

Individual emergency preparedness in Canada:

Widening the lens on the social environment

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Abstract

The goal of this thesis was to reposition individual preparedness within a social environmental context. First, a theoretical model was developed to more accurately represent the social environmental considerations neglected in current preparedness research and policy. A series of three studies tested this model using a mixed-methods approach: First, subjective conceptualizations of preparedness were explored in a qualitative analysis ($N = 12$). Findings revealed that participants evaluated their readiness not in terms of prescribed activities, but perceptions about their current resourcefulness as well as past local hazards. Participants' had positive social environments which also reinforced their perceived coping ability in future emergency events. Subsequent thesis studies investigated the role social environment further, using quantitative data. The second study explicitly tested whether perceptions of risk and coping could explain differences in preparedness based on demographic attributes linked to variations in social environment. Data from a survey examining Canadians perceptions regarding terrorism threats ($N = 1503$) revealed that greater anticipated response was significantly associated with increased age, as well as female gender, higher education levels, and higher income levels. Statistically significant differences in threat appraisals were also reported based on these demographic groupings. However, mediation analyses demonstrated that with the exception of gender, differences in anticipated response could not be explained via risk perceptions or perceived coping efficacy, suggesting that social environment's role in preparedness is not related to the internal processes often targeted in current campaigns. The third study used a multilevel design to investigate the contextual role of neighbourhood social environment in anticipated emergency response. Results demonstrated that a more deprived social neighbourhood context was related to lowered anticipated emergency response. This

relationship was maintained after controlling for significant individual-level factors such as previous experience and sociodemographics, highlighting the importance of neighbourhood social context in facilitating emergency preparedness. Taken together, these findings provide novel evidence that focusing preparedness strategies to primarily target internal processes is misguided, and that future research and policy must position preparedness efforts in the context of existing social environmental resources and barriers in order to build capacity for effective emergency response.

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This thesis is dedicated to my children: I don't expect you will ever read it from cover to cover (maybe a few pages, though?), but I hope that it will always be evidence that you can succeed so long as you do the work and don't give up (even if it takes a long, long time). Also, remember that learning – by whatever means it happens – is good for you.

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A wise woman once told me the thesis was a *quest*. I see it now. There is a ‘noble’ goal, a very long pursuit, challenges to overcome, and many (oh, so many) twists and turns along the way. There are things to lose. There are many lessons to be learned. At the end, you conquer the thesis, and then wonder if the person you have become in the process might actually be the most significant achievement. Perseverance wasn’t always my strong suit, and this thesis taught me in more ways than one that the answer truly lies in building up our strength through a little thing called...*capacity* (I couldn’t resist...heh).

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Individual emergency preparedness in Canada: Widening the lens on the social environment

The causes of major disasters around the world vary widely, emanating from numerous environmental or man-made sources. Regardless of the initial cause, all major disasters are complex phenomena that are ultimately considered *social* events, since the magnitude of their impacts hinge on the physical, economic, and psychosocial facets of the community involved (Paton & Johnston, 2006; Bowden, 2011). The potential array of consequences associated with major disasters is so widespread and pervasive that research aimed at mitigating their impacts is unequivocally inter- and multi-disciplinary, involving scholars from a wide variety of disciplines in the physical, natural, and social sciences, including psychology (McEntire, 2007; Grothmann & Reusswig, 2006). Over the last several decades, investigations have multiplied emphasizing psychological and behavioural aspects at all stages of the disaster cycle, including a focus on perceptions and determinants of related behaviours regarding *anticipated* future events (Sagala, Okada, & Paton, 2009) to improve preparedness and capacity in the event of a disaster.

The theoretical underpinnings of psychological research on anticipatory behaviours, such as those related to emergency preparedness, have evolved mainly from various health-belief models which draw attention to the cognitive and affective motivational pathways of behaviour (Vaughan, 2011), and implicate such constructs as risk perception, coping efficacy, and previous experience (Lee & Lemyre, 2009; Lindell & Perry, 2012; Solberg, Rossetto, & Joffe, 2010). While these models have played an invaluable role helping us understand why individuals may or may not take precautionary action in the interest of risk reduction, they lack a fundamental consideration that is a key feature of disaster management research: an applied recognition of the intersection between individuals and

their environment. At a time when “the disaster management profession is acknowledging the influence that social, economic and physical factors have in determining a community’s exposure to risks and its ability to cope with actual impacts” (Lindsay, 2003, p. 292), psychology research has remained considerably disconnected in this regard. This shortcoming has been echoed by other psychologists in the field, who argue that psychological research in disaster mitigation has “...not as yet provided the broader disciplinary and interdisciplinary, and social and environmental context for many important psychological considerations” (Reser & Morrissey, 2005, n.p.).

The suggested integration of social-environmental context into existing models of individual emergency preparedness and response is theoretically appropriate, and achievable in a psychological framework. Along with the valuable information made available to us through interdisciplinary contributions to disaster management, there are a number of interdisciplinary and psychological perspectives related to health and well-being that provide excellent foundations from which to extend the frame of reference beyond the individual to incorporate his or her social environment.

In consideration of the aforementioned opportunities to ameliorate our current body of knowledge, this thesis is devoted to reviewing and expanding the current psychological perspectives on individual preparedness and response by integrating a number of social-environmental concepts into research exploring the well-known predictors of anticipatory emergency behaviours. This will be accomplished in a series of studies using a mixed-methods approach, and grounded in a Canadian context: The first study will anchor the topics of interest by presenting results from a series of qualitative interviews exploring the subjective conceptualizations of preparedness as they relate to social environmental context; the second study will examine the mediation effects of cognitive-affective threat

appraisals in the relationship between sociodemographic attributes and emergency response; and the third study will present results from a multilevel analysis of neighbourhood context and preparedness as they relate to individuals and communities. These studies will be preceded by a conceptual overview presenting broader relevant themes, and followed by a general discussion of the results and their associated implications.

CHAPTER 1: CONCEPTUAL FOUNDATIONS

Defining Major Disasters

The occurrence of major disasters resulting in pervasive human impacts transcends history and geographic borders. While personal experiences are certainly influenced by elements related to particular geographical and social landscapes, it remains that all major disasters – both past and present – share common features with universal implications for individuals' health and well-being. For example, it was previously noted that all major disasters are considered social phenomena. This generalization is based in the acknowledgement that all major disasters are ultimately the resulting interaction of a *hazard* (the agent that causes the event, either natural or man-made) and a group's *susceptibility to its consequences* (Henstra & McBean, 2005). Another term often used to describe these occurrences is *emergency event*, defined as “a present or imminent event that requires prompt coordination of actions concerning persons or property to protect the health, safety or welfare of people, or to limit damage to property or the environment” (Ministers Responsible for Emergency Management, 2011, p.14). This latter designation is slightly broader in scope, recognizing the inclusion of mitigation efforts in relation to the hazard and its impacts. Despite these slight variations, both the terms *major disaster* and *emergency event* are used interchangeably to describe the occurrence of these pervasive social events; thus they are used interchangeably throughout this thesis as well.

At the source of all emergency events is the originating cause, or *hazard*. As defined by the Government of Canada, a hazard is a “potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation” (Ministers Responsible for Emergency Management, 2011, p.15). It is important here at the outset to distinguish the

terms *hazard* and *risk*: in disaster research, the term *hazard* is used to describe the source of the disaster, while the term *risk* is an indicator of potential losses, measured as a function of the probability of a hazard's occurrence and the magnitude of its consequences (Health Canada, 2009; World Health Organization., 2007). A discussion of the potential consequences in disasters is provided later in this chapter, while the focus of the present section is to outline the features of the hazard itself.

As the above definition suggests, a hazard may derive from any number of causes. More commonly, disaster research differentiates between hazards that emerge from *natural* sources (including natural disasters and health pandemics), or *man-made* sources (also sometimes referred to as *technological hazards*) (IFRC, 2011). *Public Safety Canada* (PSC) differentiates these hazards even further in terms of whether there is intent that is *malicious* (i.e. intentional) or *non-malicious* (i.e. unintentional/accidental – which also includes *natural, health, emerging technological* hazard categories) to bring focus to the particular features of terrorism and other malicious threats (Public Safety Canada, 2012a), as presented in Figure 1. As previously mentioned, however, this is a more detailed taxonomy than the more common differentiation of natural and man-made disasters. The relative distinctions of these two broader groupings is elaborated and discussed below.

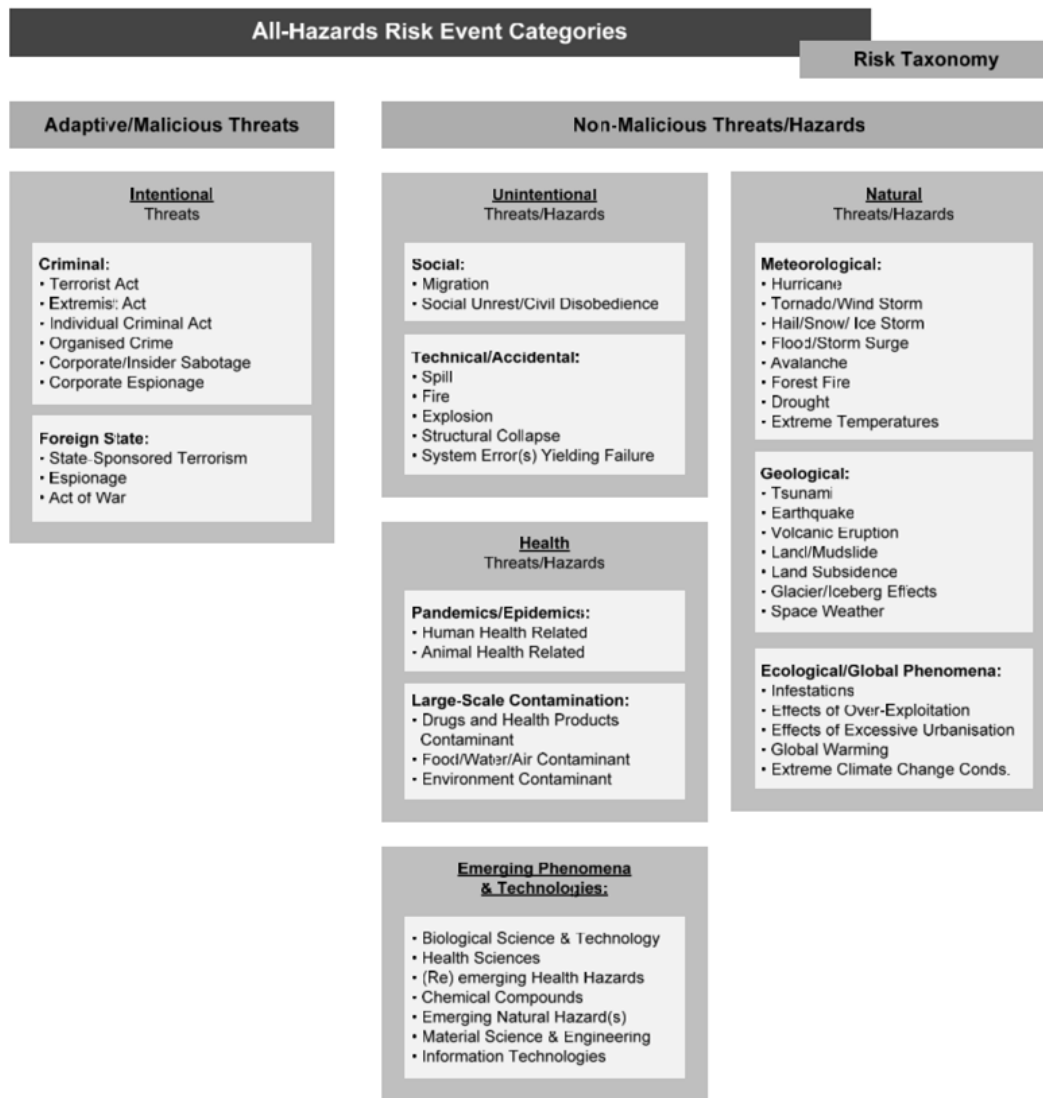


Figure 1: Hazards taxonomy (adapted from Public Safety Canada, 2012)

