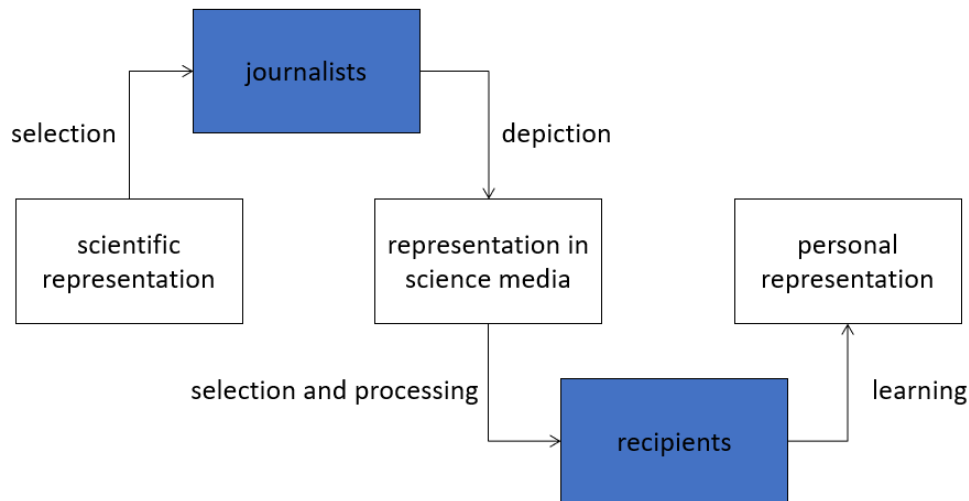


Figure 1- Maier et al., page 87. A descriptive model of media-based science communication.

The information that we select and process has to do with our capacity for learning and the capacity required for learning specific information. Lang (2000) refers to this relationship as the *limited capacity model of mediated message processing*. In this process, we must have the cognitive capacity to understand material (RA- resources available), and the information we are attempting to learn must be at a level of simplicity that we can understand (RR- resources required). If the information is too complex for us to understand, it is likely that we lose interest and motivation to learn, leading to less information being processed and retained (Anderson et al., 1981; Maier et al., 2014; Valkenburg & Vroone, 2004).

This theory highlights the importance of scientists who specialize in science communication, as scientists who are unable to simplify theories will not be able to create content that is accessible to the average viewer. Disaster films also have the capacity for science communication, as the film's characters provide exposition (the background and information necessary for the film's narrative) to explain science within the film.

Learning from Films and Television

Bandura's theory provides a foundational understanding of the learning process (Bandura, 1971). Some fields such as Criminal Justice have applied and reshaped social learning theory to fit the needs of their practice (Pratt et al., 2010). Communications scholars noted that the theories are foundational, but more refined theories are better suited for studying the influence of film and television on viewers (Tukachinsky & Tokunaga, 2013).

One foundational concept of learning from films and television is *involvement*, when a viewer connects with characters and narratives within a film (Moyer-Gusé, 2008; Slater & Rouner, 2002; Tukachinsky & Tokunaga, 2013). High level of involvement could be caused by a stimulating storyline, the engaging performances by the actors, or by the ability of filmmakers to cut everything together into a finessed final product. Involvement can also be determined by the medium; movies viewed in a theater are typically more engaging than those viewed at home, and films viewed at home are likely more engaging than reading the book version of the film (Saloman, 1984).

Tukachinsky and Tokunaga (2013) outlined the range of ways this involvement may occur. At a basic level, a viewer can see themselves in a character they are watching, either because of individual traits or the personality as a whole, known as *homophily* (Tukachinsky & Tokunaga, 2013). This is the individual viewer comparing their perceived self to the character on screen and identifying with that character. Homophily with characters may lead to the viewer changing behaviors based on the comparison, or "increase perceptions of vulnerability to a threat presented in the message" (Tukachinsky & Tokunaga, 2013, p. 289).

The second type of involvement discussed by Tukachinsky and Tokunaga (2013) is *Parasocial Relationships (PSR)*. As the term indicates, this form of involvement is similar to that

of a friendship. “In parasocial interactions, viewers experience friendliness and companionship with television characters” (Tukachinsky & Tokunaga, 2013, pg. 289). One of the best examples of this relationship is Fred Rogers, who hosted the television show *Mr. Rogers Neighborhood*, an influential feature of American culture for over 30 years. His show spoke directly to viewers, with the message “I like you just the way you are” and inviting everyone to be his “neighbor” in his “neighborhood.” Viewers would frequently come up to him on the street to talk about the influence he had on their lives, even turning to him for comfort in difficult moments such as 9/11 (Serriere, 2019).

The third type of involvement is *empathetic identification*, where the viewer “simulates possible alternate selves and imagines being in the position of the [character]” (Tukachinsky & Tokunaga, 2013, pg. 290). Individuals may see events on screen that mimic their own life events (e.g., losing a loved one, being hurt by a friend, becoming a parent) and identify with the fictional story line. In contrast to homophily, this form of involvement is focused on events and experiences rather than the characteristics of the character.

The final type of involvement is *transportation*, where the media is so compelling that the viewer suspends their disbelief that the film is showing an alternate reality (Tukachinsky & Tokunaga, 2013). Film scholars refer to this phenomenon as *escapism*, where the individual views a film with the intention of being separated from their everyday lives (Keane, 2006; Selbo, 2014; Yacowar, 2012). Franchises like *Star Wars* or *Jurassic Park* have made empires by immersing viewers into a world which can only be experienced through film, and making films that are compelling to the point that viewers are temporarily absorbed into the film.

These forms of involvement are shown to increase changes in behaviors and attitudes, as well as knowledge acquisition to a lesser degree (Tukachinsky & Tokunaga, 2013). Connecting

this to the transfer research mentioned earlier, involvement allows for a greater degree of similarity to be observed, leading to a greater likelihood of a near transfer.

Tukachinsky and Tokunaga (2013) specifically mentioned that while these forms of involvement had significant effect on knowledge acquisition and changes in behavior and attitudes, results were homogenous across types of effects, indicating the presence of other variables moderating this effect. A factor that may address this gap is the importance of processing the viewing experience with other people. Watts and Bonus (2021) studied how mother and child (age 4-5) pairs learned from children's educational television programming. The children on their own did not learn a significant amount of information, even though the programming was specifically designed for their age group. Rather, the children learned from the parents, who took the information from the television show and discussed it with their child. Bonus (2019) notes that children's television often anthropomorphizes science concepts to the point that it skews away from a near transfer to a far transfer. Parents' moderation and discussion during viewing helps with the processing, helps children understand what they are seeing, and may translate a far transfer to a near transfer.

While mostly anecdotal, another area of discussion is the capability of science-related movies to confuse viewers as they blend fact with fiction. In order to suspend disbelief and meet the viewers' expectations of escapism, filmmakers often must present fictional science in order to make their movie believable, or at least believable enough for viewers to not question the plot and lose engagement (Barnett et al., 2006). Films often begin with a foundation of basic science which should be familiar to the viewer, while also filling in gaps in viewers' knowledge with fictional information specific to the film. For example, *Jurassic Park* (1993) begins with a common understanding of paleontology, introducing a dig site and paleontologists. As the movie

continues, the scientific concepts become specifically focused on the science of embryos, and further focused on the highly complicated realm of genetics. The average viewer is likely familiar with fossils, eggs, and embryos, but are not experts. Filmmakers are able to use the novice understanding of those subjects to veer into the fictional, plot-specific science. Filmmakers regularly intermix fact and fiction in service to the plot, often preventing viewers from discerning between fact and fiction (Barnett et al., 2006; Kirby, 2008).

At a broader level, movies also create an unrealistic view of not just the scientific theories and facts within a film, but of science as a three-dimensional system and culture (Kirby, 2003; Kirby, 2011). Filmmakers face the challenge of balancing the use of stereotypes to expedite the storytelling process, with representing the authenticity of the field. Kirby (2003) notes that the diversification of scientists in films has happened slowly over the last century. For many years, scientists were portrayed as madmen, like Dr. Frankenstein or Dr. Strangelove, burdened with vision and knowledge but flawed and unpredictable. In the 1990s, their portrayal evolved to more stable scientists such as Pierce Brosnan's character in *Dante's Peak* (1997) or Helen Hunt's character in *Twister* (1996). While the role of scientist began to diversify with regards to gender in the 1990s, the role was still filled predominantly by white actors (Kirby, 2003).

This study is focused on the degree to which individuals learn and retain information from films that by nature are not meant to be educational. The information this study explored had so far largely been discarded as a byproduct of the entertainment process (Barnett et al., 2006). Mass media and communications scholars have mostly focused on the degree to which media can influence behavior (Alcañiz et al., 2006; Barker & Lawrence, 2006; Greitemeyer, 2011; Skumanich & Kintsfather, 1998). Even when the influence of media on knowledge is studied, research focuses on sources of media sharing factual content such as news media or

educational programming (see for example: Fisch, 2004; Howe, 1983; Maier et al., 2014). The next section of this chapter addresses the few articles that shed light on how disaster and climate movies lead to changes in attitudes, cognition, and knowledge.

Current Research on Learning from Disaster and Climate Movies

As mentioned earlier, disaster movies have largely been discussed in two contexts—the review of film scholars communicating the basic tenets of the genre (Keane, 2006; Selbo, 2014), or disaster researchers hypothesizing the potential negative outcomes caused by unrealistic or inaccurate representations of disasters (Couch, 2000; Haney et al., 2019; Jones, 1993; Kendra et al., 2018; McEntire, 2008; Tierney et al., 2006; Quarantelli, 1985). When seeking out similar articles to the current study, only two articles were found that focused on disasters or natural hazards, both limited to geologic sciences.

The first article focused on how middle school students' understanding of earth science was affected after watching *The Core* (2003) (Barnett et al., 2006). The film depicts a team of scientists and astronauts drilling to the center of the earth to restart the rotation of the earth's core. Riding in a laser-powered drilling machine, they speed through layers of ocean, rock, magma, and caverns made of minerals. Students had completed 4 weeks of class covering earth science (e.g., geology, tectonic plates, physical makeup of the planet) as well as 4 weeks of class covering the solar system. Students were given a pre-test 4 weeks prior to the showing of the film to establish a baseline of understanding. After a single viewing of the two-hour fifteen-minute movie, students had difficulty discerning fiction from the factual content they learned in the previous eight weeks. It was noted that the credibility of the characters in the movie influenced students' belief in the fictional science of the film.

The second study was a master's thesis by Melissa Seipel (2017) looking at the effect that

the movie *San Andreas* (2015) had on viewers. This film depicts a major earthquake along the San Andreas fault in California. The story follows the adventures of numerous characters as they navigate a heavily damaged landscape to get to safety or rescue loved ones. The film also explicitly features both correct (i.e., duck, cover, and hold on) and incorrect (i.e., triangle of life) protective actions. Students, all residents of Utah, completed a pre-test one week prior, covering topics including earthquake science, protective actions, their perceived degree of earthquake risk, and first-hand experience with disasters. Participants viewed the film and completed a post-test immediately after the viewing. One important finding was that participants with less training and knowledge related to earthquakes were more likely to believe the characters portraying experts in the film. This included believing the protective actions portrayed in the film were accurate.

A second variable, perception of realism, measured the degree to which viewers saw the film as realistic. This measure appears to be a proxy for knowledge and experience—those who have less knowledge and experience are more likely to perceive a fictional environment as more realistic. Similar to Barnett et al. (2006), it appears that the more realistic a film is perceived to be, the more effect it has on knowledge acquisition. Another similarity was the influence that fictional experts had on the viewer, as the protective actions in the film were demonstrated by firefighters, seismologists, and other individuals that are shown to have relevant training on a given action.

Beyond these two studies, most other research is focused on two single films: the fictional movie *The Day After Tomorrow* (2004) and the Al Gore documentary *An Inconvenient Truth* (2004). The studies for both focused on the effect that the film had on viewers with regard to their attitudes about climate change, and their curiosity to learn more following the movie.

The Day After Tomorrow (2004) is one of the most popular disaster films of the last

twenty years. Leiserowitz (2004) conducted a nationwide survey three weeks after the film's release and found roughly ten percent of the country had seen the film. Lowe et al. (2006) found similar results to the previously mentioned disaster movie studies in that viewers had difficulty separating fact from fiction when it came to the science of climate change. Specifically, the film contributed to confusion over the "boundaries of future climate realities" (p. 452). The movie did increase awareness of climate change, but simultaneously decreased self-efficacy. In contrast, Leiserowitz (2004) found that the movie both increased awareness and the likelihood of viewers taking action. This may be reflective of the survey instrument, as questions may have primed the respondent. For example, the questions involving behavioral intentions of future action started with the phrase, "How likely are you to do the following because of your concerns about climate change?" (Leiserowitz, 2004, pg. 30), possibly leading to an increased measure caused by respondents providing socially desirable responses.

A second major film discussed in the literature, Al Gore's *An Inconvenient Truth*, showed similar results related to change in knowledge, perceptions, and motivation. It is important to note that this film is a documentary focused on sharing factual information about climate change, as opposed to the fictional movies primarily discussed so far in this chapter. Nolan (2010) found that the film led to increased knowledge and increased concern when respondents were surveyed directly after the film. More interesting, there was a greater increase in knowledge when respondents were surveyed one month after viewing, indicating viewers had sought out additional information after they had watched the film.

In a very different style of study Jacobsen (2011) collected data related to the purchase of voluntary carbon offsets within locations where *An Inconvenient Truth* had been screened. Carbon offsets included "purchase of hybrid vehicles, CFL [Compact Fluorescent Light] light

bulbs, and energy efficient appliances” as well as donations to CarbonFund.org who supported carbon reduction projects (p. 69). The study found that in a ten-mile radius of the movie showing, carbon offsets increased for a brief period of less than a year, with little evidence to show that this behavior continued for a longer span of time.

