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THE SOCIAL CONSTRUCTION OF A DISASTER TYPOLOGY TO ENHANCE OPERATIONAL EMERGENCY PLANNING FOR K-8 PUBLIC SCHOOLS IN SOUTHERN ONTARIO

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Abstract

This dissertation outlines the development of a disaster typology that could be used as a tool for developing operational emergency plans for K-8 public schools with the potential to be applied more generally to other facilities that host vulnerable groups. The theoretical framework used to inform this study is the theory of the social construction of disasters. This theory conceptualizes disasters as being the result of the interaction between social factors, such as risk perception and vulnerability, and the hazards. The author of this dissertation is an emergency management practitioner and brought a perspective informed by both theory and practice of emergency management.

This dissertation applied a multi-method approach to the development of the typology. A draft typology was developed based on the results of an extensive literature review on the social construction of disasters and best practices in emergency planning. The next step was to refine the typology based on insights from 10 detailed semi-structured interviews which were conducted with subject matter experts in the fields of emergency management and schools. To ensure that the typology was valid, the components were tested through the use of a survey questionnaire that was distributed to school principals with a role in emergency planning.

The findings of this research support the inclusion of social construction theory as a key element in emergency planning. A typology based on social construction can be used to account for the decisions that must be made during an emergency and which can be embedded within the planning process, thus making it more operational during an emergency. It further supports the theory that disasters are not solely the result of hazards, but rather are the result of the interaction between humans and the environment.

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Statement of Originality

I, Patricia M. Martel, hereby confirm that I am the sole author of this dissertation. This is a full copy of my dissertation, which includes any final revisions as required and accepted by my examiners.

I certify that the intellectual content is the product of my own work and that all of the assistance received in preparing this dissertation and the sources used have been acknowledged. I understand that copies of this dissertation may be available electronically.

Patricia M. Martel

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Chapter One

General Introduction

1.0 Background and Rationale of Research

This dissertation outlines the development of a disaster typology that is intended to serve as a tool for schools in creating operational emergency plans. While there is a growing body of literature on emergency planning, there has been very little research undertaken on emergency planning for schools in Canada despite children being identified repeatedly as a vulnerable group in the literature and therefore being more likely to experience negative impacts due to an emergency (e.g., Allen et al., 2007; Peek, 2008; FEMA 2010, Wisner et al., 2014). Table 1 presents some of the factors identified in the literature that result in an increased vulnerability for schools.

Factors that Lead to a Disaster (Hewitt, 2005)	Factors that Influence the Vulnerability of Schools (based on Donner, 2007; Friessen and Bell, 2006)	Factors that Influence the Ability of Children to Engage in Protective Actions (based on Allen et al., 2007; Peek, 2008; FEMA 2010).
Greater concentrations of vulnerable populations	Children are perceived as a vulnerable population. Schools host large numbers of children for extended periods.	Children are dependent on adults for guidance and information during an emergency.
Subject to dangerous situations	Hazards can be internal or external hazards that required different protective actions.	Children are dependent on adults to assess the level of risk and to provide information and direction in an emergency. In a school, children may not have access to warning information other than what is provided by teachers and staff.
Lack of appropriate protective actions	Ability to engage in appropriate protective actions is dependent on factors such as having enough warning, the location of hazard (internal vs. external),	Children may not have the knowledge or ability to access the resources

	and having knowledge of protective actions.	needed to engage in protective actions without assistance from adults.

Table 1. This table relates the factors that lead to a disaster as outlined by Hewitt (2005) to the factors that influence the ability of school children to engage in protective actions.

While it is likely that the outcomes and insights of this research are transferable to other types of facilities that host vulnerable groups, this dissertation focused on contributing to the knowledge regarding K-8 schools and emergency planning.

This project is premised on the following argument: Despite advancements and innovations over the last 30 years following multiple high profile incidents at schools such as the Sandy Hook school shooting in Newtown, Connecticut in 2012 and the destruction of the Plaza Towers school in Moore, Oklahoma due to a tornado in 2013, emergency managers continue to struggle with developing operational plans that fully address the needs of vulnerable groups of people (Bissell, 2008; Webb and Chevreau, 2006; Clarke, 1999). Many emergency plans are not used during an emergency (Clarke 1999, Bissell 2008). A key reason why these plans may fall short is because the disaster typology traditionally underlying planning efforts tends to be based on the physical aspects of the event rather than including the way in which disasters are socially constructed (Bissell, 2008; Webb and Chevreau, 2006). As a result, plans are sometimes ineffective and frequently are not applied during emergencies if they do not meet the needs of the group that is exposed to the risk.

The theoretical framework for this dissertation is based upon the theory of the social construction of disasters. This theory shifts disaster studies away from viewing disasters as being solely the result of hazards. While it does not deny that the hazards have a role in the development of a disaster, it argues that social factors, such as vulnerability, are equally important. There are two primary views of social construction that have emerged in geography

and disaster studies (e.g., Oliver-Smith et al., 1999; Cardona, 2004; Hewitt, 2005, Bang, 2012).

No universally agreed upon terms were identified for these views so the terms 'social process

view' and the 'interpretative view' will be used in this research. These terms were inspired by

discussions on the nature of disaster by authors such as Dynes and Drabek (1994), Horlick-Jones

and Prades (2009), and Perry (2007). The social process view focuses on vulnerability concepts

which has been identified as a key concept in studies such as Hewitt (2005), Oliver-Smith et al.,

(1999) among others. The interpretative view addresses risk perception which has been identified

in studies such as Pidgeon et al., (2003). Both of these views encompass factors that have been

found to influence the emergency planning process and the effectiveness of emergency plans.

These views are interrelated since the main areas of study for each of these views, risk

perception and vulnerability, influence each other and can contribute to the level of risk. Well-

designed operational plans address the functional and tactical needs of the group or organization

and provide organizations with a framework to fulfill their key mandates and critical activities.

Other terms have been used frequently in the literature in addition to 'operational' including

'functional' and 'comprehensive'. The term operational was chosen as it was found to be more

common in the practitioner literature to signify a plan that was developed to meet the core needs

of the organization. A typology was developed through the inclusion of these two views that

reimagines the traditional physical-focused typology as one that supports decision making during

an emergency. The typology identifies factors that should be considered when developing an

effective emergency plan. These factors were selected as they contribute to the development of

operational plans by accounting for the needs of the vulnerable group for which the plan is

intended (e.g., their protective action needs). It achieves this by including an understanding of

how hazards and disasters are perceived, who is most at risk of suffering adverse impacts, and the required actions to mitigate harm.

Drawing from the scientific literature, this study began by using a deductive approach to develop a disaster typology that has the potential to enhance operational emergency plans to better meet the needs of vulnerable groups. To ensure that the typology was effective and inclusive of all relevant fundamental characteristics, an inductive approach was then used to test the typology through a multi-method case study approach. This dissertation makes an empirical contribution through the analysis of 10 detailed semi-structured interviews with subject matter experts in the fields of emergency and school management and the analysis of a survey questionnaire distributed to school staff responsible for emergency planning in Ontario (Figure 1).
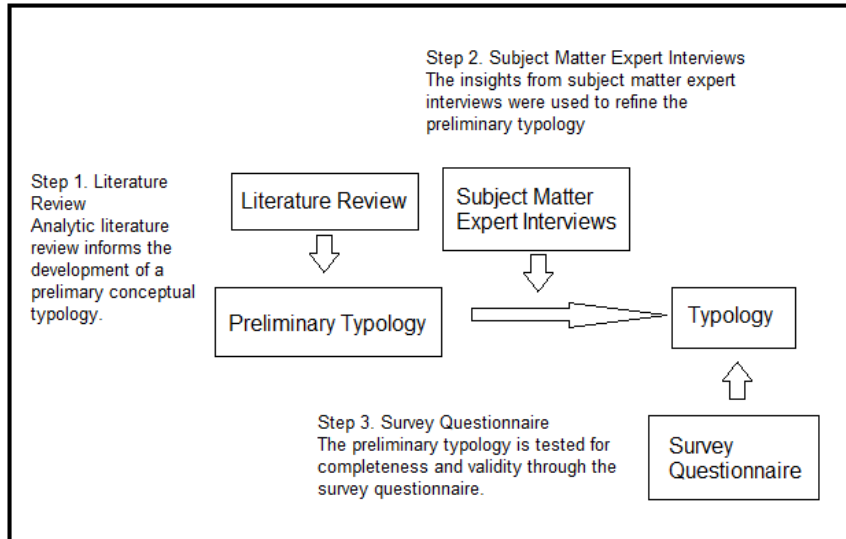
Figure 1. The three steps used in this study.

1.1 Objectives

The overall goal of this research is to advance the knowledge of emergency planning for schools and to present an approach through the development of a typology that could serve to enhance operational emergency planning. Specifically, the three main objectives are:

1) Create a typology aimed at guiding an operational emergency planning approach that incorporates the social construction of disasters in a Canadian context. It will identify the key factors that relate to the needs of schools through a multi-method approach.

2) Validate the typology through a case study of the emergency planning needs of K-8 public schools in southern Ontario.

3) Revise the typology based on the outcomes of the subject matter expert interviews and the case study, and provide recommendations regarding improving operational emergency planning for facilities that host vulnerable groups with a focus on schools.

1.2 Structure of Dissertation

This dissertation consists of six chapters. Each chapter is divided into sections to present key concepts and to allow for a clear progression towards the development throughout the document of an emergency planning typology for schools based on the social construction theory. The first chapter is intended to provide an overview of the dissertation itself, including the background, rationale, research questions, and how this research will contribute to the field of disaster studies. Since the meaning of several key terms in this dissertation vary depending on the field of study and between academia and practice, definitions are provided in Appendix III.

Chapter Two consists of the literature review. This chapter provides an in-depth examination of the literature related to the ideas explored in this dissertation. It begins by discussing the key

ideas associated with the theory of social construction that will serve as the basis for the development of the typology. This includes an overview of the history of this theory as well as a discussion on the acceptance of the theory of social construction in the field of disaster studies. Next this chapter will discuss how social construction can be applied to enhance operational emergency planning for schools. The roles and responsibilities of school staff during an emergency are discussed to provide context on the need for operational emergency planning. The chapter provides information on the use of classification methods in the social sciences and disaster studies and discusses how a typology could be constructed to assist with operational planning for schools.

The materials and methods used for the research are discussed in Chapter Three. This chapter includes an overview of the reasoning behind the selection of K-8 public schools instead of other types of facilities that host vulnerable groups and the selection of the study area used for the survey questionnaire. It provides a detailed explanation of the methodology, the research process, and the data collection methods. Subject matter expert interviews and a survey questionnaire were used to build on the literature review. The outcomes of the interviews and the survey were used to re-evaluate the preliminary typology that was developed based on the literature review.

Chapter Four provides a summary of the results from this research, including the results from the subject matter expert interviews and the survey questionnaire. Each of the factors identified based on the literature review as potential categories in the typology, the subject matter expert interviews, and the survey questionnaire were assessed. The validity and completeness of the preliminary typology was re-evaluated based on the results from this research.

Chapter Five provides a discussion of the results of this study. It provides insights into current emergency planning practices in southern Ontario K-8 public schools. It also identified key principles that could be used to enhance emergency planning/preparedness in general. This chapter provides an overview of the evolution of the typology from the preliminary typology based on the results of the literature review, to a proposed typology based on the results of the subject matter expert interviews and the survey questionnaire.

Chapter Six provides a conclusion and summary of the key findings from this research. It also discusses the limitations associated with the methods used in this study and suggests areas for future research. The final section of this chapter provides a general outline of how this research may be applied to assist in the development of school emergency plans.

1.3 Contribution to Research

This work draws upon the literature covering the social construction of disaster, risk perception, and vulnerability. This research contributes to emergency management theory and practice through the development of a typology that can assist with operational emergency planning for vulnerable groups through a social constructionist lens. The proposed typology utilizes the insights gained from both the literature and a multi-method case study to develop an operational emergency planning approach for vulnerable populations.

Chapter Two

Literature Review

This chapter provides an in-depth examination of the literature related to the ideas explored

in this dissertation. It begins with an overview of past emergencies that have impacted schools in

Canada as well as consideration of future emergencies. It then discusses the key ideas associated

with the theory of social construction, including vulnerability and risk perception, which will

serve as the basis for the development of the typology. This includes an overview of the history

of this theory as well as a discussion on the acceptance of the theory of social construction in the

field of disaster studies. This chapter discusses how social construction can be applied to

enhance operational emergency planning for schools. The roles and responsibilities of school

staff during an emergency are discussed to provide context on the need for operational

emergency planning. The chapter provides information on the use of classification methods in

the social sciences and disaster studies and discusses how a typology could be constructed to

assist with emergency planning for schools.

2.0 School Emergencies

There is a long history of emergencies impacting Canadian schools. Schools may be affected

by many of the natural, technological, and human-caused hazards that can lead to a community

emergency. For example, a very early record of a school being impacted by an emergency

occurred in 1898 when a tornado carved a path through Merritton, which is now a part of St.

Catharines, Ontario. One of the many buildings impacted was the North Ward School. As the

tornado approached, the teacher, Ida Smyth, become aware of the threat and led the 32 students

into a better-protected part of the building. While many of the students were likely saved by these actions, one student was killed and others were severely injured by the storm. The small brick school building was severely damaged with the roof torn off and parts of the walls levelled (Gannon, 1998). Severe weather continues to be a threat to schools in Canada. In 2005 the Lawfield Middle School in Hamilton, Ontario was damaged beyond repair by a tornado shortly after students were dismissed for the day.

While emergencies are often local in nature affecting only a small portion of a community (EMO, 2012), wider scale emergencies that can impact multiple schools do occasionally occur in Canada. For example, The Blizzard of '77 in the Niagara Region of Ontario was a long-duration emergency that began late morning when children were already in schools. More than 2,000 students were snowed in at 24 schools with many stranded overnight. Having the students remain at school overnight required additional resources, such as food, which not all schools had available or were able to prepare due to power outages. In some instances, people living near the schools were reported to have brought food to the staff and students via snowmobile (Niagara Falls Gazette, 1977). A similar long-duration emergency today would also require additional resources such as food, possibly bottled water, medications, and in some cases, even sleeping items. Communication plans would have to include considerations for long duration emergencies regarding how to keep parents informed about their children's wellbeing (Stephens, 1998). A much more recent event, the 2016 Fort McMurray Fire in Alberta, prompted the evacuation of the community and the closure of multiple schools (French, 2017).

The majority of the emergencies that impact communities in Ontario are caused by hazards that are perceived to be natural in origin, such as forest fires, floods, and severe weather (EMO, 2012). However, technological and human-caused hazards also can occur. In 2003, a high-

voltage power line in Ohio shut down. This started a cascade of power failures through southeastern Canada, including most of southern Ontario, and eight U.S. states, resulting in the largest North American blackout in history (Minkel, 2008). Approximately 50 million people were without electricity for up to two days. While schools were not largely impacted during the 2003 blackout because it occurred in the summer when most schools were closed, schools must be prepared for such emergencies because power outages could occur at anytime.

Despite a greater number of high-profile human caused emergencies with considerable media coverage having occurred in the United States (e.g., the Parkland Florida school shooting in 2018), Canadian schools are not immune to these emergencies. In 2016, the small community of La Loche in Saskatchewan experienced an active shooter incident. The shootings took place in two locations, one of which was a school. Another school in the community was placed under a lockdown. Four people were killed, including two people at the school, and seven others were wounded.

Emergencies will continue to impact Canadian schools in the future. It is also possible that the frequency with which schools are impacted by emergencies will increase due to factors such as climate change, which can alter the frequency and magnitude of events. Other factors such as an increasing population may also increase exposure to certain hazards. For example, a population bias is seen in the reporting of tornado occurrences in both the United States and Canada with areas that have a larger population more likely to report tornado occurrences that may otherwise be unnoticed in smaller, rural areas (Elsner and Michaels, 2013). In addition, hazards with long return periods that may have occurred far in the past when population density was much lower may occur again and result in greater damage. For example, the Insurance Bureau of Canada (2013) noted that the risk of a major earthquake affecting a highly populated

area as being one of the most destructive natural disasters that Canada could experience. The return period of a powerful magnitude 9 subduction earthquake in the Cascadia subduction zone, a highly populated area with increased seismic activity, is estimated to be 200-850 years (Structural Engineers Association of B.C., 2012). After studies found that a number of schools in this area would likely be severely damaged, the Province of British Columbia announced a $1.5 billion dollar seismic retrofit program for 750 public schools that were deemed at-risk (White et al., 2008). In addition, public awareness campaigns, such as the Great Shake Out in which many schools participate, are held to increase awareness of the hazard and the necessary protective actions in the event of an earthquake (BC Earthquake Alliance, 2018).

In some areas, provincial legislation is used to help encourage emergency planning activities. The Fire Code in Ontario requires that schools hold drills focused on the evacuation for fires and the requirements of Regulation 298 of the Education Act require schools to hold drills for emergencies other than fire. These regulations are discussed in more detail in section 2.5.2.1 Schools and Protective Actions. Although regulations dictate the requirement for schools to prepare for emergencies, the degree to which schools engage in planning and preparedness activities vary greatly because the initiatives are usually left to the school or school board's discretion.

2.1 The Social Construction of Disasters

This section provides the context that underpins the way in which social construction is understood in this research. This will include the history of the theory and the two primary perspectives associated with social construction, the interpretative view and the social process view. This will lead into a discussion on vulnerability and risk perception as key components of social construction with the potential application to enhance operational emergency planning.

Social construction has been applied to many different areas and topics in the social sciences. In several branches of geography, including human geography and disaster studies, a dominant variant of social construction emerged around how humans interact with and interpret the environment. This perspective is often referred to as the social construction of nature which describes how humans develop their concepts of nature and provides a means to conceptualize the processes by which human preferences and actions influence the natural landscape (Hacking, 1999). This move to a social constructionist view of nature signaled a shift from the more deterministic views in human geography (Archer, 2012), which attributed social processes in a particular location as the result of physical and environmental conditions. Today, social construction is the perspective that underpins much of the contemporary thinking in disaster studies (e.g. Thomas, Phillips, Lovekamp, & Fothergill 2013; Cannon, 2015) and this research project.

The roots of social construction began to emerge in the 1960s in response to positivist views that science was capable of providing purely objective knowledge and that the social sciences research should be guided exclusively by the scientific method (Archer, 2012). The predominant discourse at that time maintained that all 'valid' science should adhere to the tenants of positivism. The acceptance of the scientific method favored the physical sciences, including physical geography, because the common methods within these disciplines, including the collection of quantitative data and the ability to replicate studies, more easily aligned with the positivist orientation.   The positivist view would later result in the emergence of related views, which favoured objective, physical-based explanations (e.g., the cause of a disaster is the physical trigger or hazard), including essentialism. Essentialism argued that biology was the driving force behind social nature and behaviours, and therefore, an objective, physical cause

was responsible for social processes. Given the predominance of these views, other disciplines

within the social sciences and the humanities also attempted to incorporate the scientific method

(Barnes, 2004), even when it may not have been the best fit for their studies.

As the decade progressed, counter arguments began to arise. While positivists asserted

that valid science required the collection of quantitative data, objectivity, replicability, and

favored physical-based explanations, a counter stance developed within some disciplines in the

social sciences and humanities that favoured social-based explanations. These disciplines,

including human and environmental geography, asserted that some research questions within

their fields were more properly understood through qualitative data, the acknowledgement of the

influence of human perception, case study analysis and phenomenological insights (Archer,

2012). Discussions ensued regarding whether complete objectivity was even possible given the

filter of human perceptions and interpretations. These discussions led to the argument that

science itself was a socially constructed activity dependent on consensus among scientists

regarding the nature of reality rather than impartial, objective observations (Archer, 2012). This

view was supported by key works such as Kuhn (1962) who concluded that science itself

consisted of a series of paradigms subject to shifts. Since scientists as humans already have a

worldview or interpretation of the world through which they perceive reality, this negates any

absolute objectivity. These views would set the stage for greater acceptance of social

construction through the acknowledgement that social processes may exert an influence over

perceived physical forces.

The ideas associated with social construction became more prominent in the 1970s as

positivist views were criticized for failing to provide explanations for issues such as gender

discrimination, riots, and environmental degradation (Archer, 2012). Perspectives that moved

toward an inclusion of social theories, such as identity politics, began to gain popularity during this time. Identity politics rejected the essentialist perspective in that it attributed identity to social relationships (Gergen, 1999) rather than physical, biological factors. Following these initial debates, ideas around social construction continued to evolve throughout the subsequent decades to have an important influence on the social sciences, including geography and disaster studies.

Today in the social sciences, social construction generally encompasses the idea that human experiences are influenced by social and interpersonal influences (Gergen 1985, Gergen 1999). While some social construction perspectives do not deny that physical influences exist, the primary focus is on examining the social influences (Owen, 1995).

The acceptance of social construction shifted perspectives in disaster studies away from disasters being solely the outcome of physical factors. If human processes and actions influence nature, then even a disaster perceived to be natural in origin is likely to have been influenced by human activities (Hewitt, 2013; Oliver-Smith, 2011). An example of this would be a flood resulting in a disaster because a town was built in the floodplain. While flooding is part of the natural cycle of the waterway, human alteration of the landscape and stream channels may have exacerbated the potential for flooding and the presence of humans living within the floodplain increased risk. Given the potential for damage, floods move from being perceived as benign, natural occurrences to being considered potential hazards.

By the late 20th century, there was a growing understanding that humans are creating disasters by altering nature, and the related notion that if nature is viewed as being socially constructed then it follows that disasters are also socially constructed (Blaikie et al., 2014;

Hewitt, 2013; Brunsma et al., 2010). Hewitt (2005), for instance, concluded that disasters result

primarily from the greater concentrations of vulnerable populations subject to dangerous

situations, including physical triggers and the lack of ability and/or access to appropriate

protections. Two primary views of social construction emerged in geography and disaster studies

as social construction gained prominence; the social process view and the interpretative view

(Hewitt, 2005). These views will be discussed below.

2.2 The Social Process View and Vulnerability

In the social process view, social factors are viewed as the variables that ultimately

determine whether, how, and to whom disaster occurs (Hewitt, 2005). The social process view

encompasses vulnerability theory that in the context of disaster studies refers to the situation and

characteristics of a person or group that "influence their capacity to anticipate, cope with, resist,

and recover from the impact of a hazard" (Wisner et al., 2004, pg.11). Vulnerability differs

depending on pre-existing social inequalities and differences that result in a higher probability of

experiencing negative impacts from hazard occurrences (Wisner et al., 2004). The vulnerability

approach was applied to explain differences in impact and resiliency between populations

exposed to the same hazard (e.g., Peacock and Girard 1997; Philips, 1993); and to explain

disasters that could not be explained solely by the physical, such as famine caused by war

(Kelman, 2007). The vulnerability approach was able to provide explanations for these

differences where the positivist conceptualizations had been unable to do so. Differing levels of

vulnerability in relation to differences in impacts to different groups within the general

population has been frequently observed following a disaster (Cutter, Mitchell and Scott, 2000).

Research has identified that social factors such as age, wealth disparity, the availability of

warnings, and emergency preparedness education, can contribute to differences in vulnerability

and resiliency. If vulnerability is not addressed, it is more likely that a hazard will evolve into a disaster (White and Haas, 1975; Mileti, 1999; Changnon et al., 2000; Hewitt, 2005 and Kelman, 2011).

The acceptance of a social constructivist perspective in disaster studies can be seen in the way in which we perceive and respond to disasters. The concept of disasters has progressed from a tendency to view disasters as 'acts of God' towards viewing them as 'acts of nature' to more recently, perceiving disasters as 'acts of society' or the outcome of social factors that contribute to vulnerability (e.g., Drabek, 1991; Quarantelli, 2000; White, Kates, and Burton, 2001; Perry and Quarantelli, 2005). While the progression has occurred primarily in the academic community, it should be noted that all views are still present. Table 2 provides a simplified view of this progression.

	Acts of God	Acts of Nature	Acts of Society
Perceived Origin	Disasters have a supernatural origin	Disasters are the result of earth system processes	Disasters are socially constructed and result from human actions
Locus of Control	External to humans	External to humans	Internal to humans
Applicability to Prevention, Preparedness and Mitigation	Very limited action can be taken. A fatalistic approach is often attributed in the literature; however, many societies view spiritual measures such as prayers and rituals to be preventive.	Some actions can be taken, particularly structural engineering measures to mitigate. Prevention is generally not considered possible.	Disasters can be prevented and/or negative impacts can be prepared for or mitigated. Focuses on social measures.
Limitations	Humans are not considered to play a role in the development of a disaster, despite human interaction with the environment.	Downplays the role of humans and vulnerability in contributing to disasters.	Could downplay or even exclude the role of nature or systems.

Table 2. This table highlights the progress in the field of disaster studies towards the general acceptance of the theory of social construction and how past perspectives on the origins of disasters were applied to studies. (Based on Drabek, 1991; Quarantelli, 2000, White, Kates, and Burton, 2001).

Vulnerability theory has contributed to the development of several key models that explored the role of social factors in disasters. These models include the pressure-and-release model and similar frameworks such as the exposure model (Burton, Kates, and White, 1993; Anderson, 2000), and the hazards-of-place model of vulnerability (Cutter, 1996; Cutter, et al., 2000). While previous work explored the social determinants of vulnerability (e.g., Enarson and Marrow, 1998), the pressure-and-release model describes disasters as resulting from the intersection of hazards and the social factors that exacerbate vulnerability. These models have gained increased visibility in the social sciences in the early 2000s especially subsequent to the publication of Wisner et al. (2004) which explored vulnerability theory.

The social process view is applicable to this research as the focus is on developing a typology to assist in emergency planning for facilities that host vulnerable groups. Factors that influence the vulnerability of these groups and their resulting needs during an emergency must be identified to mitigate the impact of an emergency. How these factors are identified and incorporated into a typology will be discussed later in this dissertation.

2.3 The Interpretative View and Risk Perception

The interpretative view argues that disasters arise in part due to differences in risk perception. The concept of risk perception focuses on how hazards and risks are perceived and interpreted as threats (e.g., Slovic 1987, Dake, 1992, Sjöberg, 2000). Risk itself is a social construct (Johnson and Covello, 1987; Nelkin, 1989; Dake, 1992). While risk is generally defined in the natural sciences as the probability distribution of specific impacts arising from an event, defining risk in a social science context has been much more difficult due to different and widespread connotations of the everyday word 'risk' (Renn, 2008). Risk from a public perspective is subjective and has multiple connotations, the most common of which considers

risk as a hazard, probability, consequence, or a potential adversity or threat (Slovic and Weber, 2002). This subjective nature in a public context has given rise to the concept of 'risk perception', which focuses on the effects that risky behaviors, activities or events have on the people who experience them. There is currently no universally agreed upon definition of risk perception, although the definition suggested by Sjöberg, Moen, and Rudmo (2004) has been frequently cited in the current literature. Risk has been defined as the "subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences." (Sjöberg et al., 2004, pg. 8). Cultural theorists have proposed that risk perception is socially constructed (Douglas 1990; Douglas and Wildavsky, 1982; Schwartz and Thompson, 1990) because it is the outcome of common social interactions rather than a technical (physical-based) comprehension of the actual level of risk. The theory that risk perception is socially constructed provides an explanation of why differences in risk acceptance may vary so greatly among individuals (Thompson, Ellis, and Wildavsky, 1990). The decisions made by people based on their perceptions and acceptance of risk can contribute to the evolution of a disaster since risk perception can influence whether people engage in preparedness activities or take protective actions (e.g., Senkbeil et al., 2014).

The interpretative view of social construction has evolved in parallel to the changing perspectives regarding the social construction of nature. The evolution of how risk is understood since the 1970s has also had a profound influence on disaster studies. Despite early work by researchers such as White (1942), through the mid-20th century, risk continued to be perceived as the outcome of solely physical phenomena. The prevalence of the scientific method that favored the physical sciences resulted in a view that an understanding of risk was equal to knowledge of the hazards (Caradona, 2013). The emergence of social construction began to

change this view. Growing acceptance of vulnerability in the late 1970s (e.g., Frazier, 1979;

Maybury, 1986), despite different interpretations, has helped to shift perspectives from risk being

exclusively the outcome of physical phenomena to being influenced by social processes.

The interpretative view is applicable to this research as it influences risk perception. The

perception of risk can either motivate or deter people to engage in protective actions (Senkbeil et

al., 2014) which can influence the effectiveness of emergency plans and procedures. Factors that

influence the perceived risk must be considered to ensure that emergency plans meet the needs of

the group for which the plans are being created. How these factors are identified and

incorporated into a typology will be discussed later in this dissertation.

2.4 Applications of Social Construction in Emergency Management

While the social constructionist view of disasters has gained considerable acceptance in

the 2000s due to the growing acceptance of the social process and interpretative views in disaster

studies (Wisner et al., 2003, Homan 2003, and Hewitt 2005, Kelman 2007, McEntire 2001,

Varley 1994), it is still common for research on disasters to focus on the role of the physical

triggering agents or hazards (e.g., Alexander, 2003, Tobin and Montz 1997) or on the potential

post-disaster issues such as response and impacts (e.g., Lindell and Perry 1992, Burby et al.,

1999). This mirrors the tendency in the practice of emergency management in Canada to identify

and even classify disasters based solely on the triggering agent (e.g., Emergency Management

BC, 2004; Emergency Management Ontario, 2012; Public Safety Canada, 2014). Gilbert (1995)

coined the term 'hazard paradigm' to describe this situation in which disasters are explained as a

function of only the physical triggering agent that happens to impact a vulnerable group. This

paradigm can result in dysfunctional disaster risk reduction strategies because it places the

sources of risk outside of society, which encourages the view of the environment as a hazard or

enemy (Burton et al., 1993; Gilbert 1995) and the role of society as the passive victim (Hewitt, 2005).

This dissertation argues that placing the focus on the physical triggers with little if any consideration for the social construction of disaster is short sighted because the social aspects of disaster can often be modified through prevention, preparedness, and mitigation, rather than many of the physical aspects. This argument does not suggest that the physical triggers should be ignored for both research and planning purposes. In fact, the inclusion of the physical aspects of disasters is not in conflict with the theory of social construction since, as it was noted earlier, social construction approaches do not necessarily exclude the physical processes that may impact people and events, but instead focus primarily on examining social dimensions (Owen, 1995). This work argues that the inclusion of the hazard landscape that considers the causes, similarities and differences between hazards, can provide essential insights into studying disasters (Hewitt, 2005) because factors such as exposure, onset, and duration contribute, together with the social factors, to the development of an emergency. Therefore, in studying the causes of disasters and developing plans intended to mitigate damages, the social elements arising from the social process and interpretative views of social construction and the physical elements must be considered. It is only when they are used in isolation to explain disaster that issues arise (Gilbert 1995, Hewitt 2005).

2.5 School Emergency Planning

This section provides context on emergency planning for facilities that host vulnerable groups with a focus on schools. The roles and responsibilities of school staff during an emergency are discussed to provide context on the need for operational emergency planning.

This includes an overview of the role of planning in emergency management and operational

planning, a method focused on addressing the needs of the target group or facility. This section

discusses how social construction can be applied to enhance operational emergency planning for

schools.

2.5.1 Planning for facilities that host vulnerable groups.

Emergency planning is an essential, proactive component of emergency management.

Planning is used to direct the course of actions in response to an impending emergency or an

actual emergency and contains information on the actions that should be taken to minimize the

impact (Alexander 2002; Public Safety Canada 2012). It enhances the ability and readiness of an

institution, community, household, or individual to react constructively to threats in a manner

that minimizes the negative consequences on the safety of individuals, the integrity and

functioning of property, infrastructure and systems. The primary purpose of emergency planning

is to mitigate loss, support response, and encourage the use of appropriate protective actions. An

effective emergency plan increases the preparedness of an organization to take action to prevent

an emergency from escalating into a disaster.

Previously, little was known about the status of existing emergency planning in schools

in both Canada and the United States (Sapien and Allen, 2001, FEMA, 2010). In the past decade,

research on the status of school emergency planning in United States has increased (e.g. Kano et.

al, 2007); however, a review of the literature turns up little research for Canada. This research

covers what is known regarding school emergency planning in Canada and highlights the key

insights from this literature. This research is crucial since while Canada has not experienced the

same frequency of school emergencies as the United States, Canadian schools have experienced emergencies in the past, as illustrated by the anecdotal evidence outlined above, and will experience them in the future. That necessitates robust emergency plans for schools and school boards.

The needs of the vulnerable group may arise from both physical and social aspects of disasters and may vary at different stages of the emergency cycle. Understanding how the needs of the vulnerable group change during the different stages of an emergency is vital to developing an effective emergency plan. Facilities such as schools that host members of vulnerable groups for long periods must ensure that their emergency plans have been developed to be effective during the warning and impact stages of an emergency before response and recovery. This is because schools have duty of care requirements to ensure student safety on school premises or when involved in school activities off school grounds. Therefore, the responsibility goes beyond simply responding to an emergency. A school administration must consider how it will keep students safe during an imminent or occurring emergency. This requires the plans to include considerations related to emergency notification and protective actions.

Since schools are a part of the community they serve, they must also plan for a disruption in the resources required to recover from an emergency situation. On the night of April 4, 2017, an EF2 tornado destroyed the Goodman Elementary School in Goodman, Missouri. The extent of the damage resulted in the closure and eventual demolition of the school building. After being closed for a few days, the school, working together with the school board and neighbouring schools, was able to find spaces to house the displaced students and staff so that classes could continue at undamaged locations. While the school was initially spilt by grades due to a lack of space, a more permanent solution found by moving everyone into a wing of another school. In

this case, the track of the tornado resulted in severe damage to only one school in the area

leaving other schools undamaged and able to assist. Had multiple schools been damaged, space

to host the students and staff affected would have been a scarcer resource which would have

further limited the options available (Olliges, 2018).

2.5.2 Roles and responsibilities of schools.

Schools by their very purpose serve as facilities that host large numbers of members of a

vulnerable group; children. Children have been identified in the literature as being more likely to

suffer the negative impacts of an emergency than other groups (e.g., Cutter et al., 2003; Peek

2008). Hosting large groups of vulnerable children for long periods put schools at greater risk of

experiencing disaster should an emergency occur without adequate operational emergency

planning. It should be noted that schools, as facilities within a community, are subjected to the

laws and requirements of that broader community, municipality, region, province and country.

These laws and requirements include things such as gun control laws, land use zone regulations,

and building codes which can influence the likelihood of an emergency and the level of

vulnerability. For example, Bilham (2010) noted that building codes that required proper

engineering for buildings in earthquake zones could have mitigated the damages caused by the

2010 Haitian earthquake. While the development and implementation of these laws and

requirements are the responsibility of different levels of government, rather than the schools,

they do have a role influencing school and community safety.

Schools have long been identified as requiring emergency planning (Graham et al., 2006,

FEMA, 2010), and recent events such as the destruction of the Plaza Tower school in Moore, OK

in 2013 have further emphasized the need for emergency planning. The broad needs of a school

during an emergency are often outlined in a school's emergency plan or procedures. The most

common general needs, based on a review of 20 available school emergency plans from across

Canada, are to:

1)   Ensure the safety and care for their students, staff members and visitors.

2)   Prevent or reduce damage to property and equipment.

3)   Hasten the return to normal operations.

The vulnerability of children is recognized by the Education Act which outlines the

responsibilities school staff have to ensure the safety of students in their care. In Ontario, school

principals, teachers, and supervisory officers have a 'duty of care' for the students to protect

them from '*all reasonable foreseeable risks of injury or harm*' by Regulation 298 under the

Education Act. Teachers are required by Regulation 298 to *'ensure that all reasonable safety*

procedures are carried out in courses and activities for which the teacher is responsible'. Should

school staff fail to take these measures, then the school board can be found liable in cases of staff

negligence (Berryman, 1998). To ensure that 'all reasonable foreseeable risks' are identified,

school staff must be aware of the vulnerability of children and the potential hazards. This

awareness can assist in the development of effective operational plans to mitigate the impact of

disaster.

2.5.2.1 Schools and protective actions.

A review of the literature and school documents found that there were four general

protective action options that could be used by schools; lockdown, shelter in place, evacuation,

and close in advance (i.e., OFM Guideline 2004, OAPC 2005, Hamilton-Wentworth District

School Board 2016. Table 3 provides an overview of each protective action.

Protective Action	Purpose	Example
Lockdown	'A lockdown is used when there is a major incident or threat of violence within the school, or in relation to the school' (OAPC, 2005). Entry and exit from the building is restricted to emergency services personnel and students are kept in designated locations. Actions are taken to minimize access and visibility of students and staff.	Active shooter
Shelter in Place	'Used for an environmental or weather related situation, where it is necessary to keep all occupants within the school, to protect them from an external situation' (Hamilton-Wentworth District School Board, 2016). Students and staff may be directed to designated areas (i.e. storm shelters) depending on the type of hazard.	Tornado
Evacuation	The urgent exit of people away from an area or building affected by an ongoing threat to an external safe area. Used when the conditions within the school are unsafe or could potentially become unsafe.	Fire
Close in Advance	The school does not open for classes or other activities in advance of a forecasted potential emergency. Children and staff are asked to remain home.	Snowstorm

Table 3. The protective actions available to schools in Ontario.

Schools in Ontario are required to hold fire drills, which cover evacuation, in accordance with Regulation 454 of the Revised Regulations of Ontario, 1990 (Fire Code). Regulation 298 of the Education Act also addresses holding drills for emergencies other than fire:

(1)   In addition to the drills established under the fire safety plan required under Regulation

454 of the Revised Regulations of Ontario 1990 (Fire Code), every (school) board may provide

for the holding of drills in respect to emergencies other than those occasioned by fire.

(2)   Every principal, including the principal of an evening class or classes, or a class or

classes conducted outside the school year, shall hold at least one emergency drill during which

the instruction is given.

(3)   When a fire or emergency drill is held in a school building, every person in the building

shall have a part in the fire or emergency drill.

Students are active participants in these drills as per article three which requires all

people in the building to participate in the drill and to practice protective actions such as

evacuating the building. The Fire Code requires that fire drills be held by schools three times in

each of the fall and spring school terms (OFM Guideline, 2004). Additionally, publicly funded

schools in Ontario are required to hold a minimum of two lockdown drills per school year

(Ontario Association of Chiefs of Police (OACP), 2007). Lockdown drills are intended to

mitigate the impacts associated with an incident or threat of violence within the school, or in

relation to the school. Emergency drills intended to address other types of hazards and practice

other forms of protective actions (e.g., shelter in place during a tornado) are not mandated;

although Regulation 298 s.6 (1) of the Education Act does specify that '*every (school) board*

may provide for the holding of drills in respect to emergencies other than those occasioned by

fire'.

2.5.3 Operational emergency plans.

It has been observed that emergency plans are frequently not followed by those intended

to use the plans during an emergency (Clarke, 1999; Webb and Chevreau, 2006; Bissell, 2008).

Clarke (1999) argued that some plans do not accurately address the identified task of mitigating

the impacts of an emergency as a result of 'symbolic planning'. These 'symbolic planning'

documents, which he refers to as 'fantasy plans', do not meet the actual needs of the organization

in an emergency and have little utility in a real event. For a plan to be effective, the planning

process must include an assessment of the potential problems associated with an emergency and

the development of the plan should work towards addressing these problems (Clarke, 1999;

Perry and Lindell, 2003). Several different terms are used in the literature to refer to plans that

are developed and implemented to address the realistic needs of the target group or organization,

including 'functional plan', 'comprehensive plan' and 'operational plan'. For the purposes of this

research, the term 'operational plan' was selected because the goal of the research is to develop a

typology that can assist with the development of functional and applicable emergency plans.

Operational planning emphasizes the development process including ongoing testing,

updating, and training (Perry and Lindell, 2003), rather than just on the production of a written

document. This broader approach is beneficial in that the planning process can contribute to a

culture of preparedness through the use of a growth mindset approach. By including elements

such as training, exercises, and incorporating lessons learned from previous emergencies as part

of the process, people are able to familiarize themselves with their roles, responsibilities, and

required actions before an emergency strikes. This is particularly important when an emergency

occurs and written plans are no longer accessible or there may simply be not enough time to

review them.

The deliberate inclusion of a social constructionist perspective would allow operational

emergency plans to be better designed to meet the needs of the target vulnerable group during

each phase of the emergency. This research intends to offer a revised emergency management

classification that could contribute to emergency planning by advocating for more plans that

include the social construction of disasters. As noted by Hewitt (2005), disasters arise when

vulnerable populations are subject to dangerous situations and lack access to, or the ability to

use, appropriate protections. Critical aspects of vulnerability and the characteristics of the threat,

as they relate to the needs and abilities of the group to access appropriate protections, need to be considered in developing an effective plan.

2.6 Developing a Typology for Operational Emergency Planning

This section will discuss how the inclusion of the two primary views of social construction can be applied through a typology to enhance operational planning for facilities that host vulnerable groups, in particular, schools. This section begins by providing a general overview of the process of classification and reviews the history of classification in emergency management.

2.6.1 Overview of classification in the social sciences.

Classification is a common tool used in a multitude of fields including the social and natural sciences. It has been used as a descriptive tool in the social sciences, and many classification techniques have been used to address different research questions, with conceptual or qualitative typologies argued to be the most common (Bailey, 1994). Classification is a conceptual technique and an end product that allows for more advanced understanding, description, theory-building and testing, and comparison.

Classification is the general process of dividing entities into groups or classes based on their associations, or relationships (Doty and Glick, 1994). The goal of classification in a statistical sense is to maximize the degree of variance between different groups while minimizing the degree of variance within groups. Some of the primary advantages of classification are outlined in Table 4.

Advantages of Classification	
Forms a solid foundation for both conceptual and empirical research	Identifies similarities and dissimilarities among entities there by reducing complexity.
Presents a list of dimensions and shows the relationships between entities and dimensions.	Allows for the grouping of similar entities for analysis.
Groups can be used as tools for measurement and as an inventory tool.	Can be very versatile.

Table 4. The advantages of classification based on Bailey (1994).