Natural hazards. According to the *International Federation of Red Cross and Red Crescent Societies* (IFRC, 2011), *natural hazards* are defined as “naturally occurring physical phenomena caused either by rapid or slow onset events which can be geophysical (earthquakes, landslides, tsunamis and volcanic activity), hydrological (avalanches and floods), climatological (extreme temperatures, drought and wildfires), meteorological (cyclones and storms/wave surges) or biological (disease epidemics and insect/animal plagues)” (IFRC, 2011). Susceptibility to these events is regional, though their effects can also be extensive and far-reaching. One example is 2004 Indian Ocean earthquake and tsunami, which killed over 230 000 people in fourteen countries, and injured countless others (United Nations Environment Programme, 2012a). In addition, some areas sustained significant environmental damage, which led to another two million people being temporarily displaced (United Nations Environment Programme, 2012a). Canadians have also experienced a wide array of natural disasters over the years (Public Safety Canada, 2007), including those arising from major floods, earthquakes, tropical storms, tornadoes, hail/ice storms, avalanches and landslides, forest fires, as well as extreme temperature events.

Man-made hazards. In contrast to natural hazards, *technological* or *man-made hazards* are “events that are caused by humans and occur in or close to human settlements” (IFRC, 2011), and include industrial (including agriculture) and/or transport accidents, disruptions to infrastructure, domestic and foreign conflicts, and terrorism. While man-made disasters share many common characteristics with natural disasters in terms of susceptibilities and impacts, they are unique in that they involve some element of human error or action. Terrorism is a special type of man-made hazard: It carries the additional feature of malevolence, and the very threat of terrorism elicits fear, worry, and changes in

individual behaviour, as well as impacting institutional policies (Lee, Lemyre, & Krewski, 2010). The 9/11 terrorist attacks in 2001 resulted in the death of over three thousand individuals in the United States, but their impacts were felt around the globe and ultimately led to changes in the socio-political landscape of many countries, including Canada (Lee et al., 2010).

A number of man-made disasters have occurred in Canada. Unintentional technological disasters include train derailments, chemical spills, and contamination of food and water supplies, including the outbreaks of *E. coli* in Walkerton, Ontario in 2000 which affected 2500 residents, and the recent shutdown in 2012 of the XL Foods meat packing company in Brooks, Alberta. While intentional man-made disasters such as terrorism are less common in Canada, some historical examples include the FLQ crisis, the bombings of Turkish and Iranian embassies, and the Air India bombing, (Gibson, Lemyre, Clément, Markon, & Lee, 2007).

It should be noted that natural and man-made disasters often occur in conjunction with one another. For example, in March 2011, an earthquake off the coast of Japan caused a devastating tsunami which resulted in a massive loss of life, as well as significant environmental and infrastructural damage, including the destruction of the Fukushima nuclear power plant. Efforts to avoid a nuclear meltdown failed, leading to serious risks of contamination from the subsequent radioactive release into the environment (United Nations Environment Programme, 2012b). Another well-known example of a complex emergency combining natural and man-made hazards is Hurricane Katrina, which in 2005 caused pervasive damage to areas along the Gulf Coast; however, these devastating effects were worsened when levees in New Orleans broke, leaving approximately 80% of the city under flood water from Lake Ponchartrain (NOAA National Climatic Data Center, 2005). In

central Canada, the Red River has caused major flooding damage in Manitoba in three separate disasters spanning the last fifteen years; while the damage from these floods has been largely due to precipitation and other weather conditions, the damage from the 2009 flood was exacerbated from blocked drainage systems (Government of Manitoba, 2012). Thus, while natural and man-made disasters may be categorized separately, they are often intertwined when discussing risk reduction and disaster mitigation.

Psychosocial Considerations for Major Disasters

Individual considerations. As eluded to in the sections above, major disasters can have diverse and pervasive impacts for the individuals affected. Depending on the type of disaster, this can include death and physical injury, personal and economic losses, residential dislocation, and significant social disruption (Bowden, 2011; Phillips, Thomas, Fothergill, & Blinn-Pike, 2010). Additionally, individuals experiencing major disasters can experience a range of psychological consequences. In extreme cases, intense psychological trauma such as PTSD can occur; however, it is important to note that its prevalence in the population following most emergency events is actually quite limited and transient in nature, with rates generally diminishing over time (Pietrzak, Southwick, Tracy, Galea, & Norris, 2012; Norris et al., 2002; Norris, Friedman, & Watson, 2002). For instance, in a longitudinal study examining the course of mental disorders following Hurricane Ike, researchers found that rates of disaster-related PTSD decreased from 8.1% in the first five months following the hurricane, to 2.1% at the 5-9 month follow up, and settling at 2.5% by 18 months (Pietrzak et al., 2012); these two reported follow-up rates of PTSD are lower in comparison to estimated rates of non-disaster PTSD in the general population (Kessler, Chiu, Demler, & Walters, 2005). More commonly, individuals may experience a number of cognitive, emotional, somatic, and interpersonal impacts, such as: Impaired concentration,

intrusive thoughts; feelings of anger, fear, sadness, and anxiety, or by contrast, an emotional numbing; fatigue and sleep disturbances, headaches, gastrointestinal problems, and other physical complaints (for a discussion, see Fullerton, Ursano, Norwood, & Holloway, 2003). Furthermore, individuals may also endure social withdrawal, feel alienated, or experience more interpersonal conflict (Fullerton et al., 2003). These manifestations, while not clinically pathological in nature, are serious consequences that have significant implications for health and well-being, and may hinder recovery following a major disaster.

Community impacts. A number of negative consequences also threaten the social fabric of the larger community following a major disaster. To begin, social interactions and routine activities may be disrupted because of damage to collective public spaces such as schools, churches, and community infrastructure (Paton & Johnston, 2006). Even if there is no physical destruction to these community institutions, disruption of these activities may still take place. During the SARS outbreak in Toronto in 2003, for example, efforts to control transmission resulted in a number of hospital closures, staff shortages, and widespread cancellation of elective medical procedures (Nickell et al., 2004), while public concerns affected tourism and local businesses, especially those run by members of the Asian community (Blendon, Benson, DesRoches, Raleigh, & Taylor-Clark, 2004). . This physical and social damage to community relationships may also directly and indirectly lead to significant financial losses within a community, through loss of employment, loss of infrastructure and industry, and depreciation of property value (Dowty & Allen, 2011). These impairments can become long-lasting, extending well beyond the initial recovery period following a disaster.

Considering high-risk groups in disasters. Though the devastation that results from emergency events can be felt by individuals across all geographic, demographic, and socioeconomic strata, it has been widely demonstrated that some individuals and groups are more adversely affected by disasters and emergencies, and merit special consideration in disaster management (Phillips et al., 2010; Klinenberg, 2002; Lemyre, Gibson, Zlepnig, Meyer-Macleod, & Boutette, 2009; Fothergill & Peek, 2004; Enarson, Fothergill, & Peek, 2006). This includes those social groups whose members are disproportionately subjected to social inequalities as well, such as the poor, those with mental health difficulties, the less educated, some ethnic minorities, women, and the elderly. The increased risk that these groups face in emergency scenarios occurs across all stages of a disaster – including increased exposures to threats, physical and psychosocial harm, as well as post-event recovery obstacles (Fothergill & Peek, 2004; Phillips et al., 2010; Dash, Peacock, & Morrow, 1997; Lindell & Perry, 2004; Morrow, 1999; Peacock & Girard, 1997; Gist & Lubin, 1999).

Some important points must be acknowledged when considering the inequitable susceptibility and outcomes suffered by some individuals in major disasters. First, overarching social and economic variables influence the extent to which people are affected by these events. For instance, socially disadvantaged individuals are less likely to live in disaster-resistant dwellings, and more likely to live in closer proximity to disaster-prone areas (Wisner, Blaikie, Cannon, & Davis, 2004; Morrow, 1999; Bolin & Bolton, 1986) such as industrial zones and flood plains. In the case of Hurricane Katrina, disadvantaged neighbourhoods, such as the Lower Ninth Ward in New Orleans, were more likely to be low-lying, and thus had the highest rates of property destruction (Cutter & Emrich, 2006). In addition to structural vulnerability, some higher-risk groups face barriers which preclude

them from escaping the threat of disasters and other emergencies. One example is the attention drawn to the barriers faced by the frail elderly and those with mobility issues in the context of evacuating from disasters (Eldar, 1992; Fernandez, Byard, Lin, Benson, & Barbera, 2002).

Another important point that should be considered when discussing high-risk groups is the focus on the term *vulnerability*. While certain social groups are exposed to increased risks and increased physical and psychosocial susceptibility in disasters, the term *vulnerable* has negative connotations that emphasize personal weakness, thus shifting the focus away from the social pathways described above (Lemyre et al., 2009). This may inadvertently serve to marginalize these individuals further, and minimizes the potential contributions and resources these individuals can provide in the mitigation of disaster risk. Thus, as suggested elsewhere (Lemyre et al., 2009), the terms *at-risk* and *higher-risk* are more appropriate in the context of this thesis, and will be used instead.