The limitations of these studies are worth exploring in greater detail. First, many of the studies rely heavily on convenience samples and single-survey methodologies. Many utilize a convenience sample, surveying individuals on the front step of the movie theater, individuals who are coming to the movie theater specifically to see the film the researchers are focused on (Lowe et al., 2006; Leiserowitz, 2004). While Leiserowitz (2004) did divide respondents into two groups with separate conditions (viewers, non-viewers), the survey did not assess respondents prior to viewing the film. This could be problematic with other more pointed results, such as Leiserowitz (2004) observation that viewers of *The Day After Tomorrow* were more likely to support democratic candidates over republicans in the 2004 election (Bush vs. Kerry). Noting these limitations, these researchers are studying the perception of disaster and climate movie fans against those who did not watch the film, as opposed to the effects disaster and climate films had on changing viewers’ perceptions and knowledge related to disasters and climate change.

In all cases, these movies influenced the zeitgeist of the early 2000s. Branston (2007) coined the term *issue event film/movie*, denoting a film that builds significant buzz not only because of the anticipation over the entertainment value of the film, but the narrative value it has related to a particular salient societal issue. Both *An Inconvenient Truth* (2006) and *The Day After Tomorrow* (2004), were such films, offering an opportunity for media to cover stories related to the making of the film (e.g., actor interviews, the use of CGI, the exciting nature of the

storyline) as well as the science the movie leverages to build the narrative (i.e., what is accurate about the film, what is inaccurate, and the realities of climate change in the future). In the weeks surrounding the release of these films, web traffic on climate change websites and discussion of climate change in news media increased (Branston, 2007; Hart & Leiserowitz, 2009; Rust, 2013).

A recent example of an issue event film is *Don't Look Up* (2021), which tells the story of a comet on a collision course for the earth and the failed response efforts of corrupt politicians, which leads to the destruction of the planet. The movie's director Adam McKay created the film as both a satirical disaster movie, as well as an allegory for climate change. He hoped the film would prompt urgent action among viewers (Buckley, 2022). The movie thinly veils its references—a political leader who opposes climate change science, commanding masses of supporters clad in red baseball caps, chanting “*Don't Look Up!*” as a refusal to acknowledge the science being presented to them by experts. When the movie was released on the streaming service Netflix, it set a new record for total views in a week (Grater, 2022).

The popularity and relevance of the film led to innumerable media opportunities discussing the context of the film, the analogs to climate change, the state of science and politics in the United States, and deeper discussions on these topics from experts in related fields. Newspapers, podcasts, television networks, and radio shows brought on experts in planetary science, climate science, and disaster research. Experts in these fields generated opinion pieces for newspapers and created Twitter threads citing research (Buxbaum & Flato, 2022; Kalmus, 2021). All of this information is accessible to the public.

As Hart and Leiserowitz (2009) noted, the window of interest in a particular film is very short, less than 30 days roughly (specifically 10 days prior, and 19 days after), but within that

window there is a stifling amount of content produced as media companies work to create timely content to remain relevant and connected to their audience. The public sees and hears this content through multiple channels - television news, radio news, print news, social media- intaking this representation of science, and retaining anything that they are able to sufficiently process and learn (Maier et al., 2014). This continues for the window of public interest, with the potential that the viewer spent more time exposed to science communication about the movie compared to the actual two hours they sat watching the film.

With that in mind, it is critical that research on this topic addresses these external factors to ensure that the myriad of moderating variables is accounted for. Only by following a pre-test and post-test format, and treatment and control groups, can the research demonstrate a valid link between viewing a film, and the effect that film had on knowledge and perceptions.

A second factor that was not discussed is how long changes in perceptions are sustained after the film. A majority of studies conducted post-tests immediately after the viewer watched the film (Lowe et al., 2006; Nolan, 2010; Seipel, 2017) or within less than a month after viewing (Barnett et al., 2006; Leiserowitz, 2004). Lowe et al. (2006) did conduct a small number of focus groups to further explain the quantitative results of the initial data collection. Nolan (2010) had the longest separation between viewing of the film and a post-test, with a total of four weeks of separation.

This leaves an important question- how long do the effects of a disaster movie last on the viewer? Studying the climate change documentary, *Age of Stupid*, Howell (2011) found that the documentary increased concern and motivation to act immediately after the film, but the increase was not sustained and returned to normal levels by the second post-test at ten weeks. This would suggest that any effects caused by these disaster films related to knowledge or perceptions would

be sustained for anywhere from one to four weeks but decline and return to pre-movie levels by ten weeks after viewing.

Summary

This chapter discussed the way individuals are influenced by the media they interact with, specifically television, film, and disaster movies. This study sought to understand this relationship with specific emphasis on how individuals' perceptions of human behavior myths are influenced by the viewing of disaster movies. The next chapter will discuss the quasi-experimental design and methods that were used to conduct this study, as well as the ethical considerations and limitations.

Chapter 4: Methods

The goal of this study was to examine how individuals' anticipation of disaster myths in human behavior are affected by viewing disaster movies, providing insights to emergency management researchers and practitioners regarding the cause of human behavior disaster myths among the public.

This chapter begins by outlining the proposed sampling strategy for this study as well as the target area and sample size. The chapter then discusses the design of the study, including the survey instrument, the experiment and data collection process, and the selection of films. Discussion will then move to the analysis of data and specific analytical tests. Lastly, the chapter will review relevant ethical considerations and limitations of the proposed study.

Research Questions and Hypotheses

As mentioned in Chapter One, the research questions for this study are as follows:

- **RQ1:** Do disaster movies change the perceptions viewers hold regarding human behavior in disasters?
- **RQ2:** If so, is this change in perception observable six weeks after viewing?

The Specific hypotheses that this study addressed are as follows:

- **H1:** Viewing of disaster movies will temporarily change the anticipation of human behavior in disasters, with viewers perceiving infrequent human behaviors to be of greater frequency.
- **H2:** Any such changes to anticipation of human behavior in disasters occurring after viewing disaster movies will be temporary, lasting less than 6 weeks.

Sampling Strategy

This study initially sought to include individuals from a range of age groups and levels of

education and experience with disasters, allowing for more nuanced results in how demographic factors affect an individual's perceptions of disasters following disaster movies.

Participants were recruited through two primary channels. The first source for participants was undergraduate students studying disaster-adjacent topics (e.g., geography, geology, public administration, and political science). This sample is referred to as the "college student sample." Using professional networks and distribution lists, the researcher sought out college educators in related disciplines and invited their participation in this study. Educators were asked to include the study either as a course requirement or as an extra credit opportunity for students, with all necessary content being provided by the researcher. Educators were asked to ensure that no disaster-specific content relating to human behavior is covered in the course during the time of the study to prevent course curriculum from skewing participant responses. Students took a pretest survey three weeks prior to the initial treatment, which gave enough time for any survey-related priming to dissipate prior to the treatment. Treatment consisted of watching one disaster movie, which was followed by an immediate posttest to gauge the change of perception caused by the movie. Additionally, a 6-week posttest was given to measure changes in perceptions of disaster myths. This sample started with a total of 121 participants taking survey 1 (pre-test), and a total of 47 participants in survey 2 and 3 (post-tests) (16 participants in the control group, and 31 participants in the experimental group).

Recruiting from emergency management and disaster specific disciplines was considered for this study, but the researcher felt that there were significant challenges related to controlling external variables. This study sought to learn about how disaster movies affect individuals' perceptions of disasters. The treatment for this study was limited to the viewing of a disaster film. It is highly likely that individuals in disaster-specific courses were discussing topics that

would have counteracted misperceptions caused by disaster movies, and significantly shifted results between the pretest and posttest. For example, an introductory course in emergency management may very well have discussed research that shows looting is rare after disasters, potentially leading to a major shift in perception during the experiment. These disaster-specific classes were not included, as variations in curriculum cannot be controlled across all courses. With the broad sampling strategy being used, it was possible that some students studying in a natural hazards or emergency management related degree program were included in this study. The survey instrument being used documented the degree programs of these students, allowing the researcher to control for this variable.

Beyond specific college courses, this study also invited broad participation through an opt-in invitation shared widely through academic networks. This group included subgroups such as emergency management practitioners, emergency management academics, academics from non-disaster-specific disciplines, practitioners outside of emergency management, and lay participants (any individuals not falling into the previous categories). This group followed the same methods as the college student sample, with a pre-test, immediate post-test, and six-week posttest. A total of 82 individuals within this sample started with survey 1 (pre-test), but unfortunately only 15 continued and completed all three surveys. This number was insufficient for any statistically significant results to be generated, especially considering that number was roughly halved for the division of control and experimental groups.

One challenge experienced across both initial samples was a significant attrition between Survey 1 and the two follow-up surveys. Attrition within the Unaffiliated Sample may be explained by email platform security measures, as some respondents reported not receiving communications from the researcher and found that these emails had been flagged as junk mail

by the email platform. The College Student sample is more difficult, with a range of potential explanations including researcher communications being flagged as junk mail, lack of availability during the time period of the study, gaps in direction between the researcher and respective faculty, and insufficient incentive to complete the study.

Inclusion and Exclusion

Participants were required to be eighteen years of age or over at the start of the experiment to participate. Any individuals 17 years of age or younger at the start of the experiment were excluded from participation. Exclusion criteria were largely based on the challenges of managing consent forms for minors. Including these individuals would have meant processing forms for the participant and parent and would have created a separate parallel process to the existing study. While this study did not include individuals 17 or younger, it is the researcher's plan to develop a similar study including this population in the future.

Target Area and Sample Size

This study sought to recruit a sample that was sizable and geographically diverse, ensuring the greatest degree of generalizability possible. Previous studies have had minimal generalizability as participants have been limited to a single school or single movie theater. The college student sample allowed for larger blocks of geographic diversity representing a total of 4 participating colleges.

Table 4- Participating Institutions and Course Sections

Institution	Location	Number of Course Sections
Northwest Missouri State University	Maryville, Missouri	4
Salve Regina University	Newport, Rhode Island	1
Oklahoma State University	Stillwater, Oklahoma	1
Metropolitan Community College- Omaha	Omaha, Nebraska	1

The demographic factors within the study varied significantly between those participants completing Survey 1, and those completing all three surveys. Demographics will be discussed within the two following chapters.

Research Design

Variables and Survey Instrument

Independent variables for this study included demographic variables (e.g., age, location, education), experience with disasters, and knowledge of disasters (See Appendices A through E for Survey Instruments and approvals). The dependent variable for this experiment was *Reported Anticipation of Disaster Myths in Human Behavior*. This factor was measured by the degree to which participants report a disaster-related human behavior myth to be frequently or infrequently observed during disasters. Table 2 shows the human behavior myths selected from the emergency management and natural hazards literature that were included in this study. This list was assembled from articles referencing disaster myths within disaster films and popular culture.

The variable of *Reported Anticipation of Disaster Myths in Human Behavior* was measured using a combination of two approaches referenced in the literature review. Alexander (2007) measured “belief in the common myths about disasters” (p. 95) by asking participants to note if a reported myth was true or false. Alexander noted that this format posed a challenge, as all prompts were myths, which meant the correct response to each was “false”—an occurrence that may have caused cognitive dissonance with students familiar with standardized testing. On one hand, respondents may have wanted to respond to all questions with “false”, while on the other hand believing that no standardized test or survey would be designed with this complete lack of randomization. It was noted that this may have led to respondents knowingly providing incorrect answers in order to conform to their perceived norms of standardized testing. Seipel

(2017) studied disaster myths related to protective actions in earthquakes by providing participants with a protective action such as, “during an earthquake, drop, cover, and hold on” (p. 65), asking participants to indicate their agreement on a seven-point Likert Scale, with a range of disagree to agree.

This study combined these two methods, using a variable titled *Reported Anticipation of Disaster Myths in Human Behavior*. Initially, the researcher chose the title “reported perception” as other options such as “belief” carried deeper theoretical meanings to some researchers. However, the term *perception* reflects a product of understanding and deliberation. The factor being studied was in fact an individual’s estimate of likelihood, which amounts to their *anticipation* of an event, specifically the likelihood that disaster myths would be represented in human behavior following a disaster. Therefore, the variable was titled *Reported Anticipation of Disaster Myths in Human Behavior*. This was measured by providing respondents with a list of claims about human behavior in disasters, followed by a six-point Likert scale: 1) rarely occurs during disasters and 6) frequently occurs during disasters. The six-point scale offered a clear division of responses and avoided the possibility that participants select a middle option.

The instrument was initially designed to incorporate test-retest reliability (Mitchell & Jolley, 2010). Pairs of questions regarding the same topic were incorporated within each survey instrument. One question asked about the frequency of a human behavior myth, labeled “myth,” and one asked about the frequency of the behavior that observed more frequently, labeled as “reality.” For example, while one question asked about the frequency of antisocial behavior, another asked about the frequency of pro-social behavior (see Table 5 for examples). As will be discussed in the data analysis section, this attempt at test-retest reliability proved more nuanced than the researcher anticipated.

Table 5- Example of Myth and Reality Variables

Antisocial Behavior (Myth)	There is an increase in hurtful or aggressive behavior in a community that has experienced a disaster
Antisocial Behavior (Reality)	People are generally helpful and supportive of community members after their community has experienced a disaster
Looting (Myth)	Survivors do not participate in the response and instead wait on assistance from government agencies
Looting (Reality)	Survivors take action during response based on the information and resources available

To minimize subject bias these human behavior myth questions were randomized and divided across multiple sections of the survey instrument. This division minimized the chances that participants would be primed by the prompts or identify the relationship between variables and alter their responses. See appendices A through E for examples of the survey instruments and institutional approvals.

Experiment and Data Collection Process

This study followed a quasi-experimental format. While it was possible to make this a randomized experiment, the logistics necessary to make this change would have created challenges that may have reduced the number of participants. To avoid these types of challenges, groups of participants were assigned to the different treatments based on their participating course section.

A control group watched the film *Ant-Man* (a film categorized within the Superhero genre, and lacking imagery that may be similar to a disaster), while the control group watched the disaster movie *San Andreas*. The experiment was designed to be conducted during the fall semester of the academic year, with the experiment starting in the first full week of September, and all processes being completed prior to the start of Fall Break in the third week of November.

This process was overseen by the researcher and dictated to participants via email. This

included email and reminder emails for completing each step along the way including completing surveys and watching movies. This process was assisted by the respective college professors of the participating course sections who were copied on emails to their students and emailed separately with instructions for their classes' participation.