One of the notable features of classifications is that they are not assertions and, therefore, cannot be judged as being true or false (Marradi, 1990 pp. 28) as they "are tools for conferring organization and stability on our thoughts about reality". Classifications can be judged based on their usefulness for a specific purpose because they are tools for organizing objects, events, or thoughts (Kemeny, 1959). The typology developed in this study will be validated through a case study with the specific intent to judge its usefulness and to assess whether the organizational structure could contribute to operational emergency planning.

While classification is commonly used in the social and natural sciences, it is not without criticism, as seen and addressed in Table 5. Bailey (1994) addressed the most common critiques of classification and explained that many of these critiques are not only concerns of classification but are rather issues that arise within social science research in general. Other criticisms arise from the view that classification is "merely pre-theoretical" (Bailey, 1994). However, these criticisms are based on a misunderstanding of the role and use of classification.

Criticism	Response
It is merely descriptive or pre-theoretical.	Classification can be used as a foundation for explanation. Rasch (1987, pp.3) argues that it "should serve as a heuristic device".
There is the possibility that theoretical constructs that do not exist empirically will be treated as if they are 'real' empirical entities.	Bailey (1994) argues that this can often be avoided with a little care in the specification of types.
Classification may be static.	Static classification may be sufficient for conceptual typologies, but many classifications are revisited and evolve over time. For those based on empirical entities, the problems are probably no greater than in statistics in general.
It can be challenging to select categories or dimensions and to identify cases for classification	Testing the validity and completeness of a classification can assist with ensuring that the correct categories or dimensions are selected. Clear objectives and procedures can assist with case identification.
Small classifications with few variables may be too simplistic, while ones with many variables may be unmanageable.	A primary goal of classification is to reduce complexity and insure manageability so a study or an issue would be far more cumbersome without classification. The number of variables can be managed through careful evaluation and the use of subcategories.

Table 5. Critiques of classification based on Bailey (1994).

2.6.2 Classification in disaster studies and emergency management.

Classifications have the potential to contribute to disaster studies and emergency management in several ways by:

- Contributing to a clearer vision of the fields of disaster studies and emergency management by identifying and defining key concepts and attributes.

- Assisting in explaining what appear to be anomalies in study findings as highlighted by Quarantelli (1987) and Perry (2007).

- Advancing emergency management goals towards explanation, comprehensive planning, and risk management.

Quarantelli, as early as 1987, argued for the development of a classification to address what appeared to be anomalies in the findings of disaster studies. An example of an anomaly would be famine which does not necessarily fall under the natural, technological, or human-caused origins used by emergency management organizations (Perry, 2007). Other anomalies included differences in areas such as response, consequences, and risk perceptions. He suggested that these findings were not actually anomalous but were merely the result of an inadequate classification system. An example given by Perry (2007) regarding the use of hazards as a form of disaster classification to address these anomalies suggested that the solution may be as simple as the acknowledgement of different classifications for different hazards existing under an overarching hazard classification.

Another call for the development of classifications came from Perry and Quarantelli in 2005 who stated that "given the broad range of hazards and disasters that can be studied, developing typologies and taxonomies is an essential component of theory building" (Perry and Quarantelli, 2005, pg. 15). Perry furthered this line of thought by cautioning that it is critical that disaster researchers follow the call from Quarantelli (2005) to begin the development and application of typologies to be able to develop a meaningful understanding of disasters. Perry (2005) cautioned, "failing that, the field will continue to amass a disconnected collection of descriptive research that cannot be linked via existing conceptual tools".

2.6.2.1 Academic perspective.

In the academic literature, one of the most commonly referenced typologies was developed by Barton (1963), which he expanded several times since its initial development (Barton, 1969; Barton, 2005). Barton's typology was based on the concept of 'collective stress', defined as situations in which "many members of a social system fail to receive expected

conditions of life from the system" (Barton, 1963, pp.38); or the 'deprivation' of those expected

conditions. The typology displayed in Table 6 was developed based on the spatial and temporal

dimensions of deprivation.

Spatial	Temporal
• National • Regional • Segmental • Local	• Sudden • Gradual • Chronic

Table 6. The spatial and temporal categories chosen by Barton (1963) for the collective stress typology.

Barton would receive praise for the inclusion of spatial and temporal dimensions, which

were used in many other classification attempts (Gillespie, 2005). Prior to Barton's work, there

was not a significant classification that could be applied to preparedness activities. Following the

development of Barton's typology, more classifications were developed that focused specifically

on preparedness (e.g., Dynes, Quarantelli, and Kreps, 1981; Kreps 1989).

Dynes, Quarantelli, and Kreps (1981) developed a list of disaster agent characteristics

that could be used in a typology, although they argued that multiple variations between agents in

the identified dimensions essentially ruled out the development of a meaningful and simple

typology. Disaster agent dimensions were selected due to their significance to community

emergency planning. Dynes et al. (1981), stated that knowledge of the agent would sensitize the

emergency planner to different situations that must be considered in planning (Table 7).

Disaster Agent Dimensions	
• Predictability • Frequency • Controllability • Speed of Onset	• Length of Forewarning • Duration of Impact • Scope of Impact • Intensity of Impact

Table 7. The disaster agent dimensions identified by Dynes et al. (1981).

It is worth noting that most of the dimensions selected by Dynes et al., (1981) are of a

temporal nature (predictability, frequency, speed of onset, length of forewarning, and duration of

impact). While these dimensions do vary, many of them are strongly related to one another. It

can be argued that predictability and length of forewarning are highly related to each other since

a highly predictable event is likely to give a longer warning lead-time due to its predictability.

The speed of onset is also related to the length of forewarning, as a rapid onset event is less

likely to allow for greater warning times. While all these dimensions are useful, it is likely that

the local emergency manager is more concerned with the length of forewarning because the

warning brings the imminence of the emergency to the emergency manager's attention. The

inclusion of frequency as a dimension might be better represented by 'familiarity' since the

functional result of frequency is the population's familiarity with that hazard which has been

shown to influence risk perceptions and ultimately, protective actions (i.e., Lindell, 1994;

National Weather Service, 2011). Similar to familiarity, controllability or the perception of

control has been found to influence risk perceptions (Pearce, 2000). Since risk perceptions have

been found to have a relationship with participation in protective actions and planning activities,

familiarity and control in a planning context may be more meaningful when their influence on

protective actions and planning are considered.

     In 1987, Slovic developed one of the few classifications available at that time that

focused on elements of social construction, the psychometric paradigm. The psychometric

paradigm was developed using a variety of psychometric scaling methods that were used to

produce quantitative measures of risk perceptions of a variety of natural and technological

hazards. This was done with the intent to develop a taxonomy that could understand and predict

responses to the risks posed by these hazards. To achieve this, Slovic used psychophysical

scaling techniques and multivariate analysis to develop quantitative 'cognitive maps' of risk

perceptions. Using approaches from personality theory, Slovic (1987) was able to have

participants rate the hazards on various characteristics such as voluntariness, catastrophic

potential, controllability, and dread. This allows for a classification of the hazards based on these

characteristics (Figure 2)
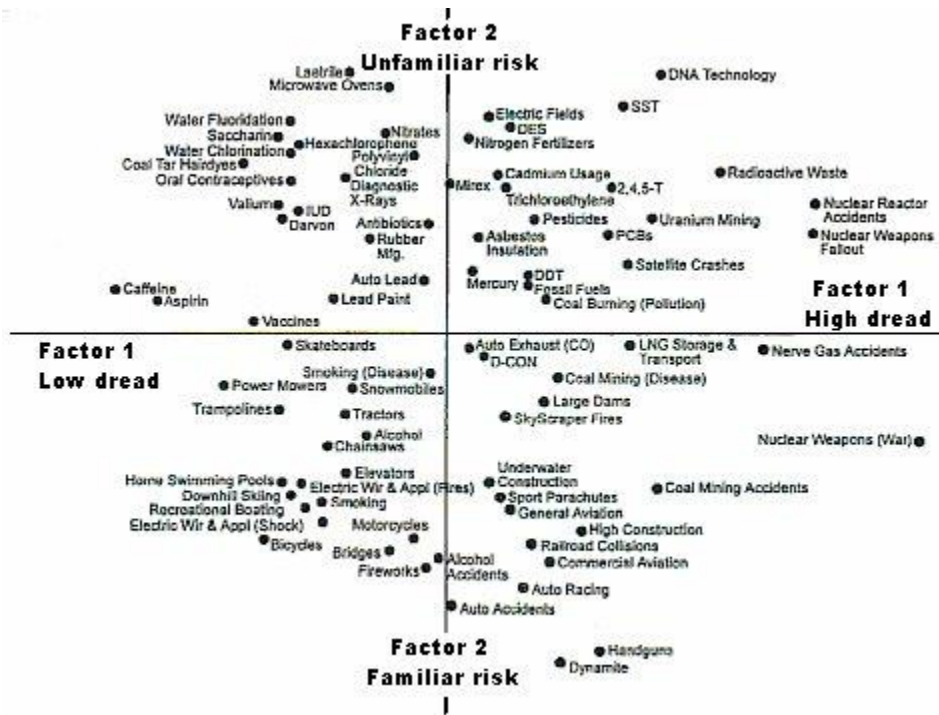
Figure 2. Slovic (1987) found that hazards could be classified based on laypersons familiarity (novelty) with the hazard and the level of dread they felt regarding the hazard through the use of the psychometric paradigm (Slovic, 1987).

It should be noted that since the psychometric paradigm focused on perceptions and

preferences the results are assessments of cognitions, rather than actual behavior (Slovic 1992).

It assumes that risk is inherently subjective; that it is a concept invented by humans to understand

and cope with danger (Slovic, 1992).

The psychometric paradigm does have limitations. Since it uses aggregated data which is

analyzed using principal component analysis, there has been some concern that it does not

account for individual differences in risk perception (Siegrist et al., 2005). The characteristics of

'Dread' and 'Novelty' were found to account for approximately 70-80% of explained variance across all hazards. However, studies such as Gardner and Gould (1989) and Sjöberg (1996, 2002) noted that the level of explained variance dropped to approximately 20% when the perceived risk was regressed across participants for one hazard at a time (Sjöberg et. al, 2004). Another limitation is that while the purpose of the psychometric paradigm was to identify the universal characteristics of risk, there was only the general delineation of groups of individuals as 'experts' or 'lay-people' which lead Marris and Langford (1997) to conclude that the identified characteristics may not be universal. It has also been suggested that the media is able to greatly influence the public's perception of risks (Wåhlberg & Sjöberg, 2000).

Despite these limitations, the psychometric paradigm has been used in a variety of risk perception studies and has been found to be an effective tool for predicting risk perception (Sjöberg et. al, 2004). The process used to develop the psychometric paradigm, in particular the survey using Likert scaling, may be useful in studying risk perception. In this research, Likert scaling may be able to identify differences and similarities in how hazards are perceived within a school planning context. Differences in risk perception that could influence the effectiveness of emergency planning could serve as fundamental characteristics for a typology.

Kreps (1989b) was another early proponent of the development of classification. He argued that "description, taxonomy, and explanation" are equal components in the development and progress of knowledge. He called for the development of new and multiple taxonomies rather than an all-encompassing classification that could account for all causations, impacts, interconnections and intended uses. Kreps argued for the development of multiple 'working' taxonomies that could serve functional purposes. Kreps (1989b) took a different approach from Barton and developed categories based on events, impacts, social units, and responses. Each of

these categories was then subdivided into three other categories; physical, temporal, and social

properties (Table 8).

	Events	Impacts	Social Units	Responses
Physical	Release of energy	Damage	Location	Alterations to the environment
Temporal	Frequency	Duration of the disaster	Timing	Relevancy before, during, or after onset
Social	Declaration of emergency	Degree of disruption	Societal level impacted	Result of institutional practices

Table 8. The disaster taxonomy and examples of each category developed by Kreps (1989a).

Many of the categories and the examples of the items in each category selected by Kreps

are similar to those identified by other classification attempts, in particular, the temporal and

spatial elements, and its focus on the inclusion of elements related to preparedness. In addition,

Kreps included a 'responses' category that would be applicable to emergency planners as it

accounts for actions at different temporal periods during the emergency. Many institutions,

including schools, must account for their roles and responsibilities during the warning and

impact stages of an emergency in their planning and must include responses such as protective

actions in their emergency plans. One of the critiques against taxonomies such as the one

developed by Kreps (1989b) is that several of the categories are actually the consequences of a

disaster (i.e., declaration of emergency) rather than a characteristic of the disaster (Quarantelli,

1988). This would result in them being less useful for planning aimed at addressing the warning

and impact stages in which appropriate actions could prevent or mitigate some of the

consequences.

Burton, Kates, and White (1993) identified seven common measures of hazards. These

measures were: frequency, duration, areal extent, speed of onset, spatial dispersion, and temporal

spacing. These seven measures were selected based on their impact on humans and that they

permitted an emergency to be measured by the type of response that could be used to address them.

In 1997, Tobin and Montz proposed a typology similar to Barton's (1963) and with some elements of Burton et al., (1993), suggesting the use of temporal and spatial dimensions. The categories they recommended are displayed in the Table 9.

Temporal	Spatial
• Rapid Onset	• Diffuse
• Slow Onset	• Concentrated

Table 9. The spatial and temporal categories selected by Tobin and Montz (1997).

They also proposed that another dimension related to 'expected or possible human and material loss' be added to their typology. However, they noted that decisions on what types of losses should be included and different methods of quantifying that information would pose significant challenges to its inclusion.

Perry (2007) undertook a review of the literature on defining disaster and found that a number of researchers who had developed definitions had identified a set of similar dimensions relevant to defining disaster that could perhaps be used for taxonomic purposes. Some of these dimensions mirror or are related to many of those identified by Dynes et al. (1981). Perry (2007) identified speed of onset, scope, and duration of impact as possible categories for classification, all of which are included in Dynes et al. (1981). The fourth category identified by Perry (2007) was 'social preparedness'. While this dimension is not specifically referenced by Dynes et al. (1981), several of the other categories would relate to social preparedness. This would include predictability and frequency, which would influence the familiarity and the existence of warning systems, control which influences risk perception, the length of forewarning which would

influence participation in protective actions, and the intensity, which would address the

population or institution's vulnerability to the event and its capacity to respond and recover.

2.6.2.2 Practitioner's perspective.

Despite increasing acceptance of the social process and interpretative views, and the

work by Barton and others, before the 1980s, in practice, disasters were placed into one of two

simple categories; natural disasters or attacks. This was later expanded to include technological

disasters which were defined by Quarantelli (1981, pp.1) as "*the disaster brought about by*

human error and the collective mistakes of groups". In some cases, the term 'technological' was

used synonymously with 'man-made'. This did not account for the root causes of some disasters,

such as those due to technological breakdowns (i.e., equipment or systems failures) rather than

human error; although an argument could be made that the human error was in failing to identify

and address the potential break down. Nevertheless, over time a distinction was made between

disasters that arose from technology and disasters that were the direct result of human actions,

referred to as human-caused disasters, such as terrorism. By the end of the Cold War, a hazards-

based taxonomy with three primary categories for classifying disasters (referred to in this

dissertation as the 'traditional taxonomy') had emerged (Figure 3).
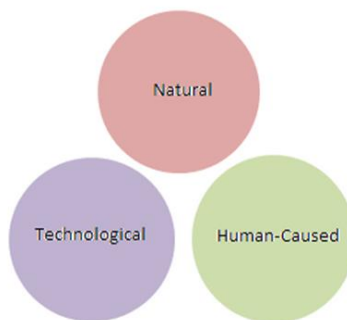
Figure 3. The traditional taxonomy that is still commonly used by emergency management agencies today. Note that the categories are isolated with no overlap.

This classification was problematic as a disaster that is classified as being 'natural' in origin (e.g., a flood) may actually be the consequence of human activity (e.g., paving over natural land which results in an increase in runoff leading to flooding) (i.e., Quarantelli, 1987; Cutter, 2001). While the flooding hazard may be perceived as natural, its occurrence can be strongly influenced by human actions that altered the landscape. Disasters such as these may ultimately be the consequence of both natural processes and human activity. Since some disasters may have multiple origins and may not fit exclusively into one category, it is more accurate to view their origins not as silos, but as more of a spectrum or an interrelationship.

While multiple attempts to classify disasters based on their characteristics have been made, none have been successfully adopted as primary classification systems by emergency management organizations in Canada. While many of the variables identified in the classification above have some relevance to the application of emergency management practices at a local level in Canada, these are rarely directly applied to activities in the emergency management cycle by emergency managers. The variables, if they are used in emergency management, are often used as a subcategory to an overarching classification that is usually agent/hazards based. The hazards-based taxonomy shown above in Figure 3 and similar variations based on origins are still commonly used today by emergency management agencies in Canada (i.e., Emergency Management Ontario, 2012) and internationally (i.e., UNISDR, 2002, FEMA, 2012), although there is some variation in the names of the categories and subcategories. One of the major limitations of this taxonomy is that as the connections between natural processes and human activities are better understood it is apparent that this taxonomy does not account for the complexity, consequences, and vulnerabilities arising from human interactions with the natural environment. Disaster is often described as being the result of the interaction between a physical

force (the hazard) and social factors. The taxonomy commonly used by emergency management

practitioners focuses solely on the physical trigger and does not account for the social

construction of disaster. This typology does not fit well with the practice of emergency

management which has been shifting towards an acceptance of social construction due to

increasing awareness and discourse over the role that these social factors play in the development

of disasters. Another limitation of this taxonomy, as noted by Perry (1989) is that classifications

of this nature are largely based on their perceived traits and do not include much, if any,

theoretical logic; although they are useful as broadly descriptive tools.

2.6.3 Developing a typology for operational planning.

This section will describe the process for developing a classification for enhancing

operational planning that could be applied to emergency planning for schools. It will discuss

guidelines for the development of a classification and how these guidelines could be applied to a

classification in emergency management.

While there are no standard guidelines to developing a classification in emergency

management, Rich (1992) proposed guidelines for the development of an organizational

taxonomy, which can be applied to classification in general. These guidelines proposed by Rich

(1992) are reflected in classifications in the field of emergency management, as noted during a

review of the emergency management literature (e.g., Perry (2007); Barton (2005); Tobin and

Montz (1997); Kreps (1989a); Dynes, Quarantelli, and Kreps (1981) and Barton, 1969). The

guideline developed by Rich (1992) proposes the use of several steps to develop a classification:

1) Theory

2) Meaning

3) Breadth

4) Depth

5) Completeness and Logic

6) Recognisability

A seventh guideline suggested by Rich (1992), 'quantitative measurement' was left out of the guidelines for general classification as it does not apply to all forms of classification, some of which are conceptual or qualitative as are the majority of disaster classifications.

A review of the literature on disaster typologies, including writings by Perry (2007), Tobin and Montz (1997), Kreps (1989), Slovic (1987), and Dynes et al. (1981) revealed several core steps in developing a classification for issues related to emergency management, which have been used in past studies, although not all steps were taken in each individual study. These steps are outlined in a general chronological order below:

1) Identify the purpose and scope of the typology or taxonomy based on a theory or theories.

2) Review literature to identify fundamental characteristics and historical approaches.

3) Review characteristics for linkages and relationships between hazards, vulnerabilities, and impacts.

4) Use characteristics to construct overarching framework of a preliminary typology/taxonomy

5) Assess the typology/taxonomy's completeness and logic through stakeholder input/empirical research

The steps outlined by Rich (1992) and the approach found in the disaster studies literature have similarities which are discussed in the sections below.

2.6.3.1 Theory and meaning.

The first step in the development of a classification is the identification of the intended purpose or reason for the classification based on theory (Rich, 1992). This is also evident in the first step identified from the literature review. A theoretical basis should be used to guide the breadth and depth of the classification. It assists in determining the type of organization/functions that are part of the intended purpose of the classification, the selection of fundamental characteristics and classes, and allows for explanation of the resulting classification. The statement of purpose guides the identification of the fundamental characteristics that will form the basis of the classification. This flows into the second step in which the meaning is developed and explained. This step is not directly referenced as a step in the emergency management literature but is featured in the body of this work. The need for a classification in a broad social context is outlined to support the reasoning of the selected method of classification (Lui Abel, 2008).

According to Bailey (1994) classification can include three levels of analysis in a manner similar to data analysis and theory. The levels of analysis can influence the type of approach taken in classifying entities. These levels are:

1.   The conceptual level in which concepts are classified.

2.   The empirical level in which only empirical objects/data are classified.

3.   The conceptual/empirical level, which is a combination of the other two levels, where a classification is first conceptually created and then is empirically tested.

2.6.3.2 Breadth.

In the second step, breadth, it is decided what type of classification scheme is best suited to the purpose of the classification. This determines the process (empirical process for

taxonomies and conceptual for typologies) and how objects/events are grouped. While many

classifications in the emergency management literature are referred to as 'taxonomies', if we

abide by the suggested division of taxonomy as empirical and typologies as conceptual (Bailey

1994), the majority of these are actually typologies (e.g., the Disaster Research Center (DRC)

typology by Provitolo, Müller, and Dubos-Paillard, 2011). This supports the observation made

by Bailey (1973) and Perry (1989) in that there is still no broad consensus regarding the

distinctions between typologies and taxonomies in the social sciences. The majority of these

typologies are qualitative classifications developed without statistical analysis and may not have

much theoretical logic.

To complicate matters further, terms such as classification, typology and taxonomy can

be used to refer to the process and the result. Since typologies and taxonomies systematically

organize concepts and identify similarities and relationships based on criteria, they can be

viewed as a form of conceptual framework (Rasch, 1987). Since the development of taxonomies

and typologies is a theoretical operation (Walker and Avant, 1983) there are two approaches that

can be used to development a taxonomy or typology; the inductive approach and the deductive

approach (Rasch, 1987). The inductive approach involves the examination of the entities for any

characteristics that may be useful as a basis for classification without a pre-existing conceptual

framework. Once characteristics have been identified, the entities are arranged into groups based

on these characteristics and emergent criteria. Only after the entities have been classified, are

labels developed for each group to specify relationships. The labelling of the groups are usually

concepts that represent the characteristics of that particular group (Hempel, 1952) and in this

way they are descriptive. After classification and labelling, a taxonomy or typology may be

developed which will retroactively specify the principles and procedures for classifying these

phenomena (Rasch, 1987). An inductive approach is usually used when the taxonomy or

typology divisions are easily recognizable and the fundamental characteristics of the entities are

already known, although there are exceptions to this rule (Rasch, 1987). The deductive approach

relies on an existing conceptual framework or theory. Conceptual labels for groups and the

criteria for classification are then built from the conceptual framework or theory (Griffiths, 1969)

which determines how entities will be classified. Although it is not a requirement, a taxonomy or

typology developed through this approach could be tested by using it to actually classify the

entities for which it was created (Rasch, 1987).

It is possible that an individual variable may not be included in the original classification

as it may have not been identified. New variables may be identified as new research becomes

available. This previously unidentified variable may be used to test the usefulness of the

classification. It may be included in previously developed categories or it may be used to form a

new group (Rasch, 1987). If a classification is unable to accommodate a previously unidentified

variable, then the classification may need to be reconsidered. Rasch (1987) stated that

'taxonomies should not be considered as set in stone' and that they may change (Rasch, 1987 pp.

148).

A classification can be based on a single characteristic (one-dimensional) or based on

multiple characteristics (multidimensional) (Marradi, 1990). Multidimensional classifications are

usually based on characteristics that are related and considered in succession. The succession of

the characteristics in a hierarchical classification is very important. The hierarchical

classification is developed by selecting characteristic 'A' as a class then using characteristic 'B'

as a subclass on the next tier. In a hierarchical classification, 'B' cannot be switched with 'A'

without altering the intent of the classification. It is considered a best practice (Marradi, 1990)

that all classes at the same level in a classification have the same degree of generality.

2.6.3.3 Depth.

The next step, depth, is the actual identification of the fundamental characteristics. This

was also found in the disaster classification literature review, although depth is usually

subdivided into several steps including the identification of the characteristics and a review of

the characteristics for linkages and relationships. Classifications should analyse multiple

dimensions in order to select fundamental classes. According to Marradi (1990), classifications

can be developed by identifying the fundamental characteristics of the objects or events that are

to be classified. For example, animals are classified into different kingdoms based on traits or

sets of traits (e.g., warm blooded) that other animals do not possess. These fundamental

characteristics serve as classes for the grouping of individual objects/events based on

relationships or associations (Simpson, 1961). While there is no specific method for selecting the

fundamental characteristics, theoretical guidance, the purpose of the classification and

knowledge of the topic can be used to select meaningful characteristics (Bailey, 1994). There are

many ways, varying in defensibility, in which the fundamental characteristics can be identified.

In some cases, the characteristics may be logical and require little effort to identify. In other

instances, further analysis is required through literature reviews, case study analysis, cluster

analysis, and interviews.

Sells (1964) developed basic guidelines for organizational classification. He argued that

the major sources of variance between the different variables were their defining features. For

example, a color chart could be divided based on the defining features of 'warm' and 'cool'

colors. Once these features have been identified, objects/events can then be assigned to them

based on their relationships and associations. This can be a limitation since a classification is only as useful as the characteristics or variables on which it is based; an argument which can also be made for many forms of statistics, such as cluster analysis.

2.6.3.4 Completeness and logic.

A literature review of disaster classification revealed that a preliminary classification is often developed. This fits within the fifth step proposed by Rich (1992); completeness and logic. The development of a preliminary classification allows for the assessment of whether all events/objects that fall within the scope of the study as defined by the theoretical analysis are included within the classification. All relationships within and between classes and members of classes should also be logical and consistent (Rich, 1992). The basic requirement of classification is that the groups are based on the fundamental characteristics and must be comprehensive and exhaustive, with variables classified into the appropriate groups. If a variable is found that does not fit within a group, then the classification may need to be revised.

The final step is recognisability. This can be ensured by a step often taken in the emergency management literature, whereby the classification's validity is assessed through stakeholder input/empirical research. The classification must represent the real world to both researchers and practitioners. This step also has a strong tie to the previous one in that both are crucial to assessing the validity of a classification.

2.7 Development of the Preliminary Typology

This section will outline the development of the preliminary typology to be used in this research based on the classification guidelines outlined by Rich (1992). The categories of the preliminary typology will be drawn from the literature on the characteristics of an emergency

and the needs of facilities that host vulnerable groups. The literature review will focus on the

social process and interpretative views of the social construction of disaster.

2.7.1. Theory and meaning.

The first step as outline by Rich (1992) and supported by the literature review of disaster

classifications is to identify the reason for the classification based on theory. This paper

hypothesizes that elements of the social construction of disaster have applications to emergency

planning that can enhance operational planning for schools. It is argued that if operational

planning for emergency management is to be effective it should incorporate elements of social

construction that can be used to address the functional and tactical needs of the organization with

the intent of reducing potential impacts. Further, the social process and interpretative views can

be applied in a manner that can assist in the identification of the needs of the vulnerable groups

during an emergency. Once identified, the needs can be categorized to assist in building a

conceptual classification intended for operational emergency planning.

2.7.2 Breadth.

The second step, breadth, is when the type of classification scheme is decided upon based

on its suitability to the purpose of the proposed classification. As noted earlier, the terms

'taxonomy' and 'typology' are frequently used interchangeably in the emergency management

literature. This research will follow the suggestion of Bailey (1994) to view typologies as

conceptual and taxonomies as empirical. Based on this division, a typology would be the most

suitable form of classification for this research since this classification is being constructed

deductively, from theoretical understandings drawn from the literature. Following the guidance

by Griffiths (1969) on the use of the deductive approach, the criteria for classification will be

based on the theory of the social construction of disasters. One of the major benefits of using the

deductive approach is that the typology can then be validated through a case study, and key

characteristics can be adjusted, as needed. Due to the interrelated nature of the variables being

studied (e.g., hazards perceived to be natural tend to be perceived as being unintentional) and the

progressive nature of emergencies (i.e., the emergency cycle), the typology will be hierarchical.

2.7.3 Depth.

Depth is the step in which the fundamental characteristics are identified. This step was

also evident in the emergency management literature, although it was often subdivided to include

the identification of the characteristics and a review of the linkages between characteristics.

According to Marradi (1990), classifications can be developed by identifying the fundamental

characteristics of the objects or events that are to be classified. These fundamental

characteristics serve as categories for the grouping of individual objects/events based on

relationships or associations (Simpson, 1961). While there is no specific method for selecting the

fundamental characteristics, theoretical guidance, the purpose of the classification and

knowledge of the topic can be used to select meaningful characteristics (Bailey, 1994).

The social process and interpretative views of the social construction of disaster will be

the basis for the development of the classification groupings and serve as the first tier of the
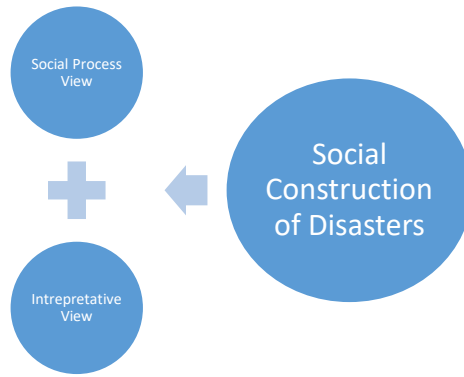
typology.

Figure 4. The two social constructionist views that will serve as the first tier of the typology. This will enhance operational plans since both views encompass factors that can greatly influence whether an incident evolves into an emergency. Factors that influence vulnerability and risk perception based on the social process and interpretative views were examined for potential relevance to a classification to enhance operational planning for facilities that host vulnerable populations and will be used to inform lower level criteria within the typology.

2.7.3.1 Inclusion of the interpretative view in the preliminary typology.

Risk perception has been included in other typologies (i.e., Slovic, 1987) and the role of risk perception as a motivator for understanding the need for protective actions and preparedness was noted in the inclusion of the 'social preparedness' category in the typology created by Perry (2007). Since children are reliant on adults for education on protective actions and for direction during an emergency (Allen et al., 2007; Peek, 2008), the interpretative view will be included in the typology since the risk perceptions of adults are what will influence the decision to develop and implement emergency plans and procedures.

The interpretative view could be included in a typology by mapping the types of critical decisions needed to reduce vulnerability and determining what role risk perception may have in influencing these decisions. The first role that risk perception has during a potential emergency is

in determining the level of risk posed by a hazardous situation. Therefore, the second tier of the

preliminary typology will be labelled 'Risk Perception'. The literature has identified several

categories that can influence how a hazard is perceived including perceived origin, perceived

control, and familiarity. These characteristics will comprise the third tier under Risk Perception.
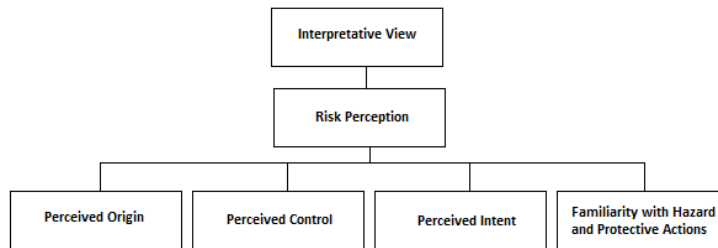
Figure 5. The interpretative view and subsequent tiers for the preliminary typology.

Studies (e.g., Schmidt, 2004; Pearce, 2000, Kaperson and Pijawka, 1985) have found that

the perceived origin of a hazard influences risk perception. Pearce (2000) noted that natural

hazards can be perceived as resulting from a 'lack of control', while technological hazards can be

viewed as arising from a 'loss of control' and that this influenced the perceived level of risk.

These categories are insufficient since there are some hazards that are human controlled, such as

terrorism. Human controlled hazards are fundamentally different in terms of control and intent.

For example, a disaster arising from a tornado is non-intentional and is the result of the

intersection between the hazard and vulnerability. However, a human-controlled hazard is

intentional and is often planned out to have the maximum level of impact through timing,

location, and sequence of events (Bullock, Haddow, and Coppola, 2015; Hausken, Bier, and

Zhuang, 2009). A human-controlled disaster may also involve more uncertainty regarding the

progression of the disaster and response efforts as the sequence and location of events may be

planned out with the intent to disrupt the response process (Pearce, 2000). This is an important

planning consideration as studies such as Donner, 2007 and Slovic and Weber, 2002, have found

that risk perception serves as a motivator for participating in protective actions by bridging the

gap between receiving information (e.g. hazard education) and believing oneself to be vulnerable

(when the perceived risk is high) or not (when the perceived risk is low). In 1990, Mileti and

Sorenson found that people who believe themselves to be vulnerable were more likely to respond

to warnings. Later studies, such as Lindell (1994), found a link between perceived risk and

whether protective actions were taken in response to a threat. Risk perception is an integral part

of most of these stages and therefore, has a direct influence on warning response.

2.7.3.1.1 Familiarity with hazard and engagement in appropriate protective actions.

Familiarity with a hazard, possible impacts, and the appropriate protective actions may

affect organizational and community planning and response through risk perception. Familiarity

has been indicated as being a significant factor in influencing risk perceptions in studies such as

NWS (2011) and Ruin et al., (2007). Whereas familiarity with the negative impacts of a hazard

can lead to an increased risk perception, familiarity with routine occurrences with no negative

experiences (e.g., frequent tornado warnings but no tornadoes, or flood warnings with dry road

conditions) can lead to a 'normalization bias' (Mileti and O'Brien, 1993, Ruin et al., 2007, NWS

2011). A normalization bias can develop when individuals use their experience of routine events

or minor impacts from a hazard to infer their ability to cope with any future occurrence of the

hazard or to assume that future hazards will not negatively affect them (Mileti and O'Brien,

1993).

In contrast, if an organization or community has experienced a disaster triggered by a

particular hazard, the level of risk, the type of expected damage and other forms of impacts may

already be familiar and there will likely be some knowledge of the appropriate protective actions.

Lawrence et al (2014) found that experience with flooding lead to a higher perception of risk and

increased preparedness activities by both communities and individuals. Experience with a hazard

that is associated with loss may influence risk perception by altering any pre-existing optimistic

bias. This is a bias in which individuals perceive themselves to be less at risk in comparison to

others (Trumbo et al., 2014). A study by Helweg-Larsen (1999) looked at how experience with a

disaster, in this case the 1994 Northridge earthquake, shaped optimistic bias. They found that

people who had experienced the earthquake displayed far less optimistic bias and a higher risk

perception than others and that those who experienced a relatively greater loss tended to display

the least optimistic bias.

Studies have found that disasters that are perceived as resulting from nature are more

familiar then those with a perceived technological or human-caused origin (Slovic, 2000;

Kasperson and Pijawka, 1985). This is in part due to a long history of populations being affected

by natural events. Perceived technological disasters are less familiar due to a shorter history and

the frequent need for specialised knowledge and expertise to understand and address the impacts,

restore systems, and contain releases. Human-caused disasters often present an even greater level

of uncertainty since there is only a limited capacity to know in advance where, when and how

these will unfold. Other unknown elements include the motivations of the individuals behind the

attack, the type of agents used (chemical, biological, radiological, nuclear, explosive), and the

duration of the attack (i.e. it would be unknown if there are multiple devices set to detonate at

different times in the case of a terrorist attack).

Interpretative view factors are a necessary component to effective emergency

management for vulnerable groups as they provide the groundwork in the process of determining

the level of risk of an impending hazard. The factors related to risk perception; perceived origin

(whether the hazard is perceived as being natural, technological, or human caused), perceived

control (whether humans are able to control the hazard), perceived intent (whether the hazard's

occurrence was intended by a person/s), and familiarity with the hazard and appropriate response

are included in Table 10. These factors will be included in the preliminary typology as

categories. These factors tie into the 'dread' and 'novelty' elements used in the psychometric

paradigm (Slovic, 1992). As noted previously in section 2.6.2.2, in reality attempts to classify

hazards and emergencies may present as more of a continuum rather than an exclusive grouping.

This is the case for the categories in Table 9, as some hazards may be viewed as not being

exclusive to one category in all situations (i.e. flooding worsened by a levee failure may be

viewed as being due to both a loss of control and a lack of control).

Interpretative View Factors		Scale		
Risk Perception	Perceived Origin	Natural	Technological	Human-Caused
	Perceived Control	Lack of Control	Loss of Control	Human Controlled
	Perceived Intent	None	Unintentional or Negligence	Intentional
	Familiarity with Hazard and Appropriate Response	Familiar	Less Familiar	Unfamiliar

Table 10. The interpretative view factors identified for the preliminary typology. Note, the scale is more of a continuum rather than exclusive, distinct categories.

2.7.3.2 Inclusion of the social process view in the preliminary typology.

Once the interpretative view has been included in the preliminary typology, the next step

is integrating the social process view, which serves as part of the first tier. The social process

view can be included in a similar manner to the interpretative view by identifying the key

decisions required during an impending emergency. These decisions are made to address the

needs of the group during an emergency to decrease vulnerability and can therefore be used to

identify categories. The categories identified based on the literature are perceived vulnerability,

limiting factors, and protective actions and will form the second tier under social process view.
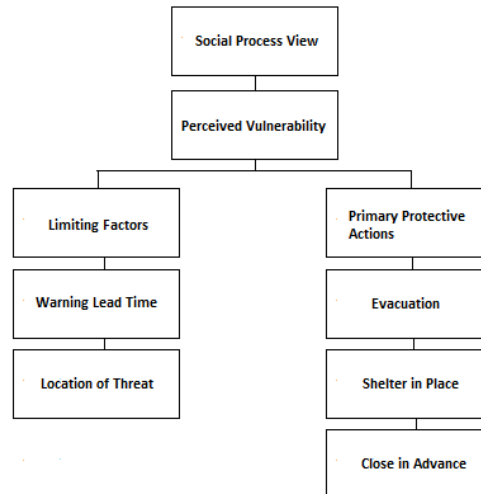
Figure 6. The social process view and subsequent tiers for the preliminary typology.

2.7.3.2.1 Perceived vulnerability.

Once the level of risk has been determined, the next critical decision during an

emergency is often whether the population being care for is vulnerable to the threat. The

authorities responsible for planning must be aware of the groups' vulnerability and the decisions,

actions, and resources required to reduce vulnerability and mitigate impact. If these authorities

are unaware of the level of vulnerability then the emergency plans will not meet the needs of the

group and will not be operational. The level of vulnerability varies between groups and in

different situations (Cutter, 2003).

Children are identified as a vulnerable group of people in the literature (e.g. Cutter el al.,

2003; National Research Council, 2006; Peek, 2008; Peek and Stough, 2010). While children are

a vulnerable group of people due to the limitations that arise from their age, they are also capable

of being resilient to disasters. Emergency planning done with a growth mindset approach can

lead to increased resilience. A growth mindset approach believes that children may not currently

have the knowledge or skills needed to protect themselves but that they can be taught over time

(Dweck, 2010, Blackwell et al., 2007; Dweck, 2006). The results of this study will assist school

emergency planners by identifying opportunities related to social construction for further

education to increase resilience.

Schools by their very purpose serve as facilities that host large numbers of members of a

vulnerable group. This puts them at greater risk of experiencing a disaster (Hewitt, 2005). Table

11 highlights the factors that lead to a disaster as identified by Hewitt (2005) and how those

factors relate to schools.

Factors that Lead to a Disaster (Hewitt, 2005)	Factors Contributing to Vulnerability
Greater concentrations of vulnerable populations	Schools host large number of children for extended periods of time.
Subject to dangerous situations	Schools may be subject to internal or external physical triggers for disasters.
Lack of appropriate protections	Appropriate protective actions depend on factors such as receiving enough warning lead time and knowledge such as the location of the threat.

Table 11. The primary needs of children assessed based on their vulnerability (Allen et al. 2007, Peek 2008, and FEMA 2010) and the factors that lead to a disaster as identified by Hewitt (2005).

Needs that arise from the factors identified by Hewitt (2005) would have to be addressed

by a school's emergency plan for the plan to be operational and effective. For example, since

children in school may take longer to reach the shelter locations, plans must account for the

average warning lead time to ensure that all children can reach the designated shelter locations

for the emergency plan to be operational. In addition, plans must be tailored to account for the

individual school's layout, resources and needs. For example, shelter in place due to a tornado is

not recommended in temporary buildings such as portable classrooms so this would have to be a

planning consideration for schools that use this type of resource. Activation of the plan requires

school staff to perceive risk by being aware of the hazard and perceiving that the school is

vulnerable to the hazard. For example, school staff may perceive an epidemic that impacts

mainly the elderly as posing a high risk to certain populations, but perceive that the vast majority

of the people within the school (children) are not vulnerable. While a small numberof people at

the school may be vulnerable, this situation may require different actions then if a large number

of people were vulnerable.

Perceived vulnerability will be included in the preliminary typology under the Social

Process tier to include differences in the perception of the vulnerability of schools to different

hazards by the authorities responsible for planning. This is a critical inclusion in the typology

which builds from the risk perception category as a low perception of a school's vulnerability

despite a high risk perception may result in fewer planning activities, attempts to educate

students in what to do during an emergency, and plans that do not meet the needs of the

vulnerable group. Risk perception and perceived vulnerability are two interconnected factors that

can lead a decision maker to determine if protective actions are needed to address an impending

emergency.

2.7.3.2.2 Limiting factors for vulnerable groups.

If the level of risk has been determined to warrant further action, the next key decision

for operational planning is to consider whether there are any situational factors that limit the

types of protective actions that can or should be taken in a particular situation. Therefore, the

category labelled 'Limiting Factors' will be included in the preliminary typology. The primary

situational factors that influence the type of protective action are the average lead-time warning

and the location of the threat. Spatial and temporal categories such as these have been used in

many disaster typologies including Barton (1963), Dynes et al. (1981), Tobin and Montz (1997),

and Perry (2007). Knowledge of these situational factors can broadly dictate what protective

actions are necessary or possible to decrease vulnerability and increase resiliency.

A spatial category has been a common feature in disaster typologies with varying scales

from national to local. Due to the focus of this research on schools, a simple local scale approach

will be used in which a hazard occurs either outside of the school or within the school. The

location of the threat is a physical characteristic that will generally be known during most

emergencies (i.e. a tornado presents an external threat to the building in which the vulnerable

group is located, while a fire in the building presents an internal threat). The location of the

threat dictates whether the vulnerable group is safer inside the building or whether they would be

safer evacuating. If a threat is within the building, then evacuation is likely to be the protective

action most likely to minimize impact. The opposite is true for threats that are outside of the

building. In that case, sheltering in place may be required to minimize impact. For some hazards,

such as active shooter scenarios or hazardous materials, the location of the threat is situation-

specific, and could be either internal or external to the school. For these situations, the location

of the threat must be assessed to determine which protective action is required. Table 12 displays

the location of several hazards in relation to schools.