Mitigating the Impacts

Thomas Edison once suggested that “An ounce of prevention is worth a pound of cure”. This philosophy translates well to the disaster management field. To be sure, Canada will continue to experience disasters of various degrees, and some researchers argue that ever-changing technological, environmental, and social conditions may actually increase the likelihood and magnitude of future events (see Henstra & McBean, 2005). While it may not be possible to prevent every major disaster from occurring, it remains that the severity and scope of resulting negative impacts can often be mitigated through the implementation of preventive actions aimed at reducing vulnerability. Indeed, disasters manifest from the interaction of both the hazard itself and a population’s existing susceptibilities (IFRC, 2011); as such, the importance of mitigation efforts in disaster management cannot be

understated. Broadly speaking, effective disaster mitigation involves the development and implementation of various physical, environmental, and social risk-reducing strategies (Lindsay, 2003; Haddow, Bullock, & Coppola, 2010; Phillips et al., 2010). While these activities are uniquely tailored to reflect the needs and resources of a particular region, two elements are commonly implemented to maximize their effectiveness: The framing of mitigation activities within an all-hazards approach, and the inclusion of planning and preparation activities to strengthen overall response capacity. A description of these two considerations is presented below.

The all-hazards approach. Whenever feasible, mitigation strategies are developed to address common threats associated with most major disasters, including natural and man-made events. This plan of action, referred to as the *all-hazards approach*, “increases efficiency by recognizing and integrating common emergency management elements across all hazard types, and then supplementing these common elements with hazard specific sub-components to fill gaps only as required” (Ministers Responsible for Emergency Management, 2011, p.14). Common elements that exist across disasters might include the need for coordinated emergency services, for example, or the provision of risk and crisis communications. Incorporating an all-hazards approach in emergency planning ultimately contributes to a more effective emergency management program, as it streamlines emergency management resources and capabilities (Paton, Millar, & Johnston, 2001; Perry & Lindell, 2003; Ministers Responsible for Emergency Management, 2011).

The various risk-reducing strategies developed and employed as mitigation tools in an all-hazards approach can address potential vulnerabilities at all stages of the disaster cycle (Perry & Lindell, 2003), as outlined in Figure 2. While much research and attention has traditionally been given to mitigation strategies during the rescue and recovery phases

of an event (Koh & Cadigan, 2008; Paek, Hilyard, Freimuth, Barge, & Mindlin, 2010; World Health Organization., 2007), there is increasing consideration being given to reducing risk in the period *before* a disaster strikes (Henstra & McBean, 2005). Examples of pre-disaster risk reduction activities include risk assessments, evaluation of existing resources, planning and preparation activities (Haddow et al., 2010). These actions all contribute to *emergency preparedness*, considered to be one of the building blocks of any successful emergency management program (Haddow et al., 2010). The following section describes this important disaster mitigation tool in more detail.

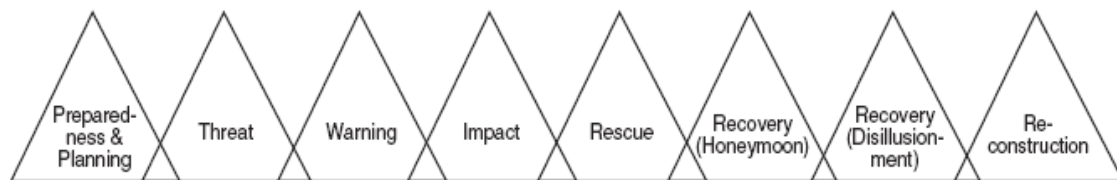


Figure 2: Illustration of the phases of a disaster (Lemyre et al, 2005)

Emergency Preparedness. The goal of emergency preparedness is to ensure that necessary resources are in place when a major disaster occurs, thus strengthening the response capacity of both individuals and communities at risk, and consequently reducing their vulnerability (World Health Organization., 2007). As with other aspects of disaster mitigation, research and planning with regards to emergency preparedness ideally occurs within an all-hazards framework. While specific events will necessitate particular responses, a more generalized preparedness approach provides fundamental support across a variety of scenarios, including natural disasters, pandemics, and man-made disasters such as terrorism (Perry & Lindell, 2003; Riad, Norris, & Ruback, 1999). This is particularly useful in Canada, where there is wide variation in regional susceptibility to various hazards.

The specific features and variable probability associated with different hazards reinforces the need for developing an all-hazards preparedness strategy. First, it is important to recognize that the low likelihood of a particular type of major disaster does not constitute an *absence* of risk. A number of major disasters that have occurred in recent years could be similarly classified as unexpected, low-probability events, such as the 9/11 attack on the World Trade Centre and the Indian Ocean Tsunami. Since these disasters are usually unpredictable, encouraging a basic, consistent level of readiness that can be applied across different emergency scenarios is a practical approach. Furthermore, emergency preparedness in the all-hazards tradition is structured to mitigate the *cumulative* risk from all potential hazards in a given community. This includes the less likely major events outlined above, but also more common events such as extended power outages and adverse weather conditions, which can also put people at risk for negative outcomes. For example, the 1998 Ice Storm in Ontario and Quebec was an amplified incidence of a fairly common weather event; some regions lost power for weeks, incapacitating a number of

communities. The all-hazards approach to preparedness is thus meant to maximize adaptive capacity at a basic level, so that response efforts can then address the specific features of the particular event.

In order to be effective, this all-hazards focus on preparedness efforts must be applied at several levels. Specifically, planning and preparation activities should be undertaken by organizations and departments within various levels of government (i.e. federal, provincial/territorial, and municipal), as well as by individual households and the community (Murphy, Cody, Frank, Glik, & Ang, 2009; Public Health Agency of Canada, 2011; Lemyre et al., 2005). A description of how preparedness is shared among these stakeholders is provided below.

Institutional emergency preparedness. Among the many responsibilities of government is the task of upholding the safety and security of its residents. The response and recovery activities that follow a disaster require multi-sector institutional involvement; as such, so do related mitigation activities. The World Health Organization proposes that governments at all levels should focus on surveillance, communications, and prioritization of resources with regards to salient hazards (WHO, as cited in Koh & Cadigan, 2008). In Canada, collaboration to this end occurs between federal, provincial/territorial, and municipal governments, based on jurisdictional provisions.

In terms of specific contributions, Canadian federal emergency management operations are coordinated by *Public Safety Canada (PSC)*, and mainly consist of providing support to lower-level emergency management offices and personnel across Canada (Public Safety Canada, 2012b). Ultimately, most disasters fall under provincial jurisdiction, with their management being handled by dedicated emergency organizations such as *Emergency Management Ontario*, for example. Provincial mandates are mainly aimed at providing

mitigation assistance and support when needed, but legislation generally defers emergency management *activities* – including emergency preparedness – to municipal governments (Henstra & McBean, 2005). The *Emergency Management and Civil Protection Act* of Ontario, for example, requires that each municipality create and maintain an emergency management program, coordinate emergency services, and provide available resources in order to plan and prepare for emergencies (Ministry of Community Safety & Correctional Services, 2012). While provincial regulations vary across the country, this emphasis on local responsibility in emergency preparedness is consistently applied throughout regulatory policies (Henstra, 2011).

The implementation of institutional-level emergency preparedness activities facilitates the reduction of risk associated with disaster threats on the public, both directly and indirectly. As mentioned earlier, these activities strengthen the response capacity of institutions in the event of a disaster by ensuring the necessary resources are available. Indirectly, these provisions can also help to generate trust and confidence in the public, which in turn has been shown to improve risk communication by engendering appropriate public perception (and hence, response) to disaster threats (Paton, 2008; Slovic, 1999; Gibson et al., 2007). For instance, in a series of focus-group interviews with the Canadian public, Gibson and her colleagues (2005) found that terrorism threat was commonly conceptualised in relation to socio-political dimensions including trust in the government's level of preparedness, while Paton (2008) demonstrated that perceived institutional preparedness was associated with individual preparedness intentions. These outcomes are particularly important given that individual preparedness, as discussed in the following subsection, is an imperative component in the successful mitigation of disaster threats and impacts (Haddow et al., 2010).

Individual emergency preparedness. Preparedness at the institutional level is vital in providing an effective formalized disaster response. However, a successful emergency preparedness program must also emphasize the importance of ensuring that households are capable of maximizing individual response capacity, because the unpredictability and magnitude of many emergency events creates the possibility that individual responses to an event will take place before coordinated efforts are mobilized. Thus, individuals may ultimately be required to assure their own safety and security in the early stages of a major disaster, up to 72 hours or longer (Government of Canada, 2012). This reality is fundamentally understood by emergency managers and policy makers, who maintain that “...the responsibility to deal with emergencies is placed first on the individual and then on successive levels of government, as the resources and expertise of each are needed” (Public Health Agency of Canada, 2011).

In order to assist individuals with this undertaking, emergency management departments may create, promote, and disseminate emergency management information to the public (Murphy et al., 2009). For instance, the *Get Prepared* campaign created by the Government of Canada encourages individuals to learn about potential hazards in their region, make emergency plans, and organize emergency kits (Government of Canada, 2012). These activities are supported by an exhaustive collection of information, resources, and step-by-step instructions which are made available on the internet, and emphasized each year during a nationally coordinated event called *Emergency Preparedness Week* (Government of Canada, 2012; Public Safety Canada, 2010). Such campaigns are generally grounded in an all-hazards approach, with particular attention given to regional threats. Specifically, individuals are encouraged to be prepared for emergencies by knowing the potential hazards in their area, but also through more general planning and preparation

activities (Government of Canada, 2012). For instance, the creation of an emergency plan includes identifying safe exits from home and neighbourhood, choosing meeting places for family members, designating outside communication contacts, delegating responsibilities regarding children and pets, and maintaining health and insurance information. The preparation of emergency kits includes organizing basic supplies that would be needed to be self-sufficient for at least 72 hours, such as food, water, a first aid kit, battery operated equipment (i.e. radio, flashlight, etc.), and any required prescription medication or health aids (Government of Canada, 2012)

Unfortunately, evidence suggests that the majority of individuals do not prepare for emergencies (Murphy et al., 2009; Levac, Toal-Sullivan, & OSullivan, 2012; Public Safety Canada, 2010; Solberg et al., 2010). For instance, a survey conducted with the Canadian public to evaluate the effectiveness of PSC's *Emergency Preparedness Week* for PSC indicated that 58% of respondents and their families had never looked for information on what to do in an emergency, and only 40% of respondents had prepared a family emergency plan or gathered emergency supplies (Public Safety Canada, 2010). Reasons given for not preparing included perceived time constraints (36%); not feeling it was needed (31%); believing the government would take care of them (28%); and financial constraints (26%) (Public Safety Canada, 2010). These low rates of individual preparedness among Canadians have been reported elsewhere (ex., Lemyre, Lee, Turner, & Krewski, 2007). Nonetheless, when the same respondents were asked if having an emergency plan and emergency kit were necessary parts of ensuring the safety of themselves and their families, 85% agreed, and 72% strongly agreed (Public Safety Canada, 2010). One possible reason for this disconnect may be related to disparities between perceived preparedness and actual preparedness, with individuals believing themselves to be more prepared than they

actually are. Such a disparity has been previously demonstrated (Ablah, Konda, & Kelley, 2009; Basolo et al., 2009).