Table 6- Treatment Tracks

Timeline:	September Week 1	September Week 4	November Week 2
<i>Group 1- Control (Ant-Man)</i>	Survey 1: Pre Test	View <i>Ant-Man</i> Survey 2: Immediate Post Test	Survey 3: 6-week Post-Test
<i>Group 2- Experiment (San Andreas)</i>	Survey 1: Pre Test	View <i>San Andreas</i> Survey 2: Immediate Post Test	Survey 3: 6-week Post-Test

Data Collection

Data for this survey was collected using the platform Google Forms ([google.com/forms](https://www.google.com/forms)). This platform was chosen as it is a commonly accepted industry standard for a free and versatile platform with all requisite security measures to protect participant data.

Participants completed three surveys. The first survey, titled "Survey 1- Pre-Test" was administered at the start of the experiment and focused on establishing a baseline of demographic data, knowledge of disasters, experience with disasters, and asked if the participant has viewed the film assigned to them in the study. The pre-test also included a set of questions to measure *Reported Anticipation of Disaster Myths in Human Behavior* as mentioned in the Research Design section of this chapter. This survey was administered at least 3 weeks prior to viewing of the first film to minimize the possibility of the survey priming responses from participants.

Participants then began the treatment track outlined in Table 6. The two treatments

included a control group watching *Ant-Man* (Group 1), and an experimental group watching *San Andreas* (Group 2). Both groups completed the aforementioned Survey 1- Pre-Test, as well as two additional post-tests. The first post-test was administered directly after the completion of their treatment. Survey 2- Immediate Post-Test included the set of questions related to the *Reported Anticipation of Disaster Myths in Human Behavior* as well as additional demographic data related to media viewing habits. The second post-test, Survey 3- 6 Week Post-Test repeated the set of questions related to the *Reported Anticipation of Disaster Myths in Human Behavior* but did not include any additional questions. Note that these survey instruments were titled for the sake of the researcher. The title of the Google Forms appearing to participants was changed to avoid priming. For example, “Survey 1- Pre-Test” was changed to “Disaster Movie Research-Survey 1”.

The researcher considered adding additional treatment groups that would watch up to 4 movies, however, the time commitment of watching 4 feature length films as part of a college course (runtime of over 7 hours) may have been a deterrent for individuals interested in participating in the study. It was decided that one movie (roughly 2 hours total) was likely the maximum time that could be asked of participants, particularly college faculty incorporating this study into a course.

Notes on Film Selection

Two films were selected for this study based on the prevalence of Disaster Myths within the movies’ narratives. As Montano and Carr (2023) documented in their analysis of Disaster Myths in popular Hollywood films, the depictions of these myths in recent Hollywood movies are relatively rare leading to a small selection of possible movies. The movies used in this study were selected based on 1) visual or verbal depiction of human behavior myths, 2) rating of PG-

13 or below, and 3) popularity of the film. Popularity is important as it is a proxy variable that reflects involvement, as discussed in Chapter Three. Table 4 lists the movies selected, as well as the human behavior myths depicted in each.

Table 7- Movies Included in the Study and Depiction of Human Behavior Myths

Movie (Year)	Human Behavior Myths within the Movie
Experiment: <i>San Andreas</i> (2015)	Looting, Panic, Widespread Antisocial Behavior
Control: <i>Ant-Man</i> (2015)	None

Data Analysis

The Statistical Package for Social Sciences (SPSS) was used to organize and analyze data for this experiment. This software provided numerous tests and tools to manipulate and analyze data. Following completion of the experiment, data was cleaned and labeled in preparation for analysis. Cleaning involved connecting the various responses across surveys for each case, removing any cases with missing data, and translating the responses created by Google Forms into meaningful variables. For example, on any questions asking to “check all that apply,” the data submission in Google Forms appears as a short form text response with the text from all checked boxes being separated by commas. The researcher spent time creating new columns for each respective response, and re-recording data into these new columns. No changes were made to submissions, only separating out data into respective columns.

The next step in data analysis was to recode the *Reported Anticipation of Disaster Myths in Human Behavior* variables. Originally the researcher intended that these variables would be used to implement test-retest reliability, however, it became apparent that this intent was based

on the incorrect assumption that these conditions were mutually exclusive and could be treated as a spectrum with the myths and realities serving as opposing points. To the contrary, participants viewed these as separate variables with a wide range of variance in the relationship of the myths and realities. There being no value to recoding variables, the researcher instead moved forward with representing each variable individually.

Data analysis then continued. Data analysis for Survey 1 was conducted using descriptive statistics, articulating means and frequencies for demographic factors, as well as *Reported Anticipation of Disaster Myths in Human Behavior*. A second data analysis process was conducted for the linear trends spanning all three surveys. This analysis included an Independent Samples t-test, descriptive statistics for means (articulating means and frequencies where appropriate), followed by analysis of the *Reported Anticipation of Disaster Myths in Human Behavior* over time. The researcher conducted a Repeated Measures Analysis of Variance test for all myth factors, however all but one factor found non-significant results, leading to the researcher using descriptive statistics to analyze the trends across Surveys 1 through 3.

Ethical Considerations

This study utilized a method of survey that involved participation of human subjects with minimal risk. This study was approved by the Institutional Review Board of Jacksonville State University prior to collection of data (see Appendix E). The only perceived risk to any participants was the content presented during the movie. All movies included in this study were rated PG-13 by the Motion Picture Association of America (MPAA), meaning “some material may be inappropriate for pre-teenagers” (Motion Picture Association, 2020). For example, the rating description for *San Andreas* read “Rated PG-13 for intense disaster action and mayhem throughout, and brief strong language” (FilmRatings.com, n.d.). This information on ratings and

content was included in communications in waivers prior to the start of the experiment.

Summary

This chapter has outlined the methods used to conduct this study. A quasi-experimental design was used and incorporated multiple treatment groups viewing a varied selection of disaster movies. The study was designed to minimize external variables such as influence of disaster related college courses, viewing of other disaster films, and other factors that may affect the generalizability of the results.

Chapter 5: Results

Introduction

This chapter will be separated into four major sections. The first section will outline the sample for Survey 1, and discuss demographic data of the sample. The second section will cover the analysis of data from Survey 1 and identify the results of that analysis. The third section will outline the sample that completed Surveys 1, 2, and 3, and discuss demographic data of the sample. The fourth section will cover the analysis of this data from data across Surveys 1, 2, and 3, and identify the results of that analysis.

Hypotheses

This study examined two hypotheses, examining the claim that disaster movies have an immediate effect on the anticipation of disaster myths in human behavior, and the amount of time this change, if any, can be observed after the individual watches a disaster movie. These hypotheses were:

- **H1:** Viewing of disaster movies will temporarily change the anticipation of human behavior in disasters, with viewers perceiving infrequent human behaviors to be of greater frequency.
- **H2:** Any such changes to anticipation of human behavior in disasters occurring after viewing disaster movies will be temporary, lasting less than 6 weeks.

Results of the hypotheses varied across the myths studied. Hypothesis One was supported for three myths: Looting Myth, Violence Myth, and Martial Law Myth. Hypothesis Two was not supported for any of these three factors, with the increased perceptions remaining beyond the baseline at the six-week mark.

Survey 1 Sample

A total of 121 students participated in Survey 1. Institutions represented included Northwest Missouri State University (83.5%, n=101), Oklahoma State University (9.9%, n=12), Salve Regina University (3.3%, n=4), and Metropolitan Community College of Omaha (3.3%, n=4). Students came from 10 different states of residence, with the greatest number coming from Missouri (59.5%, n=72), Nebraska (11.6%, n=14), and Iowa (9.9%, n=12) (see Table 8).

Table 8- Survey 1 Respondent Characteristics- State of Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FL	1	.8	.8	.8
	IA	12	9.9	9.9	10.7
	INTL	1	.8	.8	11.6
	KS	4	3.3	3.3	14.9
	MA	2	1.7	1.7	16.5
	MO	72	59.5	59.5	76.0
	NE	14	11.6	11.6	87.6
	NJ	1	.8	.8	88.4
	OK	8	6.6	6.6	95.0
	RI	1	.8	.8	95.9
	TX	5	4.1	4.1	100.0
	Total	121	100.0	100.0	

Over half of participants were female (54.5%, n=66), followed by male (43%, n=52), non-binary (1.6%, n=2), and genderfluid (0.8%, n=1) (see Table 9).

Table 9- Survey 1 Respondent Characteristics- Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	66	54.5	54.5	54.5
	Genderfluid	1	.8	.8	55.4
	Male	52	43.0	43.0	98.3
	Non-binary	2	1.6	1.6	100
	Total	121	100.0	100.0	

The majority of participants were white (86%, n=104), followed by individuals reporting Two or More Races (5%, n=6), Hispanic/Latinx (3.3%, n=4), Black or African American (3.3%, n=4), American Indian or Alaska Native (1.7%, n=2), and Asian (0.8%, n=1) (see Table 10)

Table 10- Survey 1 Respondent Characteristics- Race

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid American Indian or Alaska Native	2	1.7	1.7	1.7
Asian	1	.8	.8	2.5
Black or African American	4	3.3	3.3	5.8
Hispanic/Latinx	4	3.3	3.3	9.1
Two or More Races	6	5.0	5.0	14.0
White	104	86.0	86.0	100.0
Total	121	100.0	100.0	

Participants were also asked about their knowledge of and experience with disasters. A total of five respondents (4.1%) said they had no knowledge of disasters. This question allowed for multiple responses, and of the five that indicated they had no knowledge of disasters, four indicated that they had taken formal classwork related to disasters (this may be explained by participants' interpretation of wording on the survey instrument and will be discussed more in the next chapter). Knowledge of disasters was most frequently attributed to social media (86%, n=104), followed by news media (81%, n=98), formal classwork (67.8%, n=82), disaster specific classwork (6.6%, n=8), and a disaster specific degree (2.5%, n=3).

When asked about experience with disasters, a total of 17 individuals (14%) responded that they had no experience with disasters. Again, similar to asking about knowledge, eight (6.6%) of these individuals indicated that they both had no experience and also had experience with disasters through TV and social media. Experience with disasters was most frequently

attributed to TV and social media (89.2%, n=108), training (37.2%, n=45), being a disaster survivor (7.4%, n=9), and being a disaster responder (6.6%, n=8).

Age was typical of college students in the United States, with 90.9% of respondents being between the ages of 18 and 22 (see Table 11).

Table 11- Survey 1 Respondent Characteristics- Age

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18	24	19.8	19.8	19.8
19	29	24.0	24.0	43.8
20	23	19.0	19.0	62.8
21	23	19.0	19.0	81.8
22	11	9.1	9.1	90.9
23	4	3.3	3.3	94.2
25	2	1.7	1.7	95.9
27	1	0.8	0.8	96.7
28	1	0.8	0.8	97.5
35	1	0.8	0.8	98.3
42	1	0.8	0.8	99.2
45	1	0.8	0.8	100.0
Total	121	100.0	100.0	

To ensure that survey results were not skewed because of the degree programs of the participants, a survey question asked for them to report their degree. These responses were recoded to the variation of degree names across institutions. Table 12 shows these recoded categories, followed by any additional degree names that were grouped into each category. While no Emergency Management related courses were surveyed for this study, three students (2.5% of sample) reported that they were seeking an Emergency Management related degree. Overall, no degree category represented more than a fourth of the sample, with the largest category being Business, with 23.1% (n=28).

Survey 1 Analysis and Results

The initial survey instrument asked participants to say how frequently a list of behaviors were observed in disasters, followed by a list of behaviors representing the human behavior

Table 12- Survey 1 Respondent Characteristics- Degree Discipline

Degree Discipline	Frequency	Percent
Agriculture	2	1.7
Arts (Arts, Fine Arts)	4	3.3
Aviation and Aerospace (Aviation, Aerospace)	5	4.1
Biological Sciences (Science, Conservation, Ecology)	7	5.8
Business (Business Administration, Marketing, Finance, International Business, Accounting, Public Accounting, Sports Management, Business Economics)	28	23.1
Communications	1	.8
Computer Science	1	0.8
Criminal Justice (Criminal Justice, Justice, Criminology)	8	6.6
Cyber Security	2	1.7
Earth Sciences (Geology, Environmental Geology)	2	1.7
Education (Physical Education, Middle School Education)	11	9.1
Emergency Management (Emergency Management, Emergency and Disaster Management)	3	2.5
Geography	1	0.8
Health Sciences	1	0.8
History (American Studies, History)	2	1.7
Humanities	1	0.8
Language and Literature (Language Arts, Spanish)	5	4.1
Other (Did not list, General Studies, Undecided)	15	12.4
Political Science	9	7.4
Recreation	1	0.8
Social and Behavioral Sciences (Psychology, Sociology, Human Services)	12	9.9
Total	121	100.0

disaster myths and the realities related to those myths. Questions were shuffled and spread across two screens of the online survey to minimize subjects recognizing the pairing. Responses were recorded on a six-point Likert scale, with one being “rarely occurs in disasters,” and six being “frequently occurs during disasters”. Descriptive statistics of these responses are included in Table 13. For the full written questions, please see Table 14.

During the research proposal process, the researcher planned on treating the responses for myths and realities as two ends of a two-poled spectrum. The initial intent was to recode the “myth” variable to combine with the “reality” variable as a measure of validity. However, it was quickly apparent that while the researcher viewed these two variables as mutually exclusive, the research participants did not. All myth and reality variables were left separate. The researcher also recoded the 6-point Likert scale into two separate scales. The first was a two-point scale, recoding all responses into responses of “rare” or “frequent”. The second scale was a three-point Likert scale which included “Rare” (values of 1 or 2), “Unsure” (values of 3 or 4), and “Frequent” (values of 5 and 6). These new scales were created as a way to view data differently, but should not be treated as a substitute for responses to two and three point Likert scale questions. The results of this recoding are included in Table 14.