Hazard	Location of Threat
Earthquake	External
Tornado	External
Fire	Internal
Smoke (fire in another location)	External

Hazardous Materials	Situational
Active Shooter	Situational
Snowstorm	External
Hurricane	External
Tsunami	External
Bomb Threat	Internal
Extreme Temperatures	External
Windstorm	External
Thunderstorm	External
Power Outage in School	Internal
Power Outage in Community	External
Forest Fire	External
Ice Storm	External
Volcanic Eruption	External

Table 12. The originating locations of different types of hazards relative to schools (Environment Canada 2015, Natural Resources Canada 2015, Office of the Fire Marshal and Emergency Management 2015).)

Most disaster classifications include a temporal variable that has no uniform label in the

literature (i.e. Barton, 1963, 2005; Dynes et al. 1981; Kreps, 1989b; Perry, 2007). For the

purposes of the preliminary typology, the temporal category will be referred to as 'average lead-

time warning'. Since school staff are responsible for the safety and well-being of proportionately

large groups of children who are dependent on them for guidance during an emergency, the

average length of warning is very important (e.g., FEMA, 2013; Renfrew County District School

Board, 2008). The average length of time between receiving the warning and impact varies for

different types of disasters as demonstrated in Table 13 and the spatial difference between

warnings for different hazards can give the school staff greater or fewer options. For example,

snowstorms can be forecast several days in advance (NWS, 2015) which allows the staff the time

to decide whether the school should be closed on the day of impact. On the other hand, rapid

onset hazards such as earthquakes allow for little to no warning (USGS, 2016) meaning that staff

must plan to be able to meet the needs of students at school at the time of impact. Consideration

of the different warning period lengths allows for more realistic and operational planning. The

need for risk-based plans depends on the nature of the hazard and how it interacts with the

vulnerabilities, however, it should be noted that risk-specific annexes can be developed for all-

hazards plans to avoid duplication in the development of multiple risk-specific plans.

Hazard	Warning Lead-Time	Source
Earthquake	0 to 70 seconds	USGS, 2016
Tornado	Average of 13 minutes	NWS, 2014
Fire	No warning	OFM, 2014
Hazardous Materials	No warning to hours	CDC, 2013
Active Shooter	No warning	OPP, 2014
Snowstorm	3 to 7 days	NWS, 2015
Hurricane	2 days	NOAA, 2015
Tsunami	No warning to several hours	NOAA, 2015
Extreme Temperatures	3 to 7 days	NWS, 2015
Windstorm	Minutes to days in advance	NWS, 2015
Thunderstorm	30 minutes to hours	NWS, 2015
Power Outage	None to a day in advance	OPG, 2015
Ice Storm	3 to 7 days	NWS, 2015
Volcanic Eruption	Days in advance	Red Cross, 2007

Table 13. The general amount of average warning lead-time for specific hazards.

2.7.3.2.3 Protective actions.

As noted by FEMA (2010), appropriate protective actions are needed to provide the greatest level of protection for a vulnerable population. Participation in protective actions is a critical component of operational planning for vulnerable groups as it can significantly reduce the impact of an emergency (FEMA, 2010). Therefore, the third tier in the typology necessary for school operational planning covers protective actions. The primary protective action decision is whether to evacuate, shelter in place, or close a facility such as a school in advance of a potential emergency. The questions that a decision maker must face when confronted with this dilemma are (based on Glickman and Ujihara, 1989):

1) Is there enough time to engage in a particular protective action?

2) Will a particular protective action provide adequate protection?

This category is related to the previous one since the situational factors such as warning lead-time and location of the threat influence which broad protective action is the most appropriate for that particular situation. The situational factors that influence protective action decision making are complex but have been well documented in the disaster literature (Sorensen et al., 2002).

In recent years, there has been a focus on generic or all-hazard planning in which plans are based on general response activities that are undertaken regardless of the specific hazard that triggers the emergency (e.g., evacuation). However, plans that focus on specific activities and protective actions at the earlier impact stage, are required to assess the tactical differences amongst hazards. In these cases, a generic all hazards plan may be the overarching main plan; however, additional hazard specific annexes should be included to convey tactics and protective actions. Protective actions vary significantly between the hazards and some, such as many of the

protective actions for perceived natural hazards are much more familiar and better known to the

general population than others (Wachinger et al., 2012). In addition, the protective actions

required for some types of hazards (e.g., hazardous materials releases) may be dependent on the

situation (e.g., whether the chemical is reactive, whether it stays close to the ground) and may

have a significant impact on what general protective action is appropriate. Table 14 shows

examples of the common protective actions for specific hazards.

Hazard	Location of Threat	Primary Protective Action
Earthquake	External	Shelter in Place
Tornado	External	Shelter in Place
Fire	Situational	Shelter in Place or Evacuate
Hazardous Materials	Situational	Shelter in Place or Evacuate
Active Shooter	Situational	Lockdown
Intruder	Situation	Hold and Secure or Lockdown
Snowstorm	External	Close School in Advance
Hurricane	External	Close School in Advance
Tsunami	External	Evacuate
Bomb Threat	Situational	Hold and Secure, Lockdown or Evacuate
Extreme Temperatures	External	Shelter in Place
Windstorm	External	Shelter in Place
Thunderstorm	External	Shelter in Place
Power Outage	Internal	Evacuate
Ice Storm	External	Close School in Advance
Volcanic Eruption	External	Close School in Advance

Table 14. Not all of these primary protective actions may be appropriate in specific situations. Different
situations will pose different levels of threat. Evacuate is used in this table to denote all situations in

which the common recommended protective action is to leave the site without being able to close the school in advance of student's daily arrival and does not connote a level of threat. The location of the threat is relative to that of the school buildings.

The social-process tier can be subdivided into three secondary tiers; perceived vulnerability, limiting factors for vulnerable groups, and protective actions, as shown in Figure 7. It is important to note that similar to the interpretative view tier, the categories within this tier may also present more of a continuum rather than an exclusive grouping. For example, a decision maker may perceive vulnerability to a specific situation as falling between somewhat vulnerable (impacts are likely to be minor and easily treatable) and very vulnerable (severe impacts on the vulnerable group are possible and pose a threat to life and safety) due to uncertainties arising from a lack of situational information.
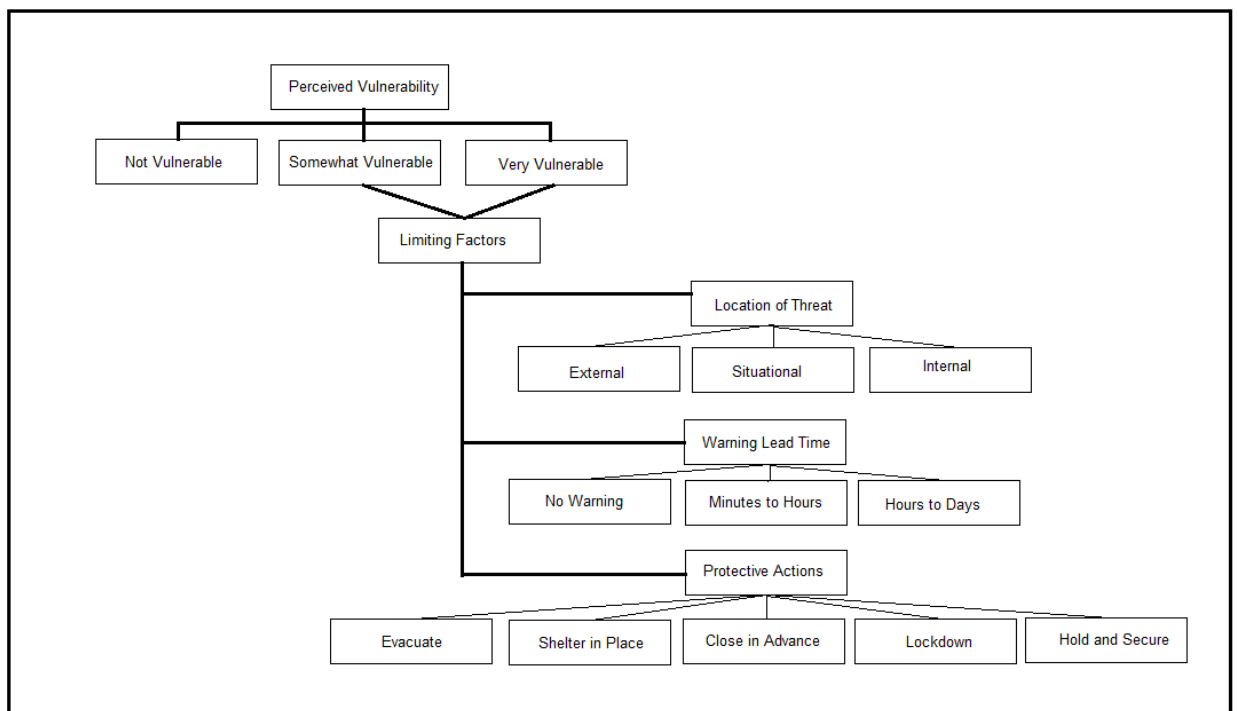
Figure 7. The social process factors identified for the preliminary typology. Thick lines indicate critical decisions while thin lines indicate potential options.

The primary needs of children as identified through the social process and interpretative views can be summarized as: the need to be provided with guidance by adults who are aware of

the risk; the need for direction in engaging in appropriate protective actions; and the need for

appropriate shelter based on the situation. Figure 7 above outlines a preliminary typology

developed based on these needs. The primary needs indicate that a typology to enhance

operational planning for facilities that host vulnerable populations should be divided into two

primary tiers. These two tiers will based on the interpretative and social process views to address

the needs required for planning to decrease vulnerability. These categories will be further

broken down to include risk perception, perceived vulnerability, limiting factors for vulnerable

groups, protective actions, and responsible agency. The critical decisions required to preserve

life and safety of the vulnerable population in each of the primary categories will be identified

and included as the second tier in the classification.

The factors identified in each tier can be applied to operational planning, as each factor

requires planning considerations to mitigate the potential impact. Characteristics were identified

based on evidence, including case studies, supporting their inclusion in emergency planning as a

necessity to preserve life and safety. The typology could additionally assist in the visualization

of the broad required actions to prepare for, prevent, mitigate, response, and recover from the

scenarios covered in each class of the typology.

2.7.4 Completeness and logic.

The final step in Rich's guidelines requires the classification to be tested for

completeness to ensure that no fundamental characteristics were omitted. The preliminary

typology has been tested through a case study approach. This case study will be designed to

identify whether all fundamental characteristics are appropriate and logical, whether they serve

the purpose of the classification by enhancing operation planning, and whether there are any

other fundamental characteristics.

Key Characteristics	Hazard				
Interpretative View Factors that Influence Risk Perception	Risk Perception	Perceived Origin	Natural	Technological	Human-Caused
		Perceived Control	Lack of Control	Loss of Control	Human Controlled
		Perceived Intent	None	Unintentional or Negligence	Intentional
		Familiarity with Hazard and Appropriate Response	Familiar	Less Familiar	Unfamiliar
Social Process View Factors required for planning to decrease vulnerability	Perceived Vulnerability	Perceived Vulnerability to the Hazard	Not Vulnerable; children are not likely to be impacted.	Somewhat Vulnerable, children are about as likely to suffer negative impacts from this hazard as the adults.	Very Vulnerable; children are more likely to suffer negative impacts from this hazard than adults.
	Limiting Factors for Vulnerable Groups	Location of Threat Relative to Location of Vulnerable Group	External	Situational	Internal
		Average Warning Lead Time received by Facility that Hosts the Vulnerable Group	No Warning	Seconds to Hours	Hours to Days
	Protective Actions	Primary Protective Actions to Reduce Impact on Vulnerable Group	Close in Advance	Shelter in Place	Evacuate
	Responsible Agency	Response Agency	Consequence Management	Consequence Management or Security	Security

Table 15. This table displays the different categories that were added to the preliminary typology to enhance operational planning for facilities that host vulnerable groups. These categories could be used to develop tools such as flow charts and decision trees to assist with school emergency planning.

2.8 Chapter Summary

Schools in Canada are not immune to emergencies and will continue to be impacted in the future. Provinces such as Ontario have a long history of school emergencies and while some efforts have been made through legislation, by individual municipalities, schools and school boards, the degree and depth of emergency planning is likely variable between schools. Social construction has shifted the perspective of disasters as the outcome of solely physical factors to

also include social factors. These social factors, such as vulnerability and risk perception, are

hypothesized to be capable of providing the basis of a typology aimed at school emergency

planning since, as social factors, they are within human control and have been identified in the

literature as influencing the outcomes when applied in the warning and impact stages of an

emergency.

Chapter Three

Materials and Methods

This chapter discusses the materials and methods used for this research. It includes an overview of the reasoning behind the selection of K-8 public schools instead of other types of facilities that host vulnerable groups and the selection of the study area used for the survey questionnaire. It provides a detailed explanation of the methodology, the research process, and the data collection methods, which include subject matter expert interviews and a survey questionnaire. It explains how the outcomes of the interviews and survey were used to assess the categories of the preliminary typology.

3.0 Research Process

This study used a multi-method approach that was selected based on the principle that different methods including literature reviews, interviews, and questionnaires, can contribute to different aspects of this research while decreasing the potential risk of systematic limitations and biases that could arise with a single method approach (Maxwell, 2005). The multi-method approach provided comprehensive insight into the social science aspects that may affect the effectiveness of the emergency planning process and therefore, the ultimate success of emergency response actions (Hayes et al., 2007). Data collection was done through a three-step approach; a multidisciplinary literature review and the ethical use of interviews and survey questionnaires.

As noted in section 2.3.2, classifications such as typologies have the potential to contribute to disaster studies and emergency management in several ways. A typology was selected as the classification tool used in this study. This selection was made since typologies are conceptual tools (Bailey, 1994), which made it appropriate to address the research questions. In

addition, typologies have been frequently used in the emergency management literature (i.e.

Tobin and Montz 1997, Kreps 1989). A conceptual, preliminary typology was developed based

on the literature to incorporate the social construction of disasters in a Canadian context with a

focus on addressing the needs of vulnerable populations, particularly school children. This was

accomplished through an extensive literature review of social construction and applications in

emergency planning in Chapter 2.

Following the literature review and the development of the preliminary typology,

interviews were held with subject matter experts to identify the fundamental characteristics that

could inform the typology. The results from the interviews were used to revise the preliminary

typology. The completeness and applicability of the typology was then assessed through a survey

questionnaire completed by current school staff responsible for emergency planning for K-8

public schools in southern Ontario. The methods and their relationship to the research questions

are outlined in Table 16.

Research Questions	Research Goals	Methods
Can the social construction of disaster be used in a Canadian context to develop a typology intended to assist in operational emergency planning for schools?	1a. To propose a typology aimed at developing an operational emergency planning approach that incorporates the social construction of disasters in a Canadian context and particularly addressing the needs of vulnerable populations. 1b. The development of the typology will first use a top-down analytic approach in which the key aspects of the typology are identified based on a comprehensive literature review.	Literature Review
2. What insights can be gained on the social construction of disasters and operational emergency planning through a case study of K-8 schools in	2. To validate and revise the proposed typology using a multi-method case study approach of the emergency planning needs of vulnerable populations.	Interviews Questionnaire

Ontario that can be applied to the proposed typology?	3. To revise the proposed typology based on the outcomes of the case study.	

Table 16. The research questions, goals, and the methods that are used to address them in this study.

3.1 Multi-Method and Case Study Approach

A multi-method approach using a survey questionnaire and interviews was chosen for several reasons. First, as noted by Byrne and Humble (2007), social phenomena and issues tend to be complex and all methods have different limitations. A multi-method approach can be used to mitigate some of the disadvantages posed by different methods by using other methods that do not have the same disadvantages. It also allows for the use of both quantitative and qualitative methods (Byrne and Humble, 2007) and provides opportunities for cross-validating results (Brewer and Hunter, 2006).

Following the literature review that provided the conceptual foundation for this study, a case-study approach using two research methods was selected. Case studies are a widely used method in the social sciences and in studies of school emergency management (Kano et al., 2007; Sapien and Allen, 2001). This approach allows for the exploration of complex issues in real life situations (Crowe et al., 2011). A case study approach is particularly useful when "a holistic, in-depth investigation is needed" (Zainal, 2007). Some additional benefits of a case study approach as outlined by Zainal (2007) are that it:

- Allows data to be collected and examined within the context of its use/environment (Yin, 1984).

- Allows for both quantitative and qualitative analysis of the data.

- Allows for the explanation of complexities in real-world situations.

These advantages support the use of an exploratory case study approach for this research since it

allows for the collection of data within the context of its use (school settings) and is an

acceptable method for explaining the complexities found in real world applications of emergency

management. There are three primary categories of case studies (Yin, 1984):

- Exploratory: used to explore any phenomenon in the data that relates to the research topic.

- Descriptive: used to describe the natural phenomena that occur within the data, i.e. the
  strategies used.

- Explanatory: used to examine the data at both explicit and implicit levels.

An exploratory case study approach was chosen as it allowed for the identification of

information related to research questions, it permitted the typology to be validated using real life

experience and examples, and it allowed for a focus on school emergency planning in Canada, an

area in which research was found to be limited. A case study approach using questionnaires to

collect data was used to assess the logic and completeness of the preliminary typology.

There are limitations to a case study approach. In some instances, the data collected may be

too complex to allow for clear and concise explanation (Hodkinson and Hodkinson, 2001).

Another potential limitation is that some common methods used in case studies, (e.g.,

interviews), do not lend themselves to quantitative representations (Hodkinson and Hodkinson,

2001). A third potential limitation is that alternate explanations of the data may exist that are not

reflected by the results, and that additional research may be required to determine if the results of

a case study are applicable elsewhere (Simon and Goes, 2013). Many of these limitations can be

addressed or at least mitigated through the use of a multi-method approach and careful selection

of procedures, the use of clear and concise questions, and the establishment of the scope of the research.

The case study was informed through key informant interviews and a survey questionnaire. The interviews were held with subject matter experts and the survey was distributed to current school staff with an active role in emergency planning.

3.2 Interview Methods

Key informant interviews are 'in-depth interviews of a select (non-random) group of experts who are most knowledgeable of the organization or issue' (Lavrakas, 2008). In-depth interviews are acknowledged as being one of the most appropriate ways of gathering data on phenomena that are not directly observable (McCracken, 1988; Minichiello, Aroni, Timewell, & Alexander, 1990; Patton, 2002). Key informant interviews can be beneficial in that they can provide an initial assessment of the subject being studied. These interviews can be, and indeed were, helpful in the development of a survey questionnaire in this research, by assisting in the identification of potential questions and creating awareness of potential response options (Lavrakas, 2008). It should be noted that the potential benefit of key informants relies on a diverse group of people being interviewed who are able to discuss all possible aspects of the issue being researched (Lavrakas, 2008).

Qualitative data analysis is the process of systematically searching and arranging qualitative data, such as interview transcripts, to increase the understanding of the phenomenon (Wong, 2008). Advantages of thematic analysis are displayed in Table 17.

Advantages of Thematic Analysis
Flexible
Results are more accessible
Useful in summarizing key information in a large body of data
Highlights similarities and differences across the data set.
Capable of generated unanticipated insights.

Table 17. The advantages of thematic analysis. Based on Braun and Clarke (2006).

There are several disadvantages associated with thematic analysis, although these can be avoided by using a transparent and methodical approach. The flexibility of this method can be perceived as a disadvantage if the method is not clear. Braun and Clarke (2006) noted that another disadvantage is that it has limited interpretative power beyond mere description if it is not used within the context of an existing theoretical framework since the framework would serve to anchor and support the analytic claims.

The data analysis process often includes the systematic searching and arranging of the data through thematic analysis, a "method for identifying, analysing, and reporting patterns (themes) within data" (Braun and Clarke, 2006, pg. 79). Braun and Clarke (2006) defined a theme as a piece of information/data that "captures something important about the data in relation to the research questions, and represents some level of patterned response of meaning within the data set" (Braun and Clarke, 2006, pg. 82). The identification of themes requires sound judgement on the part of the researcher as the prevalence of the theme is often, but not always, an indicator. Some considerations in identifying themes are:

- Prevalence across the data set: While individual themes may appear across the entire data set, this does not necessarily mean that this particular theme is more crucial than others; only that multiple sources identified it.

- Prevalence within individual interviews: The prevalence of a theme within each individual interview also does not indicate the importance of the theme and it may not require much discussion.

- Whether it captures information that is important in addressing the research question.

Two approaches to thematic analysis, inductive and theoretical, are noted by the literature (i.e., Braun and Clarke, 2006; Patton, 1990)

- Inductive Approach: This is a 'data-driven' approach in which data is coded process without trying to fit it into a pre-existing coding frame. This approach is often used for analysing data from interviews (Patton, 1990).

- Theoretical Approach: As noted by Braun and Clarke (2006), this approach is more 'analyst-driven' as it is based on the researcher's theoretical interest and focuses on some aspect of the data rather than providing a detailed overview.

Braun and Clarke (2006) developed a set of guidelines for thematic analysis. Despite being laid out as phases, Patton (1990) noted that thematic analysis requires flexibility and to account for this need for flexibility, Braun and Clarke (2006) noted that thematic analysis is more of a recursive process than a linear one.

Phases of Thematic Analysis (Braun and Clarke, 2006)	
Familiarising yourself with your data.	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
Generating initial codes.	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
Searching for themes.	Collating codes into potential themes, gathering all data relevant to each potential theme.
Reviewing themes.	Checking that the themes work in relation to the coded extracts and the entire data set, generating a thematic 'map' of the analysis.
Defining and naming themes.	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.
Producing the report.	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the scholarly report of the analysis.

Table 18. The phases of thematic analysis (Braun and Clarke, 2006).

Braun and Clarke (2006) provided further detail by outlining the processes involved in thematic

analysis. This research adhered to these processes.

Process	Number	Criteria
Transcription	1	The data have been transcribed to an appropriate level of detail, and the transcripts have been checked against the recordings to ensure accuracy.
Coding	2	Each data item has been given equal attention in the coding process.
	3	The coding process has been thorough, inclusive and comprehensive.
	4	All relevant extracts for each theme have been collected.
	5	Themes have been checked against each other and back to the original data set.
	6	Themes are internally coherent, consistent, and distinctive.
Analysis	7	Data have been analyzed rather than just paraphrased or described.
	8	Analysis and data match – the extracts illustrate the analytic claims.
	9	Analysis tells a convincing and well-organized story about the data and the research topic.
	10	Provides a good balance between analytic narrative and illustrative extracts are provided.

Overall	11	Enough time has been allocated to complete all phases of the analysis adequately.
Written Report	12	The assumptions about, and specific approach to, thematic analysis are clearly explained.
	13	There is consistency between the described method and the reported analysis.
	14	The language and concepts used in the report are consistent with the epistemological position of the analysis
	15	Themes are actively identified. Themes do not just 'emerge'.

Table 19. The processes involved in thematic analysis (Braun and Clarke, 2006).

A coding process is frequently used since qualitative data analysis requires that large amounts of data be categorized through the identification of themes during the coding process. Codes essentially refer to tags for denoting different themes from the collected data. Woods (2011) noted that a potential limitation of coding is that the clarity and applicability are heavily reliant on the analytical skills of the researcher. To maximize the effectiveness of this method, the primary researcher was responsible for coding, documented the process as recommended by Woods (2011) so that the validity of the findings could be accurately evaluated. Five aspects of a good coding system were identified by Boyatzis (1998):

- The inclusion of labels;
- Definitions of what each theme covers;
- How to flag themes;
- Descriptions of any qualifications or exclusions to identifying themes;
- Examples aimed at eliminating confusion when identifying themes.

The preparation and analysis of qualitative data can be demanding in terms of both time and labour so software designed for qualitative data analysis (NVIVO) was used in this study. Qualitative data analysis software can streamline the coding process used to analysis qualitative data (Wong, 2008). While the researcher must create and apply the theme categories and

interpret the results; software can streamline the process by grouping data by theme and retrieving already coded themes through the search function. As noted by Wong (2008), qualitative analysis software made the 'organization, reduction and storage of data more efficient and manageable'. Since the researcher is still responsible for collecting the data and interpreting the results, qualitative data analysis software is limited by the skills of the researcher and the collected data.

3.3 Survey Methods

Questionnaires are commonly used for the acquisition of information regarding perception and knowledge in the social sciences (Bird, 1999) and are often used in hazard, risk perception, and disaster studies (e.g., Blanchard-Boehm and Cook, 2004; Peacock, Brody, and Highfield, 2004;) including studies of school planning and preparedness (i.e. Graham, Shirms, Liggin, Aitken, and Dick, 2006; Diepenbrock, 2010; Marincioni and Fraboni, 2012; Momani and Salmi, 2012).

There are three categories of questions that are commonly used for questionnaires; open-ended, closed-ended, and mixed questions. Open-ended questions allow the participants to answer in their own words while closed-ended questions provide pre-determined answer options (i.e., multiple choice). Miller (2014) recommended the use of a majority of closed-ended with a few opened-ended questions, where participants have the opportunity to add comments in order to provide deeper insight and to combine the advantages of both open-ended and closed-ended questions. According to Miller and Dumford (2014), the majority of survey questionnaires contain a mixture of open- and closed-ended questions.

Type of Question	Advantages	Disadvantage
Open-Ended Question	Allows for answers that include a great deal of detail and rationale. Useful for exploratory research in which the responses serve as a guide in developing hypotheses, and providing insight on why certain patterns are found in closed-ended results.	Need for a reliable content analysis method which can be time consuming. Researchers must devote resources to the actual content analysis.
Closed-Ended Question	Analysis is often easier since no content analysis is necessary. Assist in standardizing he survey process by presenting systematic cues to respondents.	Offer the researcher little ability to get below the surface of the response. Provides no information on the thought processes that led to the response. Does not allow for the inclusion of other options that may not have been known to the researcher.

Table 20. Advantages and disadvantages of types of questions based on Miller and Dumford (2014).

Many of the questions for the current study were designed using a Likert-scale to enable analysis

through descriptive statistics, although the questions also included space for additional comments

to ensure the thoroughness of the survey. The questions were designed keeping in mind the

considerations outlined below.

Consideration	Issue	Recommendation
Positivity Bias	Respondents tend to over report positive attitudes and evaluations.	Researchers should try not to exacerbate it by doing things such as including negative numbers in a scale.
Number of Points	Need to strike a balance between offering too many and too few options.	Research has shown that Likert scales with 7 points and a midpoint tend to be most reliable, though 5-point and 3-point scales are also common.
Clear Response Options	Respondents may be confused by the distinction between different	Always pretest questions and check for differentiation.

	responses if they are subjective and not well defined.	
Mutually Exclusive Response Options	There should be no overlap between response options to avoid confusion.	Make sure there is zero overlap between response options. Again, pretesting is a good way to check this.
Anticipate All Possibilities	Try to anticipate the answers that significant percentages of respondents would choose, and include those as response options. It may also be worth offering an "other" response.	Researchers should always pretest questions to ensure that they are not missing a major or obvious response option.
Vague Quantifiers	Vague Quantifiers indicate relative frequency without using clear numerical values.	Vague quantifiers can be fine as responses as long as the options are clearly differentiated.
Primacy and Recency Effects	Respondents tend to choose either the first option on a list or the last.	Reduce primacy and recency bias by randomizing the order of responses. Research suggests that primacy and recency effects are reduced in self-administered formats.
Anchoring Effects	The labels of scale endpoints tend to affect how respondents perceive the rest of the scale. Endpoints labeled with more extreme language tend to turn off respondents, causing them to choose responses closer to the middle of the scale.	Researchers should be cautious in how they label endpoints and consider pretesting alternative endpoint labels to test for the severity of anchoring bias.

Table 21. Ranking scale considerations. Based on Miller and Dumford (2014).

Survey questions were designed to further explore some of the potential themes identified

in the literature and the interview results. Some themes were explored through the use of direct

questions (e.g., the theme 'experience' was examined by directly asking if the respondent had

experience). Other themes, such as risk perception, were explored using an indirect approach

(e.g. perceived likelihood of hazards occurring) to develop a general picture of the respondent's

risk perception for particular hazards. This was done in a manner that allowed for comparison between the perceived hazards and the actual hazards identified in the school plans.

3.4 Data Collection

3.4.1 Case study selection.

As noted in Chapter One, schools are not immune to emergencies. Historically, schools in Canada have been impacted by a variety of hazards such as tornadoes, snowstorms, and active shooters and will likely continue to be impacted in the future. Factors such as climate change may increase the frequency of certain hazards and therefore, increase the risk of schools being impacted.

Facilities that host vulnerable populations have attributes that require special planning considerations. These attributes include (Friesen and Bell, 2006):

• They host a large number of members of a vulnerable group for significant periods;

• They are dependent on the local municipality for first response support;

• They employ and serve individuals who may have special needs and disabilities who may require special consideration in emergency planning;

• They serve a diverse group of students/residents/guests and staff who may have different language, cultural, spiritual, dietary etc. needs;

• They must be conscious of, and prepared for, the concern of families for the safety of their loved ones during an emergency; and

• They are often distributed throughout a community based on population density. Therefore, there is a greater risk that should an emergency impact a community that at least one school may be impacted.

In addition, the following attributes apply to schools (Graham et al., 2006; FEMA 2010):

• The site of almost daily mass gatherings;

• Responsible for the care of children on their premises and on school run transportation

• Responsible for large numbers of children who are dependent on adults during an

emergency and are less likely to have knowledge of protective actions outside of those

instructed by caretakers, hazard education, and school drills, and;

• Student to teacher ratios show that the number of children, members of a vulnerable

group, are significantly higher than the number of adults during the majority of the hours

of operation.

These attributes serve to identify schools as facilities that host members of a vulnerable

group. This higher vulnerability to hazards underscores the importance of having effective,

operational emergency plans.

3.4.2 Study area.

Southern Ontario is the southernmost region in Canada. It is home to 12.7 million and has

the highest population density in Canada (Statistics Canada, 2017). It was selected as the study

area for this research to ensure consistency in terms of school procedures and access to

emergency resources. While southern Ontario is a mix of rural and urban areas, emergency

resources (e.g., police services, EMS, sheltering locations, emergency management assistance)

are more accessible in the event of an emergency than in more remote areas in northern Ontario.

This is due to a higher number of communities and organizations that may be able to assist with

resources, smaller distances between communities which speeds up the estimated arrival of

resources. This difference could present dissimilar emergency planning challenges for schools

located in parts of northern Ontario. Southern Ontario is home to a large percentage of the

population of Ontario. Southwestern Ontario is home to approximately 12.1% of Ontario's

population while the nearby GTA region is home to 48.5% of the population of Ontario

(Statistics Canada, 2010). The figure below displays the population density of Ontario.
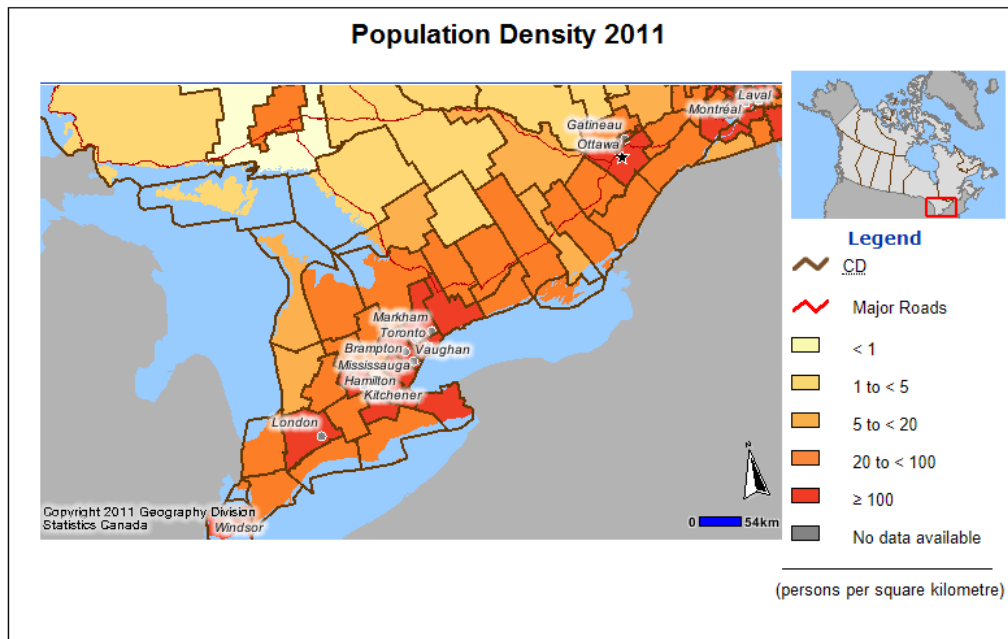
Figure 8. The population density by census division of southern Ontario (Statistics Canada, 2011).

The high population density of this area increases the chance of people being exposed to

hazards that may otherwise have occurred without being detected in an uninhabited or sparsely

populated area. Since schools are relatively dispersed in relation to population density in urban

and semi-rural areas and accessibility to rural populations (Moser, 2005), they have a high

likelihood of being affected should an emergency impact a community. The risk of human

exposure to hazards in Southern Ontario is likely to increase in the future due to population

changes. The population of Ontario is projected to grow by 28.6% or by almost 3.9 million from

the period from 2012 to 2036, with the majority of this growth expected to occur in Southern

Ontario (Ministry of Finance, 2012).

The geographic position of southern Ontario results in exposure to extreme weather

events. This includes severe winter weather such as snowstorms and freezing rain, and severe

summer weather including extreme rainfall and tornadoes. The high population density of this

area increases the risk of human-caused hazards such as civil disorder and terrorism. Due to the

high population density, this area has a large proportion of the province's critical infrastructure

including highways and electrical equipment which results in a risk of technological hazards.

Ontario has four distinct school systems: English Public, English Catholic, French Public,

and French Catholic (Ontario Ministry of Education, 2015). The four school systems are similar

in terms of organization and educational standards; however, they have different types of policy

and practices. In addition to the four school systems, there are also private schools that have their

own governance and funding structures. There are 54 school boards in Southern Ontario; 27 of

which are the English-speaking public school boards that were the focus of this study. These 27

school boards are responsible for 2,242 elementary schools (Ministry of Education, 2015).

This study focuses on the school system that covers the greatest percentage of schools in

southern Ontario, which is the English public school system (Ontario Ministry of Education,

2015). Only K-8 schools in southern Ontario were included based on differences between K-8

schools and high schools in terms of educational content and practices, different unions, and that

the age of the students is likely to influence vulnerability.

3.5 Confidentiality and privacy.

This research study design was reviewed by Wilfrid Laurier University's Research Ethics

Board to ensure that it adhered to ethics guidelines. All members of the research team completed

the required TCPS training. Interview and survey participants were informed that participation in

this study is voluntary and that they had the option to decline to participate at any point or

decline to answer any question (s) if they wished. All participants were sent an information sheet

and a consent letter.

Careful measures were taken to protect participants' confidentiality and anonymity throughout the data collection and analysis process. Data was not shared with outside individuals or groups. Data was secured in a password-protected program on a password-protected computer. A numeric code was used to name the files to ensure anonymity. After three years, all audio recordings of the participant interviews will be erased from computer hard drives and external drives. In all research documents, all identifying information was removed and participants' comments were paraphrased (unless the participant gave their expressed permission to use quotes or wishes to be identified).

3.6 Interview Data Collection

Interviews with subject matter experts were held to identify any gaps in the preliminary typology. Participants for the interviews were identified using a purposive targeted approach (Sarantakos, 2005) based on the role that the person has in emergency management or school emergency planning in North America. The participants selected for the interviews are persons who are recognized as being subject matter experts in school emergency planning and/or emergency management by their peers, through their publication history in journals and the practitioner literature, participation in working groups focused on school emergency initiatives, and through a review of past invited speakers at conferences with a focus on emergency management and schools. The majority of these participants, 70%, were from Canada with the remaining 30% from the United States.

Introductory emails were sent to all potential interview participants informing them of the purpose of the study and requesting their participation. Interviews were held with 10 participants who consented to participate in in-depth semi-structured interviews. The data collected was subjected to thematic analysis to provide insight into the use of social construction and the

disaster typology for emergency planning. The results from the interviews was then used to

inform the development of the survey questionnaire and to refine the preliminary typology.

The interview process consisted of key informant, semi-structured interviews of subject

matter experts in the fields of emergency management and school emergency planning. Key

informant interviews are acknowledged as having the potential to be helpful in the development

of survey questionnaires through the identification of potential questions and awareness of

response options (Lavrakas, 2008). The data collected from the subject matter expert interviews

was used to revise the preliminary typology and to inform the survey questionnaire, using a

diverse group of subject matter experts (i.e., people with expertise in schools, school emergency

planning, and general emergency management) to ensure a wide knowledge base of the issues

affecting school emergency planning.

The interviews were semi-structured to provide participants with a set of predetermined

questions, but to still allow for maximum input. The advantages and disadvantages of using

semi-structured interviews are outlined in Table 18:

Advantages	Disadvantages
Flexibility to explore additional themes that emerge during the interview.	Time consuming and resource intensive.
Some questions can be developed in advance and an interview guide can be created.	Reliant on the interview skills of the interviewer.
Provides reliable and comparable qualitative data.	Steps must be taken to ensure confidentiality.

Table 22. The advantages and disadvantages of semi-structured interviews based on Cohen (2006).

Steps were taken to mitigate the disadvantages shown in Table 22. To address the first

disadvantage, a basic project management approach was used to ensure that both time and

resources were managed effectively. The second disadvantage was addressed by having the

principal researcher conduct all of the interviews after undergoing training on effective interview

skills and techniques, and the completion an extensive literature review on conducting

interviews. To address the third disadvantage this research strongly adhered to the ethics

requirements.

Ten interviews ranging from 30 to 60 minutes were held. All interview participants indicated

that they had more than 8 years' experience in working in emergency management and/or with

schools or school boards, with 90% of interview participants having more than 10 years'

experience. The table below outlines the types of experience/positions held by the interview

participants.

Number of Interview Participants	Type of Experience/Positions
4	Hold or have held the designation of community emergency management coordinator or alternative community emergency management coordinator.
4	Hold or have held positions within schools or school boards.
4	Hold or have held positions involving emergency management at a provincial government level. Two of these four participants indicated that emergency planning was the primary area of their work at this level while the other two indicated that community (including vulnerable population) engagement was their primary area of work.
1	Indicated a former position within police services.
2	Indicated that they had done work on developing the Safe Schools initiative.
4	All four participants who indicated that they have or have held positions within schools or school boards indicated that they had done work to implement or maintain the safe schools program at their locations.

Table 23. Summary of interview participants' past roles in emergency management and schools. Note: some participants indicated experience in multiple roles.

The interviews were recorded with the permission of the participants using a high quality digital audio recorder. The audio data was transcribed into written form with the assistance of transcription software that allows for the synchronous playback of the audio recording and typing. The transcription process was done by the primary researcher.

3.6.1 Interview data analysis.

The qualitative interview data was analysed thematically and compared to the preliminary typology. This was done to determine if there are any gaps or redundancies in the typology. Since the intent of the interviews was to report the experiences of the subject matter experts, this research used thematic analysis to study the experiences and knowledge of the participants rather than how their response are the construction of societal discourses (Braun and Clarke, 2006). To overcome the disadvantages associated with thematic analysis, a transparent and methodical approach was used and the research used the theory of the social construction of disasters to provide context.

To identify themes in the data collected for this study, the researcher examined the data set for themes and identified themes based on their prevalence across the data set. While some themes were found to be grounded in the literature, the data was closely examined to identify new themes that emerged. This was done to ensure that all themes relevant to the research topic were included. To ensure that critical information that is not as widely known was not discarded, the researcher also identified any remaining themes that address the research questions despite not being as prevalent across the data set as some other themes. The method used to identify the individual themes (e.g., prevalence vs. its ability to address the research question) was stated in the results section to ensure transparency.

A predominately theoretical approach to thematic analysis was used. Themes were identified at a semantic level, in which they are identified based on the explicit meaning of the data or the latent level in which the underlying ideologies, assumptions, and conceptualisations of the data are identified. Since the intent of the interviews was to gain insight into the preliminary typology based on the experiences and knowledge of the subject matter experts, this research used an inductive approach in which themes were identified at a semantic level. Since the frequency that a potential theme is mentioned does not necessarily indicate its importance, measures were taken to assess its importance in addition to the number of times it was mentioned. These measures including examining the context in which the potential theme was mentioned, identifying how many participants mentioned it in addition to the number of times it was mentioned, and the use of the survey questionnaire to further explore themes.

NVIVO, data analysis software commonly used in the social sciences (e.g. Ozkan, 2004; O'Neill, 2013) and was used in this study. A major advantage to using NVIVO is that it creates a record of the data and increases transparency. Figure 9 outlines the four stages of analysis using NVIVO developed by O'Neill (2013):
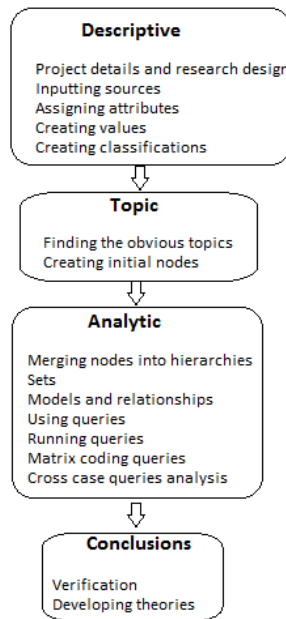
Figure 9. The four stages of qualitative data analysis as outlined by O'Neill (2013).

The approach for using NVIVO for qualitative data analysis in this study was based on the four stages outline in Figure 9, with the exception of the matrix coding sub-step which was not applicable. The themes were identified deductively through the literature review and then gaps were identified inductively from the analysis of the interview data. The preliminary typology and the survey questionnaire were then revised based on the results of the analysis of the interview data.