Taken together, this research suggests that improvements to actual planning and preparedness behaviours are needed to maximize mitigation against the outcomes of potential disaster threats. As mentioned earlier, the protective benefits of these actions are not limited to low-probability, high-consequence disasters, but also more commonly experienced minor events for which having a basic level of readiness is helpful.

Researchers disagree over the effectiveness of public education campaigns to this end, with many suggesting that further consideration must be given to better understanding the individual precursors to preparedness (Ablah et al., 2009; Basolo et al., 2009; Sagala et al., 2009). Regardless, the need for increased protective individual capacity in emergency events is evident.

Community emergency preparedness. As previously mentioned, formalized emergency preparedness and response strategies implemented at the institutional level are maximally beneficial when combined with individual preparedness, because the mobilization of official emergency departments is constrained by time and allocated resources (Haddow et al., 2010). However, the reliance on individual emergency preparedness is complicated by a number of issues, including the reported low levels of personal preparedness uptake, as described above. Furthermore, it remains that in certain circumstances even the most prepared individuals may not have the required means to successfully mitigate the pervasive threats accompanying a major disaster. An increasing amount of research and attention has thus been devoted to examining the benefits of developing effective emergency preparedness strategies in other settings, including the community itself (Marsh & Buckle, 2001).

Broadly speaking, community-based disaster preparedness builds response capacity within neighbourhoods by recognizing and utilizing existing knowledge and capabilities (Murphy, 2007; Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008; O'Brien, 2008). When implemented, it creates interdependence between local authorities and communities: local authorities appeal to community resources in order to improve municipal preparedness and response, and individual communities work with municipalities to become better informed and prepared for any potential relevant risks (Murphy, 2007).

Capitalizing on the benefits of community preparedness requires a pre-existing awareness of the community's salient features *before* a disaster strikes (O'Brien, 2008). More specifically, a successful pre-disaster strategy should be based on a local understanding of a community's social and physical environments (Oliver-Smith, 1996); this allows for the appropriate allocation of mitigation resources in the phases before a disaster occurs, and maximal community involvement during the recovery and rebuilding phases after a disaster. Increasing awareness of a neighbourhood's profile may include conducting hazard, vulnerability, and resource mapping, as well as coordinating partnerships between relevant community organizations to share information and resources (Marsh & Buckle, 2001; Perry & Lindell, 2003).

The level of preparedness achieved in different communities is bound to vary, since "like any other human activity, planning depends on the resources, skills and motivation of those that engage in that activity. The extent to which knowledge, resources and personnel are available may differ significantly from one jurisdiction to the next" (Perry & Lindell, 2003, p.339). In addition, the effectiveness of community-based preparedness rests on the ability of emergency planners to align the needs and expected behaviours of both

individuals and the community as a collective, which are not always equivalent. Smith (2006) provides the example of evacuation planning and traffic flow to illustrate this point: When a community must be evacuated, it benefits the group if individuals agree to travel in an orderly fashion. This may be difficult to achieve if individuals differentially evaluate how best to react on a personal level. To minimize these discrepancies, emergency planners must first understand the perceptions of community members, and then tailor any outreach activities to complement community needs and salient concerns (McIvor, Paton, & Johnston, 2009).

Considering high-risk groups in disaster mitigation. As previously stated, mitigation activities, including emergency preparedness, are an important component in the reduction of negative outcomes associated with disasters. This may be especially salient for high-risk populations, who are more susceptible to the negative consequences of emergency events. Unfortunately, research suggests that preparedness levels may be lower within these groups: For example, several studies on earthquake preparedness found that minorities and the poor were less likely to have disaster education opportunities, prepared less for an earthquake, and had less interest in protecting their homes with structural changes and disaster insurance (Fothergill, Maestas, & Darlington, 1999; Lindell & Perry, 2004; Fothergill & Peek, 2004). Other research has reported more complex results: For instance, when asking participants if they had engaged in a series of preparedness behaviours related to terrorism, Lemyre and colleagues (2005) found that women and individuals with less education had, for the most part, prepared less for terrorism attacks. Conversely, differences between other demographic groups (including age, visible minority status, and region of residency) varied, based on the specific preparedness behaviour in question. These mixed findings have been reported elsewhere (Uscher-Pines et al., 2009).

In other cases, such as when overall preparedness across groups is extremely high, no demographic disparities are found (Gladwin & Peacock, 1997). Despite these mixed findings, considerable evidence does suggest that groups who are most affected by disasters also face particular challenges when it comes to preparedness (Morrow, 1999; Klinenberg, 2002; World Health Organization, 2008; Peacock, Morrow, & Gladwin, 1997).

To summarize the key points in disaster mitigation as outlined above, an effective emergency preparedness and disaster mitigation strategy requires concerted efforts from institutions, communities, and individuals. That said, the primary responsibility of emergency preparedness is placed on the individual since the initial response to a disaster will often depend on individual capacity. The ability of individuals to prepare and protect themselves will also impact the requirements of any subsequent community and institutional responses. Thus, the multi-level collaboration needed for disaster mitigation is predicated on the fundamental importance of encouraging individual-level preparedness (Paton, Johnston, Bebbington, Lai, & Houghton, 2001). Unfortunately, personal preparedness levels in Canada and elsewhere are regrettably low. Facilitating the uptake of personal preparedness activities requires ongoing improvements to our understanding of the underlying processes related to these behaviours (Paton et al., 2001). To this end, a body of literature has emerged that identifies a number of psychosocial considerations in personal emergency preparedness. The following section is dedicated to reviewing the main theoretical tenets and contributions in this research, and identifying the salient gaps which be addressed in the present thesis.

Understanding Emergency Preparedness: Predominant Theories and Research

Theoretical Foundations. The theories employed to explain individual preparedness behaviours have largely evolved from research examining the pathways of

various protective health behaviours (Vaughan, 2011; Riad et al., 1999). The application of these theories in the field of disaster mitigation is warranted and informative, since emergency preparedness activities help protect individuals against the negative impacts of disasters on their physical and mental well-being. Another reason these theories are useful is because they conceptualize the uptake of behaviours in relation to preceding behavioural intentions, which is often a focus in preparedness research as well. Indeed, the goal of preparedness strategies is ultimately to improve actual behaviour, and not necessarily just the *intention* to prepare; nonetheless, the measurement of intentions provides information about existing gaps in current preparedness, and informs our knowledge with regards to anticipated behaviours for future events. Thus, in addition to measurements of actual preparedness, research on intentions provides a secondary stream with which to examine these protective behaviours.

While no single health behaviour model has been shown to dominate the literature, a number of overlapping frameworks have been referenced when explaining preparedness, preparedness intentions, and other mitigation strategies. The bulk of these theoretical applications draw from expectancy-valence models such as the *Theory of Planned Behavior* (TPB - Ajzen, 1985); *Protection Motivation Theory* (PMT - Rogers, 1983); *Extended Parallel Process Model* (EPPM - Witte, 1992); and *Person Relative to Event Theory* (PrE - Mulilis & Duval, 1995). A review of these theories will not be provided here (see Lindell & Perry, 2012, for a discussion), but it should be noted that notwithstanding each model's specificities, these frameworks jointly propose that that behaviour and intentions can be predicted from 1) an individual's evaluation of possible outcomes and 2) their attitudes toward prescribed behaviours that can affect these outcomes (Vaughan, 2011).

Accordingly, these two themes dominate the research on individual protective behaviours

for disasters; however, they are more commonly represented through the examination of specific predictor variables embodied in these models, with fewer studies making explicit reference to the abovementioned theoretical underpinnings and pathways. As such, a synthesis of the major research contributions on individual protective behaviours in disasters follows, focusing these studies as they correspond to the two overarching theoretical concepts mentioned above.

Research on individual protective behaviours in preparedness. In the vast literature on disasters, a great number of predictors in emergency preparedness and related protective behaviours have been identified. For the purposes of this thesis, the focus of this literature review will reflect a number of predictors that are commonly featured and warrant closer examination. As it happens, these variables often relate to the two broad theoretical themes noted above: Specifically, the theme described as ‘evaluations with regards to possible outcomes’ is represented in the literature by considerable research investigating factors broadly related to *threat evaluations*. These evaluations most often include variables related to personal perceptions of risk. Likewise, the theme describing ‘attitudes related to prescribed behaviours which may affect outcomes’ is often represented in the literature by research exploring evaluations of individual coping, such as self-efficacy and response efficacy. For the sake of convergence, these attitudes can be jointly labelled *response evaluations*. Finally, studies examining individuals’ previous experience with disasters are common, and warrant attention as they offer contributions to our understanding of both threat evaluations and response evaluations. A description of the research incorporating exemplars from these themes is provided below.

Threat evaluations. When examining the individual precursors to preparedness, there is a marked prominence of research calling attention to the salience of subjective

threat evaluations. These studies explore various indicators such as hazard knowledge (Martin, Martin, & Kent, 2009; Lindell & Whitney, 2000; Martin, Bender, & Raish, 2007) and hazard proximity (Lindell & Hwang, 2008; Horney, MacDonald, Van Willigen, Berke, & Kaufman, 2010); however, threat evaluations are most frequently exemplified in studies examining the connection between protective action and individual *risk perception* (ex. Lee & Lemyre, 2009; McGee, McFarlane, & Varghese, 2009; Whitehead, 2005). In fact, the relevance of hazard knowledge and proximity in the formation of threat evaluations are conceivably most salient in their influence on subjective risk perceptions. Given the overlapping applicability of these constructs, and the overwhelming prominence of risk perception research in the disaster preparedness sphere, the following section will focus exclusively on this distinct characterization of threat evaluations.