Table 13- Survey 1 Myths and Realities Descriptive Statistics

Survey Question Code	N	Minimum	Maximum	Mean	Std. Deviation
Martial Law Reality-S1	121	1	6	4.79	1.074
Martial Law Myth-S1	121	1	6	3.34	1.382
Violence Reality-S1	121	2	6	5.16	.966
Violence Myth-S1	121	1	6	3.61	1.325
Looting Reality-S1	121	2	6	4.79	1.176
Looting Myth-S1	121	1	6	3.54	1.379
Citizen Responder Reality-S1	121	1	6	4.52	1.126
Citizen Responder Myth-S1	121	1	6	3.02	1.169
Responder Myth Reality-S1	121	1	6	4.62	1.142
Role Abandonment Myth-S1	121	1	6	2.35	1.209
Panic Reality-S1	121	1	6	4.36	1.133
Panic Myth-S1	121	2	6	4.54	.975
Price Gouging Reality-S1	121	1	6	3.14	1.135
Price Gouging Myth-S1	121	1	6	3.88	1.295
Valid N (listwise)	121				

Some variables, such as “Citizen Responder” and “Role Abandonment” appeared to be viewed as polar by the participants, showing strong trends that the myth was viewed as rare, and the reality was viewed as frequent. The myth of Role Abandonment showed the strongest trend, with nearly eighty percent of participants saying the myth was rare, and nearly eighty percent reporting that the reality was frequent. In an opposing direction, the myth “price gouging” was viewed as frequent by over sixty two percent of participants, and the reality was viewed as infrequent by an even greater sixty five percent. This trend is lessened when moved from a two-point Likert scale to a three-point, but the bell curves still trend in the same respective directions. Both the myth and reality of “panic” were reported as frequent, indicating the possibility of a nuanced view of panic, suggesting that panic may be subjective based on a set of variables not included in the survey tool’s question. Three variables saw strong support for the reality, with a smaller support for the myth. Respondents reported the realities for “looting,” “martial law,” and “violence” to be at or above 83.5%, while the myths had support that hovered in the fifties. This trend of strong reality score and a middling myth score is highlighted when observed on the three-point Likert scale.

Survey 2 and 3 Sample

A total of 47 students participated in Survey 2 and 3. This included 16 individuals placed in the control group, watching Ant Man, and 31 placed in the experimental group, watching San Andreas. Institutions represented included Northwest Missouri State University (74.5%, n=35), Oklahoma State University (14.9%, n=7), Salve Regina University (6.4%, n=3), and Metropolitan Community College of Omaha (4.3%, n=2). Students came from 8 different states of residence, with the greatest number coming from Missouri (48.9%, n=23), Nebraska (12.8%, n=6), and Iowa (10.6%, n=5) (see Table 15).

Table 14- Survey 1 Means for Myths and Realities Responses

This set of questions asks you to say how frequently these things occur in disasters. You will be given an example of human behavior and asked to say how frequently it occurs during disasters on a scale of 1 to 6, with 1 being "rarely occurs during disasters" and 6 being "frequently occurs during disasters".		Two (N= (%))		Three (N= (%))		
	Mean	Rare	Frequent	Rare	Unsure	Frequent
Citizen Responder Myth- Survivors do not participate in the response and instead wait on assistance from government agencies	3.02	84 (69.4%)	37 (30.6%)	44 (36.4%)	64 (52.9%)	13 (10.7%)
Citizen Responder Reality- Survivors take action during response based on the information and resources available	4.52	21 (17.4%)	100 (82.6%)	5 (4.1%)	53 (43.8%)	63 (52.1%)
Looting Myth- Individuals steal merchandise from retail stores and other locations	3.54	58 (47.9%)	63 (52.1%)	26 (21.5%)	64 (52.9%)	31 (25.6%)
Looting Reality- Individuals take essential items (food, water, baby formula, etc.) from stores and other locations	4.79	20 (16.5%)	101 (83.5%)	6 (5.0%)	34 (28.1%)	81 (66.9%)
Martial Law Myth- Martial law is declared to ensure safety of survivors and responders	3.34	63 (52.1%)	58 (47.9%)	37 (30.6%)	56 (46.3%)	28 (23.1%)
Martial Law Reality- Communities use existing law enforcement mechanisms to ensure safety of survivors and responders	4.79	12 (9.9%)	109 (90.1%)	3 (2.5%)	45 (37.2%)	73 (60.3%)
Panic Myth- Survivors are overtaken with sense of uncontrollable fear or anxiety, and make choices they would not typically make	4.54	16 (13.2%)	105 (86.8%)	4 (3.3%)	50 (41.3%)	67 (55.4%)
Panic Reality-Survivors make informed decisions based on their prior knowledge and situation during response	4.36	25 (20.7%)	96 (79.3%)	7 (5.8%)	54 (44.6%)	60 (49.6%)
Price Gouging Myth- Businesses increase their prices to capitalize on increased demand	3.88	46 (38.0%)	75 (62.0%)	18 (14.9%)	65 (53.7%)	38 (31.4%)
Price Gouging Reality- Businesses maintain their prices immediately following a disaster	3.14	79 (65.3%)	42 (34.7%)	36 (29.8%)	69 (57.0%)	16 (13.2%)
Role Abandonment Myth- First responders do not show up for work due to fear or anxiety over responding to a large-scale event	2.35	96 (79.3%)	25 (20.7%)	71 (58.7%)	46 (38.0%)	4 (3.3%)
Role Abandonment Reality- First responders will show up for work unless they are personally affected by the disaster (ex- personal injury, injury of a loved one, children in need of care)	4.62	26 (21.5%)	95 (78.5%)	3 (2.5%)	42 (34.7%)	76 (62.8%)
Violence Myth- There is an increase in hurtful or aggressive behavior in a community that has experienced a disaster	3.61	51 (42.1%)	70 (57.9%)	29 (24.0%)	60 (49.6%)	32 (26.4%)
Violence Reality-People are generally helpful and supportive of community members after their community has experienced a disaster	5.16	8 (6.6%)	113 (93.4%)	1 (0.8%)	28 (23.1%)	92 (76.0%)

Table 15- Survey 2 and 3 Respondent Characteristics- State of Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	IA	5	10.6	10.6	10.6
	KS	3	6.4	6.4	17.0
	MA	2	4.3	4.3	21.3
	MO	23	48.9	48.9	70.2
	NE	6	12.8	12.8	83.0
	NJ	1	2.1	2.1	85.1
	OK	4	8.5	8.5	93.6
	TX	3	6.4	6.4	100.0
	Total	47	100.0	100.0	

Table 16- Survey 2 and 3 Respondent Characteristics- Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	22	46.8	46.8	46.8
	Genderfluid	1	2.1	2.1	48.9
	Male	22	46.8	46.8	95.7
	Non-Binary	2	4.3	4.3	100.0
	Total	47	100.0	100.0	

Table 17- Survey 2 and 3 Respondent Characteristics- Race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	American Indian or Alaska Native	2	4.3	4.3	4.3
	Asian	1	2.1	2.1	6.4
	Black or African American	1	2.1	2.1	8.5
	Hispanic/Latinx	2	4.3	4.3	12.8
	Two or More Races	3	6.4	6.4	19.1
	White	38	80.9	80.9	100.0
	Total	47	100.0	100.0	

Male and Female participants were equally represented (48.6%, n=22), followed by non-binary (4.3%, n=2), and genderfluid (2.1%, n=1) (see Table 16).

The majority of participants were white (80.9%, n=38), followed by individuals reporting Two or More Races (6.4%, n=3), Hispanic/Latinx (4.3%, n=2), American Indian or Alaska Native (4.3%, n=2), Black or African American (2.1%, n=1), and Asian (2.1%, n=1) (see Table 17). Age was typical of college students in the United States, with 85.1% of respondents being between the ages of 18 and 22 (see Table 18).

Table 18- Survey 2 and 3 Respondent Characteristics- Age

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18	8	17.0	17.0	17.0
19	12	25.5	25.5	42.6
20	10	21.3	21.3	63.8
21	6	12.8	12.8	76.6
22	4	8.5	8.5	85.1
23	1	2.1	2.1	87.2
25	2	4.3	4.3	91.5
27	1	2.1	2.1	93.6
28	1	2.1	2.1	95.7
35	1	2.1	2.1	97.9
42	1	2.1	2.1	100.0
Total	47	100.0	100.0	

To ensure that survey results were not skewed because of the degree programs of the participants, a survey question asked for them to report their degree. These responses were recoded to better organize data and account for the variation of degree names across institutions. Table 19 shows these recoded categories, followed by any additional degree names that were grouped into each category. Overall, no degree category represented more than roughly a fourth of the sample, with the largest category being Business, with 25.5% (n=12).

Table 19- Survey 2 and 3 Respondent Characteristics- Degree Discipline

Degree Discipline	Frequency	Percent
Arts (Arts, Fine Arts)	1	2.1
Aviation and Aerospace (Aviation, Aerospace)	4	8.5
Biological Sciences (Science, Conservation, Ecology)	2	4.3
(Business Administration, Marketing, Finance, International Business, Accounting, Public Accounting, Sports Management, Business Economics)	12	25.5
Communications	1	2.1
Criminal Justice (Criminal Justice, Justice, Criminology)	4	8.5
Earth Sciences (Geology, Environmental Geology)	3	6.4
Education (Physical Education, Middle School Education)	5	10.6
Geography	1	2.1
History (American Studies, History)	1	2.1
Humanities	1	2.1
Language and Literature (Language Arts, Spanish)	1	2.1
Other (Did not list, General Studies, Undecided)	4	8.5
Political Science	4	8.5
Recreation	1	2.1
Social and Behavioral Sciences (Psychology, Sociology, Human Services)	2	4.3
Total	47	100.0

Survey 2 and 3 Analysis and Results

A series of Repeated Measures Analysis of Variance tests were conducted using the means of all three surveys; however, only three tests yielded significant results. These results may be an accurate result of data analysis; however, it is also possible that this was a result of a small sample size.

A repeated measures ANOVA with a Huynh-Feldt correction determined that means for Looting Myth had statistically significant differences between each survey for both the control group and the experimental group, as well as Violence Myth and Panic Reality for the experimental group (see Table 19 and 20). Further analysis was conducted after this finding to study changes in Looting Myth means between the groups. Using the mean change of Looting Myth between Survey 1 and 2, an Independent Samples t-test was conducted, however, Levene's

Test for Equality was significant ($p=0.018$, $F=6.018$), indicating that the variances were different between experimental groups. As variances were significantly different between groups, the base assumptions for the t-test were not satisfied. Another Independent Samples t-test was conducted for both Violence Myth and Panic Reality, and while the base assumptions for the t-test were satisfied, not significant results were found. This result highlighted the possible effects of a small sample size, and the need for descriptive statistics to better understand the results of this small sample.

Descriptive Statistics

Means were analyzed using descriptive statistics to better understand changes in means across factors and groups (see Table 22). Analysis found changes of at least 14% or greater in five of the factors for the experimental group across the three surveys. The three strongest of these five factors (Looting Myth, Panic Reality, and Violence Myth) were prominently featured in the experimental group's film *San Andreas*. Perception of the frequency of looting in disasters went up 28.57% between Survey 1 and 2, and decreased 7.53% between Survey 2 and 3, with a gain of 16.81% between Surveys 1 and 3. Panic Reality went up by 15.08% between Survey 1 and 2 and went down to the original base line between Survey 2 and 3, returning back to the original level between Surveys 1 and 3 (gain of 0.00). Violence Myth increased 16.38% between Survey 1 and 2, and decreased 8.60% between Survey 2 and 3, with a gain of 2.59% between Surveys 1 and 3.

Analysis found changes of at least 7% or greater in two of the factors for the control group across the three surveys, including Looting Myth and Citizen Responder Myth. Looting Myth saw the same initial rise as the experimental group, with a 28.57% increase between Survey 1 and 2, and a decrease on 9.38% between Survey 2 and 3, with a gain of 10.20%

Table 20- ANOVA Results for Control Group (Ant Man)

ANOVA Results for Control Group (Ant Man)						
Variable	Sum of Squares	df	Mean Square	F	Sig	
Citizen Responder Myth	2.167	2	1.083	1	0.38	
Error	32.5	30	1.083			
Looting Myth	6.292	1.626	3.869	4.347	0.031	
Error	21.708	24.39	0.89			
Martial Law Myth	1.792	2	0.896	0.742	0.485	
Error	36.208	30	1.207			
Panic Myth	1.625	2	0.812	1.237	0.305	
Error	19.708	30	0.657			
Price Gouging Myth	1.625	2	0.812	1.237	0.305	
Error	19.708	30	0.657			
Role Abandonment Myth	1.792	1.355	1.322	1.21	0.301	
Error	22.208	20.322	1.093			
Violence Myth	0.578	2	0.289	0.634	0.538	
Error	12.756	28	0.456			
Citizen Responder Reality	0.542	2	0.271	0.19	0.828	
Error	42.792	30	1.426			
Looting Reality	2.542	1.492	1.703	1.036	0.351	
Error	36.792	22.384	1.644			
Martial Law Reality	2.542	2	1.271	2.364	0.111	
Error	16.125	30	0.538			
Panic Reality	1.625	2	0.812	0.901	0.417	
Error	27.042	30	0.901			
Price Gouging Reality	0	2	0	0	1	
Error	20	30	0.667			
Role Abandonment Reality	0.542	2	0.271	0.404	0.671	
Error	20.125	30	0.671			
Violence Reality	0.5	1.862	0.269	0.616	0.536	
Error	12.167	27.923	0.436			

Table 21- ANOVA Results for Experimental Group (San Andreas)

ANOVA Results for Experimental Group (San Andreas)						
Variable	Sum of Squares	df	Mean Square	F	Sig	
Citizen Responder Myth	0.151	2	0.075	0.083	0.921	
Error	54.516	60	0.909			
Looting Myth	18.839	1.798	10.479	10.004	<.001	
Error	56.495	53.932	1.048			
Martial Law Myth	3.699	1.77	2.09	3.173	0.056	
Error	34.968	53.096	0.659			
Panic Myth	2.323	2	1.161	2.069	0.135	
Error	33.677	60	0.561			
Price Gouging Myth	0.151	1.854	0.081	0.094	0.897	
Error	47.849	55.621	0.86			
Role Abandonment Myth	2.86	1.9	1.505	1.575	0.217	
Error	54.473	56.999	0.956			
Violence Myth	6.731	2	3.366	4.099	0.021	
Error	49.269	60	0.821			
Citizen Responder Reality	1.312	2	0.656	0.766	0.469	
Error	51.355	60	0.856			
Looting Reality	1.613	2	0.806	2.373	0.102	
Error	20.387	60	0.34			
Martial Law Reality	0.065	2	0.032	0.034	0.967	
Error	57.269	60	0.954			
Panic Reality	7.763	2	3.882	6.803	0.002	
Error	34.237	60	0.571			
Price Gouging Reality	2.215	1.722	1.286	1.3	0.278	
Error	51.118	51.658	0.99			
Role Abandonment Reality	1.312	2	0.656	0.766	0.469	
Error	51.355	60	0.856			
Violence Reality	2.86	1.849	1.546	1.959	0.154	
Error	43.806	55.484	0.79			

between Surveys 1 and 3. Additionally, Citizen Responder Myth saw a decrease of 13.04% between Survey 1 and 2, and an increase of 8.33% between Survey 2 and 3, for a gain of 4.35% between Survey 1 and 3.