3.7 Survey Data Collection

Questions for this study were developed based on the results from literature review and the results of the subject matter expert interviews. The themes identified from both the interviews and the survey results were then used to refine and validate the proposed typology. Following approval from the five school boards, letters were sent electronically to the school superintendents responsible for school safety at each school board. The purpose of this letter was to gain support from the school board and to request that they either forward the letter or allow

the letter to be sent directly to school principals who are responsible for the overall emergency planning process. This letter outlined the purpose of the study, the length of time required to complete the questionnaire, the contact information for the researcher, and the link to the questionnaire. The content of the letter was designed to meet ethics requirements and included an ethics statement.

The questionnaire was self-administered online to reach the maximum number of potential participants as recommended by Bird, (2009). An introductory paragraph was included at the start of the survey to ensure that the instructions for the survey were clear as recommended by Oppenheim (1992). To make the survey more accessible to people and to avoid potential delays, the questionnaire was available online for a two-week period. Other formats, such as hardcopies, of the questionnaire were available upon request.

The questionnaire contained structured questions consisting of a mixture of open and closed ended questions. Several were designed using a Likert Scale to enable analysis through descriptive statistics. The questions were developed with the intent to assess the preliminary typology and to identify gaps. All questions were designed to include space for participants to leave comments. Care was taken in selecting the questions to avoid potential pitfalls such as differing opinions on what constitutes a disaster based on the recommendations from the interview participants. The questionnaire responses were analyzed to assess whether the changes to the preliminary typology identified during the subject matter expert interviews were necessary to support effective operational planning for vulnerable groups. Based on the information received, the preliminary typology was revised to ensure that it adequately addressed the socially constructed needs of the schools to plan for vulnerable groups.

Participants for the questionnaire were identified using a purposive targeted approach based on the role that the person has within a school or school board. Based on the number of principals of K-8 public schools within school boards located in southern Ontario, there was a maximum of 2,268 potential responses. In Ontario, each school board requires that researchers complete an application to conduct research involving school staff. This represented a challenge as it limited the number of schools that could participate to those whose school boards had accepted the proposal resulting in a reduction in the number of potential responses. External research applications were submitted to 18 public school boards in southern Ontario that accepted applications for research from June to December. Five school boards representing 249 schools accepted the research proposal and allowed their principals to be contacted regarding the survey. These five school boards covered different geographical areas in southern Ontario including the Greater Toronto area, southwestern and southcentral Ontario and the area known as 'cottage country' in northern section of the study area. These school boards covered both urban and rural areas. Once approval was granted, questionnaire participants were invited to participate via an email distributed to the principals in each school district. This email provided the potential participants with information on the purpose of the study, how long the questionnaire would take to complete, and how the results of the questionnaire would be used (Dunn, 2005).

A total of 249 principals from each of the schools that included grades K-8 covered by the five school boards were contacted between September and November of 2017. A total of 57 responded for a response rate of 22.9%. The school sizes based on enrollment rates were compared for the respondents and for all K-8 public schools in Southern Ontario using a t-test. The results (P value of 0.8327 with a confidence interval of 95%) indicated that the difference between the school sizes provided by the respondents and all K-8 public schools in Southern

Ontario was not statistically significant, meaning that it provides no evidence that this size

distribution is not representative of the distribution across all schools in southern Ontario.
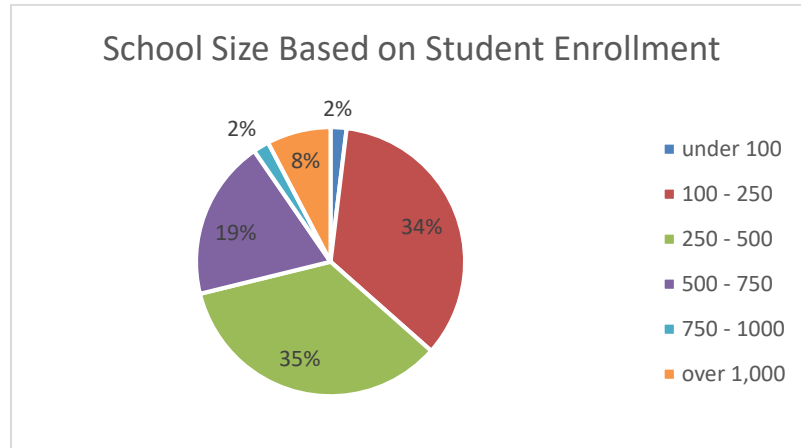
Figure 10. The school size distribution of the principals who responded to the survey.
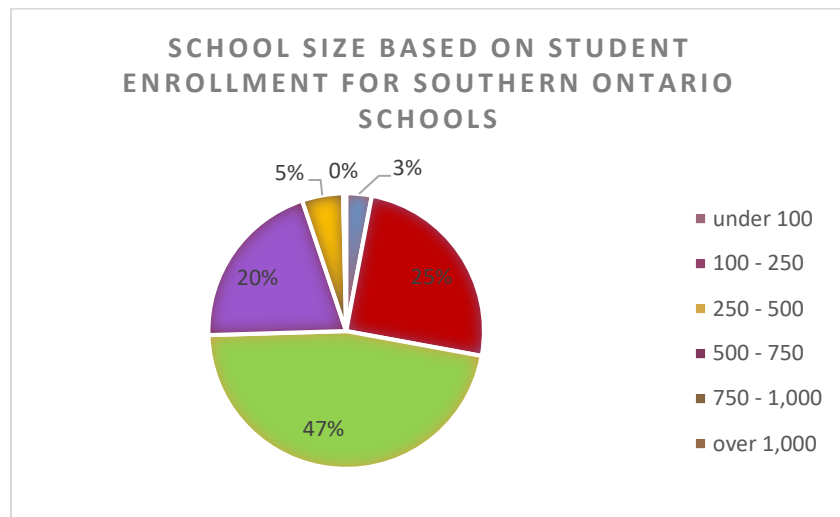
Figure 11. School sized based on student enrollment for all K-8 public schools in Southern Ontario.

All survey respondents with the exception of five who declined to answer indicated that

they have a role in developing, maintaining, or implementing their school's emergency plan. Of

the five who declined to answer this question, two left written comments clarifying that they did

have a role. One of these two stated that their school board has an overarching emergency plan

that the school administration is then responsible for implementing at the school level.

3.7.1 Survey data analysis.

As noted by Bird (2009), the potential issue of non-response bias must be addressed prior to data analysis. As recommended by de Vaus (2002), observational data such as the location of the non-respondents, the school boards, and whether grouping of non-respondents occur in areas that have not experienced recent emergencies was collected to neutralize the effect of non-response bias on the data analysis.

Once the data was collected and the potential issue of non-response bias was addressed, the data was analysed using descriptive statistics and inferential analysis to identify differences and similarities in responses that can be used to identify groupings of schools. Closed-ended questions were pre-coded, while opened-ended questions were later coded (Bird, 2009) for quantitative analysis through the development of categories and the assignment of corresponding values (Sarantakos, 2005); this was to ensure that all potential response categories were included. The data was checked and cross-checked to ensure that the coded data was accurately entered into a secure Excel spreadsheet on a private access computer. To ensure confidentially, the names of the participants or their schools was not collected.

Data analysis was done through statistical analysis using SPSS® (Statistical Package for the Social Sciences). The use of SPSS® is intended to provide a broad but descriptive overview of the data. Tests of significance were completed to determine whether the results are representative of the population and to determine whether the data supports or rejects the hypothesis. Potential relationships (e.g., between experience with past emergencies and risk perception) were analysed using chi-square tests which measures association between two variables. The chi-square test was chosen as it is suitable for categorical data and can be used for smaller sample sizes. It was used as a test of independence. The outcomes of the data analysis

were used to identify whether the variables selected for the preliminary typology aligned with the hypothesis.

3.8 Chapter Summary

Schools are facilities that host members of a vulnerable group, large numbers of children who depend on adults for direction during an emergency. Despite this, little research has been done on school emergency planning in Canada. Although this research may be applicable to other types of facilities that host members of a vulnerable group, this research will focus on K-8 public schools. The study area chosen for the case study portion was southern Ontario.

This study used a multi-method approach to decrease the risk of limitations associated with single method approaches. This approach consisted of a literature review, subject matter expert interviews, and a survey questionnaire. An extensive literature review on topics related to emergency planning, vulnerable groups, and the social construction of disasters was used to develop a preliminary typology. Participants for the interviews were selected using a key informant approach in which a non-random group of experts on the topics of emergency planning and schools were selected to provide an overview of the key factors associated with school emergency planning. The interview results were thematically analyzed and were used to refine the preliminary typology, and to assist with the development of questions for the survey. The online survey questionnaire was used to assess the completeness and validity of the preliminary typology. Applications for research were sent to the public school boards in Ontario. Five school boards representing schools in geographically diverse areas of southern Ontario approved this study. Following the approval from the school boards, participants were identified using a purposive targeted approach. The questionnaire responses were analyzed to assess

whether the changes to the preliminary typology identified during the subject matter expert interviews were necessary to support effective operational planning for vulnerable groups. This information was then used to revise the preliminary typology to ensure that it adequately addressed the socially constructed needs of the schools to plan for vulnerable groups.

Chapter Four

Results

Chapter Four provides a summary of the results from this research, including the subject matter expert interviews and the survey questionnaire. It begins by presenting the results from the subject matter expert interviews using thematic analysis used to identify any gaps in the preliminary typology and to inform the survey questions. The results from the survey questionnaire were analyzed using descriptive statistics and were used to assess the completeness and logic of the proposed typology. Inferential statistical analysis was done to explore the relationship between different variables such as whether there is a link between experience with emergencies and having an emergency plan (section 4.1.4).

4.1 Interview Results

Ten key informant, semi-structured interviews were held with subject matter experts to obtain an initial overview and assessment of the key factors that influence operational emergency planning. The results were recorded, transcribed and underwent thematic analysis to identify themes that could influence emergency planning for schools. The theory of social construction has two primary views, the interpretative view (risk perception) and the social process view (vulnerability) which can be used as categories in the typologies. Section 4.1.1 presents the interview results related to the risk perception category and its subcategories; perceived origin, familiarity, awareness, and acceptance. Section 4.2.2 presents the interview results related to the vulnerability category and its subcategories. A list of the interview questions is provided in Appendix I.

4.1.1 Risk perception.

A review of the literature identified risk perception as a key factor in emergency planning as it can influence the development and implementation of plans and engagement in protective actions (i.e., Donner 2007 and Slovic and Weber 2002). The results from the subject matter expert interviews supported the findings from the literature review that risk perception is a key factor in operational emergency planning. A total of 36 references to risk perception were made with all ten interview participants commenting on the importance of risk perception. Five participants also noted in ten references that low risk perception can influence operational planning and response by leading to complacency regarding the need for emergency planning.

"*Emergency planning is not a "hot" topic. It's hard to sell something that may never happen." (Interviewee 1)*

"*One of the biggest challenges that we are facing in our field is complacency. People don't believe that it is going to happen. We tell people do you know what you are doing, do you know what's going on, do you know your environment, are you ready to respond, do you have kits and do you have plans? Do you know what to do and do you know where your kids are, how are you going to get back together? All of these questions. And people say 'that doesn't happen here. We will be fine.' Until something does and they panic. So that to me is what really makes the difference. The main challenge is complacency*." *(Interviewee 3)*

Based on these results, risk perception remained in the typology and questions focused on risk perception were included in the survey questionnaire.

Interview participants identified several potential subcategories that could influence risk perception; the perceived origin of the hazard which includes the perceived control and the perceived intent behind a hazard, and familiarity with the hazard and associated protective actions, awareness of the threat, and acceptance of the risk. The interview results in relation to these subcategories are discussed below.

4.1.1.1 Perceived origin.

Studies such as Schmidt (2004) and Kaperson and Pijawka (1985) identified the origin of the hazard as a factor that could influence risk perceptions. The influence that origin exerts on risk perception is an important consideration for the typology; studies including Donner (2007) and Slovic and Weber (2002) found that risk perception can motivate people to engage in protective actions. It is important to note that all of the factors that lead to an emergency may not be known and that origin of the hazard ignores the role of vulnerability in the making of an emergency (Hewitt 1983, 1998). So, while an emergency may be perceived as being 'natural' in origin due to the immediate triggers (i.e. heavy rainfall triggering flooding), it may not have fully natural causes (i.e. human activities that altered the drainage patterns) (Quarantelli, 1987; Cutter, 2001). Therefore, based on the intent of the typology, it is recommended that the term 'origin' be replaced with 'perceived origin'.

The literature review identified perceived origin as being an influencing factor on risk perception (e.g., Kaperson and Pijawka 1985, Janoff-Bulman 1992, Schmidt 2004); however, the results from the subject matter experts' interviews indicated that the interview participants felt that it had little importance in operational emergency planning. A total of eight references to perceived origin were made by three interview participants who viewed it as not being an important factor in emergency planning. One participant argued that the type of impact and

required protective actions were far more important to operational emergency planning than the

perceived origin of the hazard. The majority of the studies in the literature (e.g., Slovic 1987,

Sjöberg 2000, Pidgeon et al., 2003) focused on the role of origin in the risk perceptions of lay

persons rather than those of people responsible for the development, implementation, and

maintenance of emergency plans. The interview participant's perspective about the unimportance

of perceived origin could be due to their real-world experience working in roles in emergency

management and school emergency planning and therefore differ from those of the laypersons

that the studies in the literature tended to focus on.

> *"It's not the type of hazard that is going to make a lot of difference to me; it is how it is*
>
> *going to affect people." (Interviewee 4)*

The quote above is reminiscent of the idea behind the purpose of all-hazards plans.   All-

hazards plans are developed to focus on the functions and actions that are common in

emergencies caused by different types of hazards (e.g., evacuation) (Waugh, 2005). In this

perspective, the type of hazard itself is important only as it influences the type of functions and

actions while the functions and actions themselves are the focus. Interview participants noted

that one of the greatest challenges for all hazards planning at the school level is that protective

actions may vary significantly depending on the type of hazard. For example, a shelter-in-place

order may be called for either a tornado or a hazardous materials spill outside the school. While

the overarching protective action is the same for both of these hazards, the implementation of the

protective action differs (e.g., for a hazardous materials incident there may be the additional

requirement to seal windows and doors and to shut off air intake which would not be necessary

during a tornado).

There is another way in which the origin of the hazard can impact emergency response which was not mentioned by any of the interview participants although all of them mentioned response agencies; it can influence which protective services agency has the lead. While this is not something that is controlled or managed by the school, it may influence actions during or following the event (e.g., the school is closed for a longer period of time for a criminal investigation if the origin is perceived to be human caused). In general, emergencies without a criminal element tend to be the purview of emergency management organizations while those with a criminal element are managed by of security organizations such as the municipal police detachment. While a more localized emergency at a school may not require assistance from these types of organizations at a municipal or provincial level, it would still impact which responding organization on site has command of the situation, such as fire or police. Perceived intent and control are sub-categories of perceived origin that play a significant role in whether the emergency is viewed as a potential security threat.

None of the interview participants directly identified perceived intent and control as being key considerations in developing operational emergency plans. However, the differentiation between lockdown (a security-based action for hazards that involve a human caused hazard such as an active shooter) and shelter in place (an emergency management based action for non-human controlled hazards such as severe weather) as noted by many of the participants and the involvement of security organizations such as police, indicates that perceived intent may play a lesser role in emergency planning. Due to the results of the interviews, this was explored further in the survey questionnaire. Questions were added to the survey to determine whether survey participants who were actively engaged in emergency planning in schools perceived origin as being an important factor in planning and whether they

had taken actions to prepare for hazards with different origins including human controlled

hazards such as active shooter.

4.1.1.2 Familiarity with the hazard and appropriate protective actions.

Familiarity with the hazard and the associated protective actions necessary to mitigate the

impact of a hazard is considered to be a factor that influences risk perception in the literature

(e.g., National Weather Service 2011, Lindell 1994). Risk perception has been found to influence

participation in planning activities and engagement in protective actions (Senkbeil et al. 2014,

Nirupama and Etkin, 2012, Nirupama and Etkin, 2009, Van der Pligt, 1996) so factors that

influence risk perception, such as familiarity, can influence planning and engagement. The

results of the interviews strongly supported the inclusion of familiarity in the typology with a

total of 39 references by all ten interview participants. A sample quotation follows:

> *"Understanding exactly what it is that you are dealing with and making the right*
>
> *decision about what to do with your school is critical." (Interviewee 8)*

Familiarity is an understanding of the hazard and protective actions which can be

influenced by past experience and knowledge. While there have been few studies on how

individuals perceive risk following an experience with a hazard and how they integrate this

perception into preparedness and protective actions (Trumbo et al., 2011), evidence has been

found that experience with a hazard can alter risk perceptions and lead to increased or decreased

preparedness and a willingness to take protective actions (Lawrence et al., 2014; Norris et al.,

1999). Knowledge of the hazard and protective actions were mentioned as being important

factors in planning and the mitigation of impacts 15 times by seven interview participants. Past

experience with emergencies or protective actions was mentioned 12 times by seven interview participants.

> *"Most people/communities have not really or personally experienced a large-scale*
>
> *emergency, so prioritization (of emergencies) within the "business as usual" (activities)*
>
> *is low, until an event actually happens." (Interviewee 7)*

Several interview participants noted that since emergencies are by definition uncommon events, many schools are not likely to have had much experience with emergencies and would not likely be as familiar with the specific hazards or protective actions. However, this can be mitigated through increasing knowledge of the hazards and the protective actions through training or drills. The results of the interviews suggest that knowledge and experience warrant being a tertiary tier in the typology under familiarity.

4.1.1.3 Awareness of the threat.

In addition to the variables identified in the literature review, interview participants noted that an awareness of the threat was a key factor in influencing risk perception and emergency planning. The relationship between awareness, risk perception and emergency preparedness activities has been discussed in the literature (Burningham et al., 2008, Patton 2003, Dalton 2001) with some debate as to the direction of the relationship. Does risk perception influence awareness or does awareness influence risk perception (Paton and Johnston 2001)? Interview participants indicated that they believed that awareness influences risk perceptions.

The distinction between awareness of a hazard and awareness of a threat is an important one. A hazard is an object, situation or condition that has the potential to become a threat if there is vulnerability to the hazard (based on Green 2008, EMO 2011). If exposure to a hazard occurs

it may pose a threat to life, safety, property, the economy, or the environment and an emergency

may result. For example, an area may have a flood hazard. During a flood in which the water

overflows the banks of the river, the water height may not exceed the capacity of the flood plain.

If the flood plain in this area is undeveloped then the community would not be exposed to the

flood; therefore while a flood hazard exists, this particular event is not a threat to the community.

A total of 23 references to awareness were made by nine interview participants. Interview

participants noted that it was important for schools to have an awareness of what the potential

risks are in their community and to also be aware of those that are in the school environment, as

illustrated below:

> *"It is important to have an awareness of what the risks are at the different (spatial)*
>
> *levels." (Interviewee 2)*

As mentioned in 4.1.1.1, while an all-hazards plan may provide general guidance for an

emergency, there may be hazard-specific factors that must be considered to mitigate the impact.

These specific factors may not be identified if the people responsible for the plan are unaware of

the hazards that exist within their community. For example, different hazards are associated with

different warning lead times, protective actions, and duration. Snowstorms may be forecast

several days before impact, may require the school to close in advance, and may last for a day or

longer. In contrast, an earthquake would likely occur without warning requiring staff and

students to shelter in place and would be over in a minute or so. In addition, different hazards

may be associated with different secondary and/or cascading hazards which could further

complicate the impact, response, and recovery stages. In Ontario, all municipalities are required

under the *Emergency Management and Civil Protection Act* to conduct a hazard identification

and risk assessment of the hazards that could impact their municipality. This information could

be used to inform their planning processes.

A question was added into the survey that focused on whether schools had all-hazards or

hazard-specific plans. Another question assessed the participants' general awareness of which

hazards could impact their schools. Based on these results, the inclusion of awareness in the

typology was flagged pending further exploration through the survey results.

4.1.1.4 Acceptance of the risk.

In the literature, risk perception is proposed as an influencer of risk acceptance

(Thompson et al. 1990, Slovic 1987) with acceptable risks being viewed as being within an

individual's control or to the individual's benefit (Peters and Slovic, 1996). Risk perception

influences whether people engage in preparedness activities, such as planning, or protective

actions (e.g., Senkbeil et al., 2014). If the risk is perceived to be unacceptable then there is more

willingness to take action to mitigate the risk. Three interview participants indicated that they

viewed acceptance of the risk as being a key aspect of risk perception along with awareness.

Two of these participants noted that acceptance of the risk was closely tied to other factors that

influence risk perception including knowledge and experience.

> *"I think they are a little more resilient in the North in terms of acceptance of the*
>
> *emergencies that they have had in the past; it is more built into their character."*
>
> *(Interviewee 10)*

The literature review demonstrated a link between experience with a hazard and

acceptance. Trumbo et al (2014) found that experience, particularly in which a loss was

experienced, resulted in a lower optimistic bias and a higher perception of the risk. This can be

linked to a greater willingness to engage in preparedness and protective actions (i.e. Senkbeil et al., 2014). If a hazard is seen as a possible threat to the school, it is more likely that emergency plans will be developed, and that training and resources will be allocated to address it. In some instances, awareness may be sufficient to encourage people to accept that emergencies are possible within their lifetimes. To better understand the importance of acceptance and its role in risk perception, questions 7 and 15 were added to the survey. Acceptance was added as a potential tier in the typology pending the survey results.

4.1.2 Perceived vulnerability.

All interview participants noted that, after a potential hazard has been identified, a critical decision must be made on to what degree the population being cared for, in this case children, are vulnerable to the impacts of the emergency. The decision to activate an emergency plan is tied to perceived vulnerability, rather than something that is objective. Therefore, it shall be referred to as 'perceived vulnerability' rather than simply 'vulnerability'.

The interview results supported the identification of children as a vulnerable group and demonstrated that interview participants perceived children as being more vulnerable during emergencies than the general population. All interview participants agreed with the literature (e.g., Wisner et al., 2014, FEMA, 2010, Peek, 2008) that the vulnerability of children was primarily due to their age and dependency on adult caregivers.

> *"I guess the other element I tend to think about is children would be more vulnerable*
>
> *without their families, without caretakers. If it is during school they are going to be with*
>
> *their teacher supposedly and there are certainly some safety assurances there, but there*
>
> *is a real vulnerability and risk for them in not having that." (Interviewee 2)*

All interview participants suggested that people who work with vulnerable populations must be aware of these higher levels of vulnerability and needs during an emergency. In addition, school staff must be aware that the vulnerability of children is recognized by the Education Act and that they have responsibilities to ensure the safety of students in their care under this Act. Teachers are required by Regulation 298 to *'ensure that all reasonable safety procedures are carried out in courses and activities for which the teacher is responsible'*. To ensure that 'all reasonable foreseeable risks' are identified, school staff must not only be aware of the vulnerability of children but must also be aware of the potential hazards. This awareness can assist them in developing effective operational plans to mitigate the impact as demonstrated in the quote below.

> *"In Ontario, the template for the plan says that if an emergency is called, like a lock down or something like that, that teachers needs to be assigned to, or somebody like that based on their proximity, to washrooms. They need to be assigned to go to those washrooms if it is safe to do so and see if there are any kids in there and get them out and get them into an area where they can be locked down and taken care of. In high school the plan says if you are in a washroom and a lock down is called, get out of that washroom. So the kids are old enough to know to get out of the washroom and get to a safe place to lock down because washroom doors can't be locked in schools. So I mean that is just an example of the difference in age groups and we are talking about 4 year olds up to 18 year olds right? So the plans need to be written in a language that addresses those age differences." (Interviewee 9)*

> *"So again, based on the age group of children in general the plans have to be varied so for elementary the plans are going to say one thing and for secondary schools the plans*

are going to say another thing because the [older] kids are a lot more self-sufficient."

(Interviewee 7)

In addition to age and dependency on adults, two interview participants indicated that they felt that knowledge and access to resources contributed to the vulnerability of children. Young children may be particularly reliant on adults in regards to emergency information, such as being alerted to an impending hazard or knowing how to engage in protective actions. Access to resources can also be a barrier to children as they may not have the ability or knowledge to access resources (e.g., life saving medications, shelter areas, first aid kits) that may become essential during an emergency.

Studies such as Johnston et al. (2011) have found that when provided frequently emergency practices such as drills and training on emergency procedures increase the likelihood that school staff and students will be able to respond to an emergency in an informed and predictable manner, while engaging in appropriate protective actions. The interview participant quoted below noted that since children participate in drills on a regular basis that they were more likely to respond correctly to an emergency situation than others, including adults, who have not had the same regular exposure to drills. The regular use of drills suggests the application of a growth mindset approach to emergency procedures in that it enables students and staff to gain knowledge regarding the actions they will need to take during an emergency. This approach can mitigate potential loss by using knowledge to increase students' levels of familiarity with the protective actions and reducing the need for direction.

"The kids know how things happen because they do the drills regularly. Their awareness
is better than the adults." (Interviewee 5)

Participation in drills and training can promote resiliency as it provides an opportunity to change and adapt behaviors while reducing the risks to future disasters. Two interview participants noted that resiliency is an important concept to consider in emergency planning. The interview participants noted that children have the capacity to be resilient, particularly if they are given age-appropriate training (for example, being taught about the hazards and protective actions in an age-appropriate manner that empowers them to take the correct actions during an emergency).

The interview results strongly supported the inclusion of vulnerability in the typology as a primary tier factor. This aligned with the literature that viewed schools as being facilities that hosted members of a vulnerable group and therefore, are in need of effective emergency plans. The interview results identified vulnerability as a factor, like risk perception, that could be mitigated. Mitigation could be done through activities such as needs-based planning, training, and exercises. This makes vulnerability a useful inclusion to the typology as awareness of the vulnerability and subsequent needs provides opportunities to affect the outcome of an emergency through operational emergency planning.

4.1.2.1 Limiting factors for vulnerable groups.

All interview participants indicated that situational awareness and consideration of the different limiting factors were key to taking the appropriate protective actions outlined in an operational emergency plan. Based on the literature review, the proposed typology identified two primary limiting factors; warning (i.e. Barton 2005, Perry 2007) and location (i.e. Burton et al. 1993, Tobin and Montz 1997). Warning and location were the most commonly referenced limiting factors in the interviews with 28 individual references. Warning was cited as an important limiting factor by all ten interview participants. Location was cited as an important

limiting factor by six interview participants. In addition to warning and location, interview participants also identified two other potential limiting factors: duration and area, which could be combined under the heading of 'scale'.

4.1.2.2 Average warning lead time.

Early warning of an impending hazard has the potential to significantly reduce the potential loss of life (UNISDR, 2018) and can be considered an integral part of emergency preparedness. Early warning systems are considered to be an important part of emergency preparedness and have been found to reduce fatalities when the warning is properly detected and communicated.

> *"Is it something that I am going to have spur of the moment, get no warning and we go, go, go or is it something that we know is coming? Even heat waves; we know they are coming. We can see days ahead that we are going to have some pretty hot weather and you can start to do something about it. We start to plan for it, prepare and we are in a better state now."(Interviewee 3)*

Warning was the limiting factor most frequently cited by interview participants as a key consideration for emergency planning. A total of 17 references to warning as a limiting factor were made by 10 participants. The warning lead time is important in deciding what protective actions are feasible. For example, during an earthquake the safest place to be may be in an open field with nothing overhead that could fall. However, a lack of warning means that moving from a building to an open field before the shaking begins is not feasible and would likely put people at increased risk of injury. The better protective action in this case would be to shelter in place under a heavy piece of furniture. Since an earthquake will occur with no warning, initiatives such

as the Great BC Shakeout (more information available at: www.shakeoutbc.ca) are critical as

they teach what protective actions should be taken immediately. This is important as the teachers

and staff will have little time to direct the children in safety activities. It is important that schools

have a method in place to receive warnings since a warning can only be acted on if the people in

danger receive it (Coleman et al., 2011). The results from the interviews agreed with Coleman et

al. (2011) that there must be a process in place to receive and disseminate warning information

within facilities that host vulnerable groups so that protective actions can be taken.

> *"You know, if it is an emergency situation, (it may be) swift with how it unfolds. So it is*
>
> *always the unknown is what makes emergency planning very difficult."(Interviewee 1)*

Five respondents also indicated that the speed of onset of an emergency was also a factor

that could make an event difficult to plan for and manage. Onset or how quickly an event unfolds

was noted as a potentially important consideration. However, schools may not be alerted to the

onset of a hazard and the person responsible for activating the emergency plan may only be

alerted when a warning is received. Since this typology focuses on operational planning, warning

lead time will be used because it captures the period of time in which protective measures can be

applied. Sorensen (2000) notes that, despite improvements in the dissemination of warnings to

the public, no warning system reaches all potentially affected persons.

4.1.2.3 Location of threat.

Many of the typologies in the literature included a spatial component (i.e., Burton et al.

1993, Tobin and Montz 1997). The spatial distribution of particular hazards varies depending on

the type and scale of hazard. For example, a tornado or windstorm poses an external threat to a

school building, while a hazardous materials incident caused by a spill in a chemistry class poses

an internal threat. Location of the threat can influence the decision on whether there is time to engage in a particular protective action and whether that protective action will provide adequate protection given the circumstances. As noted by Sorenson et al. (2002) the decision to evacuate must be based on a reasonable assurance that the people being evacuated will be safer leaving than if they stayed.

Location of the threat relative to the facility that hosts members of a vulnerable group was referenced a total of 11 times by six interview participants as a limiting factor that was a critical consideration for effective emergency planning. The interview participants noted that whether a threat is internal or external to the facility that hosts vulnerable groups is an important factor in planning and response.

> *"The first data that I need to be able to make that kind of decision (to activate an*
> *emergency plan) is where does the threat come from and what kind of action is needed?*
> *Is it internal or external?" (Interviewee 8)*

The location of the threat is an important factor in deciding what protective action is appropriate to the extent that location is noted in the descriptions of when many of the five general protective actions should be used, i.e. for lockdown (OAPC 2005), hold and secure (Toronto District School Board, 2018), and shelter in place (Hamilton Wentworth District School Board, 2016). For example, depending on the location of the hazardous materials spill, either evacuation or shelter in place may be more appropriate to keep students and staff isolated from the threat. The location of the threat and which general protective action is applicable can be important considerations in terms of resource inventory for facilities such as schools. An external hazard may necessitate that schools be prepared to keep students at the school longer and/or have

designated shelter areas. This would differ from an internal hazard in which plans need to be

made for evacuation and resources kept at the school may not be accessible. Based on the results,

a question focused on the importance of knowing the location of the threat was added to the

survey. Location remained in the typology pending the results of the survey.

4.1.2.4 Scale.

In addition to warning and location, two other factors were identified by interview

participants related to scale: duration and area. Duration refers to how prolonged the impact of a

hazard could be. Duration has been identified as factor in typologies such as Perry (2007);

Burton et al. (1993); Dynes et al. (1981); Kreps (1989a). The interview results supported the

inclusion of duration in the typology with four participants each noting that it is an important

factor. One interview participant noted that duration could be an important factor for facilities

such as schools as it would influence plans that include protective actions such as shelter in

place.

> *"They may need to have better shelter in place kind of plans because they may be having*
> *to keep the kids for longer." (Interviewee 7)*

While many hazards such as thunderstorms tend to be short duration events, some

hazards that occur in Southern Ontario may result in a longer duration emergency. A long

duration event may require schools to keep students at school for longer than normal or it may

result in students being unable to attend school if enough warning is received to close in

advance. If a long duration emergency external to the school occurred while the students and

staff were at school with not enough warning to close the school or send them home, the school

may require more resources than it would normally use. This happened during The Blizzard of

'77 in which more than 2,000 students were snowed in at twenty-four schools in Niagara with

many stranded overnight (Niagara Falls Gazette, 1977).

Area refers to the geographical extent of the region impacted during an emergency.

Examples of the inclusion of spatial variables were found in the literature including Barton

(1963), Slovic (1987), Kreps (1989b), Burton, Kates, and White (1993), Tobin and Montz (1997)

and Perry (2007). However, the size of the area considered in these typologies were often very

general or non-facility specific (i.e., the use of 'local' in Barton (1963) or diffuse in Tobin and

Montz (1997)).

The results of the interviews identified area as being a limiting factor that should be

included in the typology. Four participants identified area as a limiting factor and mentioned it a

total of seven times. One respondent noted:

"How widespread is it? I mean, it is a lot easier for me to take care of… a train

derailment than it is to take care of an ice storm. Because a train derailment is localized,

small area. Yeah, I am going to have to evacuate people and the damage there might be

significant but the reality is that it is just in a small area. Whereas in an ice storm the

whole city is affected." (Interviewee 3)

The extent of the area impacted can have significant repercussions in terms of response

and recovery. It can influence what type of protective action is appropriate, for example a small-

scale incident involving a minor hazardous materials spill in the chemistry class room may only

require the evacuation of students in that particular classroom in contrast to a larger hazardous

materials event that requires the evacuation of the entire school. The area can also affect the

resources required and available to mitigate the situation as reported following the destruction of

the Goodman Elementary School in Missouri by an EF2 tornado on the night of April 4, 2017

(Olliges, 2018). Had multiple schools been damaged during this tornado, space to host the

students and staff affected would have been a scarcer resource which would have further limited

the options available.

In addition, if an emergency impacts a wide area, there is a risk that the homes of

students and staff will also be affected. People may be displaced from their homes with some

staying in shelters, hotels, or friends and family that may be outside of the community. Damage

to local infrastructure, such as roads, bridges and cell towers, may also hamper the reunification

of children with their caregivers. In addition, following a wider-scale event, caregivers may be

unable or unwilling to take their children back to the school or schools that remain undamaged

may be repurposed to serve as emergency shelters. In these circumstances, schools would be

unavailable for normal activities until the crisis is dealt with (Peacock, Dash, Zhang, 2007;

Schipper and Pelling, 2006).

4.1.2.5 Protective Actions.

When deciding on a protective action, the decision makers will have to consider many

different factors, such as how much warning lead time they have received, the characteristics of

the hazard, the vulnerability of the population, and the resources available. This decision may

have to be made quickly and in the best interest of the health and safety of the people being cared

for. Protective actions were referenced as a crucial consideration for operational emergency

planning by all ten interview participants. Two interview participants indicated that protective

actions were more useful in operational emergency planning than knowing the particular hazard

or the perceived origin of the hazard.

> *"Ok, if I want to get away from something can I evacuate? Do I pick or use any of the others, hold and secure, lock down or shelter in place? You kind of start there with the planning. These are my tools. I want to stay in the school, I have got three tools. If I am going to leave the school I am going to have one tool, evacuate and then you start your decision-making process, decision making tree from there." (Interviewee 6)*

Interview participants noted that there is a strong need to ensure that protective actions are realistic given the particular emergency situation.

> *Although there is an element of truth to it but I think it needs to be factored on the analysis of this and that particular hazard and the time to implement protective actions assuming they are looking at things like shelter in place or evacuating in particular."(Interviewee 4)*

The need for protective actions to be realistic links back to Clarke's (1999) identification of 'fantasy plans' in which the actions outlined in the plans did not meet the actual needs of the group being planned for. Protective actions outlined in such plans may also be unrealistic and may not take into account the needs of the group that will engage in the protective action or may be unrealistic due to resource limitations. Sorenson et al. (2004) noted that the ability to decide on a protective action is also a resource-dependent decision and that each facility must take into consideration its own unique situation to determine if the protective action is realistic or not. For example, a school may decide that in the event of a particular type of hazard, they will shelter the students in place overnight. However, if that school does not have the resources to adequately care for the staff and students overnight, they may want to consider other options or look at increasing their resources. An example of an unrealistic protective action would be if a school

decides that during a tornado warning that it will shelter staff and students in the basement but does not actually have sufficient space in the basement to accommodate the number of people. To make this protective action more realistic, the school would have to consider other shelter locations that are easily accessible.

Interview respondents also noted that for a protective action to be useful that it must be understood and tested. Familiarity with specific hazards and their associated protective actions has been identified in the literature (i.e. National Weather Service 2011; Pearce, 2000; Lindell, 1994) as being a factor that can influence risk perception. While much of the focus in the literature has been on the role of familiarity and its role in risk perception (i.e. Slovic, 1990; Kasperson et al., 1988; Slovic 1987) from a school emergency planning perspective, familiarity with protective actions is just as, if not more critical, than familiarity with the particular hazard.

The review of the scientific literature identified three primary protective actions: evacuation (leave the area), shelter in place (stay indoors), and close in advance (school cancels activities for the day). A review of the practitioner literature (including school policies, legislation, and advisory groups) identified two more; lockdown and hold and secure. Interestingly, these two protective actions were not widely noted in the scientific literature but appear to be widely used in Ontario with schools being required to hold a minimum of two lockdown drills per school year (Ontario Association of Chiefs of Police, 2007). While it is possible that lockdowns and hold and secure could be viewed as a sub-categories within sheltering in place, interview participants, particularly those with experience in school safety, tended to view these as separate protective actions.

Lockdown was the most frequently cited protective action with 34 references to

lockdowns by 9 interview participants. Shelter in place was the second most frequently

referenced type of protective action with 28 references to shelter in place by all respondents.

Evacuation was referenced 26 times by nine respondents. Hold and secure (also referred to a

'Secure Schools') was referenced 14 times by four interview participants. These four interview

participants had experience working in school safety. A hold-and-secure is enacted when it is

desirable to secure the school due to an ongoing situation outside that is not related to the school

(e.g., a bank robbery occurs near a school but not on school property). In this situation, the

school continues to function normally, with the exterior doors being locked until such time as the

situation near the school is resolved (Ontario Ministry of Education, 2017).

The option for schools to close in advance of an impending emergency was the least

frequently mentioned protective action with four references by two interview participants. This is

interesting as it is quite common in Southern Ontario each year for schools to close for a day due

to snowstorms while other protective actions (e.g., evacuation) are more likely to be practiced

during drills rather than experienced during an actual event. In some instances, such as a sudden

change in weather conditions, the school may make the decision to close part way through the

day. Interview participants may not have addressed school closures related to snowstorms

because of reduced risk perception, or heightened experiences and familiarity (e.g., Ruin et al.

2007, NWS 2011), or the process in decision making for snowstorm related closures. Since

snowstorms are a fairly common occurrence in Ontario and usually result in minimal impacts, it

may be that closures due to this hazard are perceived more as routine events rather than

emergency situations. If closures are perceived as routine occurrences, interview participants

may have been less likely to think of and mention them as a protective action to be used during

an emergency. For some areas in southern Ontario, the school board, rather than the individual

schools, may be responsible for deciding whether to close the schools due to snowstorms which

may be another reason why interview participants did not mention it in the context of school

protective action options.

4.1.3 Summary of interview results.

Semi-structured key informant interviews were held with 10 subject matter experts to

obtain an initial overview and assessment of the key factors that influence operational emergency

planning for schools. The interviews supported the literature on risk perception as a key factor in

emergency planning. Participants noted that while a high perception of risk could encourage

planning activities, a low perception could negatively influence planning and response by

leading to complacency. While hazard origin was identified as a significant factor in the

literature (i.e. Schmidt, 2004), the participants did not perceive it as being important in

operational emergency planning. This difference may be explained by the participants' real-

world experience in emergency management and school emergency planning, which differs from

those of the laypersons that the studies in the literature tended to focus on. It is also possible that

some of the participants may not be aware of emergency management theory. The results

suggested that all-hazards plans focused on emergency functions may be more commonly used

for schools. However, since the type of hazard can influence limiting factors (i.e. warning lead-

time) and protective actions, it is recommended that hazard-specific appendices be included in

plans. The results of the interviews supported the inclusion of familiarity as a factor under risk

perception. Participants noted that many schools may not have had experience with emergencies

and would not likely be as familiar with specific hazards or protective actions. Two variables

were recommended for inclusion; awareness of the threat and acceptance of the risk. Participants

indicated that they believed that awareness influences risk perceptions and could impact

planning. They noted that it was important for schools to have an awareness of the potential

hazards and risks in their community and to also be aware of those that are in the school

environment.

Participants noted that perceived vulnerability is a significant component to a typology

focus on operational emergency planning for schools and supported the literature which

identified children as a vulnerable group. Participants felt that people who work with vulnerable

populations must be aware of the higher levels of vulnerability. A growth mindset approach was

suggested to assist children in becoming more resilient during emergencies. Two primary

limiting factors were identified from the literature that would have to be considered in plan

development; warning and location of the threat. Both were identified for inclusion by the

participants who also identified two other factors; duration and area which were combined under

the heading of 'scale'. Participants were in agreement with the literature that consideration of

protective actions in the development of plans could significantly mitigate the impact of an

emergency on vulnerable groups and noted that protective actions must be understood and tested.

The interview results refined the focus of the survey questions to cover the factors that

the participants identified as being important to school emergency planning. In addition, the

outcome of the interviews influenced the researcher to include questions focused on determining

the current status of school emergency planning. The interviews underscored the importance of

having survey questions that permitted respondents to add comments as several key pieces of

information provided by the interview participants based on their experience are not necessarily

well documented in the scientific literature.

4.2 Survey Results

A survey questionnaire was used to assess the completeness and logic of the preliminary typology. The results from the key informant interviews were used to refine the survey questions to ensure that critical aspects of the interpretative and social process views relevant to school emergency planning were covered. School boards in Ontario require that external research applications be approved before school staff can participate in external research studies. Applications were submitted to twenty public school boards in southern Ontario. Five school boards agreed to participate in this study. A purposive target approach was used to identify participants based on their role within a school. School principals at each of the five public school boards that agreed to participant were sent an invitation to participate in the survey. Fifty-seven responses were received out of a potential 249 responses for a response rate of 22.9%. The results from the survey questionnaire will be presented based on theme, rather than numerically based on the order of the question. The themes are general information, the current state of school plans, interpretative view (risk perception), and the social process view (perceived vulnerability);.A list of the survey questions is provided in Appendix II.

4.2.1 General information.

School principals at each of the five public school boards that agreed to participate were sent an invitation to participate in the survey. All respondents indicated that they had read and understood the information in the consent form and expressed their consent to participate in this research study in Question 1. Question 2 asked respondents to identify the school board that their school is a part of for data analysis purposes. Question 3 asked respondents to provide information on the approximate enrollment of their school. Question 4 confirmed that respondents had a role in developing, implementing, and/or maintaining the emergency plan.