Risk perceptions. Generally speaking, researchers maintain that if an individual does not perceive a legitimate threat associated with a particular hazard, they will not act to protect themselves from the related risks. The underlying construct, termed *risk perception*, has been shown to be a multi-factorial construct (Lee & Lemyre, 2009), and its conceptualization and measurement often varies (Vaughan & Nordenstam, 1991; Martin et al., 2007; Lindell & Whitney, 2000); however, it is most often described in terms of how an individual appraises both the likelihood and consequences of a perceived threat (Lee & Lemyre, 2009). Research largely supports the relationship between perceived threat and preparedness with regards a number of man-made and natural disasters (Kim & Kang, 2010; Miceli, Sotgiu, & Settanni, 2008; Lee, Dallaire, & Lemyre, 2009; Lindell & Hwang, 2008; Spittal, McClure, Siegert, & Walkey, 2008; Grothmann & Reusswig, 2006; Lee & Lemyre, 2009). For example, Lindell and Hwang (2008) reported that individuals with higher perceived risk for hurricanes and flooding were more likely to engage in related

mitigation activities; similar results have been reported for perceived wildfire risk and intentions to undertake mitigation activities (Martin et al., 2007). Lee and Lemyre (2009) also reported a positive association between both perceived probability and perceived personal impact of terrorist events, and individual preparedness behaviours.

The positive relationship between risk perception and protective behaviours in disasters is not uniformly reported, however. To a lesser degree, some studies find no significant relationship (Lindell & Whitney, 2000; Horney, Snider, Malone, Gammons, & Ramsey, 2008), or conclude that different dimensions of risk, such as perceived likelihood, may have less salience in preparatory behaviours (Paton, 2008). It has therefore been suggested that in order to gain a better understanding of the relationship between risk perception and preparedness, more research needs to address the multi-dimensional nature of risk perception (Lee & Lemyre, 2009; Park, Scherer, & Glynn, 2001), including empirical comparisons of known risk perception attributes, for instance.

Response evaluations. While threat evaluations are the most widely studied cognitive components in personal disaster mitigation research, a significant amount of attention has also been directed at how individuals evaluate the potential responses to a threat. Lindell and Perry (2012) affirm the importance of studying perceptions about protective actions (operationalized here as hazard adjustments) in the context of disaster mitigation: “Thus, to understand the adoption of hazard adjustments, it is just as important to understand the perceived attributes of the hazard adjustments as the perceived attributes of the hazard itself” (p.620). Proponents of Protection Motivation Theory argue that while threat evaluations are important for motivating people to consider possible actions, response evaluations determine whether these prescribed actions will actually be considered protective (see Grothmann & Reusswig, 2006, for further discussion). In truth, these two

concepts are fundamentally intertwined: Response appraisals are tied to threat evaluations in that they only occur once a threat appraisal has been made, presuming a minimum threshold of perceived risk (Grothmann & Reusswig, 2006). In other words, an individual will only contemplate the effectiveness and feasibility of a protective action once they have acknowledged that a certain threat exists. Research has suggested that response evaluations may actually mediate the relationship between threat appraisals and intentions to prepare for tsunami risks (Johnston et al., 2005).

Response evaluations are categorized in many ways, and may include appraisals relevant to the individual's own actions, or conversely, appraisals relevant to the actions of other stakeholders. These latter appraisals include research on the perceived locus of responsibility for preparedness (Spittal et al., 2008; Lindell & Whitney, 2000; McFarlane, McGee, & Faulkner, 2011), and confidence in emergency management personnel or institutions (Paton et al., 2008; Gibson et al., 2007). These factors also have implications for individually-focused response appraisals as well, which are more commonly featured in individual preparedness research. These personal appraisals address how well an individual believes they can cope with a given threat. Coping strategies are most often represented by two distinct concepts. The first addresses an individual's belief about their own abilities to perform an action – otherwise known as *self-efficacy* (Bandura, 1982). The second concentrates on an individual's belief that an action will produce the desired outcome, otherwise known as *response efficacy* (Murphy et al., 2009). The contribution of these two important constructs to the disaster mitigation literature is provided below.

Personal response. Both self-efficacy and response-efficacy have been shown to predict preparedness and mitigation intentions and behaviours (Grothmann & Reusswig, 2006; Martin et al., 2009; Murphy et al., 2009; Paek et al., 2010). For instance, Murphy and

colleagues (2009) found that higher response efficacy was related to having more supplies and higher willingness to comply with government directions in an emergency. Paton and colleagues (2008) reported that positive outcome expectancy – the belief that preparation can increase safety – was significantly related to preparedness for tsunami risks, while negative outcome expectancy (defined as the belief that tsunamis are so catastrophic that preparation is useless) was significantly related to people not preparing. Lindell and Whitney (2000) found that hazard-related response attributes, including response efficacy, were significantly correlated with adoption intentions and actual hazard adjustments; however, they reported that resource-related response attributes, including self-efficacy, were not related to preparedness intentions or behaviours. Still, other researchers have reported that self-efficacy is an important consideration in preparedness (Grothmann & Reusswig, 2006; Paek et al., 2010). For example, Paek and colleagues (2010) reported that the more confident people were in their ability to prepare, the more likely they were to have gathered supplies and were more prepared in general.

Some researchers have suggested that the direction of the relationship between personal response evaluations and preparedness behaviours is unclear (Murphy et al., 2009; Martin et al., 2007). For example, Martin, Bender, and Raish (2007) examined what motivates people to protect against wildfires, and found that self-efficacy and response-efficacy were significantly related to intentions to undertake mitigation activities for those respondents who had already performed many of the behaviours. Conversely, no relationship was found between these response appraisals and intentions to prepare in those that had not yet undertaken the behaviours. Thus, while it appears preparedness is encouraged by having confidence in one's ability to act and in the effectiveness of protective actions, it is also possible that confidence is increased as a result of having

already undertaken the behaviours in question. Lindell and Whitney (2000) addressed this issue by demonstrating the existence of significant positive partial correlations between response efficacy and preparedness intentions after controlling for previous adoption of these behaviours. While questions about the direction of these relationships remain, it follows logically that preparedness behaviours are not likely to be undertaken if they are not believed to be attainable and effective (Solberg et al., 2010). Conversely, in their review of international literature on earthquake preparedness, Solberg, Rosetto, and Joffe (2010) report that “messages that highlight the scope for human agency in seismic risk reduction play a role in allowing people to feel that they can control their risks” (p.1671); thus, emergency managers and researcher should continue to explore how these constructs can help explain and ameliorate preparedness behaviours.

Previous experience. Another concept that has often been linked to preparedness and related precautionary behaviour pertains to whether the individual has had any personal experience with the hazard in question (Lindell & Hwang, 2008; Horney et al., 2008; McFarlane et al., 2011). For instance, Horney and colleagues (2008) found that having previous experience with hurricanes was significantly related to having a disaster supply kit, and experiencing more than 10 hurricanes was positively associated with having an emergency plan. Likewise, Lindell and Hwang (2008) reported that experience with various hazards (i.e. flood, hurricane, chemical hazards) was significantly associated with flood and wind mitigation adjustments, and flood experience was further correlated with purchasing flood insurance.

Personal experience is an important consideration in disaster research because it has implications for individual threat evaluations as well as response evaluations. For instance, research has correlated past experience with higher risk perception (Solberg et al., 2010;

Paton et al., 2001; McFarlane et al., 2011), suggesting that that previous experiences provide information about the likelihood and severity of future outcomes (Weinstein, 1987). Furthermore, previous experience may increase the perception that a threat is legitimate because it is more readily available in the mind of the individual, a cognitive short-cut otherwise known as the availability heuristic (Tversky & Kahneman, 1974). As previously stated, previous experience is also thought to be important in the formation of response evaluations: It provides the individual with information about actions that can be taken to reduce negative outcomes, as well as provide a frame of reference for the perceived effectiveness of those actions as previously undertaken (Weinstein, 1987). Horney and colleagues (2008) confirmed this association in their study on hurricane preparedness, indicating that previous experience with evacuating was significantly related to having an evacuation plan for future events.

The evidence regarding previous experience and preparedness is complex, however, and results are generally mixed (see McGee et al., 2009; Lindell & Hwang, 2008, for reviews). One reason suggested for these differential results is that the conceptualization of previous experience varies greatly from one study to another (Lindell & Hwang, 2008; Solberg et al., 2010). For instance, previous experience can be operationalized and measured by the number of events experienced, the extent of personal loss, or the perceived loss for others (Paton et al., 2001; Lindell & Hwang, 2008). Moreover, research has shown that personal experience can impact perceived preparedness differently than actual preparedness: For instance, studies on volcanic eruption (for example, Paton et al., 2001) have found that direct experience was actually related to an increase in perceived preparedness, but a reduction in actual preparedness behaviours. Johnston et al explained that prior exposure to a fairly minor event with no serious consequences may create a

normalization bias (Mileti & O'Brien, 1993), meaning that perceived threat with regards to the potential severity of future events is potentially reduced by experience with less severe prior events. Research on personal mitigation activities for wildfire prevention (McFarlane et al., 2011; Martin et al., 2009) lends support to this claim, demonstrating that having a negative past experience was related to higher risk perception for future events. Along the same lines, researchers have also reported that participants tend to attribute less risk to themselves than to others when making comparisons, and seeing themselves as better prepared in consequence – a concept referred to as *optimistic bias* (Weinstein, 1987; Spittal et al., 2008). Given the complexity of these relationships, McGee, McFarlane, and Varghese (2009) argue that in isolation, personal experience should not be considered sufficient to “encourage residents to implement all recommended mitigation measures” (p.321). Nevertheless, past experience remains an important consideration in disaster mitigation since it has the potential to influence both threat and coping evaluations, which are predominantly featured in preparedness research. Furthermore, preparedness strategies are tailored in such a way to accommodate regions of varying exposures to these events; thus, understanding the nuances of how the past impacts future behaviours remains a worthwhile endeavour.