Table 22- Change of Means across Survey 1, 2, and 3

Factor	Group	Survey 1	Survey 2	MD (1 to 2)	MD % (1 to 2)	Survey 3	MD (2 to 3)	MD % (2 to 3)	MD 1 to 3	MD % (1 to 3)
Citizen Responder Myth	Control	2.875	2.500	-0.375	-13.04%	3.000	0.500	8.33%	0.125	4.35%
	Experiment	3.194	3.290	0.097	3.03%	3.258	-0.032	-0.54%	0.065	2.02%
Citizen Responder Reality	Control	4.688	4.625	-0.063	-1.33%	4.438	-0.188	-3.13%	-0.250	-5.33%
	Experiment	4.161	4.548	0.387	9.30%	4.323	-0.226	-3.76%	0.161	3.88%
Looting Myth	Control	3.063	3.938	0.875	28.57%	3.375	-0.563	-9.38%	0.313	10.20%
	Experiment	3.839	4.935	1.097	28.57%	4.484	-0.452	-7.53%	0.645	16.81%
Looting Reality	Control	4.938	4.625	-0.313	-6.33%	4.375	-0.250	-4.17%	-0.563	-11.39%
	Experiment	4.871	5.032	0.161	3.31%	4.710	-0.323	-5.38%	-0.161	-3.31%
Martial Law Myth	Control	3.188	3.250	0.062	1.96%	3.625	0.375	6.25%	0.438	13.73%
	Experiment	3.065	3.516	0.452	14.74%	3.452	-0.065	-1.08%	0.387	12.63%
Martial Law Reality	Control	4.563	4.813	0.250	5.48%	5.125	0.313	5.21%	0.563	12.33%
	Experiment	4.710	4.677	-0.032	-0.68%	4.645	-0.032	-0.54%	-0.065	-1.37%
Panic Myth	Control	4.688	4.563	-0.125	-2.67%	4.250	-0.313	-5.21%	-0.438	-9.33%
	Experiment	4.452	4.839	0.387	8.70%	4.645	-0.194	-3.23%	0.194	4.35%
Panic Reality	Control	4.188	4.313	0.125	2.99%	4.625	0.313	5.21%	0.438	10.45%
	Experiment	4.065	4.677	0.613	15.08%	4.065	-0.613	-10.22%	0.000	0.00%
Price Gouging Myth	Control	3.688	3.750	0.063	1.69%	3.438	-0.313	-5.21%	-0.250	-6.78%
	Experiment	3.935	3.968	0.032	0.82%	3.871	-0.097	-1.61%	-0.065	-1.64%
Price Gouging Reality	Control	3.688	3.750	0.063	1.69%	3.438	-0.313	-5.21%	-0.250	-6.78%
	Experiment	3.935	3.968	0.032	0.82%	3.871	-0.097	-1.61%	-0.065	-1.64%
Role Abandonment Myth	Control	2.188	2.125	-0.063	-2.86%	1.750	-0.375	-6.25%	-0.438	-20.00%
	Experiment	2.677	2.290	-0.387	-14.46%	2.323	0.032	0.54%	-0.355	-13.25%
Role Abandonment Reality	Control	4.938	5.000	0.063	1.27%	4.750	-0.250	-4.17%	-0.188	-3.80%
	Experiment	4.484	4.613	0.129	2.88%	4.323	-0.290	-4.84%	-0.161	-3.60%
Violence Myth	Control	2.933	3.200	0.267	9.09%	3.000	-0.200	-3.33%	0.067	2.27%
	Experiment	3.742	4.355	0.613	16.38%	3.839	-0.516	-8.60%	0.097	2.59%
Violence Reality	Control	5.188	5.063	-0.125	-2.41%	4.938	-0.125	-2.08%	-0.250	-4.82%
	Experiment	4.935	4.516	-0.419	-8.50%	4.645	0.129	2.15%	-0.290	-5.88%

While the intent of this study was focused on the potential immediate post-movie spikes and long-term decline of trends, a number of factors saw long term gradual trends. These were isolated to the Control group, and provide insight related to other trends occurring outside of the study. Three factors saw a steady increase of ten percent or more including Marial Law Myth (gain of 13.75% increase between Survey 1 and 3), Martial Law Reality (gain of 12.33%

increase between Survey 1 and 3), and Panic Reality (gain of 10.45% increase between Survey 1 and 3). Additionally, Role Abandonment Myth saw a decrease of 20.00% between Survey 1 and 3.

Effect of Independent Variables on Looting Myth Score

Further descriptive statistics focused on the changes in Looting Myth Score across the demographic variables of Gender, Number of Movies Watched, News Viewing, and Primary News source (see Table 23). While both men and women saw a significant increase in *Looting Myth* between Survey 1 and 2, women’s scores were mostly sustained through survey 3, with a net increase of 28.95%. The number of movies watched was associated with a smaller increase in *Looting Myth* between survey 1 and 2, and a smaller net increase between survey 1 and 3. Means

Table 23- Demographic Variables and Looting Myth Variable

Group	N=	Survey 1	Survey 2	MD (1 to 2)	MD % (1 to 2)	Survey 3	MD (2 to 3)	MD % (2 to 3)	MD 1 to 3	MD % (1 to 3)
Looting Myth * Gender										
Men	22	3.676	4.710	1.033	28.11%	3.810	-0.900	-15.00%	0.133	3.63%
Women	22	3.438	4.500	1.062	30.89%	4.433	-0.067	-1.11%	0.995	28.95%
Genderfluid	1	1.000	2.000	1.000	100.00%	1.000	-1.000	-16.67%	0.000	0.00%
Non-Binary	2	2.500	2.000	-0.500	-20.00%	1.500	-0.500	-8.33%	-1.000	-40.00%
Looting Myth * Movies Watched										
3 or less		3.402	4.474	1.071	31.49%	3.962	-0.512	-8.53%	0.560	16.45%
4 or more		3.517	4.350	0.833	23.70%	3.867	-0.483	-8.06%	0.350	9.95%
Looting Myth * Movies Watched (Experimental Group Only)										
3 or less		3.905	5.048	1.143	29.27%	4.524	-0.524	-8.73%	0.619	15.85%
4 or more		3.700	4.700	1.000	27.03%	4.400	-0.300	-5.00%	0.700	18.92%
Looting * News Viewing										
15 minutes or less	25	3.333	4.599	1.266	37.98%	4.306	-0.294	-4.89%	0.972	29.17%
15 to 30 minutes	7	4.000	5.417	1.417	35.42%	5.167	-0.250	-4.17%	1.167	29.17%
30 to 60	6	3.625	4.250	0.625	17.24%	3.875	-0.375	-6.25%	0.250	6.90%
60 to 120	4	3.000	3.750	0.750	25.00%	2.750	-1.000	-16.67%	-0.250	-8.33%
120 to 240	5	2.875	2.625	-0.250	-8.70%	2.000	-0.625	-10.42%	-0.875	-30.43%
Primary News Source										
I do not regularly seek out news media	10	4.00	5.10	1.100	27.50%	4.80	-0.300	-5.00%	0.800	20.00%
News websites on the internet	9	3.56	4.89	1.333	37.50%	3.89	-1.000	-16.67%	0.333	9.38%
Radio	2	4.00	3.00	-1.000	-25.00%	2.50	-0.500	-8.33%	-1.500	-37.50%
Social Media	22	3.41	4.55	1.136	33.33%	4.23	-0.318	-5.30%	0.818	24.00%
Television	4	3.25	3.75	0.500	15.38%	3.00	-0.750	-12.50%	-0.250	-7.69%

for News Viewing were mixed, with individuals watching 1 to 2 hours of news having single digit increases between Survey 1 and 2. Lastly, Primary News Source were mixed, with the

number of individuals responding likely drastically skewing results (e.g. Radio with n=2 had the highest mean at -37.50) .

Reported Disaster Movies

Respondents were asked to note any disaster movies they had watched in the previous three years as part of Survey 2. Responses were freeform text entries with no character limit. This was done for two reasons. First, was to identify potential outliers that may skew results if they had been watching a significant number of disaster movies. In total, 66% of respondents reported watching 3 or less disaster movies in the month prior to Survey 2 (see Table 24), with the highest number reported being 21 movies.

The second purpose of this question was for the sake of content analysis, to be used as an indicator of what qualifies as a disaster movie according to the research participants. Responses received were condensed to a single list, noting the number of responses that included each movie, followed by a categorization of Broad Categories and Specific Categories modeled after the approach used by Montano and Carr (2022). See Appendix F for more information.

Table 24- Survey 2- How many disaster movies have you watched in the last month?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	16	34.0	34.0	34.0
	1.00	4	8.5	8.5	42.6
	2.00	2	4.3	4.3	46.8
	3.00	9	19.1	19.1	66.0
	4.00	6	12.8	12.8	78.7
	5.00	1	2.1	2.1	80.9
	6.00	3	6.4	6.4	87.2
	7.00	1	2.1	2.1	89.4
	8.00	3	6.4	6.4	95.7
	11.00	1	2.1	2.1	97.9
	21.00	1	2.1	2.1	100.0
	Total	47	100.0	100.0	

Summary

This chapter addressed the demographics and results of two separate analyses. The first set analyzed responses to Survey 1 and focused on a baseline of anticipation of disaster myths in human behavior. The second analysis looked at cases that responded to all three surveys, and analyzed the changes in means across these three surveys. The next chapter will discuss these analyses and identify major themes and potential explanations observed by the researcher.

Chapter 6: Discussion

Introduction

This chapter will discuss the data outlined in chapter five, adding context and providing possible explanations for trends observed. The chapter starts by discussing the potential effects of the sample on the findings. Next, the results of Survey 1 are discussed, reviewing the baseline perceptions respondents had related to disaster myths, and if those perceptions matched previous researchers' observations of these same trends. Then the chapter will discuss any trends observed across all three surveys, and the potential explanation of those trends. Finally, the chapter will discuss the disaster movies participants reported watching, and the insight this provides into how individuals categorize a disaster movie.

Effect of Sample

As noted in the Limitations section of Chapter 4, this study was limited by several factors. First, the sample was primarily representative of midwestern states, with nearly 80% of both samples coming from four adjoining states (Iowa, Kansas, Missouri, Nebraska). Second, the sample was primarily white with all other races being represented single digits. Lastly, the age ranges represented were typical of college students, with the majority of respondents being between the ages of 18 and 22. All of these demographic characteristics represent a subsection of the population, potentially skewing the results based on the views shared by individuals within these demographic subgroups.

Baseline Responses to Myths and Realities in Survey 1

As shown by the results of Survey 1 to the disaster myth questions, there is some degree of overlap on certain topics between the perceived frequency of realities and myths. This overlap could have a few explanations. First, both the realities and “myths” may occur simultaneously. It

is certainly possible, for example, to observe a case of looting during a disaster while simultaneously observing that the vast majority of people are not engaged in looting, or observing these behaviors differently across different events. Emergency Management scholars have noted the need for nuance and clarification when discussing disaster myths (Barsky et al., 2006; Fischer, 2008; McEntire, 2004). Defining this concept as a myth implies absolute impossibility, rather than saying that individuals exaggerate the frequency of these rare behaviors and amplify the concerns of residents and stakeholders (McEntire, 2021). In this sense, overlap could be observed as a product of the participants' observations, life experiences, and the specific focusing events they have been exposed to.

A second related factor includes the sources of knowledge and experience with disasters. As noted in the Survey 1 results, over 80% of participants reported their knowledge of disasters coming from social media (86%) and news media (81%), with only 6.6% of participants having disaster specific coursework. In contrast, only 14% of participants reported having firsthand experience with disasters (7.4% as a disaster survivor, 6.6% as a disaster responder). As Kaplan and Tran (2021) note, in 2021 alone over a third of Americans experienced a weather-related disaster. For the midwestern respondents living adjacent to the Missouri River, there was a substantial flood in 2019 that affected everything from morning commutes to supply chain routes (Norvell, 2019). Every respondent in some way or another was affected by the COVID-19 pandemic. It is likely that the numbers may have been different if a third option, experience observing disasters in my region, would have been included. While many respondents no doubt had first-hand experience with one of these events, they may not have felt comfortable calling themselves a *survivor* without having experienced danger or loss. It is also possible that participants' conceptualization of a disaster was such that these events were either frequent and

therefore considered normal, or that these events were not sufficient to meet participants' criteria for what they considered to be a disaster.

A third factor is *Cognitive Dissonance*, a theory posed by Leon Festinger in 1957 (Festinger, 1957). This theory poses that a person holding two opposing viewpoints may experience discomfort, and that this discomfort may lead to cognitions intended to reduce this discomfort (Harmon-Jones & Mills, 2019). These may include “removing dissonant cognitions, adding new consonant cognitions, reducing the importance of dissonant cognitions, or increasing the importance of consonant cognitions” (Harmon-Jones & Mills, 2019, pg. 4). Some factors, like *panic*, can be contextualized in two directions with respondents seeing the myth and the reality to both be true. A person can panic and freeze because of the intensity of their situation, while also making decisions and taking action based on the information at hand. Other factors, like Role Abandonment, are more polar than others because of the context surrounding the topic (Kushma, 2007), as will be discussed later in this section.