4.2.2 Current state of school plans.

In Question 5 survey respondents were asked if their school has an emergency plan. A total of 51 responses were given, with six respondents declining to answer. Fifty respondents (98%) indicated that their schools do have emergency plans. One respondent answered that their school does not have an emergency plan.

Question 6 asked if school staff and students received annual training on the school's emergency plan. Fifty-one responses were given and the same six respondents who declined to answer whether their school had an emergency plan also declined to answer this question. All of the 51 respondents (100%) who chose to answer this question stated that their school had annual training for staff and students.

Question 10 asked respondents to identify, based on their experience, how well they felt that schools were supported in engaging in effective emergency planning in terms of funding, resources, support and information sources. Respondents selected their answers using a Likert scale. Forty-seven (92%) respondents chose to answer this question.
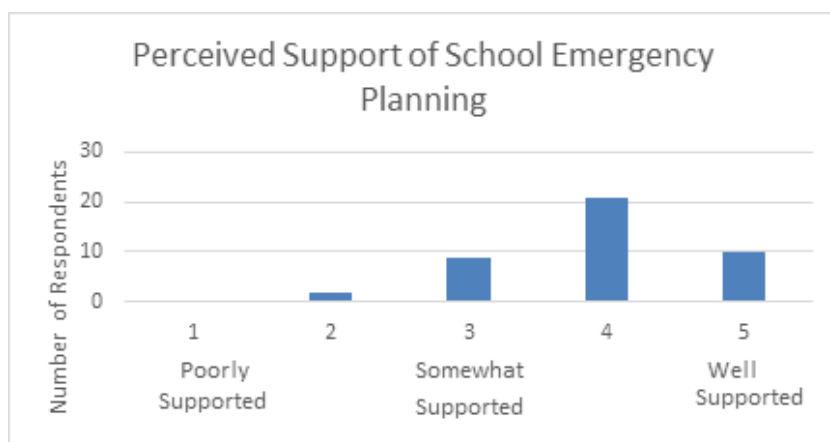
Figure 12. Respondents indicated their perception of the level of support that schools receive for emergency planning in terms of funding, resources, support and available information.

Of the 47 respondents, 21%; (n = 10) responded that they perceived emergency planning
in their schools as being well supported. The majority of respondents (45%; n = 21) choose a
value of 4 as their perceived level of support which lies between being 'somewhat' and 'well'
supported. Somewhat supported was selected by 19% (n = 9) of respondents while 2% (n = 1)
chose 2 which is between 'poorly supported' and 'somewhat supported'.

Question 11 asked respondents to identify what they perceived to be the top three
challenges for school emergency planning. Forty-nine (96%) respondents chose to answer this
question.
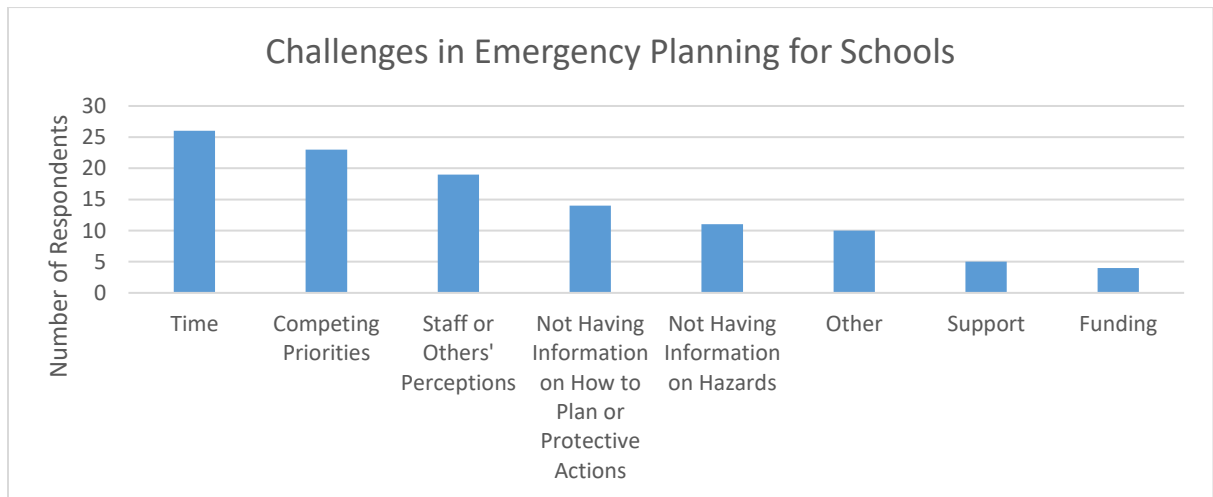
Figure 13. Respondents were asked to pick what they believed to be the top three challenges facing
school emergency planning.

The top challenge identified by the respondents in Question 11 was having the time to do
emergency planning (53%, n = 26). This was following by the challenge of having competing
priorities (47%) and staff or others having the perception that emergencies will not happen (39%,
n = 19). Fewer respondents felt that support (10%, n = 5) or funding (8%, n = 4) were among the
top three challenges in emergency planning for schools. Twenty percent (n = 10) of the

respondents selected 'other'. Two of the respondents who selected 'other' indicated in the

comments that they felt that their schools did not have challenges. One responded that they

viewed a challenge as having staff who could support students with special needs during an

emergency. Another identified a challenge as ensuring that all staff, including supply teachers,

are familiar with the plan. Two of these respondents felt that a challenge was planning for a

variety of situations when there are so many unknowns and that the plan needs to cover as many

scenarios as possible. One respondent indicated that sometimes the weather postpones planned

drills. One respondent stated that he or she wondered whether protective actions had been

'institutionalized' in their school and whether others would know what to do if key staff were

away. This person went on to say that to addressing this challenge would require time to sit and

process the information, develop a plan and then share it with their staff.

4.2.3 Interpretative view: risk perception.

The 50 respondents (98%) who indicated that their school had an emergency plan were

asked to indicate which of the hazards listed were covered by the plan in Question 7. All 50

(100%) chose to answer this question. The results are displayed in Figure 14 below.
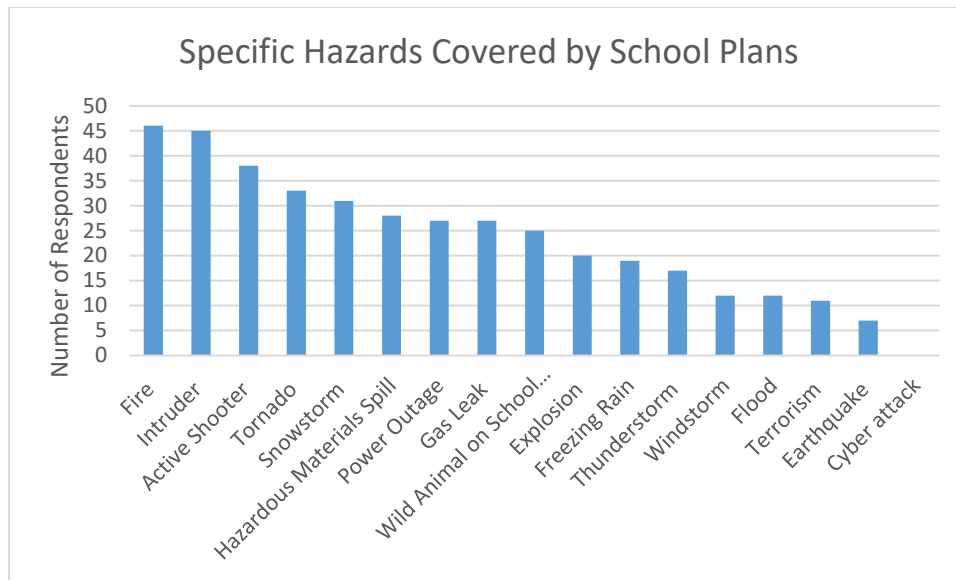
Figure 14. Hazards covered by the respondent's school emergency plans.

Almost all respondents (90%, n = 45) stated that their school plans covered fire, which is not surprising considering that schools must adhere to the Fire Code which requires them to have a fire plan (Government of Ontario, 1997). It is unknown whether the 10% (n = 5) that did not indicate having a plan for fire responded that way because they viewed the fire plan as being separate from other emergency plans, or if their school truly did not have a fire plan.

Active shooter and intruder hazards were covered by a majority of the plans with 88% (n = 44) of respondents reporting that their plans covered active shooters and 75% (n = 37) covering intruders. While intruders in schools may be more common hazards (e.g., an unknown relative comes to pick up a child), active shooter events are not common in Canada at this time. However, there has been significant media attention due to events in the United States that have resulted in mandatory drills in schools that have heightened awareness.

However, other hazards which occur more frequently in southern Ontario were reported to be covered by fewer schools. Flooding is the hazard responsible for the highest number of

emergency declarations in Ontario (PEOC, 2017) and has replaced fire as the hazard responsible

for the highest amount of losses according to the Insurance Bureau of Canada (2017). However,

only 23% of respondents (n = 12) indicated that their school plan covered flooding despite being

in municipalities known to have been impacted by floods. Schools in Ontario have been

impacted by floods in the past, for example, several schools were closed in Brantford during a

2018 flood. It is possible that the schools may not be located in areas that have flooded in the

past; however, with flood events increasing in frequency (PEOC, 2017), it is possible that

flooding could become a greater concern in the future. None of the respondents selected cyber-

attack as being covered by the plans. Cyber-attacks have been increasing in frequency over the

past decade (EMO, 2012). While higher profile attacks in Canada have targeted higher education

institutes (e.g., Algonquin College in 2018) and municipalities (e.g., Wasaga Beach in 2018), the

number of cyber-attacks on all types of organizations, including schools, is increasing (Doran,

2017).

Thirty-two respondents (64%) indicated in a sub question under Question 7 that their

school plan focused on addressing the problems using an all-hazards plan. These plans are

intended to be adaptable to meet the needs of the response regardless of the type of hazard. In

some instances, although these plans do not specifically cover individual hazards, they may still

be able to meet the needs of the school. However, drawing from the results of the interviews, the

inclusion of hazard-specific appendices related to warning notification and protective actions

should be considered.

Respondents were asked in Question 13 how likely they believe it to be that their school

could experience an emergency in the next 20 years. Thirty-seven participants (73%) responded

to this question. A Likert Scale was used with potential responses ranging from 1 (not possible) to 5 (very likely).
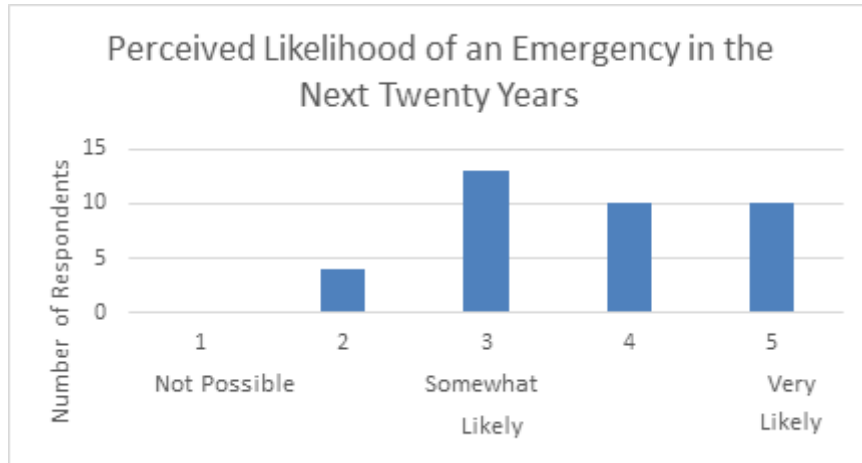
Figure 15. The respondents were asked to indicate how likely they believed it was that their schools would be impacted by an emergency in the next 20 years.

None of the respondents felt that an emergency impacting their school in the next 20 years was impossible. Only 11% (n = 4) of respondents selected '2', which is in between 'not possible' and 'somewhat possible' showing a low risk perception in terms of the likelihood of an emergency. The highest percentage of respondents, 35% (n = 13) selected a value of '3' which is associated with an emergency being somewhat possible. The next highest value selected was 5 (very likely) which was selected by 27% (n = 10) of respondents. The remaining respondents, 27%, (n = 10) felt that the likelihood of an emergency impacting their schools in the next 20 years fell between 'somewhat possible' and 'very likely'.

Forty-eight (84%) of the respondents chose to answer Question 14. Respondents were then asked which of a series of statements best characterized their views on the likelihood of an emergency impacting their school and what would be necessary to be prepared. None of the respondents chose the statements 'An emergency would not occur here' and 'An emergency is so

unlikely that there is not much need to be prepared'. The statement 'An emergency is unlikely but preparedness is essential' was selected by 35% (n = 17) of the respondents. 'An emergency is possible but we are prepared' was selected by 33% (n = 16) while 'An emergency is possible but we still need to be more prepared' was chosen by the remaining 31% (n = 15). It is important to note that 100% of the respondents felt that emergency preparedness is essential. One of the comments left for this question explained that it is essential that plans are continuously reviewed and modified to reflect the changing times and the potential threats to student and staff safety. Another comment stated that they felt that their school would not be prepared for a natural disaster such as a tornado.

4.2.3.1 Perceived origin.

Question 23 asked respondents whether their school plans categorized hazards as being either natural, technological, or human caused. Forty-five (79%) people chose to answer this question. Twenty-seven of the respondents or 60% selected 'no' indicating that their school does not categorize hazards in this manner. The 'yes' option was selected by 22% (n = 10) of the respondents while the remaining 18% (n = 8) responded that they were uncertain. Two respondents left comments stating that their schools' plans do not explicitly refer to these categories but that hazards are 'somewhat' grouped in this manner. Another respondent left a comment stating that his or her school does categorize hazards in this way but does not use the technological category.

Respondents were then asked in Question 24 whether they believe that dividing hazards into the natural, technological, and human caused categories would be useful for school emergency planning. The inclusion of the perceived origin of the hazards in the initial typology was strongly supported in the literature but received little support in the interview results. The

response from the survey participants was mixed with 41% (n = 18) believing that it is helpful, 35% (n = 16) responding that they did not believe that it is helpful, and 24% (n = 11) who were uncertain of its usefulness. Three respondents chose to leave comments. One of these respondents expressed concern that this would only make the plan more complicated. The other two stated that they did not feel that the categories were relevant to managing an emergency.

4.2.3.2 Familiarity with hazard and protective actions.

Question 12 asked respondents whether their school, staff, or community had experienced an emergency in the past 10 years. Fifty-six (98%) people chose to respond to this question. Overall, 77% (n = 36) of respondents indicated that yes, either their school, staff or community had experienced an emergency while 23% (n = 11) responded that they were uncertain or that their school, staff or community had not experienced an emergency in the past 10 years. One of the respondents who answered 'no experience' wrote in the comments that their school had only been open for a few years, which could influence this response. Some of the respondents chose to elaborate on the types of emergencies that had been experienced which included fires, physical violence and threats, gas leaks, bomb scares, and wild animals on school grounds.
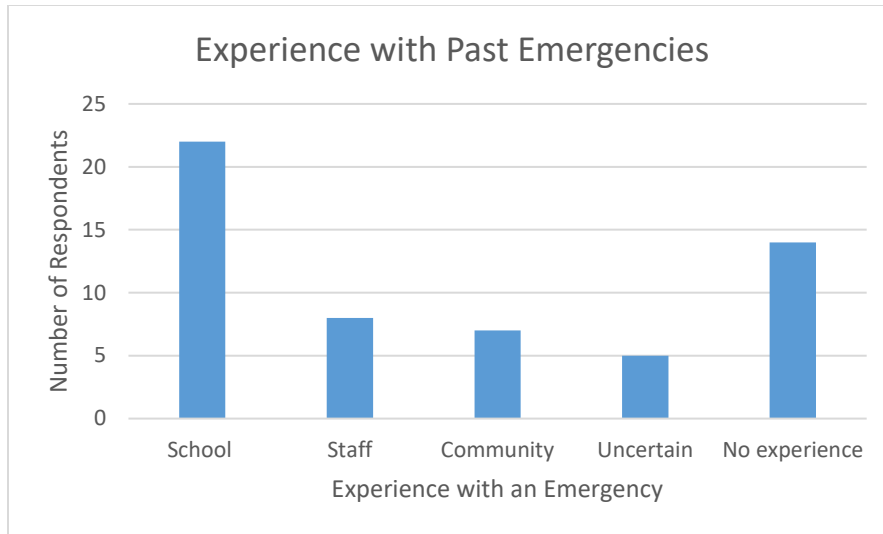
Figure 16. Experience with emergencies (n = 48).

The majority of the participants who responded to Question 12 who had experience with

an emergency (n = 36, 77%) indicated that their school experienced an emergency in the past 10

years (n = 22, 61%). Fewer respondents, 17% answered that some of the school staff had

experienced an emergency in the past 10 years (n = 8, 22%). Only 17% (n = 6) of respondents

answered that their community had an emergency in the past 10 years. Ten percent (n = 5) were

uncertain whether their school, staff, or community had experienced an emergency in the past 10

years while 29% (n = 14) responded that their school, community or staff had not experienced an

emergency in the past 10 years.

Question 17 provided respondents with a list of different hazards and asked them to

identify which type of general protective action (evacuation, shelter in place, hold and secure,

lockdown, or close in advance) they believed would be most likely used to mitigate the impacts

of that particular hazard. This was compared to the primary recommended protective action. The

primary protective action for each hazard is the one that is widely recommended by

organizations such as Environment Canada (2017), National Weather Service (2017),

Department of Homeland Security (2017), and Emergency Management Ontario (2017) as being

applicable for most situations. Forty-seven (82%) respondents chose to answer this question and

the results are shown in Table 24.

Perceived Origin	Hazard	Recommended Protective Action	# of Respondents Who Selected Recommended Action	Respondents Who Selected Recommended Action
Technological	Fire	Evacuation	44	94%
Human-Caused	Active shooter	Lockdown	44	94%
Human-Caused	Intruder	Lockdown	42	89%
Natural	Tornado	Shelter-in-place	33	70%
Technological	Power outage	Situational	28	60%
Natural	Thunderstorm	Shelter-in-place	25	56%
Technological	Gas Leak	Evacuation	25	53%
Natural	Wild animal	Hold-and-secure	22	50%
Natural	Forest fire	Situational	21	46%
Natural	Snowstorm	Close in advance	20	44%
Human-Caused	Terrorism	Situational	18	39%
Technological	Hazmat	Situational	16	34%
Natural	Flood	Situational	15	32%
Natural	Earthquake	Shelter-in-place	9	20%

Table 24. This table shows the percentage of respondents who selected the type of protective action that is most commonly recommended for the particular hazard.

As seen in Table 24, participant responses did not always align with the recommended protective

actions. The hazards where more participants identified the recommended protective actions

were fire (94%, n = 44), active shooter (94%, n = 44), and intruder (89%, n = 42). These hazards

are the ones most frequently practiced in drills as fire drills and lockdown drills are mandated in

Ontario. Fewer participants selected the recommended protective actions for a hazardous

materials incident (34%, n = 16), earthquake (20%, n = 9), or a flood (17%, n = 8).

Table 25 provides a breakdown of the percentage of respondents who selected each type

of protective action as being the primary one for each hazard. The recommended protective

actions are highlighted.

Hazard	Evacuation	Shelter in Place	Lockdown	Hold and Secure	Close in Advance	Situational	Other
Tornado	0%	70%	0%	11%	6%	13%	0%
Flood	17%	13%	0%	6%	28%	32%	4%
Fire	94%	0%	0%	0%	2%	4%	0%
Hazardous Materials Spill	34%	15%	0%	9%	6%	34%	2%
Active Shooter	0%	2%	94%	0%	0%	4%	0%
Power Outage	2%	17%	0%	6%	9%	60%	6%
Snowstorm	0%	7%	0%	0%	44%	46%	4%
Terrorism	0%	2%	44%	9%	4%	29%	2%
Wild Animal	0%	36%	4%	47%	0%	11%	2%
Gas Leak	53%	9%	0%	0%	2%	32%	4%
Earthquake	9%	20%	2%	4%	4%	53%	7%
Intruder	0%	0%	89%	2%	0%	9%	0%
Thunderstorm	0%	56%	0%	11%	0%	24%	9%
Forest Fire	11%	13%	0%	0%	11%	46%	12%

Table 25. The distribution of respondents who selected each protective action as the recommended protective action for that specific hazard. The recommended protective is highlighted in grey.

For some hazards, it appears that there is confusion regarding what the primary protective action should be. The primary protective action for a tornado is to shelter in place (Environment Canada, 2018). However, 10% (n = 5) of participants selected hold-and-secure, which would provide some safety as students remain indoors, but would not provide the same level of safety as shelter in place in which particular areas are chosen as shelters from the severe weather, such as interior rooms on the lowest level. Other discrepancies may be due to the best protective action depending on the situation. For example, for snowstorm 44% (n = 20) selected 'close in advance' while 46% (n = 22) selected 'situational. The recommended protective action is to close in advance of a snowstorm. However, it is possible in southern Ontario for a snowsquall to shift direction with little warning whereas the larger winter storm systems can be forecast days in advance which makes closing the school in advance more feasible.

4.2.3.4 Awareness.

The respondents were asked to identify in Question 15 which of the listed hazards they believed could occur in the community where their school is located. Table 26 shows the results. Fifty respondents (88%) chose to answer this question.

Perceived Hazards in Community	Number of Respondents	Percentage of Respondents
Snowstorm	46	96%
Freezing Rain	46	96%
Power Outage	45	94%
Fire	45	94%
Intruder	42	88%
Thunderstorm	41	85%
Wild Animal	38	79%
Active Shooter	35	73%
Gas Leak	35	73%
Tornado	34	71%
Windstorm	32	67%
Explosion	30	63%
Cyber Attack	25	52%
Hazardous Materials Incident	24	50%
Terrorism	18	38%
Flood	18	38%
Earthquake	13	27%
Forest Fire	9	18%

Table 26. The hazards that respondents (n = 50) believed could occur in the communities where their schools are located.

The two hazards with the greatest percentage of responses at 96% each were snowstorm (n = 46) and freezing rain (n = 46). This was followed by power outage and fire at 94% (n = 45). Intruders were perceived as a potential hazard by 88% (n = 42) of respondents. All four of these hazards are considered very common in southern Ontario with most communities experiencing several occurrences annually (EMO, 2012), often with minimal impact. Windstorm and flooding which are common occurrences in southern Ontario were selected by 67% (n = 32) and 38% (n = 18%) of the respondents respectively. It should be noted that flood was selected by only 38% of respondents despite it being responsible for the majority of declared emergencies in Ontario

(PEOC, 2017) and now exceeding fire in terms of insurance claims (IBC, 2017). Earthquake and

forest fire were selected by the smallest percentage of respondents with 27% (n = 13) and 19% (n

= 9) respectively perceiving them as being possible in their communities. These two hazards are

less common in some communities due to long return periods or location-specific characteristics.

Another interesting note is that terrorism (not including active shooters) was identified by only

36% of respondents despite claims in the emergency management community that the public

views it as a significant threat within their communities.

4.2.3.4 Acceptance.

The results from the Question 15 regarding perceived hazards in the community were

compared to the results from the Question 7 that asked respondents to identify which hazards

were covered by their school's emergency plan (Table 27). Thirty-nine (78%) of the respondents

chose to answer both of these questions.

Perceived Hazards Not Covered by School Plans					
Hazard	Covered by Plan		Perceived as Possible		Not Covered by Plans
	# of Respondents	Percentage	# of Respondents	Percentage	
Fire	37	95%	33	85%	-10%
Shooter	32	82%	26	67%	-15%
Power Outage	21	54%	36	92%	38%
Snowstorm	27	70%	35	90%	20%
Freezing Rain	17	44%	35	90%	46%
Terrorism	11	28%	15	38%	10%
Animal	20	51%	28	72%	21%
Intruder	37	95%	32	82%	-13%
Thunderstorm	15	38%	31	80%	42%
Hazmat	23	59%	19	49%	-10%
Tornado	27	70%	25	64%	-6%
Windstorm	12	30%	23	59%	29%
Flood	9	23%	14	36%	13%
Explosion	17	44%	24	62%	18%

Gas Leak	22	56%	27	70%	14%
Cyber Attack	0	0	21	54%	54%
Earthquake	7	18%	10	26%	8%
Forest Fire	0	0	5	13%	13%

Table 27. A list of the hazards identified by the respondents (n = 50) that are covered by school plans compared to those identified by respondents as being possible in the communities where their schools are located.

As seen in Table 27, quite a few respondents identified hazards as being possible in the community which were not included in their school's plan. A chi-square test, x^2 (17)=47.739, p<0.05, found that there is a statistically significant dependence between the hazards identified in the community and their inclusion in a school plan.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
hazardtype * coveredperceived	866	100.0%	0	0.0%	866	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	47.739[a]	17	.000
Likelihood Ratio	58.001	17	.000
N of Valid Cases	866		

a. 2 cells (5.6%) have expected count less than 5. The minimum expected count is 2.86.

Figure 17. The SPSS output tables that tested the dependence between the hazards identified in the community and those included in school plans.

Many of the hazards were perceived as being possible in the community more frequently then they were included in plans. Cyber attack had the highest discrepancy between plan coverage and perceived risk with no respondents indicating that it is covered in their plan. However, 54% identified it as a potential hazard that could impact their community. Freezing rain had the second largest discrepancy between plan coverage and perceived risk with 17 respondents (44%)

indicating that it is covered by their plan compared to the 35 (90%) who identified it as a

possible threat to their community. Thunderstorms had the third highest discrepancy with 38% (n

= 15) responding that it is covered but 52% (n = 26) identifying it as a potential hazard. Power

outages had similar results with 54% (n = 21) noting that they are covered by plans but 92% (36)

identifying it as a hazard in the community. Freezing rain, thunderstorms, and power outages can

occur anywhere in Ontario and often occur multiple times a year with little in terms of severe

impacts. These three hazards may not be included in school plans simply because they are

viewed as easily managed events that are routine occurrences rather than actual emergencies.

However, while these hazards may occur frequently, it is still possible for them to occur at a

much greater intensity which could result in an emergency situation. This could be a case of

normalcy bias (Mileti and O'Brien, 1993) in which people view the occurrences as being

indicative of all occurrences of these hazards rather than considering a higher magnitude event.

In contrast, fire (covered by plans n = 37, 95% compared to n = 33, 85% identified as a hazard),

active shooter (covered by plans n = 32, 82% compared to n = 26, 67%), intruder (covered by

plans n =37, 95% compared to n = 32, 82%) and hazardous materials incidents (covered by plans

n = 23, 59% compared to n = 19, 49%) were more likely to be included in school plans than they

were perceived as hazards in the community.

4.2.4 Social process view: perceived vulnerability.

Respondents were asked if their school emergency plans included considerations for staff

and students with disabilities. Of the 51 respondents who answered Question 8, 98% responded

positively. One respondent indicated that their school plan does not include considerations for

staff and students with disabilities.

Question 9 asked respondents to rate using a Likert scale, their confidence that the current school plan would meet the safety needs of students and staff during an emergency.
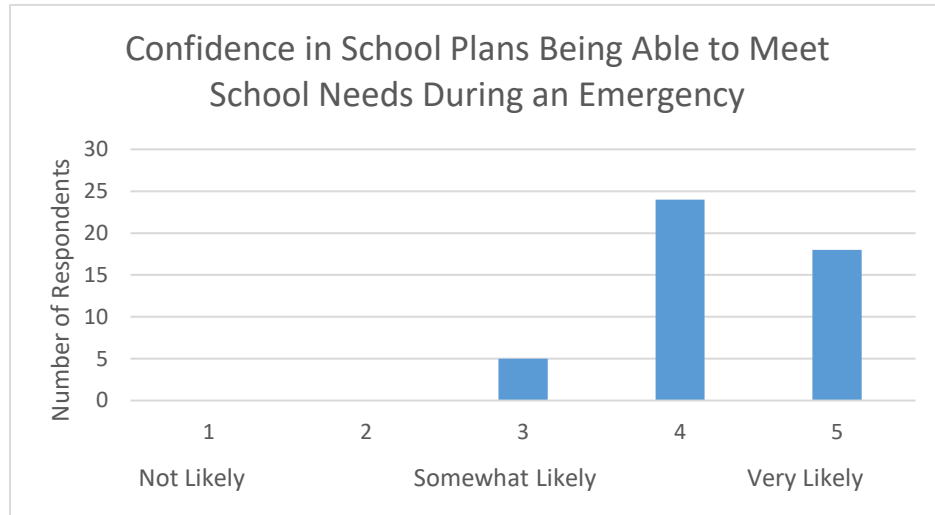
Figure 18. The respondent's confidence in the current school emergency plan's ability to meet student and staff needs during an actual emergency with 1 being 'not likely' to 5 being 'very likely'.

As seen in Figure 18, all of the 49 respondents (100%) felt that their school's emergency plan would at least somewhat meet the needs of students and staff during an actual emergency. Responses indicated that overall, respondents had confidence in the current plans being able to meet school needs with 18 (37%, n = 18) selecting 5 (plan is likely to meet the needs) with 24 (49%) selecting 4 which indicates that they felt that their school plans fell between somewhat likely to likely in being able to meet the needs of the students and staff during an actual emergency. Only 10% (n = 5) of respondents selected 3, plans are somewhat likely to meet the needs.

Of the 37 respondents (73%) who answered Questions 13 and 9 regarding their perception of the likelihood of an emergency and the ability of the current plan to meet the needs of students and staff, 23 (62%) responded that their school, community, or staff had experienced an emergency. The respondents' perceived likelihood of an emergency and their experience with

past emergencies is show in Figure 19. Perceived likelihood was obtained through the use of a

Likert scale with one being that an emergency impacting the school in the next twenty years as

being 'not possible, to five being 'very likely'.
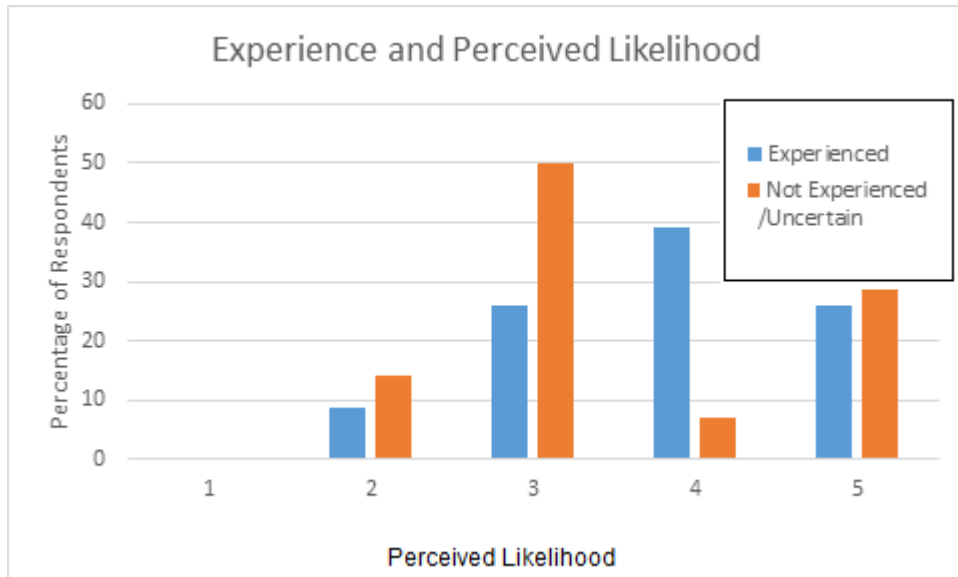
Figure 19. The perceived likelihood compared to past experience with emergencies within a 20 year period.

A chi-square test, $x^2(3)=4.594$, $p<0.05$, was used to examine whether there was a

relationship between the perceived likelihood of an emergency impacting the school in the next

20 years with those who reported experience with an emergency (n = 36, 77%), and those who

did not (n = 11, 33%). Based on the results of this test, no statistically significant dependence

was observed between perceived likelihood of an emergency and previous experience with an

emergency.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
experience * perceived_likelihood	41	100.0%	0	0.0%	41	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.594[a]	3	.204
Likelihood Ratio	4.950	3	.175
N of Valid Cases	41		

a. 5 cells (62.5%) have expected count less than 5. The minimum expected count is 1.27.

Figure 20. The SPSS output tables that tested the dependence between experience and the perceived likelihood of an emergency.

A second chi-square test, $x^2(6)=6.279$, $p<0.05$, was done to determine whether this differed depending on whether the respondent reported that the school (n = 22, 61%), staff (n = 8, 22%), or community (n = 6, 17%), had the experience with the emergency.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
experience type * perceived likelihood	28	100.0%	0	0.0%	28	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.279[a]	6	.393
Likelihood Ratio	6.299	6	.391
Linear-by-Linear Association	.068	1	.794
N of Valid Cases	28		

a. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .43.

Figure 21. The SPSS output tables that tested the dependence between the type of experience (school, community, staff) and the perceived likelihood.

The results from this test also indicated that there was no statistically significant dependence in perceived likelihood based on who/what experienced an emergency. This does not support the literature which identifies experience with a hazard as a factor that can influence risk perception (Ruin et al. 2007, Mileti and O'Brien 1993) and ultimately the planning process and that it warrants being included in the typology. It should be noted that this is a fairly small sample size with only 36 respondents answering both of these questions and future work should be done to further examine the possible link between experience and risk perception.

The responses to Question 14 regarding the perceived likelihood of an emergency were compared to the respondents' views on how well the current school plans would meet the needs of students and staff during a real emergency in Question 9 (Figure 22).
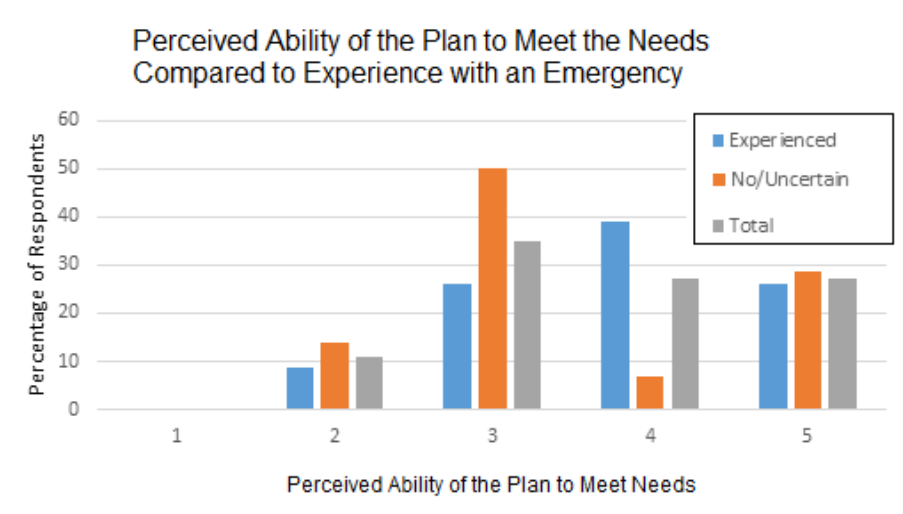
Figure 22. Experience with an emergency compared to the perceived ability of the school's current emergency plan to meet the needs of students and staff. The different colored bars show past experience with an emergency (experienced, no experience/uncertain).

A chi-square test, $x^2(6)=7.925$, $p<0.05$, was used to assess whether there is a relationship between the participant's perceived likelihood of an emergency and their confidence in their school emergency plan. No statistically significant dependence was found.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
confidence in plans * perceived likelihood	35	100.0%	0	0.0%	35	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.925[a]	6	.244
Likelihood Ratio	9.332	6	.156
Linear-by-Linear Association	.845	1	.358
N of Valid Cases	35		

a. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .46.

Figure 23. The SPSS output tables that tested the dependence between confidence in school emergency plans and perceived likelihood of an emergency.

The participants' confidence in their school emergency plan was examined to determine if there was a relationship with the perceived level of support for emergency planning (Q10). A chi-square test, $x^2(6)=24.694$, $p<0.05$, found a statistically significant dependence in perceived support for emergency planning and confidence in emergency plans. Based on this result, higher levels of perceived support are associated with higher levels of confidence in the effectiveness of a school plan.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
confidence in fire plan * admin support	47	100.0%	0	0.0%	47	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.694[a]	6	.000
Likelihood Ratio	22.744	6	.001
Linear-by-Linear Association	8.388	1	.004
N of Valid Cases	47		

a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .32.

Figure 24. The SPSS output tables that tested the dependence between confidence in the school emergency plan and perceived support for emergency planning.

4.2.4.1 Protective actions.

For Question 16 respondents were asked to identify if their schools had the following protective actions in place; evacuation, shelter in place, lock down, hold and secure, and close in advance as shown in Figure 25. A total of 47 respondents (92%) chose to answer this question. All respondents (100%, n = 47) stated that their schools had evacuation, lock down, and hold and

secure procedures in place. Shelter in place had slightly fewer responses with 98% (n = 46) of

respondents aware of procedures. Procedures for closing the school in advance of a potential

emergency were identified by 75% (n = 35) of respondents.
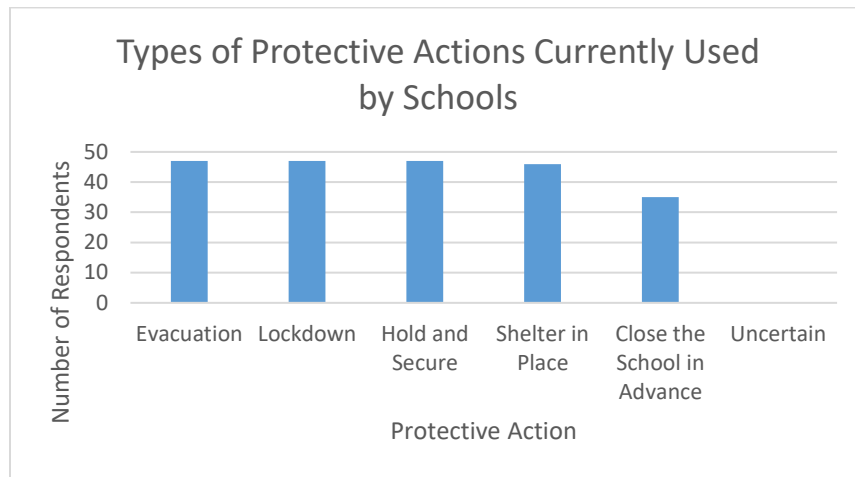
Figure 25. The number of respondents (n = 47) who identified that their school uses the listed protective
actions.

4.2.4.2 Limiting factors.

Respondents were asked their opinion in Question 18 as to how important they felt it was

to know the location of the hazard (internal or external to the school) when deciding which

protective actions were best suited. Forty-seven people (92%) chose to answer this question. A

Likert Scale was used with a value of 1 being 'not important', a value of 3 being 'somewhat

important', and a value of 5 as being 'very important'. A total of 36 respondents or 77% of

respondents selected 5 or 'very important'. Ten respondents or 21% selected 4 which lies in

between being 'somewhat important' to 'very important'. Only one respondent (2%) selected 3

or 'somewhat important'. None of the respondents gave it a value of less than a 3.

Question 20 asked respondents if their school had a method in place to receive warnings.

Out of the 50 respondents, 90% (n = 45) indicated that their school had a way to receive

warnings. Question 19 asked respondents how their school would be initially notified of a

potential emergency. Respondents were able to select several options that they would receive

notification from the authorities, from reports by students and/or staff, through a warning

notification system, through the use of a weather radio, or through media reports. There was also

an option to select that the school has no notification system and to select 'other' as an option.

The sources of emergency notifications that were reported in the survey results and the number

of respondents who reported using them (n = 45, 90%) are shown in Figure 26.
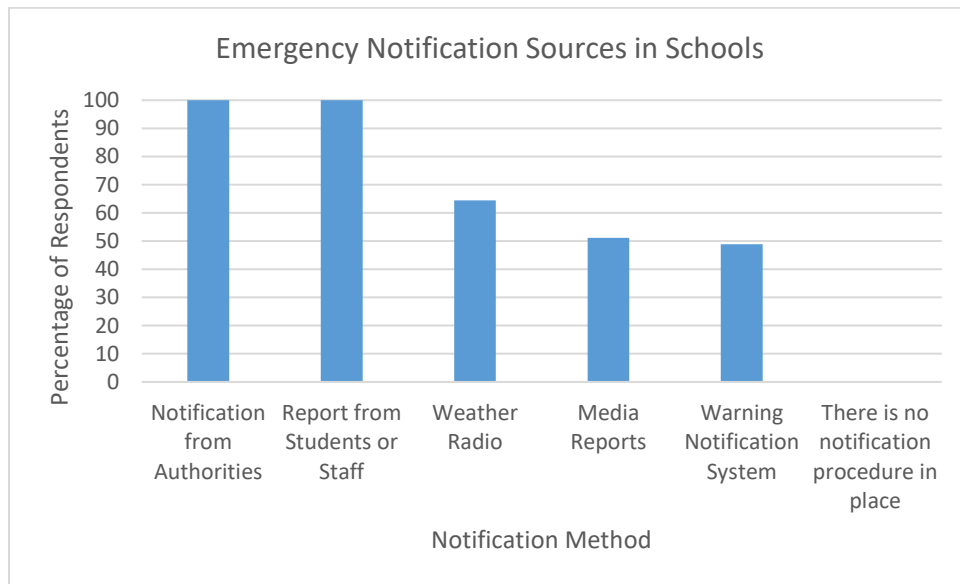
Figure 26. Sources of emergency notifications in schools.

One of the respondents who selected 'other' noted that the warning would be initially

communicated by the Director of Education. No mention was provided as to how the people in

this position would receive the notification themselves. Two of the other respondents noted that

they might receive notification through multiple methods depending on the situation while a

third mentioned that they use a notification system. A fourth respondent noted that if someone at

the school saw a number of emergency vehicles in the area that this would prompt them to look

into it. This respondent also noted that they are rarely told of emergencies by the authorities.