Limitations of health-behaviour models. The above-mentioned theories of preparedness, and the large existing body of corresponding research, have been integral to understanding disaster-related protective behaviours. Indeed, the themes and components identified in research related to health-behaviour models help us to comprehend the psychological underpinnings of individual preparedness intentions and behaviours, and warrant consideration when developing and evaluating disaster mitigation strategies. Nevertheless, this paradigm is problematic for two major reasons. First, it restricts our

perspective on individual preparedness by suggesting that that the precursors to these behaviours largely originate from internal processes, such as personal traits, cognitions, and perceptions (Becker, Paton, Johnston, & Ronan, 2012; Vaughan, 2011). With regards to earthquake preparedness, for example, Solberg and colleagues (2010) write:

The vast majority of the studies assume that the most important causes of seismic adjustment can be conceptualised as mental processes that take place primarily within the individual mind...social psychology adopts a narrow focus: inter-individual influences on intra-individual cognitive processes. The wider contexts of hazard representations and responses to vulnerability have been largely neglected in psychological models of seismic adjustment. (p.1673)

In recent years, more researchers have echoed the erroneous danger of reducing theories of preparedness to internal factors (Becker et al., 2012; Reser & Morrissey, 2005), arguing that in addition to these personal pathways, preparedness takes place within a broader context, and incorporates economic, social, and political elements (Vaughan, 2011; Reser & Morrissey, 2005). In fact, Smith (2006) argues that the very *formation* of individual perceptions and beliefs emphasized in these health-behaviour models are influenced by larger social factors; this interaction may ultimately “...cause psychological processes to play out differently in different contexts” (Becker et al., 2012). In addition to these conceptual objections, some investigators have also suggested that measurement omissions of these higher-order variables may also contribute to problematic low levels of statistical explained variance in studies solely examining individual psychological constructs (McFarlane et al., 2011). Since this narrow focus is regularly exhibited in studies of preparedness, it may be significantly limiting the discourse surrounding the uptake of individual protective behaviours in disasters.

A second problem that exists in much of the research on individual preparedness involves the conceptualization and measurement of the protective actions and intentions in question. Specifically, the measurement of individual preparedness behaviour is limited largely to quantitative ratings of preparedness intentions, and checklists of related actions. While these measures are very important and informative, there remains a current lack of understanding regarding how individuals interpret and create *meaning* with regards to the mitigation of hazards (Becker, Johnston, Paton, & Ronan, 2009; Reser & Morrissey, 2005). An increased emphasis on the subjective and experiential formation of attitudes about one's own preparedness would certainly contribute to our understanding of the complex interrelationships of relevant internal cognitive processes; moreover, it would allow for the inclusion of narratives implicating the wider societal and contextual influences mentioned above. To achieve this balance, more qualitative research must be incorporated to complement the overwhelmingly quantitative base of literature on the precursors to preparedness (Becker et al., 2009).

Unfortunately, these missed opportunities not only limit our knowledge regarding personal preparedness and related protective behaviours – they ultimately interfere with the success of disaster mitigation strategies aimed at individuals. The proposed antecedents to preparedness as presently outlined in most health behaviour models suggest that providing the public with information about hazards and related precautionary actions should be sufficient to increase these behaviours. Unfortunately, a number of researchers have argued that in isolation, this approach is simply not effective (Paton et al., 2008; Rohrmann, 2000). The low adoption of preparedness intentions and actions among the public despite increasing dissemination efforts by emergency preparedness departments, including in Canada, certainly supports this criticism. Thus, in failing to develop an appreciation of

nuanced and contextual processes, the success of preparedness strategies will be continue to be limited (Smith, 2006, p.146)

Bridging the Gaps in Preparedness Research: Social Environmental Context.

As mentioned in the section above, the current research on individual preparedness behaviours has been criticized for not sufficiently recognizing the importance of wider social context. Fortunately, the successful expansion of these psychological theories of preparedness is easily informed by existing literature that situates individual protective health behaviours within multiple levels of one's social sphere – otherwise known as the *social environment*. Limited applications of social environmental elements in preparedness studies have begun to appear more recently (ex. Paton, Smith, Daly, & Johnston, 2008; Becker et al., 2012), although to date, these advancements remain largely underdeveloped (Becker et al., 2012). An overview of existing social environmental considerations in preparedness research will be presented and evaluated below, guided by an initial introduction the topic of social environment as it relates to various protective health behaviours.

Defining social environment. While no single definition or operationalization of its components exists, social environment is broadly characterized as the social setting in which individuals live, including the people and institutions with whom they interact (Barnett & Casper, 2001). In light of the expansive breadth attributed to such a description, an exhaustive review of this paradigm and its numerous elements is well beyond the scope of this thesis. Instead, the following sub-sections will illustrate theoretical features of a social environmental framework: Specifically, 1) a positional nesting of individual characteristics within multiple levels of contextual environments, explained here by *social-ecological models*; 2) the recognition that individual characteristics are shaped by greater

social forces, such as those described by the *social determinants of health and well-being*, and; 3) the introduction of a number of pathways that operate within these contexts, which shift focus away from internal processes (such as those emphasized in traditional medical and psychological models of health behaviour), and focus instead on the interaction between person and environment. The applicability of each of these considerations to the study of individual preparedness research will be addressed throughout, concluding with a brief discussion regarding the salience of this framework when considering high risk groups.

Social-ecological models. The conceptualization of the individual as being nested within broader social environments has roots in Urie Bronfenbrenner's (Bronfenbrenner, 1979; Reser & Morrissey, 2005) seminal work known widely today as *Ecological Systems Theory*. This psychological model was originally designed to explain childhood development, and postulates that various nested 'systems' exist in our lives that may contain their own norms and rules, which all have the potential to shape our development and behaviour. These systems include direct influences such as the *microsystem* (immediate surroundings, such as the family or close social networks) and the *mesosystem* (which connects objects in the microsystem, i.e. neighbourhood and community groups), as well as broader contexts that indirectly influence behaviour, such as the *exosystem* (e.g., welfare services, mass media, and community contexts); and the *macrosystem* (the larger socio-cultural context). The individual is at the centre of these nested levels (see Figure 3).

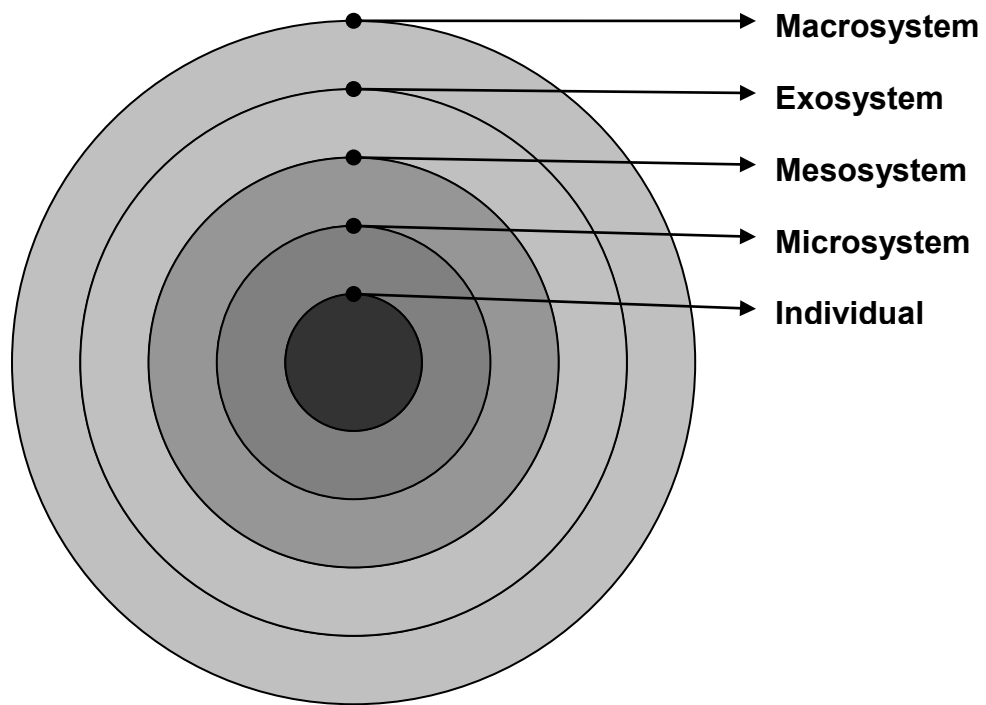


Figure 3: Ecological systems model (adapted from Bronfenbrenner, 1978)

The social-ecological approach is increasingly represented in research on health and health behaviours (Lemyre & Orpana, 2002; Fleury & Lee, 2006; Taylor, Repetti, & Seeman, 1997), and “a consensus is emerging that multilevel perspectives consistent with social ecological models are promising approaches in health behavior [sic] research and health promotion efforts”(Fleury & Lee, 2006, p.130). Likewise, the possible benefit of applying social-ecological models to emergency preparedness is straightforward: the multi-level structure of this perspective allows for the integration of various social and contextual influences of preparedness in relation to the individual (Kumar et al., 2011). Furthermore, since individual preparedness campaigns are conceivably aligned with other types of health promotion, the translation of social-ecological perspectives of health behaviour to the study of individual preparedness is certainly appropriate, and should be considered further (Masten & Obradovic, 2008).

The social determinants of health and well-being. One of the most compelling applications of social environmental consideration to the study of health and well-being emerged from the discipline of population health, and the *Social Determinants of Health*. First introduced by British researchers examining health inequalities between social groups (see Marmot et al., 1991, for a description), this seminal work demonstrated that individuals in the lowest socio-economic strata had consistently higher mortality and morbidity rates, and that a gradient in health could be discerned based on socio-economic position (Marmot et al., 1991). A number of specific socially-based determinants of health have also been formally identified in Canadian health policy, and include: Aboriginal status, disability, early life, education, employment and working conditions, food insecurity, health services, gender, housing, income and income distribution, race, social exclusion, social safety net, and unemployment/job security (Mikkonen & Raphael, 2010). An illustrative model of

these determinants is presented in Figure 4. It should be noted that these determinants are not simply individual-level traits; rather, they can be positioned within various (and sometimes multiple) levels of the socio-ecological model.