The combination of these factors may explain the responses of each individual. Social media and news media can shape the conceptualizations of the individual, and, likewise, conceptualization can shape the sources of media that individual uses. Feeding into those decisions is the knowledge and experience of an individual. A disaster survivor or responder may have a stronger opinion about questions within the survey instrument than an individual who does not have direct experience with disasters. This study's survey instrument used a six-point Likert scale, allowing participants a range of responses, but requiring them to commit to one side of the center-mark, effectively choosing between two responses, but allowing for degrees of committal. Disaster survivors and responders may have had more polar responses based on their experiences, while others may have had more middling responses based on their knowledge and

experience through news and social media. Future research on this topic should take this theory into consideration, both in the conceptualization of the research, and the design of the survey tool.

Additionally, the phrasing of the survey instrument posed a challenge, in that creating distinct observations requires distinguishing language. Language was borrowed from previous studies, with the researcher attempting to create neutral language that communicated the concept, while maintaining the spirit of the source material. Subjective terms such as *steal* versus *take* (within the variables related to looting) were used to communicate intent, but also may have primed respondents. Future studies should evaluate this language, the effect it has on respondents, and suggest alternative language if deemed necessary.

Discussion of Individual Factors from Survey 1

This section will discuss the trends observed from Survey 1. As noted earlier, this sample included 121 individuals with a much greater size and diversity than was observed for the subsequent surveys. This section will focus on the baseline perceived frequency of each myth and discuss the potential explanations for trends observed.

Citizen Responder- Refuted

When asked about survivors taking action following a disaster as opposed to waiting for help, 69.4% of respondents said that waiting for help was rare (inclusive of all responses 1 through 3) and that survivors taking action was much more likely (inclusive of all responses 4 through 6). This may be explained by the individual and household focused response to the COVID-19 pandemic, particularly in the early phases prior to more organized public health campaigns. This could also be a reflection of midwestern culture, and the emergency management systems within those communities. In the rural areas of states like Iowa, Kansas,

Missouri, and Nebraska, collectively representing roughly 80% of the sample, the emergency response system often includes an entirely volunteer fire department (United States Fire Administration, 2023), and a small staff of career emergency medical staff (King et al., 2018) and law enforcement officers (Bradley, 2020). This level of staffing across public safety agencies would suggest that emergency management agencies are similarly short staffed, however, no empirical research has been conducted to date that would confirm this claim.

Looting- Mixed Response

Looting received a mixed response, with 83.5% saying the reality (individuals take essential items) was frequent (inclusive of all responses 4 through 6), and 52.1% saying that the myth (individuals steal merchandise) was frequent (inclusive of all responses 1 through 3). Looting is one of the most persistent myths and one that was highlighted in research following response to Hurricane Katrina and the levee failure (Barsky et al., 2006; Tierney et al., 2006). This is also an example of a myth that has degrees of truth. As Fischer (2008) and others note, some looting did occur after Hurricane Katrina, but, in general, these occurrences are exaggerated by the media, and “non-existent or numerically rare” (p. 67). Concerns are amplified by the news media (Tierney et al., 2006), and more recently in social media as images and short videos quickly move through the population (Hall, 2022). Additionally, trusted sources can amplify these concerns, such as Florida Governor Ron DeSantis warning that looters will be punished, implying that residents would be protecting their homes with firearms following Hurricane Ian (Fox 35 Orlando, 2022). The general concern for safety, amplified by the political context of these issues, may accelerate the dissemination of these stories, leading to a degree of risk perception that is disproportionate to the actual threat of looting.

The myth of looting poses a unique threat to emergency management. The job of emergency managers is to coordinate agencies and resources, and effectively delegate these agencies and resources to address needs within an affected community (Lindsay, 2012). When the ratio is one responder per multiple hundreds of citizens (USFA, 2020), it is not possible to assist every resident and priorities must be established (Argon et al., 2010; Ghanbari et al., 2021). If an elected official is operating under the assumption that looting will be a serious challenge in an upcoming disaster, they are more likely to redirect responders away from disaster response tasks to protect against looting (Tierney et al., 2006). This takes the already small ratio of first responders per citizen and makes it even smaller. The lack of staff may slow down other personnel-dependent tasks such as door-to-door wellness checks or providing additional assistance to individuals attempting to evacuate. It also means those responders are spending more time exposed to the hazard itself, for a threat that is unlikely to occur. Residents inside the area may take this concern of looting and see a personal responsibility to protect their property (Tierney et al., 2006). In some events such as hurricanes this puts residents directly in harm's way, with the potential outcomes including the need for rescue or death (Tierney et al., 2006).

Residents outside of the hazard zone also have a stake, as they are likely contributing financially to this effort. The responders that are redirected to protect against looting are likely part of the request for reimbursement under Presidential Disaster Declarations, a pot of money that is paid into by United States taxpayers. Future studies should evaluate the potential cost of this redirection and quantify just how much money is lost in disasters where looting is a vocalized concern.

Martial Law- Mixed Response

Similar to looting, Martial Law saw a mixed response with 52.1% of participants viewing the myth (martial law is declared after some disasters) as frequent (inclusive of all responses 1 through 3), and 90.1% of participants viewed the reality (communities use existing law enforcement resources to ensure safety of survivors and responders) as frequent (inclusive of all responses 4 through 6). Again, explanations likely can be found in the way news and social media approach the issue, as well as high profile elected officials and stakeholders warning of legal action for any lawlessness. There are few sources that offer a definitive list of martial law declarations, but the Brennan Center for Justice's *Guide to Martial Law in the United States* includes a timeline starting in 1814, and ending in 1963, and in that time span only noting 4 declarations for "natural disasters" (Nunn, 2022). These included the Chicago Fire of 1871, the Galveston Hurricane of 1900, Jacksonville, Florida's Great Fire of 1901, and the Great Dayton Flood of 1913. Rubin (2020) notes that there are significant limitations on how martial law can be used and who can issue a declaration. The military is largely limited from acting as law enforcement and are typically deployed in support of disaster response operations. In this sense, it is possible that respondents associate terms like curfews and the visuals of military being present as part of martial law, without fully understanding the legalities, terms, and conditions of such action. It is also possible they are blending disasters and civil disturbance, martial law declarations being more common for the latter.

Panic- Mixed Response

Both the myth (survivors experience uncontrollable fear and anxiety) and the reality (survivors make informed decisions based on the information they have) were viewed as frequent by over roughly 80% of respondents (inclusive of all responses 4 through 6). This may

be based on respondents' experience of stress, and previous experience within the spectrum between stress and uncontrollable fear. Panic is one of the most common terms used to describe people experiencing a disaster by news media and it may be the case that individuals instinctively use the term in a more colloquial way rather than in a cognitive psychological way.

Price Gouging- Supported

Price gouging following disasters was observed as frequent by 62.0% of participants (inclusive of all responses 4 through 6), and 65.3% of participants viewed the reality (businesses maintain prices after a disaster) as rare (inclusive of all responses 1 through 3). This may be a product of the COVID-19 pandemic, an event which saw a spectrum of price hikes. These included price increases due to supply and demand, increases due to increases in costs and services, rapid national inflation, and in some cases price gouging (Webber & Wasner, 2023). Although price gouging was still relatively rare during the pandemic, when it did occur it tended to receive outsized media attention which may have left people with the impression that it was a widespread phenomenon. Consumers also have trouble distinguishing the various causes of economic phenomena, especially when price hikes are being observed across all sectors, and not just nationally but globally. While the pandemic serves as a unique and standalone example of a focusing event for many reasons (Montano & Savitt, 2020), it may have affected the way Americans see price gouging in disasters.

Role Abandonment- Refuted

When asked about the frequency of first responders not showing up for work due to fear or anxiety over responding to a large-scale event, 79.3% of respondents said this was infrequent (inclusive of all responses 1 through 3), and 78.5% (inclusive of all responses 4 through 6) said responders showing up for work unless personally affected was a frequent occurrence in

disasters. This observation strongly opposes the initial myth and may be a product of the last 20 years. The September 11th attacks of 2001 were followed by a period of remembrance and memorial for first responders, particularly for firefighters, of whom 343 were killed. In the years following the attacks, first responders were recognized for their service during the event, and for their routine work in their community. When *Saturday Night Live*, an institution of entertainment in New York City, came back on the air after the attack, the show took time to honor the service and losses experienced by first responders (Michaels & McCarthy-Miller, 2001). Other ongoing acts of remembrance included memorial stair-climbs, memorial flags and memorabilia, and yearly memorial ceremonies. This collective of actions elevated first responders beyond civil servants, and even beyond their previous status as respected professionals, to new levels of status similar to that of military service members.

Most respondents participating in this study were not born until after the September 11th attacks, and grew up in a society with this elevated perception of first responders. With that in mind, it makes sense that participants would view first responders not showing up out of fear or cowardice to be a rare occurrence. It is possible that the initial myth of Role Abandonment cited by researchers could likewise be explained by other societal narratives feeding into the public's perception of first responders during that era, such as the reported role abandonment that occurred during Hurricane Katrina in New Orleans (Kushma, 2007).

Violence- Mixed Response

The myth of violence (there is an increase of hurtful or aggressive behavior within a community after disasters between survivors, conceptually distinct from domestic violence which typically happens within a family unit) was viewed as frequent by 57.9% (inclusive of all responses 4 to 6) of respondents, however the violence reality (people are generally helpful and

supportive after disasters) was viewed as frequent by 93.4% (inclusive of all responses 4 to 6) of respondents, and had the highest mean of all responses at 5.16 on a 6 point scale. This may be explained by factors similar to those affecting looting such as news and social media, and the statements of stakeholders and political leaders.

Discussion of Trends observed in Survey 1 through 3

While only three statistically significant results were found using the Repeated Measures ANOVAs, it is possible that these were caused by the small sample size of this study. Future studies should attempt to reproduce these results with a greater sample size to confirm that the lack of significance is associated with the responses and not the sample size. It is likely that a large sample size would reduce both the variance of means within groups, and the disproportionate effect a small number of outliers can have within a small sample size.

The sizable change in experimental group means between Survey 1 and 2 for the factors of Looting Myth (+18.28%) and Violence Myth (+10.22%) would suggest that the movie indeed may have affected viewers perceptions of these disaster myths. At the same time, the factor of Panic Reality also saw an increase (+10.22%), suggesting that realities observed in these films may also have an effect. Martial Law Myth also saw an increase of 7.53% in the experimental group, suggesting that scenes of lawlessness or violence in films may influence viewers perceptions. In *San Andreas* these included gun violence, physical altercations between characters, and characters using vehicles without permission of the owner. This effect for Martial Law may also be a product of what is not on scene. Viewers may misperceive a joint disaster response between military and civilian organizations as extending to peace keeping operation and view that as martial law, rather than the operations emergency managers know to be frequent following a major disaster. It is also important to recognize that few individuals, even within

emergency management, fully understand the definition and conditions of martial law. Without that knowledge, respondents are relying on their memory of the buzzword conceptualization of “martial law” when responding as part of this study.

An important finding is that both the control and experimental groups saw a double-digit percentage increase in perception of the frequency of looting, as observed by the Repeated Measures Analysis of Variance discussed in Chapter 5. In general, the control group saw minimal changes across all factors and across all surveys, Looting Myth being the exception. This change may be explained in a few ways. First, it is possible that the movies for both the control group (*Ant Man* (2015)) and experimental group (*San Andreas* (2015)) had content that led to an effect on viewers, changing their perception related to Looting Myth. It is also possible that the current events described in the limitations section of Chapter 4 had an effect on both groups. Given the conditions of this study it was impossible to control for this exposure outside of the study. However, future studies may be able to further study the effects of this influence.

Respondents’ Reported Viewing of Disaster Movies

As part of Survey 2, respondents were asked to list all the disaster movies they had watched in the previous 3 years. These responses are included in their entirety in Appendix F. As Freidman et al. (2014) notes, genre is a product of the relationship between film makers and movie goers, with the most profitable films being imitated and reshaped, giving the audience something new while repeating elements that they loved in previous films. Genres change over time, and often films will pull from multiple genres. Within disaster movies there may be overlap like *The Hurricane Heist* (2018) pulling from disaster movies and heist movies. *World War Z* (2013) blends disaster movies and zombie movies. *This is the End* (2013) pulls tropes from a wide range of movies from disaster films, and post-apocalyptic films like *Mad Max*, all while

including the stoner-comedy tropes for which directors Evan Goldberg and Seth Rogan are famous. This tendency for overlapping genres was observed in the list of disaster movies respondents had recently watched.

Many films reported were ones that often are considered staples of the modern genre, such as *The Day After Tomorrow* (2004), *2012* (2009), and *Geostorm* (2017). These movies are standard examples, exemplifying the genre elements noted by authors like Keane (2006) and Yacowar (1977), while also meeting audiences' expectations, as noted by Montano and Carr (2022). If each movie had a hypothetical genre spectrum with one end being purely *disaster movie* genre, and the other end being another genre it is pulling from, these films are entirely on the *disaster movie* end.

A large category that would see movies across this hypothetical genre spectrum would be pandemic and zombie movies. Both have a similar core plot mechanism in that there is a disease that is quickly moving through a population and threatens the lives of the main characters. For pandemic movies, this plot stays within the realms of our day to day reality and shows us how our societal structures would respond. *Contagion* (2011) famously followed this plot, so well that it experienced a resurgence in 2020 as people sought an understanding of their current pandemic (Jabr, 2020).

Zombie movies follow a similar plot line but move beyond the experience of our realities into a world where the dead are reborn into an altered state of consciousness and continue to spread the disease. Many of these zombie movies feature scenes that look nearly identical to pandemic movies: shots of a sick individual moving into a busy space like a subway car, closeups on points of physical contact like handrails or doorknobs, the spread of saliva droplets or blood by infected individuals. In this way, zombie movies could also be classified pandemic

movies, and more generally as disaster movies, however, as Montano and Carr (2022) note, genre is decided by film makers and studios.

Another movie reported as a disaster movie was *Planet of the Apes*. This is a franchise of movies, and the respondents were not specific about which one. In general, the franchise follows the demise of the human race as they are overtaken by other primates, leading to apes being the dominant species on earth. The original 1968 film showed this ape-dominant future occurring in the year 3978, but more recent films have developed a prequel canon. *Rise of the Planet of the Apes* (2011) features the moment where an act of genetic engineering goes wrong, giving way to a global pandemic. During the end credits, a main character is shown experiencing a nosebleed while standing in an international airport. The shot then cuts to a global map, charting the rapid spread of the disease and laying the backstory for the original 1968 film.