Question 20 asked respondents if their school currently had a plan for alerting students

and staff to an impending emergency. This question received forty-six responses (90%). All

respondents (100%) who answered this question responded that their school did have a plan in

place with the methods displayed in Figure 27. Question 21 followed up on the previous question

by asking the respondents who had answered yes to Question 20 how the school would alert

students and staff. Forty-five people responded. Many of the respondents (67%, n = 31) stated

that their school could use several methods to alert people, however 33% (n = 15) of respondents

only listed their PA system.
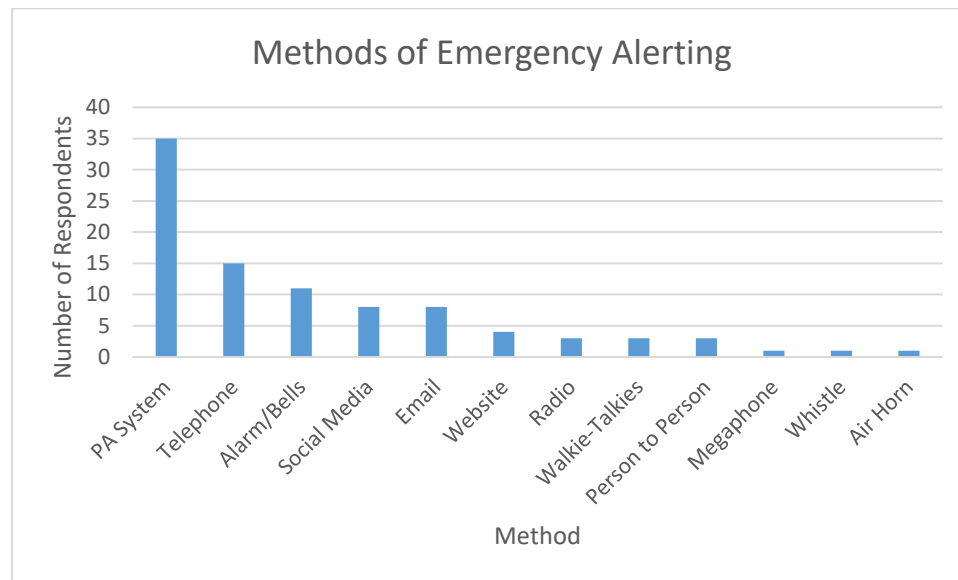
Figure 27. The methods the schools would use to alert students and staff of an emergency (Question 21).

Respondents were then asked in Question 22 about their opinions regarding how

important they believed it is for schools to have a method of alerting students and staff to an

impending emergency. They were asked to select a value on a Likert scale from 1 (not

important) to 5 (very important) with a mid-point of 3 (somewhat important). A total of 45

respondents (88%) chose to answer this question (Figure 28).
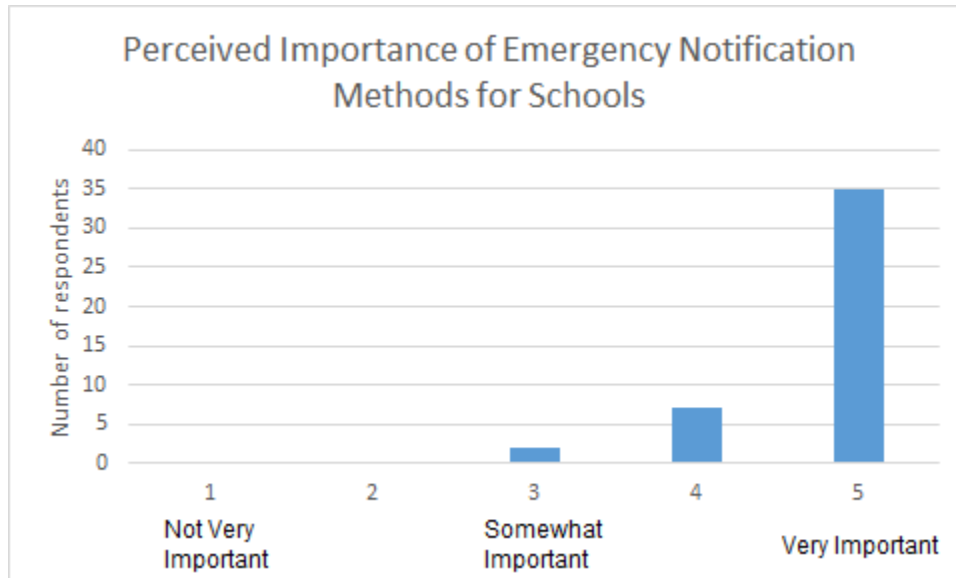
Figure 28. The perceived importance of having a method for receiving emergency notifications. None of the respondents chosen the values of 1 (not very important) or 2 which lies between 'not very important' and 'somewhat important'. Only two people or 4% of respondents felt that it was only 'somewhat important' with a value of three while 16% (n = 7) selected a value of 4 which lies in between 'somewhat important' and 'very important'. The majority of respondents felt that having a method of alerting students and staff to an impending emergency was very important with 80% (n = 36) choosing a value of five.

4.2.5 Summary of survey results.

The survey was distributed electronically to principals at each of the five public school boards in southern Ontario that approved the survey. The questions were designed to cover the current state of school emergency planning, and factors related to the interpretative and social process views of the social construction of disasters.

The majority of schools that responded to the survey (98%) have emergency plans and that all of them provide annual training to students and staff. It should be noted that schools

without plans or with less confidence in the effectiveness of their current plans may have been

less likely to agree to participate. Participants were asked how well they felt emergency planning

was supported in their school. The majority (45%) felt it was between 'somewhat' and 'well'

supported which shows that there is an opportunity for emergency planning in schools to be

better supported. Participants identified having the time to do emergency planning, managing

competing priorities, and a low risk perception of emergencies held by other staff members as

being the top challenges to emergency planning. Additionally, participants were asked how well

they felt their current school's plan would meet the needs of students and staff during a real

emergency. Responses indicated that overall, respondents had confidence in the current plans

being able to meet school needs with 18 (37%) selecting 5 (plan is likely to meet the needs) with

24 (49%) selecting 4 which indicates that they felt that their school plans fell between being

likely to somewhat being able to meet the needs of the students and staff. A chi-square test found

a statistically significant dependence on confidence in school plans and perceived support for

emergency planning with higher levels of support contributing to higher levels of confidence in

the plan.

Participants were asked how likely they believed it was that their school could experience

an emergency in the next 20 years. All participants believed that an emergency was possible and

100% stated that they believed that emergency preparedness was essential. When questioned

about past experience with an emergency, the majority (46%) who reported experience indicated

that their school experienced an emergency in the past 10 years. Overall, 77% of respondents

indicated that yes, either their school, staff or community had experienced an emergency in the

past 10 years. The results from the question regarding the perceived likelihood of emergency

impacting the school within 20 years and the question regarding experience with past

emergencies were compared to determine if there was a relationship between the two. A chi-square test did not find any statistically significant dependence for perceived likelihood on past experience which may be a result of the small sample size.

Participants were asked which specific hazards were covered by their school's emergency plan. Almost all (90%) reported that their school plans covered fire, which is required by the Fire Code (Government of Ontario, 1997). It is unknown whether those who did not indicate having a plan for fire responded that way because they viewed the fire plan as being separate from other emergency plans, or if their schools do not have a fire plan. Active shooter (88%) and intruder hazards (75%) were covered by a majority of the plans. There was a discrepancy noted between hazards covered by school emergency plans and those that pose a greater risk based on their frequency and potential consequence. There is no available source of information such as database that covers school emergencies. This would have allowed the researcher to compare past school emergencies with past emergency declarations. However, schools in southern Ontario have been impacted by flooding in the past (i.e. the 2018 Brantford floods and the 2017 Toronto Island flood, both of which resulted in the closure of schools). To assess the participant's level of perceived risk for different types of hazards, they were asked to identify all of the hazards on a list that could impact the community where their school is located. The responses were then compared to the results from the question that asked respondents to identify which hazards were covered by their school's emergency plan. Many respondents identified hazards that were not covered by their school's plan, such as freezing rain and thunderstorms.

The survey found that the use of protective actions varied among the schools. All participants indicated that their school had procedures for evacuation, lock down, and hold-and-secure. Fewer schools had procedures focused on shelter-in-place (98%) and closing in advance

of a potential emergency (75%). The majority of participants (98%) agreed that one of the primary factors that limits the type of protective action is whether the hazard is internal or external to the school. Another limiting factor recognized by the survey participants was the timely ability to receive a warning and to communicate the warning to students and staff. The majority of participants (96%) felt that receiving a warning and having warning lead time to engage in protective actions was essential. Ninety percent of those surveyed shared that their school already has a method in place to receive warnings. All participants responded that their school had a notification plan in place to disseminate warnings. However, the methods of receiving warnings and the speed and reliability of those methods and their dissemination to students and staff would vary (i.e. differences in the speed and reliability of technology such as weather radio alerts versus word of mouth).

Participants were asked whether their school plans categorized hazards as being either natural, technological, or human caused. Only 22% of participants responded that their plans categorized hazards in this way, although 18% were uncertain. The survey results showed more uncertainty as to the usefulness of these categories than the interview results with only 41% believing that it is helpful.

4.3 Chapter Summary

This research used a multi-method case study approach to develop and refine a typology based on the social construction of disasters. Subject matter expert interviews were used to obtain an initial overview and assessment of the key factors that influence operational emergency planning for schools. The results from these 10 semi-structured interviews were thematically analyzed and their context assessed, and used to inform the development of the survey questions.

The survey was distributed to the principals of schools within school boards that approved this study. A total of 57 responses were received for a response rate of 23%. The goal of the survey was to further explore the themes identified in the interviews and to assess the validity and completeness of the proposed typology.

Risk perception aligns with the interpretative view of the theory of the social construction of disasters. Results indicated that a perception of a high degree of risk can increase participation in emergency planning activities while a low risk perception can influence operational planning and response by leading to complacency regarding the need for emergency planning. Therefore, risk perception remained as a primary tier in the typology. The subcategories under risk perception focused on factors that could influence risk perceptions in a manner that could result in either increased or decreased participation in planning activities or protective actions and included the origin of the hazard, the perceived control of the hazard, the perceived intent behind a hazard, and familiarity with the hazard and the associated protective actions. The results of the interviews and survey indicated that awareness of the threat and acceptance of the risk should also be added to the typology.

Vulnerability aligns with the social process view in the social construction of disasters. The results from the interviews and survey supported the findings from the literature review that perceived vulnerability is a key factor in operational emergency planning for schools. The results also supported the findings from the literature that identified children as a vulnerable group. Two subcategories under vulnerability were identified that could be used to inform operational emergency planning for schools; limiting factors and protective actions. The results from the interviews and survey identified two other potential limiting factors in addition to warning and

location of the threat; duration and area. These were added to the typology under the heading of

'scale'. The preliminary typology was updated to reflect these changes.

Chapter Five

Discussion

This chapter begins with a discussion on the development of the typology followed by a discussion of the importance of emergency planning for schools as supported by the results from the interviews and survey. It will outline general principles that would support more effective operational planning.

The development of this typology assists by filling a gap in the literature noted as far back as Kreps (1986) in which the majority of disaster classifications were not designed for functional uses, such as the development of emergency plans for vulnerable groups. This research outlines the development of a typology based on the social construction of disasters and suggests the results could be used to provide insights into developing effective emergency plans for schools. Additionally, research such as this helps with the development of a definition of disaster, which has long been a challenge in disaster studies (Perry 2007), through the identification of the importance of both physical and social elements. It further clarifies the role of social factors such as risk perception and vulnerability in the development of a disaster.

The preliminary typology was developed following an extensive literature review and was then refined through the use of subject matter expert interviews and a survey questionnaire that was distributed to school staff with a role in emergency planning. The survey questions were developed based on the results of the interviews which identified areas of focus and gaps. This chapter will conclude with an overview of the changes made to the preliminary typology based on the results of the interviews and survey.

5.1 Development of a Typology

One of the primary objectives of this research was to develop a typology aimed at guiding an operational emergency planning approach that incorporates the social construction of disasters in a Canadian context. The development of this typology fills a gap in the literature noted as far back as Kreps (1986) in which the majority of disaster classifications are not designed for functional uses, such as the development of emergency plans for vulnerable groups. It accomplishes this by outlining the development of a typology that could be used to provide insight as to how elements of the social construction of disasters (e.g., risk perception, vulnerability) could be applied to build more effective emergency plans.

As noted in the literature review section, schools and other facilities that host members of a vulnerable group have a significant role under Regulation 298 of the Education Act in keeping these people safe from 'all reasonable foreseeable risks of injury or harm' which would include the warning and impact stages of an emergency. Due to this role, the development of the typology focused on the importance of accounting for the socially constructed needs arising from risk perception and vulnerabilities in the warning and impact stages. This dissertation was based on the hypothesis that operational plans could be enhanced by ensuring that the plan addresses the basic requirements of the vulnerable group. These basic requirements were identified through this typology and most of these factors were found to be related to the warning (i.e., the need for warning notification) and impact (i.e., the need to engage in appropriate protective actions) stages.

A review of the literature on the development of classifications was undertaken to guide the process of creating a typology. Since no guidelines were found that specifically addressed developing a classification in disaster studies, the guidelines proposed by Rich (1992) were

examined for their applicability. Classifications, including typologies and taxonomies in disaster studies such as Perry (2007); Barton (2005); Tobin and Montz (1997); Kreps (1989a); Dynes, Quarantelli, and Kreps (1981) and Barton, (1969) were analyzed to determine whether their development processes aligned with Rich's guidelines. A review of these classifications found that Rich's guidelines are reflected in classifications in the field of emergency management and would therefore be suitable for guiding the process of developing the typology in this study and future classification attempts in emergency management.

Once the preliminary typology was designed, its completeness and validity as per Rich's (1992) guidelines were tested through the use of the subject matter expert interviews and the survey. Subject matter expert interviews or 'key informant interviews' were held with individuals selected based on their expertise on emergency management and school emergency planning. This method was chosen as it provides an appropriate means of collecting data on phenomena that are not directly observable (McCracken, 1988; Minichiello, Aroni, Timewell, & Alexander, 1990; Patton, 2002), such as best practices in school emergency planning. Subject matter expert interviews can also provide an initial assessment of the subject which can be useful in the development of a survey questionnaire (Lavrakas, 2008). The results from the subject matter expert interviews were used to inform the survey questions. The interview results identified areas of focus (e.g. risk perception and vulnerability) for the survey. The interview results were useful in confirming the inclusion of questions on topics as being able to influence the outcome of an emergency in the literature review, such as familiarity (i.e., Lindell, 1994; National Weather Service, 2011), protective actions (FEMA, 2010), and warning notification (FEMA, 2013). Several gaps that were identified in the interviews resulted in the addition of questions in the survey that focused on topics such as experience and awareness of the hazards

and protective actions, and acceptance of the risk. This was done to confirm these topics as key

factors and whether they should be included in the typology as determined by the survey results.

Questions were designed to assess the perceived importance of these topics in emergency

planning and mitigation.

The survey questions were also designed to further explore apparent contradictions

between the results of the literature review and the interviews. While the majority of the results

from the interviews supported the findings from the literature review, a discrepancy was found

regarding the perceived origin of the hazard. The perceived origin was identified in the literature

as being a significant factor in risk perception (e.g., Schmidt, 2004; Pearce, 2000, Kaperson and

Pijawka, 1985). This was not supported by the interview results, so several survey questions

were added to assess whether perceived origin should be included in the typology.

The two primary views of social construction in disaster studies were incorporated into

the preliminary typology, the social process view and the interpretative view (Hewitt, 2005). The

social process view covers vulnerability theory and the interpretative view covers risk

perception, which were added as the first tier of the preliminary typology based on the literature

review. The addition of these views into the typology were supported by the literature review and

confirmed by the subject matter expert interviews and the survey results. The sections below will

discuss the confirmation of the key factors and gaps identified in the literature review.

5.1.1 Interpretative view.

The interpretative view argues that disasters arise in part due to differences in risk

perception. The concept of risk perception focuses on how hazards and risk are perceived and

interpreted as threats (e.g., Slovic 1987, Dake 1992, Sjöberg 2000). As noted by Wachinger et

al. (2013, pp. 1050), risk perceptions "play a major role for motivating individuals to take action

to avoid, mitigate, adapt to, or even ignore risks". This concept is important to emergency

planning as, "where disbelief in the possibility of an earthquake, a tornado, or a flood is strong,

the resultant damages from the event are likely to be greater than where awareness of the danger

leads to effective precautionary action" (Burton and Kates, 1963, pp. 412). Based on the

literature review, this was a necessary inclusion in the typology as the decisions made by people

based on their perceptions and acceptance of risk can contribute to the evolution of a disaster

since risk perception can influence whether people engage in preparedness activities or take

protective actions (e.g., Senkbeil et al., 2014).

The literature on risk perception was further examined to identify which elements of risk

perception may have the greatest contribution to emergency planning. Four elements, perceived

origin, perceived control, perceived intent, and familiarity with the hazard and protective actions,

were added to the preliminary typology and are discussed in more detail below. Studies such as

Slovic (2000) concluded that perceived origin, perceived control and perceived intent as factors

that influence risk perception. Other studies have shown that experience with past events can

alter a person's perception of the risk (e.g., Ruin et al. 2007, Mileti and O'Brien 1993).

5.1.1.1 Perceived origin.

While the literature review identified perceived origin, perceived control and perceived

intent as factors that influence risk perception (e.g., Slovic 2000, Sjöberg 2000), this was not

supported by the results of the interviews. This may be due to real world experience in

emergency responses or it may be due to a lack of awareness of emergency management theories

on perceived origin. None of the interview participants directly mentioned perceived intent and

control as being key considerations in developing operational emergency plans, although the

differentiation between lockdown and shelter in place indicates that perceived intent may play a

lesser role in emergency planning. Since the perceived control and perceived intent are related to perceived origin, these may fit better into the typology as subsets of perceived origin. To further explore whether perceived origin should be included in the typology, several questions regarding the importance of perceived origin in emergency planning were added to the survey questionnaire.

The response from the survey participants on the importance of knowing the origin of the hazard was mixed with 41% believing that it is helpful for emergency planning, 35% responding that they did not believe that it is helpful, and 24% who were uncertain of its usefulness. While some studies, such as Slovic (2000), note differences between how hazards are perceived based on their origin, Wachinger et al. (2013) came to a different conclusion. They hypothesized that based on a review of the natural hazard literature that "…the neat distinction between natural and human-induced hazards is slowly vanishing" (Wachinger et al. 2013, pp. 1062) due to the complex relationship between human activities and the natural environment. This relationship and more general awareness about the impact of human activities on the environment (i.e. construction of flood control measures, climate change) could be contributing to these results.

Another factor that could contribute to the uncertainty as to whether perceived origin is a useful tool is familiarity. Familiarity with a hazard can be due to direct or indirect experience with a hazard. Wachinger et al. (2013) noted that 'indirect experience' includes education, media, and hazard witnesses (who did not suffer losses themselves). Indirect experience can influence risk perception, particularly if it serves to recall an individual's memories of a personal experience (Wachinger et al. 2013). While natural hazards are believed to be the most familiar according to the literature (Slovic, 2000; Kasperson and Pijawka, 1985), in this research, the three hazards that were associated with the highest percentages of respondents knowing the

recommended protective actions were fire (technological), active shooter (human-caused), and intruder (human-caused). The high degree of familiarity with the fire hazard is not surprising given that schools are required to hold fire drills several times a year. As noted by several of the subject matter experts interviewed for this study, following high profile school shootings particularly in the United States, many Canadian schools have begun to implement lockdown and hold and secure procedures that are focused on mitigating the impacts of active shooter and intruder incidents. The emphasis on these drills likely influenced the degree of familiarity with the protective actions for this hazard.

However, the lack of support for the inclusion in the results does not entirely discount the inclusion of perceived origin in the typology as perceived intent and control are subsets of this factor. The elements of perceived intent and control may have contributed to the push to plan and create procedures for the active shooter and intruder hazards as both are intentional incidents controlled by the aggressor/s. This focus on the active shooter and intruder threats may have increased the fear associated with these hazards. Fear or dread was one of the factors identified by Slovic et al. (1987) that increased the perceived level of risk and motivated people to view that risk as being unacceptable. The increased media coverage of these events even in Canada may have led to a familiarity with these hazards. Additional studies could be done to examine how respondents would rate the likelihood of these particular hazards and whether this aligns with the actual likelihood. Based on the results of the literature review and survey questionnaire it is recommended that perceived origin remain in the typology despite not being identified as a critical factor in the interviews.

This result is also relevant to practitioners of emergency management. Many emergency management programs use the traditional hazard origin model with distinct and non-overlapping

categories of natural, technological, and human caused, to classify disasters (e.g., Emergency

Management Ontario, 2012; UNISDR, 2002, FEMA, 2012). It suggests that as Wachinger et al.

(2013) noted that the lines between the classification of hazard origins has blurred and that a new

model is needed that accounts more for the complexity of the relationship between humans and

the environment. This study still found that perceived origin can play a role in emergency

planning, albeit a seemingly lesser one than previously proposed in some studies, so the

traditional model can be simply modified as shown below to account for the interconnectivity

between the different categories of origin (Figure 29).
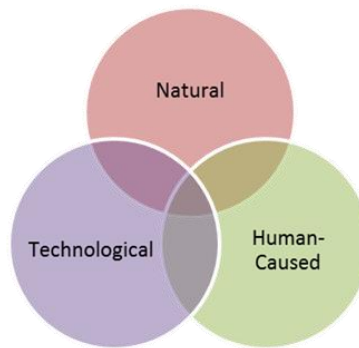
Figure 29. This diagram displays the nature of disasters in the traditional taxonomy. The
categories overlap with some arising from multiple sources.

5.1.1.2 Familiarity.

Familiarity with a hazard and/or protective actions is identified in the literature as being

able to influence a person's risk perception (e.g., Lindell, 1994; National Weather Service, 2011,

Lawrence et al 2014). The results of the interviews encouraged the expansion of familiarity

through recommendations to include experience and knowledge of hazards and protective

actions. These recommendations were made on the basis that these factors influence familiarity

and ultimately may influence risk perceptions. These two factors were identified in the

interviews as being critical components in how familiar a hazard is perceived to be and can

influence risk perceptions. Questions based on experience and knowledge were added to the survey questionnaire to confirm the relevancy of these factors in school emergency planning.

The results from this study supported the literature that identifies experience with a past emergency as a factor that influences how likely people believe that they may be impacted by another emergency in the future. Participants who indicated that they had experienced a past emergency were found to be more likely to perceive a higher likelihood of being impacted by an emergency again. Those that had not experienced an emergency were more likely to perceive a lower likelihood of a future emergency.

Another finding from this research was that experience with a past emergency was found to influence confidence in the current emergency plan. The group of participants who reported no emergency experience were found to have a high confidence in the school plan's effectiveness. It is possible that those who have not experienced an emergency or those who have experience with non-damaging incidents that did not escalate into emergencies (Kreps, 1992) may be overconfident in their plan's ability to manage an actual emergency. Wachinger et al. (2013) noted that past experience with a non-damaging incident could lead to a false sense of security or a misjudgment of an individual or organization's ability to cope. Overconfidence in preparedness has been documented in the literature (e.g., Rohrmann 1998; Walton and Smith 2009) as affecting risk perception through optimism bias in which an individual believes that they are better prepared than they actually are (Pallier et al. 2002; Walton and Smith 2009). As noted by Groves (2013) overconfidence can be an issue since a higher level of confidence does not necessarily equate to actual preparedness. Perry, Lindell, and Tierney (2001) found that overconfidence can be an issue for emergency managers as well as the general public. They note

that emergency planners can become overconfident due to experiences with routine incidents (Perry et al. 2001).

The second group of participants who reported confidence in their school's plan were those whose schools had directly experienced an emergency. Studies such as Lawrence et al (2014) found that experiences with past emergencies, particularly if they were viewed as having caused losses, can lead to a higher risk perception and increased preparedness activities including planning. In the cases in which participants reported experience with a past emergency and a high confidence in their school's emergency plan, this may be due to the experience of an emergency providing an opportunity for the school to test their emergency plan and procedures in a real world situation. This may have provided the school with the opportunity to identify and address any gaps, thereby giving the respondents more confidence in the plan's effectiveness. As noted above, optimism bias can influence individual's risk perceptions so that they perceive themselves to be at less risk than others (e.g., Helweg-Larsen 1999, Trumbo et al., 2014). Helweg-Larsen (1999) found that people who had experienced a relatively greater loss from an emergency tended to display the least optimistic bias. Unfortunately, in this doctoral project, no relationship could be determined between experience with an emergency and having an emergency plan as all but one respondent indicated that their school had an emergency plan. In some instances, the emergency plan may be mandated by the school boards rather than being up to the discretion of the individual schools.

5.1.1.3 Awareness.

Awareness has been identified in the literature has having a relationship with risk perception and emergency preparedness activities (e.g., Burningham et al., 2008, Patton 2003, Dalton 2001). However, the direction of the relationship has been the matter of some debate

(Paton and Johnston, 2001). Interview participants in this study noted that awareness plays a role in helping to determine if an event is an emergency or if it can be handled through normal processes. The results indicate that awareness can influence risk perception, particularly in the planning stage and in the activation of an emergency plan before the impact of the hazard since it allows the threat to be recognized. This aligns with early thoughts in the literature on the role of awareness and that it may influence action (e.g., Sims and Baumann 1983). However, the literature does point out that the relationship between awareness and action is not straightforward with authors such as Paton (2006) and Ballantyne et al. (2000) noting that in some cases preparedness activity engagement is still low despite awareness. It is possible that some people may engage in avoidance or denial of a risk or may transfer their responsibility for their own safety to others (Ballantyne et al. 2000, Paton, 2003). This discrepancy between the results and some of the literature may be due to the fact that interview participants were individuals who held roles in emergency management and/or schools and therefore were tasked with a 'duty of care' rather than the subjects of other studies which were frequently members of the general public.

Awareness of the hazard and its risks was identified in the interviews as a crucial component to the ability to develop a realistic perception of the risk. An awareness that the hazard presents a risk is more likely to result in emergency planning since, in accordance with the theory of bounded rationality (Simon, 1957), people will not be able to take action if they are unaware of the need to take action. To assess awareness, survey participants were asked questions regarding the types of hazards that could occur in their community, and what types of protective actions are generally used during different types of hazards. Participants could select as many hazards as they believed could occur in their area. The two hazards with the greatest

percentage of responses at 96% each were snowstorm and freezing rain. This was followed by

power outage and fire at 94%. Windstorm and flooding which are common occurrences in

southern Ontario were selected by only 67% and 38% of the respondents respectively.

Earthquake and forest fire were selected by the smallest percentage of respondents with 27% and

19% respectively perceiving them as being possible in their communities. Most of the hazards

that survey respondents were asked about in the survey could occur in any community in

southern Ontario (EMO, 2011), with the exception of forest fire, which is dependent on

particular land uses and the presence of vegetation. It is possible that some school plans do not

cover particular hazards due to specific reasons related to their individual locations or resources

(e.g., a school that has a backup generator may not view a power outage as a potential

emergency) or it is possible that this represents a gap in awareness of potential hazards. Further

research would be required to determine the cause of this difference.

5.1.1.4 Acceptance.

Studies such as Thompson et al. (1990) and Slovic (1987) propose that risk perception

can influence the acceptance of a risk. Risks are viewed as more acceptable if they are perceived

as being low risk, viewed as being within an individual's control, and/or those that offer some

benefit (Peters and Slovic, 1996). As noted previously, risk perception can influence engagement

in preparedness activities including emergency planning (Senkbeil et al., 2014) so if the risk is

viewed as being unacceptable then there will likely be more willingness to take action to mitigate

the risk.

In this study, interview participants identified acceptance of the risk as a factor that can

influence risk perception and ultimately, emergency planning, which aligns with the literature.

Although acceptance is related to the other variables that influence risk perception, acceptance

was assigned its own category in the typology since, while familiarity and awareness can

influence acceptance, they are not necessarily guaranteed to result in an acceptance of the risk.

Based on the results of the subject matter expert interviews, acceptance of the risk and awareness

of the risk were added to the typology and questions related to acceptance of the risk were added

to the survey questionnaire.

Whether a risk is viewed as acceptable and therefore tolerated is often based on whether

the risk is perceived as being low, whether there are benefits to accepting the risk, and whether it

is voluntary or imposed (Slovic, 1987). The perception of a risk can be influenced by factors

including familiarity/knowledge and experience (Wachinger et al. 2013). A risk could also be

misconstrued as acceptable based on inaccurate information (e.g., the belief that a particular

hazard is not possible in that area or cannot occur at a magnitude that causes losses) or it could

be decided that the potential benefits are worth accepting the risk (Slovic, 1987). Therefore, for

acceptance to be used as a mechanism to address risk, it must be based on an accurate picture of

the danger. This would include knowledge/awareness of what hazards could occur. As noted in

the results chapter, 92% of the survey respondents identified hazards as being possible in the

community that were not included in their school's plan. While some of this may be due to the

use of all-hazards plans, the majority of respondent who indicated that they had an all-hazard

plan still identified specific hazards covered in the appendices of their plan. Three of the top four

hazards that respondents identified as not being included in school plans were freezing rain,

thunderstorm, and windstorm. These hazards are common in communities in southern Ontario

with multiple occurrences annually (EMO, 2012). Since they occur so frequently, it is likely that

school emergency planners would be aware that these hazards do occur. However, since these

hazards often result in low impact events that cause little disruption or damage with the majority

of the impacts occurring off school property, the frequency of non-damaging incidents could be influencing risk perceptions (Wachinger et al. 2013) and leading to a normalcy bias (Mileti and O'Brien, 1993, Ruin et al., 2007, NWS 2011). It is possible that these hazards are not being included in school emergency plans because the low risk perception and normalcy bias have resulted in the risk being viewed as acceptable. If viewed as an acceptable and non-damaging risk, it is possible that the current plans are perceived as being sufficient. It is also possible that specific hazards are included in plans if they are viewed as having an unacceptable level of risk. The plans are then therefore created to mitigate these risks. However, follow up research would be necessary to confirm this hypothesis.

5.1.1.5 Changes to the interpretative view in the typology.

The preliminary typology has two primary branches, the intrepretative view branch (shown and discussed below) and the social process branch (discussed in section 5.2). Figure 30 shows the interpretative componenet of the preliminary typology which was developed based on the literature review. It has risk perception as a tier under the interpretative view. The tiers under risk perception are perceived origin, perceived control, perceived intent and familiarity with hazards and protective actions. The results of both the interviews and the survey were used to assess the completeness and rationality of this preliminary typology.
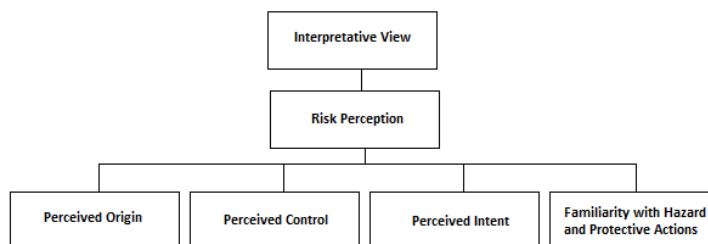
Figure 30. The interpretative component of the preliminary typology based on the results of the literature review.

The results from the subject matter expert interviews and the survey prompted changes to the preliminary typology. Perceived control and perceived intent became subsets of perceived origin. The results of both the interviews and the survey resulted in the subsets of knowledge and experience under familiarity with hazard and protective actions since these two factors were identified in the results as being significant influencers on familiairty and could be used to assist in emergency planning. In addition, two other factors, awareness of the threat and acceptance of the risk were added to the interpretative branch of the typology based on the results from the interviews and survey. Figure 31 shows the modified typology following the results of the interviews and survey.
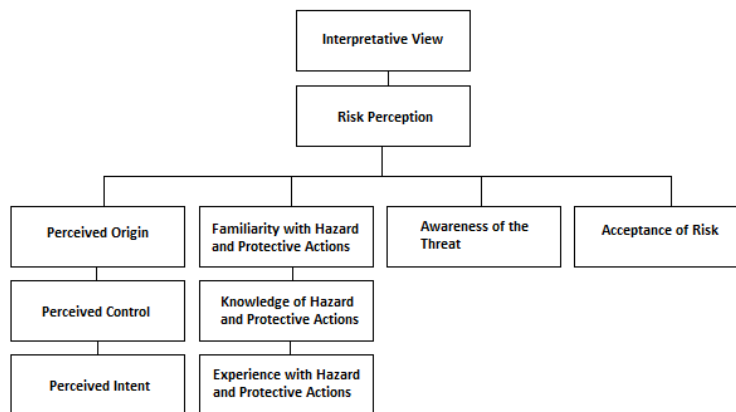
Figure 31. The interpretative view component of the typology revised to include the results from the subject matter expert interviews.

5.1.2 The social process view in the typology.

The second primary view of the social construction of disasters is the social process view. This view holds that social factors are the variables that ultimately determine whether, how, and to whom disaster occurs (Hewitt, 2005). The social-process view encompasses vulnerability theory that in the context of disaster studies refers to the situation and characteristics of a person or group that "influence their capacity to anticipate, cope with, resist, and recover from the

impact of a hazard" (Wisner et al., 2004, pg.11). Different groups of people within the general population have been identified as more vulnerable due to social factors such as age, access to resources etc. (Cutter, Mitchell and Scott, 2000). Vulnerability is a critical consideration in emergency planning as if it is not effectively addressed it can greatly increase the likelihood of a hazard developing into a disaster (White and Haas, 1975; Mileti, 1999; Changnon et al., 2000; Hewitt, 2005 and Kelman, 2011). Therefore, it was identified as an important addition to the typology.

The social process view was incorporated into the preliminary typology in a similar manner to the interpretative view by identifying the key decisions that would be required during the warning and impact stages of an emergency. This resulted in the identification of vulnerability (Cutter, 2003), limiting factors (Tobin and Montz 1997, Perry 2007) and protective actions (Sorensen, Shumpert and Vogt 2002) from the literature. These were included as a tier under the social process view in the preliminary typology. The limiting factors identified during the literature review were the average warning lead-time (UNISDR, 2018) and the location of the threat relative to the school (Tobin and Montz 1997).

The literature identifies perceived vulnerability of oneself or others as an important factor that can influence the outcome of an incident (e.g., Hewitt, 2005, Kelman, 2011). The results from the subject matter expert interviews in this study supported this finding and identified vulnerability as a critical consideration in the development of operational emergency plans for facilities that host members of vulnerable groups (e.g., schools). Interview participants also indicated that they believed that children are more vulnerable than adults due to their age and dependency, which aligns with the literature that identifies children as members of a vulnerable group (e.g., Allen et al., 2007; Peek, 2008; FEMA 2010, Wisner et al., 2014). The interview

participants pointed out that due to the nature of schools, the large number of students and staff who attend them, and their roles in a community, that schools are likely to have individuals with disabilities and different needs (Fifolt et al., 2017). According to Statistics Canada, approximately 4% of Canadian children (Statistics Canada, 2008) and 14% of Canadians more than 15 years old have reported a disability (Statistics Canada, 2012). These two factors, the presence of large numbers of children requiring adult supervision and the potential for multiple people with disabilities, results in schools being classified as facilities that host members of vulnerable groups (Graham et al., 2006, FEMA, 2010). However, in order for vulnerability to be used as a catalyst for planning, the vulnerability of the group being planned for must first be recognized which is why this typology uses the term 'perceived vulnerability'.

5.1.2.1 Protective actions.

Protective actions were identified in both the literature review and this research as being an integral component to a typology based on operational planning for schools. The primary purpose of emergency planning is to mitigate the impact on life and limb (Alexander, 2002) for which engagement in protective actions plays a key role. Risk perception and the acceptance of risk can influence whether people choose to engage in protective actions (e.g., Senkbeil et al. 2014). Schools in Ontario have duty of care requirements to ensure the safety of students on their premises or involved in school activities. This requires schools to plan for the safety of their students during an imminent or already occurring emergency. To achieve this, planning for the warning and impact stages of an emergency where protective actions can be assessed for appropriateness and then engaged in is required. The types of protective actions and the factors that limit participation in them is something that should be addressed for a realist, operational emergency planning (Clarke, 1999).

A review of the peer-reviewed literature identified four general protective actions that could be used by schools: lockdown, shelter-in-place, evacuation, and closing in advance (e.g., Bergh 2009, Bayram et al. 2015). A review of the practitioner literature and the results of the interviews identified a fifth, hold-and-secure (e.g., Toronto District School Board, 2018). To determine the types of protective actions that schools have procedures for, questions were added to the survey questionnaire. The survey results confirmed that all five protective actions are accounted for in plans and procedures to varying degrees in schools in southern Ontario. However, not all schools had procedures for each of the five protective actions with close in advance being less likely to be in place. Closures due to inclement winter weather are common events in southern Ontario for which many school boards have developed notification procedures for (e.g., Peel District School Board, Toronto District School Board). Given the frequency of snowstorms in southern Ontario, it is rather surprising that not all survey participants identified having a close in advance procedure. It is possible that these schools still have procedures that cover this protective action under a different name and/or it is perceived more as a routine event rather than a protective action for an emergency.

The results from the subject matter expert interviews and survey related to protective actions and perceived origin support the suggestion that schools may want to consider the use of all-hazard plans with hazard specific annexes (Connolly, 2012). Thirty-two survey respondents indicated that their school plan focused on addressing the problems caused by the hazard (an all-hazards plan). All-hazards plans provide a broad outline that is intended to be adaptable to the specific situation rather than providing guidance for individual scenarios (Fifolt et al. 2017, FEMA, 2015). Fifolt et al. (2017) noted that emergency planners who used an all-hazards approach to planning indicated that they believed that they were better prepared to meet the

needs of the population that they served. However, protective actions may vary depending on the

particular type of hazard so it is appropriate for schools to use all hazards plans as they were

originally intended. All-hazard plans were originally intended to have a generic all hazards plan

serve as the overarching main plan with additional hazard specific annexes included to convey

tactics and specific protective action activities that may vary depending on the hazard (Alexander

2005, Quarantelli 1992).

Once the risk has been identified and accepted, it must then be decided which protective

action is appropriate based on other limiting factors such as the amount of warning lead time, the

location of the hazard, and duration. The following section will discuss the limiting factors that

can influence protective action engagement.

5.1.2.2 Limiting factors.

Limiting factors in this research refers to the situational factors that restrict the types of

protective actions that can or should be taken in a particular emergency. Many disaster

classifications have included spatial and temporal factors including Barton (1963), Dynes et al.

(1981), Tobin and Montz (1997), and Perry (2007). Knowledge of these situational factors can

broadly dictate what protective actions are necessary or possible to decrease vulnerability and

increase resiliency.

Two spatial factors were identified during a literature review for this research as a key

limiting factor for school emergency planning, the location of the threat relative to the school and

the area impacted by the hazard. Spatial factors have been commonly included in disaster

typologies with varying scales from national to local (e.g., Dynes et al. 1981, Tobin and Montz

1997). Due to the focus of this research on developing a typology for schools, a simple local

scale approach was used in which a hazard occurs either outside of the school or within the school. Area impacted by the hazard was also suggested by the interview participants as a potential limiting factor. This may be a limiting factor more at the municipal level, which has a role in response. At a facility level, the extent of the area affected may influence how long protective actions will be in place for but are not likely to influence school emergency activities. As such, area is proposed for inclusion in the typology along with duration under the heading of 'scale'.

Two temporal limiting factors were identified; the average warning lead time and duration. A temporal limiting factor was identified during the literature review, the average warning lead time (NWS, 2011). The average warning lead item, or the average amount of time between a warning being issued and the impact of the hazard is an important consideration for schools (e.g., FEMA 2013, Renfrew County District School Board 2008) as it can limit the type and extent to which protective actions can be taken. The results from the subject matter expert interviews in this supported these two limiting factors as being key operational planning considerations. The interview results also supported the inclusion of duration as a limiting factor. Duration has been noted in the literature as being a factor that can contribute to the development of an emergency (Hewitt, 2005) and has been included in disaster classifications such as Perry (2007). This factor was suggested by interview participants as it can influence the effectiveness of emergency plans and protective actions. For example, shelter in place may not be feasible for long duration events if adequate resources are not available.

The survey results supported the inclusion of the location variable under the limiting factors subcategory in the typology. The majority of respondents (77%) felt that location was a critical component, so it remains in the typology. Another limiting factor that was supported by

the survey results was the inclusion of warning. The majority of the schools included in the

survey (90%) noted that they had already established ways of receiving warning information

through methods such as notification from authorities or reports from students or staff, and all of

those who responded had procedures in place to notify students and staff of a warning.

5.1.2.3 Changes to the social process view in the typology.

A preliminary typology was developed based on the peer reviewed literature. This

typology was then assessed for completeness and logic through the subject matter expert

interviews and the survey questionnaire. Figure 32 shows the social process branch of the

preliminary typology that was developed following the literature review before the results of the

interviews and surveys were added. The preliminary social process branch was comprised of two

branches under perceived vulnerability; limiting factors and primary protective actions.
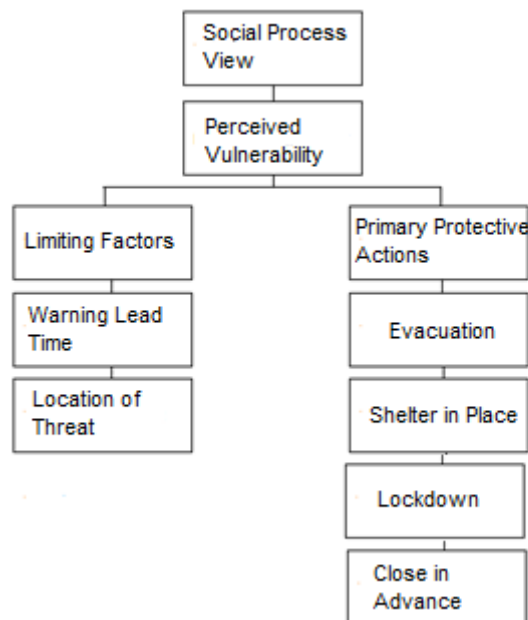
Figure 32. The social process component of the preliminary typology based on the results of the literature
review.