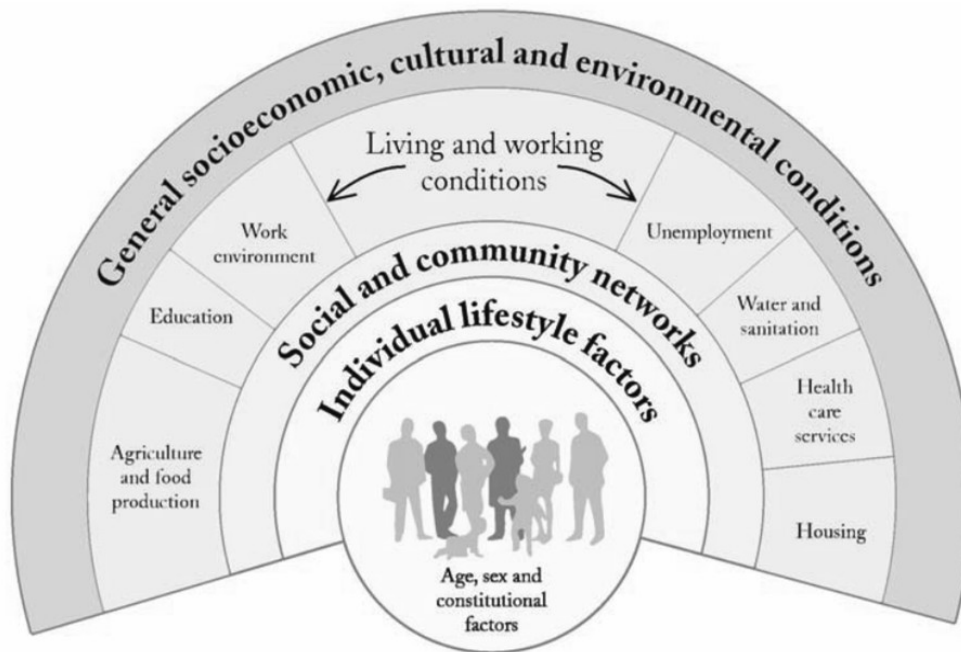


Figure 4: Illustrative representation of the social determinants of health (Adapted from Dahlgren and Whitehead, as cited in Mikkonen and Raphael, 2010)

Along with the more formalized *Social Determinants of Health*, researchers have argued more generally that social forces affect health and well-being differentially, with implications for health behaviours. For example, in their recent review of research on socioeconomic disparities in health behaviours, Pampel, Krueger, and Denny (2010) state that the resources encouraging healthy behaviours are more readily available to high SES groups, while conversely, social disadvantage is itself a source of adversity in fostering protective health behaviours. They further explain that the initiation of protective health behaviours is purported to have less benefit for socially disadvantaged individuals, both in terms of immediate gain, and long-term benefit (Pampel, Krueger, & Denney, 2010). Indeed, a great deal of research has supported the claim that differences in various health behaviours are tied to social inequalities (Kosteniuk & Dickinson, 2003; Shankar, McMunn, Banks, & Steptoe, 2011; Orpana, Lemyre, & Kelly, 2007; Fone et al., 2007; Orpana & Lemyre, 2004). For example, social isolation – which disproportionately affects the elderly, the poor, and minorities (Cacioppo & Hawkley, 2003; Cutter & Emrich, 2006; Klinenberg, 2002) – has been tied to a greater risk of smoking, being inactive, and reporting multiple health-risk behaviours (Shankar et al., 2011; Kharicha, Harari, Swift, Gillmann, & Stuck, 2007). This research has led to the understanding that “...the common causes of the ill health that affects *populations* are environmental...[and which] reflect the way we live” (Wilkinson & Marmot, 2003, p. 7).

Applying this perspective to preparedness research is useful as it underpins the assertion that protective behaviours are facilitated and hindered by social forces, which in turn can impact individuals disproportionately. Unfortunately, the social (and often economic) characteristics that contribute to vulnerability vis-à-vis disaster mitigation behaviours have not been successfully described as they have been with regards to the

social determinants of health and well-being (Lindsay, 2003). These forces manifest in social categorizations that are sometimes misconstrued as individual-level traits (for example, age, gender, race, education level, etc.) Thus, realigning disaster-related protective behaviours in consideration of higher-order social determinants helps address the criticism that research on preparedness is examined mainly in terms of internal processes.

Related pathways of person-environment interaction. Inherent in models of social-ecology and the social determinants of health and well-being is the premise that behaviour can be shaped by the interaction of individuals within their social environments. Research from a number of disciplines has supported these claims through the examination of specific social environmental pathways that affect health-related behaviour, which also correspond to different socio-ecological levels and are related to social determinants of health and well-being. It should be noted that the descriptions of selected pathways discussed here will be expanded in subsequent chapters of this thesis, while their present introduction serves to position their agency in the broader frameworks described above.

At the microsystem level, two examples of social environmental influence in the uptake and maintenance of protective health behaviours include *social networks* (the density and number of social groups) and *social support* (the qualitative function of these groups). Specifically, it has been reported that social networks facilitate support for healthy behaviours, the exchange of information on how to achieve and maintain these healthy behaviours, and the threat of sanctions for unhealthy behaviours (Pampel et al., 2010). As previously stated, the lack of such networks can affect certain groups, such as the elderly, more severely. At the broader mesosystem level, associations have been demonstrated between various neighbourhood characteristics and health behaviours such as smoking, drinking, and exercise, even when controlling for individual-level factors (Li, Fisher,

Brownson, & Bosworth, 2005; Wen, Kandula, & Lauderdale, 2007; Taylor et al., 1997; King et al., 2006; Cooper & Guthrie, 2007). For example, Wen and colleagues (2007) found associations between neighbourhood *social cohesion* (the level of connectedness in a community) and physical activity rates, while neighbourhood *social capital* (feelings of trust and reciprocity) is believed to enhance the diffusion of protective health information and promotion of health-enhancing behaviours (Eriksson, 2011), although this relationship is debated (Ziersch, Baum, MacDougall, & Putland, 2005; Pampel et al., 2010). Finally, exosystem and macrosystem elements of social environment include broader considerations such as insufficient availability of services or social issues like income inequality, which are thought to weaken social cohesion and reinforce feelings of deprivation, both of which have been tied to disparities in health behaviour (see Pampel et al., 2010, for a review). These pathways are often related, and barriers in one nested system can have implications for barriers in other systems, thereby compounding the impact of various social determinants.

Considering high-risk groups. As previously mentioned, the populations who are often considered to be higher-risk in an emergency are often at a general disadvantage in other social realms (Gist & Lubin, 1999). This disadvantage includes health outcomes, as documented in research from Canada and elsewhere on the social gradient in health, which purports that differences in health are related to larger social inequalities (Kosteniuk & Dickinson, 2003; Fone et al., 2007; Orpana et al., 2007; Orpana & Lemyre, 2004). Furthermore, as outlined above, similar discrepancies are reported with regards to health behaviours (Ross, 2000).

Given the evidence for the association between health, health behaviours, and social-environmental factors, one explanation for the inequalities noted above may be

linked to disparities in the social environments of high-risk groups. For instance, as previously stated, social isolation is a concern for the elderly, especially those who are economically disadvantaged (Cacioppo & Hawkley, 2003). On a broader scale, lower-income neighbourhoods, which have higher proportions of socially disadvantaged residents, are often shown to have lower levels of social cohesion and social capital (Li, Savage, & Pickles, 2003; Saegert, Thompson, & Warren, 2001; Stafford et al., 2003), and the prevalence of poor housing conditions and social disintegration has been shown to be higher in neighbourhoods with a low socioeconomic status (Bosma, van de Mheen, Borsboom, & Mackenbach, 2001).

Taken together, the associations demonstrated between various social environmental pathways in protective health behaviours support the notion that social environmental context should be an important consideration in the conceptualization of health behaviour models and related health promotion strategies. Indeed, this is a common contention (Masten & Obradovic, 2008; Vaughan, 2011; Lindsay, 2003). By extension, this literature also suggests that social environmental considerations in individual preparedness research warrant greater attention, and the principles outlined above provide a useful framework from which to adapt these advancements. Indeed, preparedness behaviours are carried out in the context of one's social networks, community, and greater social positioning, which implicate elements of social ecological models and social determinants, as well as the various corresponding pathways. Moreover, this perspective has particular salience for high-risk groups who may face more barriers to achieving a positive social environment, as outlined above; thus, social environmental frameworks may help address the disparities in preparedness behaviours often reported among high-risk groups.

Locating social environment in emergency preparedness research. In response to the growing criticisms that the predominant focus on individual-level processes in preparedness research is too limited in scope, some literature has begun to emerge which draws attention to social contextual elements of disaster-related protective action (Vaughan, 2011), both conceptually (Lindell & Perry, 2012; Solberg et al., 2010; Levac et al., 2012) and empirically (Paton et al., 2001; Paton et al., 2008; Wood et al., 2011). The various elements under investigation in these studies are easily integrated into the social environmental framework advanced in the previous sections, and support the assertion that social environmental considerations improve our understanding of individual preparedness. An overview of these significant contributions is presented below, arranged to correspond with this framework. An identification of remaining gaps and limitations will follow.

Microsystem elements. The earliest examples of social environmental contributions in preparedness research involve various elements that function in the microsystem of one's social environment (i.e. close social groups). For example, in revisiting the traditional health behaviour models usually featured in preparedness research (such as those criticized in the sections above), it must be noted that one particular theory does in fact make reference to an element of social environment. More specifically, the *social norms* component inherent in the *Theory of Reasoned Action* (Fishbein & Ajzen, 1975) recognizes the importance of social influence in the formation of behavioural intentions. In spite of this recognized, established component in the theoretical model, it stands that the construct has been given limited attention in empirical preparedness research (Riad et al., 1999; Becker et al., 2012; Kim & Kang, 2010; Wood et al., 2011). Similarly, in a more recently developed theoretical model of protective action in disasters, called the *Protective Action Decision Model* (PADM – Lindell & Perry, 2004, 2012), the importance of social influence in

obtaining information about disaster-related risks and protective behaviours is emphasized, and a related element of their model indirectly relates social norms to the inherent social influence of various information sources. Lindell and Perry (2012) maintain that information about risks and preparedness can be diffused by formal means, but also by intermediate sources such as social networks who may influence behaviour. While they acknowledge that their reference to *social cues* shares elements with the *social norms* component of the TRA, they state that no empirical research to date has tested this particular parallel between the theories (Lindell and Perry, 2012).

There is some limited research that does empirically examine the role of social norms, however. The focus on the diffusion of information from both formal and informal sources is similarly proposed in the *Actionable Risk Communication Model* presented by Wood, Miletti, and colleagues (2011), who state that both communication from others and observations of others' preparedness behaviours can influence protective action. They further elaborate that upon obtaining these informational cues, they proceed to search for confirmatory reinforcement of the appropriateness of this behaviour within their social networks, a process referred to as *milling* (Wood et al., 2011). They tested this model in the context of preparing for terrorism threats, and found support for the notion that the perceived actions of others and the information received from others does predict the adoption of preparedness behaviours (Wood et al, 2011). This relationship has been found in other quantitative (Riad et al., 1999; Solberg et al., 2010) and qualitative (Becker et al., 2012) studies of preparedness for natural disasters. Similarly, Kumar and colleagues (2011) reported that vaccine uptake during the 2009 H1N1 pandemic was positively associated with the number of social contacts encouraging this protective action, supporting similar findings from earlier studies (see Kumar et al, 2011, for a review).

Mesosystem elements. There has been increasing attention being given to community-based factors in preparedness research (Spittal et al., 2008; Kim & Kang, 2010; Bihari & Ryan, 2012; Paton et al., 2008). For example, Paton and colleagues (Paton et al., 2009; Paton et al., 2008) developed a model of household preparedness for earthquakes that identifies the roles of community participation and collective efficacy on preparedness. They report that participation in the community and being able to identify community resources and needs led to increased levels of empowerment and trust, which were related to greater intentions to prepare (Paton et al, 2009; Paton et al, 2008). The importance of community participation in facilitating preparedness was also reported in more recently presented qualitative findings (Becker et al, 2012).