While not flagged in any previous literature, this film clearly met the criteria of one respondent to be categorized as a disaster movie. This is an excellent example of how difficult it is to set clear parameters defining a disaster movie. Montano and Carr (2022) discussed the challenge of understanding the criteria that viewers use to determine inclusion into a genre. Their article used IMDB and the genre flagging system within the website to filter movies. However, the question IMDB asks users *is this a disaster movie*, not *what makes this a disaster movie?* Teasing this out through inference is the only option available.

One line of logic that respondents may be following is *this looks like a disaster, so this is a disaster movie*. That might explain why so many Marvel superhero movies were mentioned. At least three individuals referenced one or multiple superhero movies when asked which disaster movies they had watched in the previous three years. Many superhero movies include imagery of

cities being destroyed, and on occasion forces of nature being wielded by bad actors that may resemble nature based or meteorological disasters.

Other movies face this same challenge of determining why it was included. Were *Troy*, *Independence Day*, and *Shin Godzilla* included because they show the destruction of a city? Were *Everest*, *Adrift*, and *The Martian* included because they were about humans experiencing failures of human technology under severe stresses of nature? Or are some of these included because they feature humans facing life threatening conditions for extended periods of time?

These questions were not the focus of this study, and the researcher determined early on that the time required for participation in the study was already significant. Adding these questions may have further decreased the completion rate across the three surveys. Future studies should consider how average citizens conceptualize disasters, and the implications that may have for their support of emergency management professionals, as well as associated legislation and policy at the national level.

Some emergency management researchers have anecdotally noted the lack of awareness some United States citizens have of the emergency management system, however, to the researcher's awareness, no nationwide surveys on this topic have been published. Further exploration may shed light on this topic, focusing on the disconnection between what citizens see and understand, and what the realities are. If viewers see the Federal Emergency Management Agency (FEMA) handing out bottles of water in *Contagion* and staffing reception centers in *Greenland*, but have not seen a local emergency manager in a disaster film since 1997 in *Volcano*, that may affect their perception of how the emergency management system works in the United States.

Notes on the Survey Instrument

An important note for future continuations of this study is the need address the wording of the survey instrument to ensure that it is clear to respondents. As was noted in the results section, four individuals in this study indicated both that they had taken formal classwork related to disaster, and that they had no knowledge of disasters. Similarly, eight individuals indicated they both had no experience with disasters, but also had experience with disasters through TV and social media. One explanation for these responses was a difference between the researcher's and the respondents' definition or conceptualization of *knowledge* and *experience*. Similar challenges can be observed in the operationalization of myth and reality variables, with certain words having different meanings to respective audiences. Future iterations of this survey tool should account for these differences by revising language where appropriate, and, if possible, providing opportunity for clarifying responses from participants to ensure these outliers are addressed and accounted for within the results.

Limitations

One of the greatest potential limitations observed in this study was the small sample size. This is reflected in the Results chapter. This study found a small number of significant findings, it is possible that other significant results may have been found if the sample size were greater. A greater sample size would also allow for greater sensitivity, and reduce the effect of outliers within the study.

Additionally, this sample from this study was not representative of the county as a whole. While diverse within the region, the majority of the sample were from a small cluster of midwestern states. Finally, because the vast majority of participants were enrolled in collegiate courses, the sample differed slightly from the regular curve of socioeconomic status and

education observed in the broader national population.

The possibility exists that participants may have intentionally or inadvertently viewed additional disaster movies, or rewatched the movie they watched as part of the study. Given the limited ability of the researcher to limit their exposure outside of the study, this limitation was accounted for by asking participants to self-report additional disaster movies they viewed as part of the pre-test and post-tests. This allowed the researcher to identify those participants that may have been influenced by additional films in case their responses needed to be controlled for as an outlier.

The viewing conditions of the film may have potentially affected the results of this study as well. In order to generalize results generated from this study, the context and conditions of viewing should be similar for all participants. Related studies referenced in the literature review for this study have used a mix of viewing films in theaters and viewing films in homes or classrooms. This study asked participants to view films either in collegiate classrooms or in their personal residences based on the structure of the specific course section they were in. It was not possible to standardize this viewing mode as some classes were entirely online while others were in person.

It is possible that there was a difference in engagement and retention of information according to viewing location, which may lead to differences in change in perception. Studies to this point have not discussed this difference, only noted the conditions within the study. The results of this study will articulate this limitation, and include directions related to the specific viewing conditions for the respective samples.

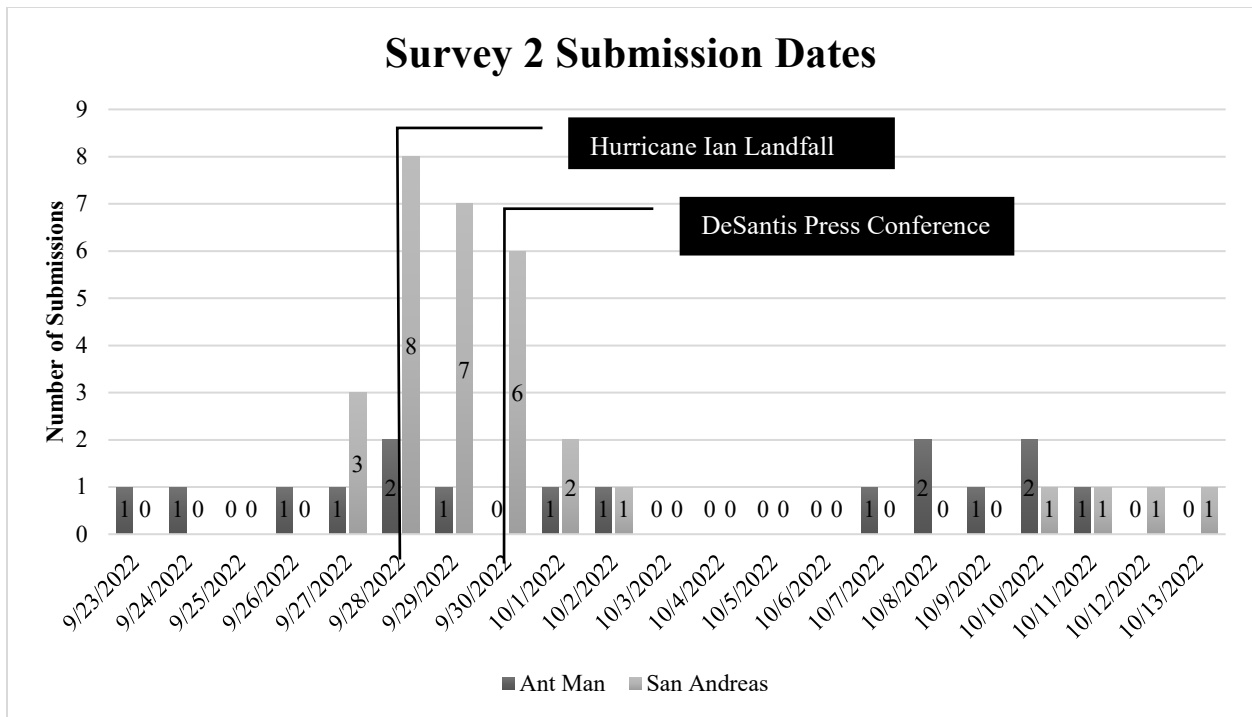


Figure 2 Charting of Survey 2 Submission Dates

One of the greatest limitations of this study included current events occurring outside the study. During the same span of time that participants were submitting Survey 2, Hurricane Ian made landfall on Wednesday September 28th, 2022, in Florida. Governor Ron DeSantis held a press conference September 30, 2022, and as part of his address included discussions of looting, implying that citizens’ may be using firearms to protect their property. He went as far as warning, “don’t even think about looting” (Sabes, 2022, pg. 1). DeSantis was widely recognized at the time as a likely presidential candidate for the Republican Party and received substantial airtime across networks for these types of press conferences in the run up to his reelection in November of 2022.

The earliest responses to Survey 2 were on September 23rd, 2022, and the latest were on October 13th, 2022, with a total of 85% (n=40) of submissions on September 28th or later, and 47% (n=22) of submissions on September 30th or later. See Figure 2 to see a charting of Survey 2

submission dates. It is possible that the media surrounding Hurricane Ian may have affected the responses of both groups related to the Looting Myth variables, a trend discussed in later chapters.

Chapter 7: Conclusion

This study sought to better understand the effect that disaster movies had on individuals' perceptions of disaster myths, and the underlying factors that may explain variance in these perceptions. While limited by the sample size, this study was able to document varied levels of support across these myths as well as provide a baseline for both the myths and associated realities.

The disaster myths as a concept are rooted in the earliest writings of this discipline's founders. Their work documented the observed trends of the time, factors that posed a challenge to managing these major events. These myths pose a heightened challenge to two groups: residents and emergency management professionals.

Residents experience disasters and make decisions based on the information they have. A majority of the respondents in this sample indicated that they get their information about disasters from social media and news media. While disasters are becoming more frequent, and are blanketing the United States with their effects, only 14% of this sample reported having firsthand experience with disasters. This reliance on news and social media to inform residents about disasters poses a major need. Emergency management professionals must work to ensure that the perception of what a disaster is like matches the reality that professionals and scholars know to be true.

For emergency management professionals, the responsibility goes beyond informing residents about the realities of human behavior during disasters. If elected officials and leaders are making decisions based on these myths (they are after all citizens, and may have similar sources for knowledge and experience as the respondents in this survey), it is the responsibility of emergency management professionals and scholars to address this difference. This should not

just be happening at the local level between administrators and emergency managers, but at a national level. Entities like the International Association of Emergency Managers should be developing policy statements and talking points. These myths have the potential to cause the loss of money, as well as the lives of residents and responders alike.

The filmmakers themselves should also be aware of the potential negative effects these films may have on viewers, and use that influence to further accurate depictions of events and professionals. Groups such as the Science and Entertainment Exchange, a program of the National Academy of Sciences, are available and focused on connecting filmmakers with expert practitioners and researchers who can advise on the realities of their respective fields (Science and Entertainment Exchange, 2023).

That being said, myths in disaster movies are rare compared to the image painted by previous researchers. When film selection occurred for this study, *San Andreas* was selected because it ranked high for number of myths featured, which included only three myths (Looting, Panic, Widespread Antisocial Behavior). Even then, these moments constituted far less time within the film than their respective realities.

Beyond movies, the medium of television should also be studied for its effects on viewers. While movies run for only a couple of hours, television series have the capability to continue a story across multiple hours, allowing for greater repeat exposure of the plots within a television show. Children's television for example has the potential to demonstrate disasters and associated protective action, with children watching the show on repeat and seeing that same content multiple times over. There have even been examples of television being used strategically to address the needs of young viewers as they attempt to understand disasters. For example, Sesame Street created a series of episodes called "Big Bird loses his nest", where big

bird shows viewers the experience of losing his home, feeling out of place, and going through the slow process of recovery (Pliskin, 2001). For these television shows that focus on accuracy of content, they can be incorporated into existing youth preparedness efforts such as those through the Ready Kids programs (through Ready.gov), or disaster focused school curriculum (Hayward, 2019; Temurnikar, 2020).

Other shows feature disaster but may be more focused on entertainment than education. One such show, *Spirit- Riding Free*, includes depictions of a pandemic, earthquake, tornado, drought, and even the negative outcomes of oil drilling (Wallington, 2017). Future research should identify how this longer duration and repeated exposure to content may affect viewers (both children and adults) differently.

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Appendix A- Participant Information Sheet

Study Information Sheet

Title of the study: Learning from Disaster Movies

Purpose of the Research: The purpose of this study is to identify what viewers learn about disasters from watching disaster movies.

Procedures: Participants will watch a disaster movie and take three surveys. The movie will be rated PG-13 or lower. Surveys will focus on demographic information, information about disasters, and personal media engagement habits.

Research Location: All research processes will take place online, with participants accessing films and surveys through links provided by their instructor.

Viewing of the film: Instructors have been given the film to show to the class. Please communicate with your instructor to find out how you will view or access the movie.

Total Time Commitment: It is anticipated that your participation will take a total of 3 hours over the fall semester, including all surveys and the viewing of the film.

Potential Risks: The only potential risk is possible adverse effects caused by watching the disaster film. Films are expected to have intense disaster action and mayhem throughout, and brief strong language according to the film ratings system created by the Motion Picture Association of America.

Confidentiality of Records and Responses: Responses to surveys will not be shared with any person outside of the research team. Responses will be stored using a password protected database on a password protected computer. Data will be kept for a minimum of one year and up to five years depending on how long analysis of the data may take.

Benefits of this study: This study will better inform researchers and filmmakers alike as to what information is learned from disaster films, allowing these films to serve a more positive role in the future.

Voluntary Participation: Please know that your participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

Withdrawal from the study: Should you wish to withdraw from the study, please contact your instructor to let them know.

Additional Questions: Should you have any additional questions please feel free to contact the Principal Investigator (lead researcher) John Carr at JohnCarrEM@gmail.com .

Appendix B- Survey 1: Pre-Test

Survey 1: Pre-Test

* Required

Consent and Identifier Information

Thank you so much for your willingness to participate in this study! This section is focused on communicating about the study. The purpose of this study is to identify what viewers learn about disasters from watching disaster movies. Participants will watch a disaster movie and take three surveys. The movie will be rated PG-13 or lower. Surveys will focus on demographic information, information about disasters, and personal media engagement habits. All research processes will take place online, with participants accessing films and surveys through links provided by their instructor. It is anticipated that your participation will take a total of 3 hours including all surveys and the viewing of the film. The only potential risk is possible adverse effects caused by watching the disaster film. Films are expected to have intense hazard event action and mayhem throughout, and brief strong language according to the film ratings system created by the Motion Picture Association of America.

Please know that your participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Should you wish to withdraw from the study, please contact your instructor to let them know. Should you have any additional questions please feel free to contact the Principal Investigator (lead researcher) John Carr at JohnCarrEM@gmail.com.

A full description of this study is available at this link: [CLICK HERE](#)

Your name and email address will be used to connect survey data, and will be removed from your responses prior to analysis.