Following the analysis of the interview and survey results, several changes were made to the preliminary typology. Limiting factors was expanded to include scale that covers duration and area impacted. Both of these factors were identified in the interviews as having the potential to influence vulnerability and emergency planning needs. The interviews also noted that there were five primary protective actions, which included hold and secure, instead of the four found in the literature review. The results of the survey confirmed that hold and secure is in use in southern Ontario schools and noted that all five protective actions are currently in use in schools in southern Ontario. These changes are shown in Figure 33.
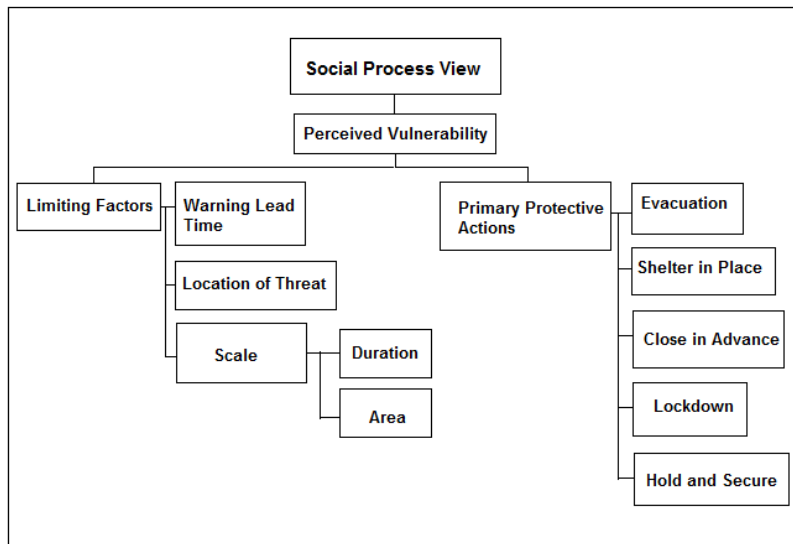
Figure 33. The social process view component of the typology revised to include the results from the subject matter expert interviews.

5.2 Defining Disaster

This research supports a definition of a disaster which acknowledges the social elements of disaster. Porfiriev (2005) noted that there seem to be two primary approaches to defining disaster, an applied or pragmatic approach and a theoretical/conceptual approach. The pragmatic approach is often taken by people who are in roles such as 'decision making analyst, engineer, or a natural scientist' (Porfiriev, 2005 pg. 56). This would include emergency management

practitioners. A pragmatic approach would focus on the development of operational definitions that could be used to create plans and procedures to prepare, mitigate, respond, and recover from disasters. The theoretical/conceptual approach to definition building is noted by Porfiriev (2005) to be more likely used by a social scientist with the intent to develop a conceptually based definition of disaster. Both of these approaches are necessary given the different needs of the researcher and the practitioner but as noted by Porfiriev (2005), can be complementary as they both serve to increase our knowledge of disasters. Due to the nature of this study, this research is likely to be useful in supporting the development of a broad conceptual definition of disaster, however, certain elements of the typology may also be useful in the development of a more applied definition.

Definitions of disaster in the literature have approached the role of the social construction of disasters in different manners. Some have chosen to focus solely on the physical factors of a disaster with the social impacts being the fallout of the occurrence of the disaster (e.g., Kroll-Smith and Couch 1990; Foster 1990). Some have taken a social construction view of the definition of disaster and view a disaster as the outcome of social processes that create hazards or increase the vulnerability of a social system (e.g., Quarantelli, 1992; Tierney, 1989). Others have focused on disasters as the result of a combination of factors, including physical and social, that result in both physical and social impacts (e.g., Hewitt 2005, Horlick-Jones et al. 1991; Kreps 1989).

Disaster studies research has shown that social factors such as risk perceptions and vulnerability are key determinants in whether an incident will become an emergency or disaster. Despite their crucial role, these elements of the social construction of disasters are not commonly found in the definitions used by provincial and territorial emergency management organizations

in Canada. It should be noted that Emergency Management Organizations in North America and

schools tend to use the term 'emergency' rather than 'disaster' and that these terms are

sometimes used interchangeably by practitioner organizations.

Public Safety Canada has adopted a definition that supports the social nature of disasters

in the Emergency Management Framework for Canada. It defines a disasters as 'essentially a

social phenomenon that results when a hazard intersects with a vulnerable community in a way

that exceeds or overwhelms the community's ability to cope and may cause serious harm to the

safety, health, welfare, property or environment of people; may be triggered by a naturally

occurring phenomenon which has its origins within the geophysical or biological environment or

by human action or error, whether malicious or unintentional, including technological failures,

accidents and terrorist acts.' (Public Safety Canada (2017). The federal government's acceptance

of the role of social aspects in the development of a disaster does not carry over to most of the

provincial and territorial definitions. Table 28 shows the definition of disaster and/or emergency

for the primary legislation regarding emergency management in the provinces and the definition

used by the provincial emergency management programs. It should be noted that emergency

management organizations tend to use more 'impact based' definitions for disaster (e.g., Ontario,

Alberta).

Province	Legislation	Program
Ontario	'Emergency means a situation or an impending situation that constitutes a danger of major proportions that could result in serious harm to persons or substantial damage to property and that is caused by the forces of nature, a disease or other health risk, an accident or an act whether intentional or otherwise; ("situation d'urgence")' - Emergency Management and Civil Protection Act (1990)	'A serious disruption to an affected area, involving widespread human, property, environmental and / or economic impacts, that exceed the ability of one or more affected communities to cope using their own resources.'

		Emergency Management Ontario (2011)
Alberta	'Disaster' means an event that results in serious harm to the safety, health or welfare of people or in widespread damage to property;' - Emergency Management Act (2013)	Same definition as in the Act.
British Columbia	'Disaster means a calamity that (a) is caused by accident, fire, explosion or technical failure or by the forces of nature, and (b) has resulted in serious harm to the health, safety or welfare of people, or in widespread damage to property; And "emergency" means a present or imminent event or circumstance that (a) is caused by accident, fire, explosion, technical failure or the forces of nature, and (b) requires prompt coordination of action or special regulation of persons or property to protect the health, safety or welfare of a person or to limit damage to property;' - Emergency Program Act (1996)	Same definition as in the Act
Manitoba	'Disaster means a calamity, however caused, which has resulted in or may result in (a) the loss of life, or (b) serious harm or damage to the safety, health or welfare of people, or (c) wide-spread damage to property or the environment; (« sinistre ») "emergency" means a present or imminent situation or condition that requires prompt action to prevent or limit (a) the loss of life, or (b) harm or damage to the safety, health or welfare of people, or (c) damage to property or the environment; (« situation d'urgence »)	
New Brunswick	'Disaster means any real or anticipated occurrence such as disease, pestilence, fire, flood, tempest, explosion, enemy attack or sabotage, which endangers property, the environment or the health, safety or welfare of the civil population.(désastre) "emergency" means a present or imminent event in respect of which the Minister or municipality, as the case may be, believes prompt coordination of action or regulation of persons or property must be undertaken to protect property, the environment or the health, safety or welfare of the civil population.(situation d'urgence) - Emergency Measures Act	Emergency means a present or imminent event that requires prompt co-ordination of actions concerning persons or property to protect the health, safety or welfare of the civil population or to limit damage to property or the environment. (Emergency Measures Organization, 2017)
Saskatchewan	Emergency means:	Same definition as in Act.

	(i) a calamity caused by: (A) accident; (B) act of war or insurrection; (C) terrorist activity as defined in the Criminal Code; (D) forces of nature; or (ii) a present or imminent situation or condition, including a threat of terrorist activity as defined in the Criminal Code, that requires prompt action to prevent or limit: (A) the loss of life; (B) harm or damage to the safety, health or welfare of people; or (C) damage to property or the environment; - Emergency Planning Act (1989)	

Table 28. Definitions of emergency and disaster used by provincial emergency management organizations.

By focusing on the impacts of the emergency, an opportunity is missed in these definitions to describe an emergency rather than defining potential outcomes. Emergency management programs in Canada are frequently required by legislation (i.e., The Emergency Management and Civil Protection Act in Ontario) to address all pillars of emergency management; preparedness, mitigation, prevention, response, and recovery. Not only does a focus on the impacts for a definition miss an opportunity to define what an emergency is, but it also does not provide much insights into the pillars other than response and recovery.

The Pressure and Release model (PAR) is a conceptual model that can be used as a framework for understanding disasters (Wisner et al., 2004). PAR presents disasters as the result of an interaction of two opposing forces, a hazard and social pressures (Wisner et al., 2003) with vulnerability being rooted in social processes. During the development of the typology the relationship between the physical and social aspects of disaster were examined to determine how a typology could address the key planning considerations. A finding of this research was that the physical aspects of a disaster appear to be embedded within the social context. This allows for the physical actions to be applicable through emergency management activities (e.g., planning).

This differs from the PAR model that views the hazard as being an isolated factor that interacts with vulnerability, rather than an embedded one. The key factors identified in the typology are factors that arise from the overlap between the physical attributes of a hazard and the social aspects of risk perception and vulnerability. Additional factors arising from the hazard which may contribute to an emergency for facility that host vulnerable groups when placed in a social context may exist as this study was focused on emergency planning for schools. It was found that the physical factors ultimately needed to be viewed through a lens focused on how they contributed to the vulnerability of the group being planned for them to be applicable to emergency planning since the end goal of planning is to minimize the impacts of an emergency (Alexander, 2002) on humans. For example, the duration, warning, and location of the hazard are only important factors in planning if the group being planned for is vulnerable. Future research may identify additional factors that are relevant for other types of organizations or groups. This research also builds on the PAR model by introducing risk perception as a social component in addition to vulnerability to assist in developing operational emergency plans for vulnerable groups, particularly schools.

Even the origin of the emergency (often described as 'natural', 'technological' or 'human-caused' (EMO, 2012), which is often identified as a physical trait (e.g., EMO 2012, Public Safety Canada 2014), is influenced by social perspectives. For example, for this typology it was found that 'origin' was perhaps more accurately described as 'perceived origin' since emergencies often have complex origins that cannot always be attributed to solely natural/technological/human causes. This was addressed in the typology through the placement of these factors under the broader, socially-derived, tiers of vulnerability and risk perception. This research supports work done by (Kreps, 1983) that presents emergencies and disasters as

both a physical and social event and demonstrates how both the physical and social aspects need to be considered during planning.

Based on this research, with one vulnerable population, school children and broader emergency definitions such as the one used by Public Safety Canada (2017) and the peer-reviewed literature (e.g., Kreps, 1983, Hewitt 2005), it is recommended that emergency management organizations consider moving away from impact-based definitions in favor of definitions that include the social nature of emergencies. A suggested definition based on the one provided by Public Safety Canada is:

"An emergency occurs when the characteristics of a hazard interact with social elements such as vulnerability and/or risk perception in a manner that increases the risk of negative impacts that could exceed or overwhelm a group, facility, organization, or community's resources and ability to cope if not sufficiently managed. Potential impacts may include serious harm to the safety, health (including psychological), and wellbeing of people, property, or the environment of people."

5.3 The Typology and Plan Development

The preliminary typology was revised to include the results from the subject matter expert interviews (Figure 34). The typology suggests that there may be general factors such as vulnerability and risk perception that can greatly influence the outcome of an emergency for a facility that hosts vulnerable groups. These factors should be considerations during the planning process and kept in mind to foster a culture of emergency preparedness. This typology could be used as the basis for developing an operational emergency plan for schools through the creation of tools, such as flowcharts, to assist in guiding the process. School planners could also use the

principles identified through this work to guide the planning process to ensure the development

of a more effective emergency plan.
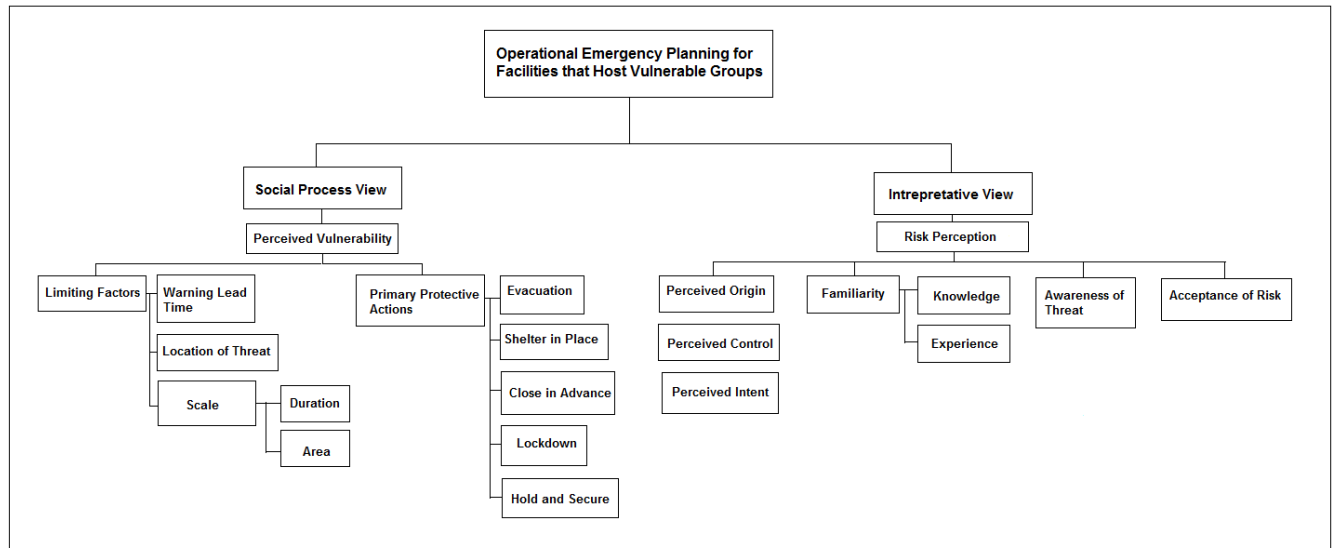
Figure 34. The final typology for school emergency planning based on social construction.

The typology can be used in the identification of crucial factors/decisions during an

impending emergency. The identification of these factors can assist school staff in mitigating the

potential impacts by considering them during the planning process. There are key questions for

facilities that host vulnerable groups, e.g., are people vulnerable? What type of protective action

is best suited for this situation? Is there enough warning time to engage in protective actions?

Even before a hazard strikes there are planning considerations such as: Are people in this facility

aware of the threat? Do we have a notification system in place to alert them? Are we familiar

with the different types of protective actions? These questions could then be incorporated into a

series of strategic questions or a flow chart that could be used to guide the planning process.

The typology categories could be used to identify key planning considerations (e.g., do

the risk perceptions reflect an accurate awareness of the threat) and key decisions (e.g., whether

to engage in protective actions) If so, what is the best protective action based on the warning lead time, location of the threat, and scale. However, it must be noted that the categories used in the typology are intended to provide a general approach. To be as effective as possible, it is recommended by Dynes et al. (1981) that the specifics of any given disaster plan have to be filled in by each particular reader depending on the nature of his community, the likelihood of threats to it, and the resources that are available as noted as early as Dynes et al (1981) and supported by others (e.g., Lindell and Perry, 2003) since then.

Ultimately, this typology is a tool that explores the key socially constructed factors through the interpretative view (risk perception) and the social process view (vulnerability) in emergency planning for vulnerable groups. It explored the importance of risk perception and vulnerable in emergency planning and how factors from each may contribute to building more effective operational emergency plans. It identified factors, such as risk perception, familiarity and acceptance of the risk that may influence planning behavior and the support for planning. This research also identified key aspects of the social process view which could be used to identify key decisions in plan development (e.g., how vulnerability and the limiting factors could influence engagement in the protective actions).

5.4 Key Recommendations

This research provided several empirical contributions that can contribute to the applied use of emergency management. The findings of this research promote movement towards an acceptance of the role of social factors in operational emergency planning. It also presents information on the current state of school emergency planning in southern Ontario and the challenges facing planners. The results from the subject matter expert interviews and the survey

questions led to the development of a list of principles for plan development which can be used

to guide those responsible for school emergency planning.

5.4.1 Moving away from a hazard-centric approach.

As noted previously, hazard specific plans are still commonly used by practitioners

including schools. Hazard-origin approaches (i.e., natural, technological, human-caused) are still

used to classify incidents by emergency management organizations (e.g., Public Safety Canada

2014, EMO 2012). As noted by Birkmann (2006, pp. 10)

"Instead of defining disasters primarily as physical occurrences, requiring largely technological
solutions, disasters are better viewed as a result of the complex interaction between a potentially
damaging physical event (e.g. floods, earthquakes and storms) or non-physical event (e.g. social
emergency) and the vulnerability of a society, its infrastructure, economy and environment,
which are determined by human behaviour."

This research encourages movement away from a hazard centric approach to a more

complete understanding of disasters that includes the acceptance of the social factors that can

contribute to a disaster as shown in Figure 30. This is an important consideration for emergency

planning as often times it is the social factors for which actions can be taken to mitigate the

impact. Another outcome of this research that is applicable for school emergency planners is the

need for the social factors identified in the typology to be addressed in school planning focused

on the warning and impact stages of an emergency. While the response and recovery stages are

often the focus of emergency management organizations due to their requirement to assist others

impacted by disaster, schools have a duty of care to ensure the safety of their students during an

emergency. However, this does not mean that schools and other facilities that host vulnerable

groups should ignore the other stages. It simply suggests that more focus be put upon the

planning for the warning and impact stages since these are the stage in which school plans are

most likely to have the opportunity to mitigate the negative impacts of an emergency.

5.4.2 Insight into school emergency plans.

This typology was designed to focus on key factors that could address the needs of vulnerable populations during an emergency and was intended to address a gap noted by Clarke (1999), Webb and Chevreau (2006), Bissell (2008), among others, that many emergency plans do not fully address the needs of the vulnerable group that the plan is intended to help. There are many facilities that host large numbers of members of a vulnerable group (e.g., nursing homes, hospitals, and schools) for which having an effective operational plan is a critical component of safety. Despite multiple high-profile incidents as schools in North American in the past decade, little research has been done on school emergency planning in Canada despite children being commonly recognized as a vulnerable group in the literature (e.g., Allen et al., 2007; Peek, 2008; FEMA 2010, Wisner et al., 2014). This research provides a contribution by giving some insight into the state of school emergency plans for K-8 public schools in southern Ontario.

The literature identified emergency planning as being an essential component to minimize the impact of emergencies (e.g., Alexander 2002). Studies (e.g., Graham et al., 2006; FEMA 2010) and events such as the Blizzard of '77 in Niagara, Ontario and the destruction of the Plaza Tower School in Oklahoma due to a tornado have shown that schools require effective emergency plans. In Ontario, Regulation 298 under the Education Act outlines the responsibilities of school staff in caring for the safety of their students but does not specific the requirement of having an emergency plan and what that plan should cover. The Fire Code requires that Ontario public schools in Ontario have a safety plan in case of fire (OFM, 2004) and lockdown protocols are required by the Provincial government (Ontario Association of Chiefs of Police, 2007). However, no legislation or requirements were found at a provincial level that mandated having an emergency plan for other types of incidents.

Despite emergency plans not being mandated, this study found that having an emergency plan is considered to be a best practice for schools. Indeed, its importance was stressed by all interview participants, and 98.0% of the Southern Ontario K-8 public schools that participated in this survey had school emergency plans. While some of these plans may be templates distributed by the school boards for the principals and staff to fill out for their schools (as indicated by some of the comments), it does show that the majority of schools have taken some level of initiative in emergency planning. This aligns with the results from the subject matter expert interviews in which having an emergency plan for schools was viewed as a best practice. The detail and depth of the planning was out of scope for this study. However, it would be interesting to examine what percentage of plans account for different scenarios such as an emergency occurring during a lunch break or just as students are being transported home in future studies.

Since little research has been done on the status of school emergency planning in Canada, little is known about the challenges that planners face. This research identified the challenges that face school emergency planners. Survey respondents were asked to identify the top three challenges to emergency planning for schools. Few respondents (10%) selected support from the school administration or school board, or funding (8%) as being within the top three challenges facing schools. While this does not necessarily mean that all schools receive an adequate level of support or funding for their emergency planning programs, it does suggest that many school administrations and school boards view emergency planning as enough of a priority in that support and funding is provided. However, it is important to note that this likely varies from school to school or school board to school board and it may have been a reason why some school boards declined to participate in this study. The top three challenges in school emergency planning as identified by the respondents were:

     • Time to engage in planning activities (53%),

     • Having competing priorities (47%),

     • Engaging with staff or others who hold the perception that emergencies will not happen (39%).

For effective operational school emergency plans to be developed, they must be properly resourced and efforts must be made to combat the influence of low risk perceptions on the need for planning. Securing the resources and motivating people to engage disaster preparedness and planning which competes with daily issues has long been noted as a challenge for emergency planners (e.g., Rossi et al. 1982). Ideally, the development of operational emergency plans would be supported at multiple levels including the school, school board and provincial levels. As for the challenges posed by risk perception, a growth mindset approach could be applied to develop and encourage a culture of emergency preparedness in schools. More information on a growth mindset approach is provided in section 5.4.2 Principles of Plan Development.

All of the subject matter experts identified emergency planning as being a critical need for a safe school. One hundred percent of the survey respondents felt that emergency preparedness is essential. This supports the literature, which identifies emergency planning as an essential component to reducing the impact of emergencies (e.g., Alexander 2002). Survey respondents indirectly expressed a sense of urgency with 90% of survey respondents believing that an emergency impacting their schools in the next 20 years is either 'somewhat possible' or 'very likely'. The importance of emergency planning and the urgency expressed by the respondents must be conveyed to those responsible for supporting school emergency planning resources. Resources including time and staffing must be dedicated to emergency planning to ensure that competing priorities do not overshadow emergency planning. Care must be taken in planning to ensure that plans are realistic and based on the needs of the group being planned for.

The typology developed in this research can serve as a guide in the development of operational plans as discussed in section 5.3. However, it must be noted that the typology presents a general approach to thinking about emergency planning that attempts to make the planner aware that major factors, both physical and social, have to be taken into consideration in emergency planning. It suggests that there are several core factors, the elements of the typology that will influence the outcome of the emergency based on the decisions that are made. These factors must be kept in mind during the planning process for a plan to be effective. A general approach is needed as it is likely that the specifics of any emergency plan will depend on the individual school circumstances including resources, layout, location etc.

5.4.3 Principles of plan development.

These principles were outcomes of the subject matter expert interviews which provided insights into best practices in emergency planning and the survey which provided insight into practices currently in place in Ontario schools.

Needs-Based: Adopting a needs-based approach is fundamental to the development of an operational emergency plan. As noted by Alexander (2005) an emergency plan 'seeks the most efficient way to use essential resources to satisfy urgent or chronic needs under conditions of extreme duress.' Subject matter experts agreed that for a typology to be effective in encouraging operational planning for a facility that hosts vulnerable groups, consideration of the needs of those groups must be included from the beginning. Emergency plans must also follow this principle to be effective.

"An Emergency Plan has to start with vulnerable groups; those who are most at risk, particularly during events that will displace vulnerable groups." (Interviewee 2)

Several survey questions explored whether the current plans accounted for the possible

needs of the group being planned for during an emergency. Respondents were asked the degree

of confidence they had in their school plans being able to meet staff and student needs during an

emergency. The majority of respondents (86%, n = 42) reported that they felt fairly confident

that the plan would address their needs during a real event. The remainder felt that there was a

need to improve the current plans to better align them with staff and student needs. None felt that

the plans were inadequate and that the planning process did not take needs into consideration.

The results indicate that a needs-based approach is one of the tools used in emergency planning

for schools, although they do indicate that there may be opportunities for it to be further

integrated into the school culture through training, exercises and learning opportunities aimed at

increasing resiliency through a growth mindset approach. In addition, the results showed that

planning considerations were made to consider the needs of different groups within the student

and staff population with 98% of plans including consideration of the needs for people with

disabilities.

Flexible: Another overarching principle that was identified in both the subject matter expert

interviews and the survey results was flexibility in planning. This aligns with work done by

authors such as Kreps (1992), Kartez, and Lindell (1990) which recognized the need for

flexibility in planning as it is impossible to plan for all contingencies. Subject matter experts

recommended that the typology and resulting plans should be kept simple and allow for

flexibility. This was supported by the survey results. It is recommended the emergency plan and

procedures must be generic enough to be applied to different situations while still provide

enough guidance to be useful.

"So you have to have generic enough plans that a principal of the building can apply

them to a variety of different situations. So there has got to be a certain degree of

flexibility." (Interviewee 7)

"So the plans got to be flexible enough so that it can deal with different situations but

clear enough so that once decisions are made in terms of the specific nature of what is

happening, people know what to do." (Interviewee 4)

Question 17 in the survey provided respondents with a list of different hazards and asked them to

identify which type of general protective action (evacuation, shelter in place, hold and secure,

lockdown, or close in advance) they believed would be most likely to be used to mitigate the

impacts of a particular hazard. While this question was originally intended to gauge the

respondents' familiarity with the protective actions, it provided insights as to the value of

flexibility in emergency planning. Some hazards, such as tornadoes, have a particular protective

action that they are associated with based on the nature of the hazard. In the case of tornadoes, it

is recommended to shelter in place in an interior room on the lowest level. The majority of

respondents (70%) did select shelter in place as the best option. However, 13% of respondents

selected 'depends on the situation'. While it is possible that these respondents were simply

unaware that shelter in place is guidance given by organizations such as Environment Canada for

this hazard, it is also possible that they were considering situation specific examples within their

own schools. For example, while students in classrooms in the main building of the school may

be able to shelter in place immediately once the alert is issued, students in portable, unsecured

buildings may first have to evacuate those buildings and then shelter in place in the permanent

school buildings. While outside the scope of this research, it is recommended that future research

further explore this finding to determine where it is intended to underline the importance of

flexibility related to site specific limitations or if it simply is a result of a lack of familiarity with the hazard and associated protective actions.

Flexibility should be a consideration at all stages of the emergency and should be accounted for in planning. The key variables identified in the typology (e.g., location) can serve as indicators of the key areas where differing scenarios may result in the need for plans to be flexible and to provide different options (e.g., different types of protective actions). In the emergency notification and alerting questions, several respondents left comments suggesting the method of receiving the notification or disseminating the alert would depend on the situation. For example, in a tornado situation the notification would come from a different source (Environment Canada) than in an active shooter situation (police or internal report). The same would likely be true for the alerts with a tornado alert including potentially broadcasting information and safety instructors over an internal PA system while other options (specific alarms, text messages etc.) might be preferable in an active shooter scenario aimed at avoiding making information available to the aggressor.

Simple and Intuitive: Another recommendation was that the typology and resulting plans should be simple and intuitive. As noted by Alexander (2005) emergency plans should be written in clear and simple language. This can help to prevent misunderstandings and differences in interpretation of technical terminology. This makes them accessible to a wider audience of people should they need to refer to the plan.

> *"Keep your plan intuitive. Don't create complex, unnatural processes for your people to*
>
> *follow during an emergency. Try to mimic things that they normally or naturally would*
>
> *do during an emergency and incorporate that into your plan so that it becomes a little*
>
> *more instinctive for those that are responding to it rather than a completely new process*

or a new way of doing things that is only going to done for a couple of days of this crisis

and then we are going to go back to our old way. So intuitive is also something that you

should try to factor in there." (Interviewee 5)

The results of this study also suggest that plans should not be complex as a complex plan

is more difficult to follow during an emergency. Plans should be intuitive so that they easily

come to mind and should try to include processes that people are familiar with. However, during

an emergency normal processes may not be appropriate so care must be taken in reaching a

balance between flexibility and familiarity.

Growth Mindset Approach: In order for the plan to be activated during an emergency,

people have to be familiar with it. Studies such as Johnston et al. (2011) have found that

emergency practices such as drills and training on emergency procedures when provided

frequently increase the likelihood that school staff and students will be able to respond to an

emergency in an informed and predictable manner, while engaging in appropriate protective

actions. Drills may be tailored to fit the age and needs of the children. For example, kindergarten

students may require more direction and supervision during an emergency than high school

students. Age appropriate training can be developed with a growth mindset approach that

encourages the development of knowledge and the ability to engage in protective actions

(Dweck, 2017) necessary to help prepare children for an emergency. This can assist in mitigating

the impacts of an emergency, as the children will know what actions to take.

A growth mindset approach as suggested during the subject matter expert interviews

could help during the development of training to build a culture of emergency preparedness.

Once the typology has been applied and a plan is being developed, it is important to incorporate

a growth mindset approach to school emergency management programs by using age appropriate

training and exercises to teach students how to respond during an emergency and considering

their needs. Language about emergencies and protective actions should also be tailored to engage

children. Opportunities to identify areas in which a growth mindset approach could be applied

should be visible within the typology (e.g, by including variables such as protective actions in

which children would be engaged during a drill or emergency).

All of the schools who responded to the survey stated that they had some type of training

for staff and students. This familiarization with the plan and procedures will make it more likely

that they will remember and act upon the plan should an emergency occur. The inclusion of

students in training is also promising since it provides an opportunity for students to learn their

roles during an emergency and to be able to enact protective actions under the direction of school

staff. Learning and practicing evacuation for fire and lockdown protective actions have been

identified as being an important component to school safety to the extent that they have been

mandated by the province. Other protective actions (e.g., shelter in place) are not mandated

despite potentially being equally as important to mitigating impacts during other types of

emergencies. Training could be tailored to be age appropriate and to meet the needs of staff and

students who may have special needs during an emergency.

5.5 Knowledge Mobilization Opportunities

The results of this research could be used to influence school boards, schools, and school

staff to adopt a culture of emergency preparedness. For this to be effective, operational

emergency planning would be a component along with a growth mindset approach to ensure that

all people with a role in emergency preparedness, including the children are included. The

typology and the principles of plan development could be used as a baseline for the development of tools used to assist the planning process for school emergency plans. Since the typology identifies key planning considerations, tools such as flow charts or decision trees could be developed to guide decision making during an emergency to ensure that all of the critical considerations are dealt with. These tools could be developed for use at different levels based on the roles of key players such as school boards, school principals and teachers and could provide a functional guide to help support appropriate decision making.

The principles of plan development for school emergency plans identified in this research could be used as a core component in the development and revision of emergency plans. A checklist or even a simple list of the principles and considerations in how to apply them when planning could be developed. More in-depth tools, such as a planning guide for schools could be developed that incorporate these principles as a framework for developing operational emergency plans for vulnerable groups. Since operational planning requires training and drills, the principles could also be used to inform other emergency preparedness activities, such as the need for a growth mindset approach to be incorporated into training. The tools developed from both the typology and the principles could be developed to empower staff, students and others with a role in emergency preparedness to be able to confidently take the correct actions during an emergency to mitigate harm and to ensure safety.

5.6 Chapter Summary

This chapter discussed the development of the typology and how the results from the survey questionnaire and the subject matter expert interviews influenced the development. The intent of this typology was to guide an operational emergency planning approach that incorporates the social construction of disasters in a Canadian context. The theoretical framework used in this study was the social construction of disasters. It is based on the premise that by understanding how the social elements, such as vulnerability, contribute to emergencies, that steps can be taken to address these elements proactively through emergency planning. The typology can be used in the identification of crucial decisions during an impending emergency that can be addressed through planning.

Kreps (1986) called for the development of more disaster classifications designed for functional uses, such as the development of emergency plans. This research addresses this call and accomplishes this by outlining the development of a typology that could be used to provide insight as to how elements of the social construction of disasters (e.g. risk perception, vulnerability) could be applied to build more effective emergency plans. A preliminary typology was developed based on an extensive literature review. The development of this typology adhered to Rich's (1992) guidelines which were found to be applicable. The completeness and applicability were tested through the use of the survey and interviews.

This research provided some insight into the definition of disaster which has been recognized as a challenge in disaster studies (e.g., Perry 2007) in that it supports the literature on the true nature of disasters as both physical and social events which leads to a better understanding of disasters. This research found that physical and social factors were important planning considerations that could influence whether an incident escalated into a disaster. However, the physical factors (i.e. duration, warning, and location) were identified as tiers under the overarching social factors of vulnerability and risk perception as these factors can be addressed through planning if they must be considered through the lens of vulnerability. It suggests movement away from a hazard-centric approach to one that embraces the role of social construction. While this could be useful in the development of a broad, conceptual definition, the key factors identified in the typology may also be useful in the development of a more applied definition of disaster.

Chapter Six

Conclusion

Chapter Six provides a conclusion from this research. It highlights begins with a review of the purpose and objectives of this study and then discusses the broad contributions of the work, outlines for the reader some limitations associated with the methods used in this study, and suggests future research work.

6.1 Purpose and Objectives

The purpose of this study was to advance the knowledge of emergency planning for K-8 schools and to develop a typology based on the social construction of disaster that could serve to enhance operational emergency planning. Three key objectives guided this research. Each objective contributed to building a typology that would meet the needs of K-8 schools. The first objective was to create a typology aimed at guiding an operational emergency planning approach that incorporates the social construction of disasters in a Canadian context and particularly addresses the needs of vulnerable populations in which the key aspects of the typology were identified based on a multi-method approach. The second objective was to validate the typology through a case study of the emergency planning needs of K-8 public schools in southern Ontario. The third objective was to then revise the typology based on the outcomes of the subject matter expert interviews and the case study, and provide recommendations regarding improving operational emergency planning for schools as facilities that host vulnerable groups.

6.2 Summary

Emergency management as a field of practice is still evolving. Emergency planning is an essential, proactive component of emergency management and is used to direct the actions that should be taken to minimize the impacts of a potential emergency (Alexander 2002; Public Safety Canada 2012). Recent high-profile incidents such as the Sandy Hook school shooting in 2012 and the destruction of the Plaza Towers school due to a tornado in 2013 have highlighted the importance of having effective school emergency plans. However, effective planning for members of vulnerable groups continues to be a challenge (Bissell, 2008; Webb and Chevreau, 2006; Clarke, 1999).

Well-designed operational plans address the functional and tactical needs of the group or organization and provide organizations with a framework to fulfill their key mandates and critical activities. The theory of the social construction suggests that social factors, such as those arising from vulnerability and risk perception, are key contributors to disasters. These social factors were hypothesized to be capable of providing the basis of a typology aimed at school emergency planning since they are within human control and have been identified in the literature as influencing the outcomes of an emergency. The typology could be used in the identification of crucial decisions during an impending emergency that can be addressed through planning.

This research examined how the social construction of disasters could be used to reimagine the traditional physical-focused typology as one that supports decision making during an emergency by identifying key factors that should be considered when developing an effective emergency plan. It achieved this through an understanding of how physical and social factors interact to become a disaster. It found that the physical factors ultimately needed to be viewed

through a lens focused on how they contributed to the vulnerability of the group being planned

for them to be applicable to emergency planning. In this sense, the physical factors that

contribute to a disaster can be conceptualized as being embedded in the social factors. This

provides some insight into the definition of disaster, which has been recognized as a challenge in

disaster studies (e.g., Perry 2007) and a resulting recommendation is that emergency

management organizations should move away from the traditional impact-based definitions that

they currently use, to a definition that accounts for the social nature of disasters. This is

important for emergency planning as it allows for a definition that is applicable to all stages of an

emergency.

In addition to providing insight into the role of social factors in the development of

disasters, the critical analysis identified some of the underlying challenges that schools' face

when attempting to undertake emergency planning activities. It also identified five principles of

school emergency planning that could be applied to build stronger, more effective emergency

plans.

6.3 Limitations

A limitation of this study was the number of survey participants (n = 57). While the

participant response rate for the survey was 23%, limitations set by the school boards on the

approval of research studies resulted in approval to contact schools within five school boards in

southern Ontario. A broader study that covered all schools in southern Ontario would mitigate

the risk that the school boards that declined to participate were doing so due to a lack of faith in

their schools' emergency plans. In addition, further research could be done to explore current

school planning activities throughout Ontario, or even Canada. This would provide a much

needed picture of the current state of school planning in Canada.

The Ministry of Education was contacted for this study but did not respond. Future research could be assisted by their participation through the encouragement of schools to adopt planning best practices and to encourage more research on current school plans.

6.4 Areas for Future Research

There are several areas of future research that could expand on the findings of this study. A case study using a whole of community approach could be taken in which the emergency planning principles and the other findings of this research are implemented through the development of tools. This would require support at both a school board and school level and would benefit from the involvement of parents and guardians of the school children. Parents and guardians would have to be aware of the school plans since they also have roles in school safety. This would provide insight into how the implementation process could be undertaken.

Another potential area for future research would be to explore whether the typology created in this study is applicable to other types of facilities that host members of a vulnerable group. The results may be applicable to facilities such as nursing homes or daycares, however, this would need to be tested.

Perceptions were studied in this research since it is the perceptions of risk and vulnerability that leads to the activation (or not) of school emergency plans. An in-depth comparison between subjective and objective assessments of risk were outside of the scope of this study. Future studies could compare the risk perceptions held by those responsible for school planning and more objective measures of risk.

A third area would be to examine past emergencies that have impacted schools in Ontario. Currently, no database or records of school specific incidents that covered all hazards is

available. A database could be used to identify which hazards have historically impacted schools in different areas. This information could be used as a tool to inform school emergency planning. The development of planning tools such as key decision flow charts based on the typology were outside the scope of this research, however, future work could be done to develop and then test their applicability in emergency planning. Finally, another area for future research would be to approach provincial and territorial officials to test whether the organizational definitions of disaster could be formally revised to include the social aspects of disasters.

References

Alexander, D. (2002). Principles of emergency planning and management. Oxford University Press on Demand.

Alexander, D. (2003). Towards the development of standards in emergency management training and education. Disaster Prevention and Management: An International Journal, 12(2), pp. 113-123.

Alexander, D. (2005). Towards the development of a standard in emergency planning. Disaster Prevention and Management: An International Journal, 14(2), pp.158-175.

Allen, G. M., Parrillo, S. J., Will, J., & Mohr, J. A. (2007). Principles of disaster planning for the pediatric population. Prehospital and Disaster Medicine, 22(6), pp. 537-540.

Anderson, N. E. (2000). *Seismic adjustments: the influence of inconvenience and efficacy perceptions, state of residence, and demographic factors* (Doctoral dissertation). Retrieved from: https://scholarsarchive.byu.edu/etd/5611

Archer, K. (2012). Social constructions of the environment in J. Stoltman (Ed.) *21st Century Geography: A Reference Handbook, Vol 2.* (pp. 499 – 508). Thousand Oakes, California: Sage.

Bailey, J. (2008). First steps in qualitative data analysis: transcribing. Family Practice, 25(2), pp. 127-131.

Bailey, K. D. (1973). Monothetic and polythetic typologies and their relation to conceptualization, measurement and scaling. American Sociological Review. pp. 18-33.

Bailey, K.D. (1994). Typologies and taxonomies: an introduction to classification techniques in M. Lewis-Beck (Ed.) *Quantitative Applications in the Social Sciences.* (pp. 1 – 90). Thousand Oakes, California: Sage University.

Barton, A. H. (1963). Social organization under stress: a sociological review of disaster studies. Washington, DC, US: National Academy of Sciences-National Research Council.

Ballantyne, M., Paton, D., Johnston, D., Kozuch, M., Daly, M., (2000). Information on volcanic and earthquake hazards: the impact on awareness and preparation. Journal of Volcanology and Geothermal Research 172 (2008), pp. 179–188.

Bang, H.N. (2008). Social vulnerability and risk perception to natural hazards in Cameroon two decades after the Lake Nyos gas disaster: what future prospect for the displaced disaster victims? In: Proceedings of the paper presented for social vulnerability at the United Nations university-institute for environment and human security (UNU-EHS), Germany.

Barton, A.H. (1969). Communities in disaster: a sociological analysis of collective stress situations. Garden City, New York: Doubleday.

Barton, A.H. (2005). Disaster and Collective Stress in: R.W Perry and E.L. Qurantelli (Eds.) *What is a Disaster?: New Answers to Old Questions.* (pp. 125 – 152). New York, New York: Springer.

Barnes, T. (2004). A paper related to everything but more related to local things. Annals of the Association of American Geographers, 94(2), pp. 278-283.

Bayram, V., Tansel, B. Ç., & Yaman, H. (2015). Compromising system and user interests in shelter location and evacuation planning. Transportation Research Part B: Methodological, 72, pp. 146-163.

Bergh, B. (2009). *A qualitative study of school lockdown procedures and teachers' ability to conduct and implement them at the classroom level* (Doctoral dissertation). Western Michigan University (Publication No. AAT 3354065).

Bilham, R. (2010). Lessons from the Haiti earthquake. Nature, 463(7283), pp. 878.

Bird, D. K. (2009). The use of questionnaires for acquiring information on public perception of natural hazards and risk mitigation - a review of current knowledge and practice. Natural Hazards and Earth System Sciences, 9(4), pp.1307-1325.

Birkmann, J. (2006). Measuring vulnerability to promote disaster-resilient societies: conceptual frameworks and definitions in Measuring vulnerability to natural hazards: towards disaster resilient societies. Toyko, Japan: United Nations University Press.

Bissell, W. C. (2008). From Iraq to Katrina and back: bureaucratic planning as strategic failure, fiction, and fantasy. Sociology Compass, 2(5), pp. 1431-1461.

Blackwell, C., & Williams, J. R. (2007). Utilization of concept maps in teaching leadership. Academic Exchange Quarterly, 11(2), pp. 66-71.

Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2014). At risk: natural hazards, people's vulnerability and disasters. New York, New York: Routledge.

Blanchard-Boehm, R. D. and M. J. Cook. (2004). Risk communication and public education in Edmonton, Alberta, Canada on the 10th anniversary of the 'Black Friday' tornado. International Research in Geographical and Environmental Education, 13(1), pp. 38-54.

Boin, A. and McConnell, A. (2007). Preparing for critical infrastructure breakdowns: the limits of crisis management and the need for resilience. Journal of Contingencies and Crisis Management, 15(1), pp. 50-59.

Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), pp. 77-101.

Brewer, J. and Hunter, A. (2006). Foundations of multimethod research: synthesizing styles. Thousand Oakes, California: Sage Publications

Brunsma, D.L., Overfelt, D., and Picou, S.J. (2010). The sociology of Katrina: perspectives on a modern catastrophe. Lanham, Maryland: Rowman and Littlefield Publishers.

Bullock,J., Haddow,G., and Coppola, D. (2015). Introduction to homeland security: principles of all-hazards risk management. 5th Edition. Jordan Hill, Oxford: Elsevier Science & Technology Books

Burby, R. J., Beatley, T., Berke, P. R., Deyle, R. E., French, S. P., Godschalk, D. R., and R.G. Paterson (1999). Unleashing the power of planning to create disaster-resistant communities. Journal of the American Planning Association, 65(3), pp. 247-258.

Burton, I. and Kates, R.W. (1963). The perception of natural hazards in resource management. Natural Resources Journal, 3(3), pp. 412 – 441.

Burton, I., Kates, R. W., & White, G. F. (1993). The environment as hazard. New York, New York: Gilford Press.

Byrne, J., & Humble, A. M. (2007). An introduction to mixed method research. Atlantic research centre for family-work issues, 1-4.

Cannon, T. (2015). Disasters, Climate Change and the Significance of 'Culture'. Cultures and Disasters: Understanding Cultural Framings in Disaster Risk Reduction, pp. 88.

Cannon, T. (2015). Disasters, climate change and the significance of 'culture' in *Cultures and disasters* (pp. 104-122). London, UK: Routledge.

Cardona, O. (2004). The need for rethinking the concepts of vulnerability and risk from a holistic perspective: a necessary review and criticism for effective risk management.G. Bankoff, G. Frerks, D. Hilhorst (Eds.) in *Mapping Vulnerability: Disasters, Development and People*. (pp. 56 – 70). London, UK: Routledge.

Changnon, S. A., Pielke Jr, R. A., Changnon, D., Sylves, R. T., & Pulwarty, R. (2000). Human factors explain the increased losses from weather and climate extremes. Bulletin of the American Meteorological Society, 81(3), pp. 437-442.

Clarke, L. (1999). Mission improbable: using fantasy documents to tame disaster. Chicago, IL: University of Chicago Press.

Cohen, D. (2006). Qualitative research guidelines project: semi-structured interviews. Princeton, New Jersey: Robert Wood Johnson Foundation.

Coleman, T., Knupp, K., Spann, J., Elliott, J., and Peters, B. (2011). The history (and future) of tornado warning dissemination in the United States. Bulletin of the American Meteorology Society. May 2011.

Connolly, M. (2012). Is your college really ready for a crisis? Community College Journal of Research and Practice, 36(5), pp. 376-378.

Crowe, S., Cresswell, K., Robertson, A. Huby, G., Avery, A. and Sheikh, A. (2011). The case study approach. BMC Medical Research Methodology, 11, pp. 100.

Cutter, S. L. (1996). Societal responses to environmental hazards. International Social Science Journal, 48(150), pp. 525-536.

Cutter, S. L. (2001). The changing nature of risks and hazards in S.L. Cutter (Ed.) *American Hazardscapes: The Regionalization of Hazards and Disasters* (pp. 1 – 12*).* Washington, DC: Joseph Henry Press.

Cutter, S.L. (2003). GI science, disasters, and emergency management. Transactions in GIS, 7(4), pp. 439–445.

Cutter, S. L., Mitchell, J. T., & Scott, M. S. (2000). Revealing the vulnerability of people and places: a case study of Georgetown County, South Carolina. Annals of the Association of American Geographers, 90(4), pp. 713–737.

Cutter, S. L., Boruff, B. J., & Shirley, W. L. (2003). Social vulnerability to environmental hazards. Social Science Quarterly, 84(2), pp. 242-261.

Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. Global Environmental Change, 18(4), pp. 598-606.

Dake, K. (1992). Myths of nature: culture and the social construction of risk. Journal of Social Issues, 48(4), pp. 21-37.

Dalton, J., Elias, M., and Wandersman, A. (2001). Community psychology: linking individuals and communities. Belmont, CA: Wadsworth Publishing.

De Vaus, D. D. (2002). Surveys in social research. New South Wales: Allen & Unwin.

Demerritt, D. (1996). Social theory and the reconstruction of science and geography. Transactions of the Institute of British Geographers, pp. 484-503.

Demerritt, D. (2002). What is the 'social construction of nature'? A typology and sympathetic critique. Progress in Human Geography, 26(6), pp. 767-790.

Department of Homeland Security. (2017). *Plan ahead for disasters.* Retrieved from the Department of Homeland Security Website: https://www.ready.gov/. Accessed December 22, 2017.

Diepenbrock, R. G. (2010). *Safety and security concerns: perceptions of preparedness of a rural school district* (Doctoral dissertation). Wichita State University.

Doran, L. (2017). Ransomware attacks force school districts to shore up—or pay up. Education Week, 36(17), pp. 10.

Donner, W. (2007). *An integrated model of risk perception and protective action: public response to tornado warnings*. (Doctoral dissertation). Department of Sociology and Criminal Justice,Newark, DE: University of Delaware.

Doty, D.H. and Glick, W.H. (1994). Typologies as a unique form of theory building: toward improved understanding and modelling. Academy of Management Review, 19(2), pp. 230-251.

Douglas, M. (1990). Risk as a forensic resource. Risk, 119(4), 1-16.

Douglas, M., & Wildavsky, A. (1982). How can we know the risks we face? Why risk selection is a social process. Risk Analysis, 2(2), pp. 49-58.

Drabek, T.E. (1991). Anticipating Organizational Evacuations: Disaster Planning by Managers of Tourist-Oriented Private Firms. International Journal of Mass Emergencies and Disasters. Vol. 9, Iss. 2, pp. 219-245.

Dweck, C. (2006). How can you change from a fixed mindset to a growth mindset? Mindset Online: http://mindsetonline.com/changeyourmindset/firststeps/

Dweck, C. S. (2010). Mind-sets. Principal Leadership, 10(5), pp. 26-29.

Dynes, R.R. and Drabek, T.H. (1999). The structure of disaster research: It's policy and disciplinary implications. International Journal of Mass Emergencies and Disasters. Vol. 12, No. 1, pp. 5-23.

Dynes, R.R., Quarantelli, E.L., and Kreps, G.A. (1981). A perspective on disaster planning. Report Series No.1, 3rd Edition. Newark, DE: University of Delaware Research Center.

French, J. (2017, April 25). Fort McMurray schools still feeling the wildfire's effects. *Edmonton Sun*. Retrieved from www.edmontonsun.com.

Emergency Management BC. (2004) Hazard risk and vulnerability analysis. Retrieved from the Government of British Columbia website https://www2.gov.bc.ca/gov/content/safety/emergency-

preparedness-response-recovery/local-emergency-programs/hazard-risk-and-vulnerability-analysis.

Emergency Management Ontario. (2010). Emergency management doctrine for Ontario. Ministry of Community Safety and Correctional Services. Government of Ontario.

Emergency Management Ontario. (2012). The Ontario provincial hazard identification and risk assessment. Ministry of Community Safety and Correctional Services. Government of Ontario.

Emergency Management Ontario. (2017). Emergency preparedness. Retrieved from the Government of Ontario website at: https://www.ontario.ca/page/emergency-preparedness?_ga=2.267847820.346863007.1513955505-624525129.1510943651..

Enarson, E., & Morrow, B. (1998). The gendered terrain of disaster. Westport, CT: Praeget.

FEMA. (2006). Principles of emergency management in *Independent Study, IS230*. Washington, DC: Government of the United States.

FEMA. (2010). National commission on children and disasters. *2010 Report to the President and Congress*. Retrieved from United States Government website at http://www.acf.hhs.gov/ohsepr/nccdreport/index.html..

FEMA. (2012). Hazard list. Washington, DC: Government of the United States.

Fifolt, M., Wakelee, J., Eldridge-Auffant, L., Carpenter, R., & Hites, L. (2017). Addressing the needs of adults and children with disabilities through emergency preparedness and organizational improvisation. Nonprofit Management and Leadership, 27(3), pp. 423-434.

Foster, H. (1990) Disaster mitigation for planners: the preservation of life and property, New York, New York: Springer Verlag.

Frazier, K. (1979). The violent face of nature: severe phenomena and natural disasters. New York, New York: William Morrow & Company.

Friesen, K., & Bell, D. (2006). Risk reduction and emergency preparedness activities of Canadian universities. International Journal of Mass Emergencies and Disasters, 24(2), pp. 223 - 224.

Gall, M. (2013). From social vulnerability to resilience: measuring progress toward disaster risk reduction. UNU-EHS Interdisciplinary Security Connections 13. UNU-EHS, Bonn

Gannon, D. (1998, September 26). The Day of Destruction in Merritton. The St. Catharines Standard. Retrieved from www.stcatharinesstandard.ca

Gergen, K.J. (1985). The social constructionist movement in modern psychology. American Psychologist, 40(3), pp. 266 – 275.

Gergen, K.J. (1999). An invitation to social construction. London, England: Sage.

Gilbert, C. (1995). Studying disaster: a review of the main conceptual tools. International Journal of Mass Emergencies and Disasters, 13, pp. 231-240.

Gorden, Raymond (1992). Basic interviewing skills. Long Grove, IL: Waveland Press.

Government of Ontario. (1997). Fire code. Fire protection and prevention act.Ontario Regulation 213/07 : Government of Ontario.

Graham, J., Shirm, S., Liggin, R., Aitken, M. E., & Dick, R. (2006). Mass-casualty events at schools: a national preparedness survey. Pediatrics, 117(1),pp. e8-e15.

Griffiths, D. E. (1969). Developing taxonomies of organizational behavior in education administration. Chicago, IL: Rand McNally.

Groves, S. (2013). *Knowledge, involvement and emergency preparedness* (Doctoral dissertation). University of South Florida.

Hacking, I. (1999). The social construction of what? Cambridge, MA: Harvard University Press.

Hamilton-Wentworth District School Board. (2016). Safe school drill dates for parents. Retrieved from www.hwdsb.on.ca/.../files/2016/.../Safe-School-Drill-Dates-for-Parents-2016-2017.pdf.

Hausken K, Bier VM, Zhuang J. (2009). Defending against terrorism, natural disasters, and all hazards: game theoretic risk analysis of security threats. New York, New York: Springer.

Helweg-Larsen, M. (1999). (The lack of) optimistic bias in response to the Northridge earthquake: the role of personal experience. Basic and Applied Social Psychology, 21, pp. 119 – 129.

Hempel, C. G. (1952). Fundamentals of concept formation in empirical science. International Encyclopedia of Unified Science, 2(7) pp. 15 - 23.

Hewitt, K. (2005). The karakoram anomaly? Glacier expansion and the 'elevation effect'. Karakoram, Himalaya, Inner Asia. Mountain Research and Development Journal, 25, pp. 332-348.

Hewitt, K. (2013). Environmental disasters in social context: toward a preventive and precautionary approach. Natural Hazards, 66(1), pp. 3-14.

Hodkinson, P. and Hodkinson, H. (2001). The strengths and limitations of case study research. Paper presented to the Learning and Skills Development Agency Conference: Making an Impact on Policy and Practice. Cambridge, 5 – 7 December, 2001.

Homan, J. (2003). The Social Construction of Natural Disaster. Natural Disasters and Development in a Globalizing World, pp. 141.

Horlick-Jones, T. and Prades, A. (2009). On interpretative risk perception research: Some reflections on its origins; its nature; and its possible applications in risk communication practice. Health, Risk and Society. Vol. 11, Iss.5, pp. 409 – 430.

Johnson, B. B., & Covello, V. T. (1987). The social construction of risk: essays on risk selection and perception, Dordrecht, Amsterdam: D. Reidel Publishing Company.

Johnson, B. B., & Covello, V. T. (1987). The social and cultural construction of risk - essays on risk selection and perception. Dordrecht, Netherlands: Springer Netherlands

Johnston, D., Tarrant, R., Tipler, K., Coomer, M., Pedersen, S. and Garside, R. (2011). Preparing schools for future earthquakes in New Zealand: lessons from an evaluation of a Wellington school exercise. Australian Journal of Emergency Management, 26(1), pp. 24 – 36.

Kartez, J.D. and Lindell, M.K. (1990). Adaptive planning for community disaster response in R.T. Silves, W.L. Waugh (Eds.) *Cities and disaster: North American studies in emergency management (first edition)* (pp. 5 – 33). Springfield IL: Charles C. Thomas Publishers.

Kano, M., Ramirez, M., Ybarra, W. J., Frias, G., & Bourque, L. B. (2007). Are schools prepared for emergencies? A baseline assessment of emergency preparedness at school sites in three Los Angeles County school districts. Education and Urban Society, 39(3), pp.399-422.

Kasperson, R.E. and Pijawka, K.D. (1985). Societal response to hazards and major hazard events: comparing natural and technological hazards. Public Administration Review, 45, pp. 7 – 18.

Kasperson, R.E., Renn, O, Slovic, P., Brown, H.S., Emel, J., Goble, R.; Kasperson, J.X., Ratick, S. (1988). The social amplification of risk: a conceptual framework. Risk Analysis, 8(2), pp. 177-187.

Kelman, I. (2007). Decision-making for flood-threatened properties in *Flood risk management in Europe* (pp. 3-19). Dordrecht, Netherlands: Springer.

Kelman, I. (2007). Decision-making for flood-threatened properties in *Flood risk management in Europe* (pp. 3-19). Dordrecht, Netherlands: Springer Netherlands

Kelman, I. (2011). Disaster diplomacy: how disasters affect peace and conflict. New York, New York: Routledge.

Kemeny, J.G. (1959). A philosopher looks at science in V. Nostrand. *Quotations from the Italian translation 'Il filosofo e la scienza'*. Milano: Il Saggiatore.

Tveiten, C., Albrechtsen, E., Wærø, I. and Marit Wahl, A. (2012). Building resilience into emergency management. Safety Science, 50(10), pp. 1960 – 1966.

Kreps, G. A. (1989). Social structure and disaster. Presented at Symposium on Social Structure and Disaster, College of William and Mary, Williamsburg, Virginia, 15-16 May 1986. University of Delaware Press.

Kreps, G. A. (1989b). Description, taxonomy, and explanation in disaster research. International Journal of Mass Emergencies and Disasters, 7(3), pp. 277-280.

Kreps, G.A. (1992). Foundations and principles of emergency planning and management in D. Parker and J. Handmer (Eds.) *Hazard Management and Emergency Planning* (pp. 159 – 165*).* London, UK: Routledge.

Kroll-Smith, J.S. and Couch, S.R. (1990). The real disaster is above ground: a mine fire and social conflict. Lexington, Kentucky: University Press of Kentucky

Kuhn, T. S. (1962). The structure of scientific theories. Chicago, IL: University of Chicago Press.

Lawrence, J., Quade, D., and Becker, J. (2014). Integrating the effects of flood experience on risk perception with responses to changing climate risk. Natural Hazards, 74(3), pp. 1773–1794.

Lavrakas, P. J. (2008). Encyclopedia of survey research methods. Thousand Oakes: CA: Sage Publications.

Lindell, M. K. (1994). Perceived characteristics of environmental hazards. International Journal of Mass Emergencies and Disasters, 12(1), pp. 303-326.

Lindell, M. K., & Perry, R. W. (1992). Behavioral foundations of community emergency planning. Vancouver Island, BC: Hemisphere Publishing Corp.

Marincioni, F., & Fraboni, R. (201.). A baseline assessment of emergency planning and preparedness in Italian universities. Disasters, 36(2), pp. 291-315.

Marradi, A. (1990). Classification, typology, taxonomy. Quality and Quantity, 24(1), pp. 129-157.

Maybury, R. H. (1986). Violent forces of nature. Scotland, UK: Lomond Publications.

McCracken, G. (1988). The long interview. Thousand Oakes, CA: Sage.

McEntire, D. A. (2001). Triggering agents, vulnerabilities and disaster reduction: towards a holistic paradigm. Disaster Prevention and Management: An International Journal, 10(3), pp. 189-196.

Mileti, D. (1999). Disasters by design: a reassessment of natural hazards in the United States. Washington, DC: Joseph Henry Press.

Mileti, D. S., & O'Brien, P. (1993). Public response to aftershock warnings. US Geological Survey Professional Paper. No. 1553, pp. 31-42.

Mileti, D., and Sorensen, J. (1990). Communication of emergency public warnings. Oak Ridge National Laboratory, ORNL-6609. Oak Ridge, TN: National Laboratory.

Miller, A.L. and Dumford, A.D. (2014). Open-ended survey questions: item nonresponse nightmare or qualitative data dream? Survey Practice, 7(5), pp. 1 -11.

Minichiello, V., Aroni, R., Timewell, E., & Alexander, L. (1990). In-depth interviewing: researching people. Hong Kong: Longman Cheshire Pty Limited.

Ministry of Finance. (2012). Ontario population projections. Government of Ontario. Retrieved from Government of Ontario website, www.fin.gov.on.ca.

Momani, N. M., & Salmi, A. (2012). Preparedness of schools in the province of Jeddah to deal with earthquake risks. Disaster Prevention and Management: An International Journal, 21(4), pp. 463-473.

Moser, M. (2005). Location, location, location: placing the rural primary school and the local community within the spatial .market. Presented at the British Educational Research Association Annual Conference, University of Manchester, 16-18 September 2004 and at the Royal Geographic Society Conference 2005.

National Research Council of the National Academies. (2006) Facing hazards and disasters: understanding human dimensions. Washington, DC: The National Academic Press.

National Weather Service. (2011). NWS Central Region service assessment Joplin, Missouri, Tornado – May 22, 2011. Department of Commerce. Government of the United States.

National Weather Service. (2017). Severe weather safety tips. Retrieved from the National Oceanic and Atmospheric Administration website www.crh.noaa.gov/Image/mkx/pdf/handouts/weather-safety-tips.pdf.

Nelkin, D. (1989). Communicating technological risk: The Social Construction of Risk Perception. Annual Review of Public Health, 10(1), pp. 95-113.

Nirupama, N. and Etkin, D. (2009). Emergency managers in Ontario: an exploratory study of their perspectives. Journal of Homeland Security and Emergency Management, 6(1), Article 38.

Nirupama, N. and Etkin, D. (2012). Institutional perception and support in emergency management in Ontario, Canada. Disaster Prevention and Management, 21(5), pp. 599-607.

Norris, F.H., Smith, T. and Kaniasty, K. (1999). Revisiting the experience – behavior hypothesis: the effects of Hurricane Hugo on hazard preparedness and other self-protective acts. Basic and Applied Social Psychology, 21(1), pp. 37 – 37.

Office of the Fire Marshal (OFM). (2004). OFM guideline: OFM-TG-01-2004 Fire Drills.

O'Neill, M. (2013). The NVivo toolkit: how to apply NVivo in your PhD for research and publishing success. http://contentz.mkt5276.com/lp/46188/261238/The-NVivo-Toolkit-Final.pdf.

Oliver-Smith, A. (2011). Revealing root causes: the disaster anthropology of Gregory Button. American Anthropologist, 113(4), pp. 646-648.

Oliver-Smith, A., Hoffman, S.M., and Hoffman, S. (1999). The angry earth: disaster in anthropological perspective. London, UK: Psychology Press.

Olliges, L. (2018). Groundbreaking brings positive progress to tornado anniversary in Goodman. Retrieved from KAOM TV website at http://www.koamtv.com/story/37882508/groundbreaking-brings-positive-progress-to-tornado-anniversary-in-goodman

Ontario Association of Police Chiefs (2007). Guidelines for developing and maintaining lockdown procedures for elementary and secondary schools in Ontario. Retrieved from the Ministry of Education website www.edu.gov.on.ca/eng/policyfunding/memos/.../LockdownGuidelinesEn.pdf.

Ontario Ministry of Education. (2015). Ontario's school system. Government of Ontario.

Oppenheim, A. N. (1992). Descriptive survey designs in *Questionnaire Design, Interviewing and Attitude Measurement* (pp. 38 – 46*).* London, UK: Continuum

Owen, B. M. (1995). The economics of a disaster: the Exxon Valdez oil spill. Westport, CT: Greenwood Publishing Group.

Ozkan, B.C. (2004). Using NVivo to analyze qualitative classroom data on constructivist learning environments. The Qualitative Report, 9(4), pp. 589-603

Paton, D. (2003). Disaster preparedness: a social-cognitive perspective. Disaster Prevention and Management: An International Journal, 12(3), pp. 210-216.

Paton, D., 2006. Measuring and monitoring Rresilience. Auckland Region, Aukland: CDEM Group.

Patton, M.Q. (2002). Qualitative research and evaluation methods. Thousand Oaks, CA: Sage.

Peacock, W.G., Brody, S.D. and Highfield, W. (2004). Hurricane risk perceptions among Florida's single family homeowners. Landscape and Urban Planning, 73(2), pp. 120-135.

Peacock, W. G., & Girard, C. (1997). Ethnic and racial inequalities in hurricane damage and insurance settlements in *Hurricane Andrew: ethnicity, gender and the sociology of disasters* (pp. 171-190). London, UK: Routledge.

Peacock W.G., Dash N., Zhang Y. (2007). Sheltering and housing recovery following disaster in *Handbook of Disaster Research* (pp 258-274). New York, NY: Springer.

Pearce, L. D. R. (2000). *An integrated approach for community hazard, impact, risk and vulnerability analysis: HIRV* (Doctoral dissertation), University of British Columbia.(DOI: 10.14288/1.0099665).

Peek, L. (2008). Children and disasters: understanding vulnerability, developing capacities, and promoting resilience. Children Youth and Environments, 18(1), pp. 1-29.

Peek, L., & Stough, L. M. (2010). Children with disabilities in the context of disaster: a social vulnerability perspective. Child Development, 81(4), pp. 1260-1270.

Perry, R. W. (1989). Taxonomy, classification, and theories of disaster phenomena in G. Kreps (Ed.) *Social structure and disaster* (pp. 351 – 359). Newark, DE. University of Delaware Press.

Perry, R. W. (2007). What is a disaster? in *Handbook of disaster research* (pp. 1-15). New York, New York: Springer.

Perry, R. W., & Lindell, M. K. (2003). Preparedness for emergency response: guidelines for the emergency planning process. Disasters, 27(4), pp. 336-350.

Perry, R. W., Lindell, M. K., & Tierney, K. J. (2001). Facing the unexpected: disaster preparedness and response in the United States. Washington, DC: Joseph Henry Press.

Perry, R. W., & Quarantelli, E. L. (2005). What is a disaster?: New answers to old questions. Bloomington, IN: Xlibris Corporation.

Petak, W.J. (1985). Emergency management: a challenge for public administration. Public Administration Review, 45(1), pp. 3-7.

Peters, E., & Slovic, P. (1996). The role of affect and worldviews as orienting dispositions in the perception and acceptance of nuclear power. Journal of Applied Social Psychology, 26(16), pp. 1427-1453.

Phillips, B. D. (1993). Cultural diversity in disasters: sheltering, housing, and long-term recovery. International Journal of Mass Emergencies and Disasters, 11(1), pp. 99-110.

Pidgeon, N., Kasperson, R. E., & Slovic, P. (2003). The social amplification of risk. Cambridge, MA: Cambridge University Press.

Porfiriev, B.N. (2005). Issues in the definition and delineation of disasters and disaster areas in Quarantelli, E.L. (Ed.), *What is a disaster: a dozen perspectives on the issue* (pp. 69 – 88). London, UK: Routledge.

Provitolo, D., Müller, J.P., and Dubos-Paillard, E. (2011). Emergent human behavior during a disaster: thematic versus complex systems approaches in Proc. EPNACS 2011 within ECCS'11 Emergent Properties in Natural and Artificial Complex Systems, Vienna, Austria – September 15.

Public Safety Canada. (2012). Emergency management. Retrieved from the Government of Canada website www.publicsafety.gc.ca.

Public Safety Canada. (2014). All-hazards risk assessment. Retrieved from the Government of Canada website www.publicsafety.gc.ca.

Quarantelli, E. L. (1984). Emergent citizen groups in disaster preparedness and recovery activities. Newark, DA: Disaster Research Centre. University of Delaware.

Quarantelli, E. L. (1987). Research in the disaster area: what is being one and what should be done?.Disaster Research Center.

Quarantelli, E. L. (1988). Conceptualizing disasters from a sociological perspective. International Journal of Mass Emergencies and Disasters, 7(3), pp. 243 – 251.

Quarantelli, E.L. (1992). Disaster research in E. Borgatta and M. Borgatta (Eds.), *Encyclopedia of sociology.* New York, NY: Macmillan.

Quarantelli, E.L. (2000). Disaster research in H.E.F. Borgatta and R.J.V. Montgomery (Eds.) *Encyclopedia of Sociology, 2nd edition (*pp.681 – 688). New York, NY: Macmillan, 681–688.

Quarantelli, E.L. (1992). The case for a generic rather than agent-specific approach to disasters. Disaster Management, 2(1), pp. 191 – 196.

Quarantelli, E. L. (Ed.). (2005). What is a disaster?: A dozen perspectives on the question. London, UK: Routledge.

Rasch, R. F. (1987). The nature of taxonomy. Journal of Nursing Scholarship, 19(3), pp. 147-49.

Renn, O. (2008). Concepts of risk: an interdisciplinary review part 1: disciplinary risk concepts. Gaia-Ecological Perspectives for Science and Society, 17(1), pp. 50-66.

Rich, P. (1992). The organizational taxonomy: definition and design. Academy of Management Review, 17(4), pp. 758-781.

Riessman, C.K. 1993. Narrative analysis. Qualitative research methods series. (30). Newbury Park, CA: Sage.

Rohrmann, B. (1998). Assessing hazard information/communication programs. Australian Psychologist, 33(2), pp. 105 – 112.

Rossi, P.H., Wright, J.D., and Weber-Burdin, E. (1982). Natural hazards and public choice: The state and local politics of hazard mitigation. New York, NY: Academic Press.

Ruin, I.; Gaillard, J.C. and Lutoff, C. (2007). How to get there? Assessing motorists' flash flood risk perception on daily itineraries. Environmental Hazards, 7(1), pp. 235–244.

Sapien, R. E., & Allen, A. (2001). Emergency preparation in schools: a snapshot of a rural state. Pediatric Emergency Care, 17(5), pp. 329-333.

Sarantakos, S. (2005). Social research. Basingstoke, UK: Palgrave Macmillan.

Schipper, L. and Pelling, M. (2006). Disaster risk, climate change and international development: scope for, and challenges to, integration. Disasters, 30(1), pp. 19−38.

Schwab, J. Topping, K.C., Eadie, C.C., Deyle, R.E., and Smith, R.A. (1998). Planning for post-disaster recovery and reconstruction in *PAS Report 483/484* (FEMA 421), Chicago, IL: American Planning Association.

Senkbeil, J. C., Scott, D. A., Guinazu-Walker, P., & Rockman, M. S. (2014). Ethnic and racial differences in tornado hazard perception, preparedness, and shelter lead time in Tuscaloosa. The Professional Geographer, 66(4), pp. 610-620.

Siegrist, M*.,* Keller, C. and Kiers, H.A.L. (2005). A new look at the psychometric paradigm of perception of hazards. Risk Analysis, 25(1), pp. 211-222.

Simpson, G. G. (1961). Principles of animal classification. New York, NY: Columbia University Press.

Sims, J. and Baumann, D. (1983). Educational programs and human response to natural hazards. Environment and Behaviour, 5(2), pp. 165-189.

Sjöberg, L. (2000). Factors in risk perception. Risk Analysis, 20(1), pp. 1-12.

Sjöberg,L.; Moen, B. and Rundmo, T. (2004). Explaining risk perception: an evaluation of the psychometric paradigm in risk perception Rresearch in *Rotunde*, No. 84. Norwegian University of Science and Technology, Department of Psychology, Trondheim, Norway.

Slovic, P. (1987). Perception of risk. Science, 236(4799), pp. 280-285.

Slovic, P. (1990). Perceptions of risk: reflections on the psychometric paradigm in D. Golding and S. Krimsky (Eds.), *Theories of Risk* (pp. 117 – 152). Westport, CN: Greenwood.

Slovic, P., & Weber, E. U. (2002). Perspective of risk posed by extreme events. In conference Risk management strategies in an uncertain world,Columbia University and Wissenschaftskolleg zu Berlin, New York, 1–21, 2002.

Sorensen, J. H. (2000). Hazard warning systems: review of 20 years of progress. Natural Hazards Review, 1(2), pp. 119-125.

Sorensen, J.H., Shumpert, B.L., and Vogt, B.M. (2004). Planning for protective action decision making: evacuate or shelter-in-place. Journal of Hazardous Materials, A109, pp. 1–11.

Statistics Canada (2008). Children with disabilities and the educational system - a provincial perspective. Retrieved from the Government of Canada website https://www150.statcan.gc.ca/n1/pub/81-004-x/2007001/9631-eng.htm#a.

Statistics Canada (2012). A profile of persons with disabilities among Canadians aged 15 years or older. Retrieved from the Government of Canada website https://www150.statcan.gc.ca/n1/pub/89-654-x/89-654-x2015001-eng.htm. Accessed 10-09-2018

Stephens, R. D. (1998). Ten steps to safer schools: security for students and staff begins with planning. American School Board Journal, 185(1), pp. 30- 36.

Thomas, D. S., Phillips, B. D., Lovekamp, W. E., & Fothergill, A. (2013). Social vulnerability to disasters. Boca Raton, FL: CRC Press.

Thompson, M., Ellis, R., & Wildavsky, A. (1990). Cultural theory. Boulder, CO: Westview Press.

Tierney, K. (1989). Improving theory and research on hazard mitigation: political economy and organizational perspectives. International Journal of Mass Emergencies and Disasters, 7(1), pp. 367–396.

Tobin, G., & Montz, B. (1997). Natural hazards and disasters: when potential becomes reality. *Natural hazards: explanation and integration* (pp. 1 – 54). New York, NY: Guilford Publication.

Toronto District School Board (2018). Hold & secure/lockdown. Retrieved from the Toronto District School Board website http://www.tdsb.on.ca/Elementary-School/Caring-Safe-Schools/Hold-and-Secure-Lockdown.

Trumbo, C., Meyer, M.A., Marlatt, H., Peek, L. and Morrissey, B. (2014). An assessment of change in risk perception and optimistic bias for hurricanes among Gulf Coast residents. Risk Analysis, 34(6), pp. 1013 – 1024.

Turner, B. L. (2010). Vulnerability and resilience: coalescing or paralleling approaches for sustainability science?. Global Environmental Change, 20(4), pp. 570-576.

UNISDR. (2002). World disaster reduction campaign. United Nations Office for Disaster Risk Reduction (UNISDR).

UNISDR. (2009). Terminology on disaster risk reduction. United Nations Office for Disaster Risk Reduction (UNISDR).

UNISDR. (2018). Preparedness & early warning. Retrieved from the UNDP website http://www.undp.org/content/undp/en/home/climate-and-disaster-resilience/disaster-risk-reduction/preparedness-and-early-warning.html.

Van der Pligt, J. (1996). Risk perception and self-protective behavior. European Psychologist, 1(1), pp. 34-43.

Varley, A. (1994). Disasters, development and environment. Hoboken, NJ: John Wiley & Sons.

Wachinger, G. and Renn, O. (2010). Risk perception and natural hazards in *CapHaz-Net WP3 Report.*, Stuttgart, Germany: DIALOGIK Non-Profit Institute for Communication and Cooperative Research.

Wachinger, G., Ortwin, R., Begg, C. and Kuhlicke, C. (2013). The risk perception paradox— implications for governance and communication of natural hazards. Risk Analysis, 33(6), pp. 1049 – 1065.

Wåhlberg, A., & Sjöberg, L. (2000). Risk perception and the media. Journal of Risk Research, 3(1), pp. 31-50.

Walton, D. and Smith, K. (2009). Survival confidence of New Zealanders in outdoor and post-earthquake situations. Australian Journal of Emergency Management, 24(3), pp. 38 – 43.

Waugh, W. L. (2005). Terrorism and the all-hazards model. Journal of Emergency Management, 3(2), pp. 8–10.

Webb, G. R., & Chevreau, F. R. (2006). Planning to improvise: the importance of creativity and flexibility in crisis response. International Journal of Emergency Management, 3(1), pp. 66-72.

Wisner B. (2004). Assessment of capability and vulnerability in G. Bankoff, G. Frerks and D. Hilhorst (Eds.), *Mapping vulnerability: disasters, development and people* (pp.183 – 193). London, UK: Earthscan, London.

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2003). At risk, second edition. London, UK: Routledge.

White, G.F. (1942). Human adjustment to floods: a geographic approach to the flood problem in the United States. Chicago, IL: University of Chicago, Department of Geography.

White, G. F., & Haas, J. E. (1975). Assessment of research on natural hazards. Cambridge, MA: Massachusetts Institute of Technology Press.

White, G.F., Kates, R.W., and Burton, I. (2001). Knowing better and losing even more: the use of knowledge in hazards management. Environmental Hazards, 3(1), pp. 81–92.

Wong, L.P. (2008). Data analysis in qualitative research: a brief guide to using Nvivo. Malaysian Family Physician, 3(1), pp. 14–20.

Woods, M. (2011). Interviewing for research and analysing qualitative data: an overview. Retrieved from http://owll.massey.ac.nz/pdf/interviewing-forresearch- and-analysing-qualitative-data.pdf

Zainal, Z. (2007). Case study as a research method. Journal of Kemanusiaan. 9(1), pp. 10 - 12.

Appendix I

Subject Matter Expert Interview Questions

1. What is your/your organization's role in emergency management? How does this relate to school emergency management?

2. What types of factors do you consider to be important when developing an emergency plan?

3. What are the factors that contribute to a vulnerable group, such as children, being at risk? How can these factors be addressed in an emergency plan?

4. What information is critical to make the decision to activate an emergency plan?

5. Based on your knowledge and experience, in your opinion, what would be the key decisions that the person/s responsible for activating an emergency plan for a school must make during an impending emergency?

   5b. What influences their ability to make these decisions?

6. In your opinion, what hazards pose the greatest risk to schools in Southern Ontario? Which hazards pose the greatest risk to schools in Northern Ontario?

7. What factors make a hazard more difficult to plan for?

8. Are there often challenges in getting support to develop and maintain emergency plans?

9. Are you aware of any particular tools or information available that can help with the development of a school emergency plan?

10. In your opinion, what actions could be taken to make emergency plans more effective for K-8 public schools?

Appendix II

Survey Questions

Consent

Participants will be asked to indicate that they grant their consent and have understood the consent form that was included in the email sent to them.

*1. I have read and understand the information in the consent form. I agree to participate in this research study.

- Yes
- No

General Information

2. Please identify which school board your school is part of (Note: this question is just for data analysis purposes. Published results will not tie responses to individual school boards to ensure confidentiality)

3. What is the approximate student enrollment number for your school?

4. Do you have a role in developing, maintaining, or implementing your school's emergency plan?

- Yes
- No
- Uncertain

Comments:

Current Emergency Plan

*5. Does your school have an emergency plan?

- Yes
- No
- I am not aware of a plan.

Comments:

6. Do school staff and students receive annual training (i.e. drills, exercises or other forms of training) on the school's emergency plan?

- Yes
- No

- Uncertain

Comments:

7. If your school has an emergency plan, does it cover: (Check all that apply)

- Tornado
- Windstorm
- Fire
- Flood
- Hazardous Materials Spill
- Active Shooter
- Power Outage
- Snowstorm
- Freezing Rain
- Terrorism
- Wild animal on school ground
- Explosion
- Gas Leak
- Earthquake
- Intruder
- Thunderstorm
- Cyber Attack
- The plan focuses on addressing the problems caused by the hazard (e.g. evacuation) rather than addressing individual hazards.
- Other (please specific):

8. Does your school's emergency plan include considerations for students and staff with disabilities?

- Yes
- No
- Uncertain

Comments:

9. In your personal opinion, would the current school emergency plan meet the safety needs of your students and staff during an emergency?

10. Based on your experience, on a scale from 1 (poorly supported) to 5 (well supported), how well supported are schools (through resources, funding, support, information sources) in engaging in effective emergency planning?

1 (poorly supported)	3 (somewhat supported)	5 (well supported)

11. What are the top 3 challenges for school emergency planning? (Select three).

- Funding
- Support (from staff, school board, or the provincial government)
- Time
- Competing priorities
- Not having the information on the hazards in your school's area.
- Staff or others having the perception that emergencies won't happen.
- Other: (please specify)

Experience, Familiarity, and Awareness

12. Has your school, staff, or community experienced an emergency situation in the past 10 years?

- Yes, the school has experienced an emergency.
- Yes, some of our staff have experienced an emergency.
- Yes, our community has experienced an emergency.
- No
- Uncertain

Details:

13. In your opinion, how likely is it that your school may experience an emergency in the next 20 years? '1' being not possible to '5' being very likely.

1 (not possible)	3 (somewhat possible)	5 (very likely)

14. Which statement best characterizes your views on the likelihood of an emergency affecting your school?

- An emergency would not occur here.
- An emergency is so unlikely that there is not much need to be prepared.
- An emergency is unlikely but preparedness is essential.

- An emergency is possible but we are prepared.
- An emergency is possible but we still need to be more prepared.

Comments:

15. Which of the following hazards could occur in the community your school is located in? Check all that apply.

- Tornado
- Windstorm
- Flood
- Fire
- Hazardous Materials Spill
- Active Shooter
- Power Outage
- Snowstorm
- Freezing Rain
- Terrorism
- Wild animal on school grounds
- Explosion
- Gas Leak
- Earthquake
- Intruder
- Thunderstorm
- Cyber Attack
- Forest Fire
- Other (please specify):

16. Common protective actions for impending hazards include:

Evacuation: The urgent exiting or escape of people away from a building or an area that contains a hazard.

Shelter in place: The act of seeking shelter from a hazard in the building that you are already in.

Lockdown: All school students and staff are secured in locked areas and regular school activities are stopped.

Hold and Secure: The outside doors to the school are locked and entry and exit of the building is monitored. Regular interior school activities continue in a controlled manner.

Close in advance: The school and school property are closed before a hazard arrives. Students and staff are either sent home or are told not to come into school.

16. Does your school have plans/procedures to engage in the following protective actions? Select all that apply.

- Evacuation
- Shelter in place
- Lockdown
- Hold and secure
- Close in advance
- Uncertain
- Other (please specify):

17. Please select the protective action that you believe would be most likely to be used during each hazard.

Hazard	Evacuation	Shelter in Place	Lockdown	Hold and Secure	Close in Advance	Depends on the Situation	Other
Tornado							
Flood							
Fire							
Hazardous Materials Spill							
Active Shooter							
Power Outage							
Snowstorm							
Terrorism							
Wild Animal on School Grounds							
Gas Leak							
Earthquake							
Intruder							
Thunderstorm							

Forest Fire							

Other (please specify):

18. In your opinion, how important is it to know the location of the hazard (i.e. internal or external to the school) in addition to the types of hazard when deciding on what protective actions should be taken during an emergency? ('1' being not important to '5' being very important).

1 (not important	3 (somewhat important)	5 (very important)
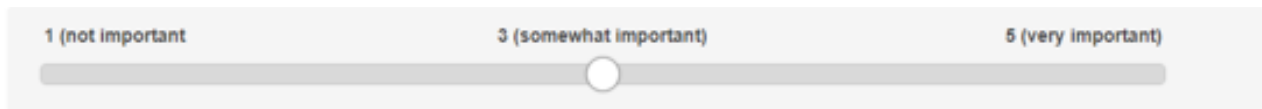
Notification and Warning

19. How would your school initially be notified of a potential emergency? Select all that apply.

- Notification from authorities
- Report from students or staff
- Warning notification system
- Weather radio
- Media reports
- There is no notification procedure in place
- Other (please specify):

20. Does your school currently have a plan for alerting students and staff to an emergency situation?

- Yes
- No
- Uncertain

Comments:

21. If yes to the previous question, how would your school alert students and staff?

Comments:

22. In your opinion, how important is it for schools to have a method of providing warnings to students and staff regarding impending emergencies? ('1' being not important to '5' being very important).

1 (not important)	3 (somewhat important)	5 (very important)
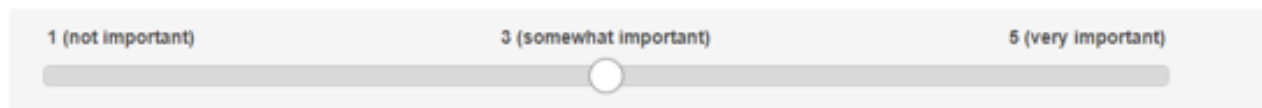
Hazard Categories

23. Does your school's current emergency plan divide hazards into the natural, technological, and human caused categories?

- Yes
- No
- Uncertain
- Other (please specify):

24. Do you believe that dividing hazards into the natural, technological, or human caused categories is helpful to school emergency planning?

- Yes
- No
- Uncertain

Comments:

Survey Complete

Thank you for taking the time to complete this survey.

* Denotes that an answer is required.

Appendix III

Terms

This appendix defines some of the terms used in this dissertation. It is important to note that some of these terms have different meanings or are sometimes used in different contexts. These terms are intended to explain their use in the context of this research.

Emergency and Disaster: Are often used interchangeably in practice An emergency occurs when the characteristics of a hazard interact with social elements such as vulnerability and/or risk perception in a manner that increases the risk of negative impacts that could exceed or overwhelm a group, facility, organization, or community's resources and ability to cope if not sufficiently managed. Potential impacts may include serious harm to the safety, health (including psychological), and wellbeing of people, property, or the environment of people.

Growth Mindset Approach: A growth mindset approach believes that some people may not currently have the knowledge or skills needed to protect themselves but that they can be taught over time in an age appropriate manner (Dweck, 2010, Blackwell et al., 2007; Dweck, 2006).

Hazard: An existing or possible agent or situation that has the potential to cause harm.

Operational Plan: An emergency plan address the functional and tactical needs of the group or organization and provide organizations with a framework to fulfill their key mandates and critical activities.

Perceived Vulnerability: How vulnerable an individual, group, or population is believed to be.

Protective Action: Actions by people taken to mitigate bodily harm from a potential or realized emergency situation.

Resilience: "The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures." UN/ISDR. Geneva 2004.

Risk: The probability of harm due to the intersection between a hazard and social factors such as vulnerability.

Risk Perception: The concept of risk perception focuses on how hazards and risks are perceived and interpreted as threats (e.g., Slovic 1987, Dake, 1992, Sjöberg, 2000).

Secondary Hazard: A hazard that may arise due to the occurrence of another hazard. For example, a power outage triggered by freezing rain.

Threat: A hazard that is perceived as having the potential (through interaction with vulnerabilities) to result in an emergency or disaster.

Vulnerability: Vulnerability differs depending on pre-existing social inequalities and differences that result in a higher probability of experiencing negative impacts from hazard occurrences (Wisner et al., 2004). Due to the purpose and scope of this study, the vulnerability of students and staff while on school grounds or engaging in school supervised/sponsored activities was considered.