1. I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description. *

Mark only one oval.

Yes

2. I understand that my participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. *

Mark only one oval.

I understand

3. Inclusion requirement: I am at or above the age of 18 and currently living in the United States.

Mark only one oval.

I am

4. First Name *

5. Last Name *

6. Email (school email preferred) *

7. Confirm Email (school email preferred) *

8. School Name

Demographic Information

9. Age *

10. Gender *

Mark only one oval.

- Male
- Female
- Prefer not to say
- Other: _____

11. Race *

Mark only one oval.

- Asian
- American Indian or Alaska Native
- Black or African American
- Hispanic/Latinx
- Native Hawaiian or Other Pacific Islander
- White
- Two or More Races
- Other: _____

12. In what state/territory do you live (where is your permanent address)? *

13. In what country do you live (where is your permanent address)? *

Mark only one oval.

- United States
- Canada
- Other: _____

14. What size of community do you currently live in? *

Mark only one oval.

- City- 200,000 people or more
- Small City- 50,000 to 200,000 people
- Large town- 10,000 to 50,000 people
- Smaller town- 1,000 to 10,000 people
- Very Small town- less than 1,000
- I don't know

15. Education (highest degree completed) *

Mark only one oval.

- 12th grade or less
- Graduated high school or equivalent
- Some college, no degree
- Associate degree
- Bachelor's degree
- Master's Degree
- Doctoral Degree

16. List the degrees you have completed (e.g., MS in Sociology, or BS in Biology)

17. List any degrees you are IN THE PROCESS OF completing (e.g., MS in Sociology, or BS in Biology)

18. Knowledge of Disasters: check all that apply *

Check all that apply.

- I have no knowledge of disasters
- I have learned about disasters from seeing them on social media (Facebook, Instagram, Twitter, YouTube, etc.)
- I have learned about disasters from news media (television, radio, newspapers, etc.)
- I have learned about disasters from classes that are not focused on disasters (e.g., earth science classes talking about earthquakes)
- I have learned about disasters from disaster-specific classes (e.g., Introduction to emergency management, Natural Hazards)
- I have or are pursuing a degree in a disaster related field

19. Experience with Disasters: check all that apply *

Check all that apply.

- I have no experience with disasters
- I have seen disasters depicted on television or on social media
- I have participated in trainings and/or simulations that depict disasters
- I have experienced a disaster first hand as a survivor
- I have experienced a disaster first hand as a responder
- I have experienced multiple disasters as a survivor or responder

Disaster
Related
Content
Part II

This set of questions asks you to say how frequently these things occur in disasters. You will be given an example of human behavior and asked to say how frequently it occurs during disasters on a scale of 1 to 6, with 1 being "rarely occurs during disasters" and 6 being "Frequently occurs during disasters".

20. Communities use existing law enforcement mechanisms to ensure safety of survivors and responders

Mark only one oval.

1	2	3	4	5	6		
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

21. Martial law is declared to ensure safety of survivors and responders

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

22. People are generally helpful and supportive of community members after their community has experienced a disaster

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

23. Individuals take essential items (food, water, baby formula, etc.) from stores and other locations

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

24. Survivors take action during response based on the information and resources available

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

25. Individuals steal merchandise from retail stores and other locations

Mark only one oval.

1 2 3 4 5 6

Rarely occurs during disasters Frequently occurs during disasters

26. Survivors make informed decisions based on their prior knowledge and situation during response

Mark only one oval.

1 2 3 4 5 6

Rarely occurs during disasters Frequently occurs during disasters

Disaster
Related
Content
Part II

This set of questions asks you to say how frequently these things occur in disasters. You will be given an example of human behavior and asked to say how frequently it occurs during disasters on a scale of 1 to 6, with 1 being 'rarely occurs during disasters' and 6 being 'Frequently occurs during disasters'.

27. Survivors are overtaken with sense of uncontrollable fear or anxiety, and make choices they would not typically make

Mark only one oval.

1 2 3 4 5 6

Rarely occurs during disasters Frequently occurs during disasters

28. There is an increase in hurtful or aggressive behavior in a community that has experienced a disaster

Mark only one oval.

1 2 3 4 5 6

Rarely occurs during disasters Frequently occurs during disasters

29. First responders will show up for work unless they are personally effected by the disaster (ex- personal injury, injury of a loved one, children in need of care)

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

30. Businesses increase their prices to capitalize on increased demand

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

31. Survivors do not participate in the response and instead wait on assistance from government agencies

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

32. First responders do not show up for work due to fear or anxiety over responding to a large-scale event

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

33. Businesses maintain their prices immediately following a disaster

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

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Google Forms

Appendix C- Survey 2 : Immediate Post-Test

Survey 2: Immediate Post-Test

* Required

Consent and Identifier Information

This section is a reminder that your participation in this study is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Should you wish to withdraw from the study, please contact your instructor to let them know. Should you have any additional questions please feel free to contact the Principal Investigator (lead researcher) John Carr at JohnCarrEM@gmail.com.

If you have any questions about the purpose of the study, a full description and information page is available at this link: [CLICK HERE](#)

Your name and email address will be used to connect survey data, and will be removed from your responses prior to analysis.

1. I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description. *

Mark only one oval.

Yes

2. I understand that my participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. *

Mark only one oval.

I understand

3. First Name *

4. Last Name *

5. Email (school email preferred) *

6. Confirm Email (school email preferred) *

7. School Name

Movie
Questions

These questions focus on how closely you watched the movie and remember different details.

8. Dwayne "The Rock" Johnson's character is a

Mark only one oval.

- Security specialist
 Biological Researcher
 Helicopter Rescue Responder
 Seismologist

9. During the movie, Dwayne "The Rock" Johnson drives all of the following except for.

Mark only one oval.

- Motorcycle
 Truck
 Boat
 Plane

10. The two brothers in the movie are from

Mark only one oval.

- Italy
 England
 Ireland
 South Africa

11. The daughter (Alex Daddario) and the two brothers find a radio in a

Mark only one oval.

- Police car
 Plane
 Gas station
 Firetruck

Disaster Related Content Part I

12. What is your primary source for news?

Mark only one oval.

- Television
 News websites on the internet
 Newspapers or other print media
 Radio
 Social Media
 I do not regularly seek out news media

- 13. What channels or accounts do you most frequently watch? This could be specific networks or specific individuals on social media

- 14. How many hours a day do you spend watching/listening to these channels or accounts?

Mark only one oval.

- 15 minutes or less a day
- 15 to 30 minutes a day
- 30 minutes to an hour
- 1 to 2 hours a day
- 2 to 4 hours a day
- More than 4 hours a day

- 15. Please list any other disaster movies you have watched in the last month:

Disaster
Related
Content
Part II

This set of questions asks you to say how frequently these things occur in disasters. You will be given an example of human behavior and asked to say how frequently it occurs during disasters on a scale of 1 to 6, with 1 being "rarely occurs during disasters" and 6 being "Frequently occurs during disasters".

28. First responders do not show up for work due to fear or anxiety over responding to a large-scale event

Mark only one oval.

1 2 3 4 5 6

Rarely occurs during disasters Frequently occurs during disasters

29. Businesses maintain their prices immediately following a disaster

Mark only one oval.

1 2 3 4 5 6

Rarely occurs during disasters Frequently occurs during disasters

Disaster Movie Information

30. Before this study, had you seen the film San Andreas before? *



Mark only one oval.

- Yes
- No

31. If yes, how long ago did you view the film?

32. To the best of your memory, please list any other disaster movies you have watched in the last three years:

Appendix D- Survey 3: Six Week Post-Test

Survey 3: Six Week Post-Test

* Required

Consent and Identifier Information

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If you have any questions about the purpose of the study, a full description and information page is available at this link: [CLICK HERE](#)

Your name and email address will be used to connect survey data, and will be removed from your responses prior to analysis.

1. I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description. *

Mark only one oval.

Yes

2. I understand that my participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. *

Mark only one oval.

I understand

3. First Name *

4. Last Name *

14. Individuals steal merchandise from retail stores and other locations

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

15. Survivors make informed decisions based on their prior knowledge and situation during response

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

**Disaster
Related
Content
Part III**

This set of questions asks you to say how frequently these things occur in disasters. You will be given an example of human behavior and asked to say how frequently it occurs during disasters on a scale of 1 to 6, with 1 being "rarely occurs during disasters" and 6 being "Frequently occurs during disasters".

16. Survivors are overtaken with sense of uncontrollable fear or anxiety, and make choices they would not typically make

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

17. There is an increase in hurtful or aggressive behavior in a community that has experienced a disaster

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

18. First responders will show up for work unless they are personally effected by the disaster (ex- personal injury, injury of a loved one, children in need of care)

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

19. Businesses increase their prices to capitalize on increased demand

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

20. Survivors do not participate in the response and instead wait on assistance from government agencies

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

21. First responders do not show up for work due to fear or anxiety over responding to a large-scale event

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

22. Businesses maintain their prices immediately following a disaster

Mark only one oval.

	1	2	3	4	5	6	
Rarely occurs during disasters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frequently occurs during disasters

Appendix E- Institutional Review Board Approval

Institutional Review Board for the Protection of Human Subjects in Research
249 Angle Hall
700 Pelham Road North
Jacksonville, AL 36265-1602

August 31, 2022

John Carr
700 Pelham Rd. North
Jacksonville, AL 36265

Dear John:

Your project "Learning from Disaster Movies" 08312022 has been granted exemption by the JSU Institutional Review Board for the Protection of Human Subjects in Research (IRB). If your research deviates from that listed in the protocol, please notify me immediately. One year from the date of this approval letter, please send me a progress report of your research project.

Best wishes for a successful research project.

Sincerely,

A handwritten signature in black ink, appearing to read 'Lynn Garner', written in a cursive style.

Lynn Garner
Associate Human Protections Administrator, Institutional Review Board

Appendix F- Disaster Movies Watched by Participants in Previous 3 Years

Movie Name (Alphabetical Order)	Count of Responses	Broad Category	Specific Category
911	1	Natural Hazard	Multiple
2012	13	Natural Hazard	Flood
2020	2	Natural Hazard	Earthquake
22 July	1	Terrorism	Active Shooter
13 minutes	1	Natural Hazard	Tornado
28 days later	2	Pandemic	Zombies
28 weeks later	1	Pandemic	Zombies
A Quiet Place	1	Science Fiction	Alien Attack
Adrift	1	Man-Made Hazard	Boat Sinking
Always	1	Natural Hazard	Wildfire
Armageddon	4	Space Weather	Space Object
Battleship	1	War	War
Bird box	1	Science Fiction	Alien Attack
Christmas Twister	1	Natural Hazard	Tornado
Contagion	4	Pandemic	Pandemic
Crawl	3	Natural Hazard	Hurricane
Dante's Peak	6	Natural Hazard	Volcano
Day After Tomorrow	2	Space Weather	Planetary/Astronomical Event
Deep Impact	2	Space Weather	Space Object
Deep Water Horizon	6	Man-made Hazard	Oil Spill
Don't Look Up	6	Space Weather	Space Object
Everest	1	Man-made Hazard	Failed Hiking Expedition
Finch	1	Space Weather	Solar Flare
Geostorm	6	Terrorism	Cyber Security Incident
Gravity	2	Man-made Hazard	Space Travel Incident
Greenland	3	Space Weather	Space Object
Hellfighters	1	Man-made Hazard	Oil Spill
How It Ends	1	Undefined	Undefined
I am Legend	1	Pandemic	Pandemic

Independence Day	3	Science Fiction	Alien Attack
Interstellar	1	Climate Change	Climate Change
Into the Storm	5	Natural Hazard	Tornado
Jaws	1	Science Fiction	Monster
Jurassic Park and World franchise	2	Natural Hazard	Volcano
Lord of the Rings (Series of Movies)	1	Fantasy Movie	Fantasy Movie
Marvel- Avengers	1	Superhero Movie	Superhero Movie
Marvel- Avengers civil War	1	Superhero Movie	Superhero Movie
Marvel- Avengers end game	1	Superhero Movie	Superhero Movie
Marvel- Avengers Infinity War	1	Superhero Movie	Superhero Movie
Marvel- Doctor Strange and Multiverse if Madness	1	Superhero Movie	Superhero Movie
Marvel- Eternals	1	Superhero Movie	Superhero Movie
Marvel- Iron man	1	Superhero Movie	Superhero Movie
Marvel- Spiderman No Way Home	1	Superhero Movie	Superhero Movie
Marvel- Thor Love and Thunder	1	Superhero Movie	Superhero Movie
Megafault	1	Natural Hazard	Earthquake
Men in Black III	1	Science Fiction	Alien Attack
Oblivion	1	Science Fiction	Alien Attack
Only the Brave	3	Natural Hazard	Wildfire
The Perfect Storm	1	Natural Hazard	Hurricane
Planes 2	1	Natural Hazard	Wildfire
Planet of the Apes	1	Science Fiction	Pandemic
Pompeii	2	Natural Hazard	Volcano
San Andreas	12	Natural Hazard	Earthquake
Sharknado	1	Natural Hazard	Tornado
Shin Godzilla	1	Science Fiction	Monster
Shutter Island	1	Other	Other

The 5th Wave	4	Science Fiction	Alien Attack
The Burning Sea	1	Man-made Hazard	Oil Spill
The Core	2	Man-Made Hazards	Geological/Seismological Experimentation
The Day After Tomorrow	7	Natural Hazard	Cold Snap
The Happening	1	Pandemic	Pandemic
The Hobbit (Series of Movies)	1	Fantasy Movie	Fantasy Movie
The Impossible	2	Natural Hazard	Tsunami
The Martian	1	Man-Made Hazard	Space Travel Incident
The Perfect Storm	1	Man-made Hazards	Maritime
The Quake	1	Natural Hazard	Earthquake
The Titanic	5	Man-Made Hazards	Maritime
The Wave	2	Natural Hazard	Tsunami
This Is The End	1	Science Fiction	Paranormal, Magical, and Occult
Train to Busan	1	Pandemic	Zombies
Troy	1	War	War
Twister	19	Natural Hazard	Tornado
Volcano	2	Natural Hazard	Volcano
World War Z	3	Pandemic	Zombies
Zombieland	1	Pandemic	Zombies