Other community-based factors recently discussed in preparedness literature relate to the strength of community ties, and include concepts such as neighbourhood belonging, place attachment, sense of community, social cohesion, and social capital. Many researchers argue that the inclusion of these factors is warranted because research also shows that "...community members who feel an attachment to their surroundings as well as a sense of place are more likely to get involved in happenings within the community" (Evans, as cited in DiGian, 2005; also see Koh & Cadigan, 2008; Levac et al., 2012), although it remains that actual empirical studies examining these indicators are limited, and results are mixed. For example, in their qualitative study of earthquake preparedness, Becker and colleagues (2012) reported that sense of community led to increased awareness about the importance of preparedness, because respondents "...felt a responsibility to look after themselves in a disaster and be available to help others in the community" (n.p.) Similar results have been reported in quantitative research, such as Bihari and Ryan's (2012) findings that both place attachment and social capital were positively associated with wildfire preparedness, as well

as Buckland and Rahman's (1999) assertion that communities high in social capital were better prepared for the 1997 Red River flood in Manitoba, Canada. On the other hand, while Kim and Kang (2010) found that social capital was significantly related to protective behaviours *during* a hurricane, this relationship was not found for protective behaviours *before* the actual event.

On a related note, some researchers have examined the roles of homeowner status and length of residence within a community on preparedness behaviours (Spittal et al., 2008; DiGian, 2005; Milulis, Duval, & Bovalino, 2000). These variables are thought to be associated with community participation and belongingness, in the sense that owning a home and longer years of residence may increase community interactions and ties to the neighbourhood (DiGian, 2005; Milulis et al, 2000). Furthermore, length of residence may also be tied to gaining experience and knowledge about local hazards and their mitigation (DiGian, 2005). Indeed, Spittal, McClure, Seigert and Walkey (2008) found that both factors were related to preparedness for earthquakes. Findings with regards to home ownership have supported similar assertions made by Milulis and colleagues (2000), Basolo and colleagues (2009), and DiGian (2005), although the results in the latter study are interpreted with caution, due to a low effect size (DiGian, 2005).

Exosystem elements. A few studies have examined the relationship between preparedness and social environmental elements at the exosystem level (that is, external forces indirectly linked to the individual). These studies focus largely on the access of information surrounding hazards and their mitigation. For example, Kim and Kang (2010) reported that belonging to an integrated storytelling network, including local media connectedness, significantly predicted household preparedness for hurricanes. Earlier work by Mileti and colleagues (Mileti & O'Brien, 1993; Mileti & Darlington, 1997) found that

local newspaper inserts about earthquake hazards were related to individuals' risk perceptions and preparedness behaviours.

Research has also examined the role of information received from institutional stakeholders in the uptake of individual protective behaviours in emergencies. For example, research linked H1N1 vaccine uptake during the 2009 pandemic to receiving information from health care providers, even when individuals did not have their own health-care practitioner (Kumar et al, 2011). The same study also reported that receiving “a lot” of information from one's own health-care provider, as well as believing that one's own health-care provider would encourage vaccination, were positively associated with uptake (Kumar et al, 2011). Similarly, Basolo and colleagues (2009) found that the greater the number of information sources providing preparedness information for hurricanes and earthquakes (including pamphlets, the newspaper, public service announcements, and workshops), the greater one's *perceived* preparedness; however, the relationship between number of information sources and *actual* preparedness behaviours was more mixed (Basolo et al, 2009).

Macrosystem elements. As stated earlier, the macrosystem refers to the larger socio-cultural context within which individuals, their social networks, their communities, and related institutional systems operate. Thus, it is important to recognize that the elements identified in the sections above function in the broader context of the social, political, and economic climate, and are subject to variations across time and regions (Haque & Etkin, 2007). For example, the creation of federal departments such as the *Department of Homeland Security* in the United States, and *Public Safety Canada* were originally created in the context of the September 11th, 2001 attacks on the World Trade Centres, which brought swift and significant focus to the study of terrorism, and disaster

mitigation more generally (Gibson et al., 2007). Despite this major institutional response to terrorism in Canada, concern regarding terrorism threats among members of the Canadian public remained fairly low (Lee et al., 2010; Gibson et al., 2007). Qualitative focus groups with the Canadian public (see Gibson et al, 2007) examined how attitudes related to socio-political context influenced terrorism threat perceptions, and findings revealed that participants were not concerned because they viewed the overarching Canadian identity – as perceived both in Canada and internationally – as one reflecting values of peacefulness, multiculturalism, and tolerance. Accordingly, respondents believed this identity ultimately mitigated the risk of an attack on Canadian soil (Gibson et al, 2007).

Another example of how the role of social context can be acknowledged in preparedness research is through the study of high-risk groups. As previously mentioned, the social determinants of health and well-being are rooted in larger social forces which put these groups at increased risk for negative outcomes, and present barriers to protective health behaviours; the same can be said about disaster preparedness. For example, several studies on earthquake preparedness have found that minorities and the poor are less likely to have disaster education opportunities, prepare less for an earthquake, and have less interest in protecting their homes with structural changes and disaster insurance (Fothergill et al., 1999; Lindell & Perry, 2004). One reason for this could be that existing preparedness strategies do not consider the barriers that at-risk populations face, such as lack of resources to gather supplies and perform mitigation activities (Morrow, 1999; Fothergill & Peek, 2004). It has also been reported elsewhere that when overall preparedness across groups is extremely high, these demographic disparities are not found (Gladwin & Peacock, 1997), suggesting that an existing culture of preparedness may have strategies in place to address these barriers and facilitate increased protective behaviours. Since socially-based barriers to

protective action have been specified in research investigating behaviours of high-risk groups *during* a disaster (see Phillips et al., 2010, for a review), it stands that a similar positioning of demographic risk factors in relation to macrosystem elements is a legitimate shift in focus.

Existing gaps. The social-environmental advancements summarized above demonstrate encouraging progress in the advancement of individual preparedness research. However, this area of psychological study is still underdeveloped and gaps remain in understanding how social context interacts with the preparedness process (Becker et al., 2012). For example, there is a paucity of research that incorporates several levels of social environmental context into theories of individual protective behaviours (Kumar et al., 2011; Paton et al., 2009), despite the evidence presented here that precursors to preparedness happen at multiple levels. Recently, Kumar and colleagues (2011) developed a socio-ecological framework that incorporated intrapersonal, interpersonal, and institutional elements, and which significantly predicted vaccine uptake during the course of the H1N1 outbreak of 2009. These results further justify the relevance of such models as they relate to the all-hazards approach in pre-event behaviours as well. Indeed, further development of theories of preparedness incorporating multiple levels of social environmental context is required to gain a more comprehensive understanding of this complex phenomenon. This includes the re-examination of factors that are often conceptualized as individual-level, but also have significance at higher levels of interpretation (such as demographics, for example). Also, traditional research on internal processes that are important components in preparedness should be incorporated into the social environmental framework as well, to examine possible interactions between these internal and external forces.

In terms of specific social environmental components related to preparedness, there are a number of indicators that have yet to be given adequate attention in empirical study. For instance, at the microsystem level, the role of social networks and social support in preparedness and pre-event research is scarce (Paton et al., 2001; Koh & Cadigan, 2008) when compared to the established literature on the importance of these relationships in terms of outcomes and post-event recovery (for further discussion, see Klinenberg, 2002; Messias, Barrington, & Lacy, 2012). Since findings have demonstrated that social support for preparation activities predicts individual preparedness – even when controlling for past experience and personal characteristics (Heller, Alexander, Gatz, Knight, & Rose, 2005) – continued examination of the process by which social networks foster preparedness is warranted.

With particular reference to mesosystem factors, it appears that variables meant to reflect community-level processes are instead measured at the individual-level. Indeed, the examination of the potential *compositional* effects of these factors provides useful information about a community; however, it would be useful to examine these processes as they exist independently at the community level, in order to properly examine the *contextual* influence of these factors on individual preparedness. Unfortunately, there are very few contextual and multi-level investigations of community-level precursors to individual preparedness in the present literature.

Gaps also remain in terms of macrosystem factors related to preparedness. For instance, researchers have called for more research examining behaviours from a variety of countries, since different countries experience hazards in very different ways (Haque & Etkin, 2007). By examining perceptions and behaviours in a Canadian context, a more ecologically valid portrayal of threat perceptions can be inferred, and more appropriate

frameworks to inform communication about risks can be developed (Gibson et al., 2007; Lee et al., 2010; Lemyre et al., 2005) Conversely, much of the research on individual preparedness in industrialized nations currently originates from the United States and regions of Oceania (i.e. Australia and New Zealand), which have vastly different social, political, and economic contexts that warrant consideration in the interpretation of research findings – especially those related to social environment. Thus, an examination of preparedness behaviours and perceptions with social environmental considerations in the Canadian context is needed to expand our understanding of existing Canadian research in this area (O'Sullivan et al., 2007; Lee et al., 2010; Gibson et al., 2007; Lee & Lemyre, 2009).

One final limitation worth noting has implications for each of the previous shortcomings described above. As stated previously, there is very little attention in preparedness research with regards to how people make meaning of their perceptions and behaviours regarding disaster-related protective behaviours (Becker et al., 2009). The use of scales and checklists is certainly an important method of measuring the extent of one's preparedness or perceptions about their preparedness. However, this research could benefit from the addition of individual narratives which can help expand our understanding of how the concept of preparedness takes form in the minds of individuals (McIvor et al., 2009). As noted by Becker and colleagues (2009), this can be achieved by supplementing quantitative research with qualitative information, since it “affords greater opportunities to explore social diversity and provides more flexibility for elucidation of risk interpretation and action processes” (p.4). This is especially important if preparedness is to be framed in the context of the social-environment, and should be considered at all levels as outlined above.

Proposed Model of Social Environment and Emergency Preparedness

Inspired by the aforementioned criticisms of traditional preparedness models, the applicability of social environmental perspectives of related protective health behaviours, and the current trends examining social contextual elements related to preparedness, a proposed model for the relationship between social environment and emergency preparedness is illustrated in Figure 5. The model incorporates numerous social environmental factors which are not meant to be exhaustive, but instead reflect prominent elements related to individual preparedness within a social context, as described in the research above. These factors are positioned within various levels of the social environment (i.e. the individual, close social ties, the neighbourhood, external influences, and the larger social context), thus shifting the focus of individual preparedness to a more appropriate framework.

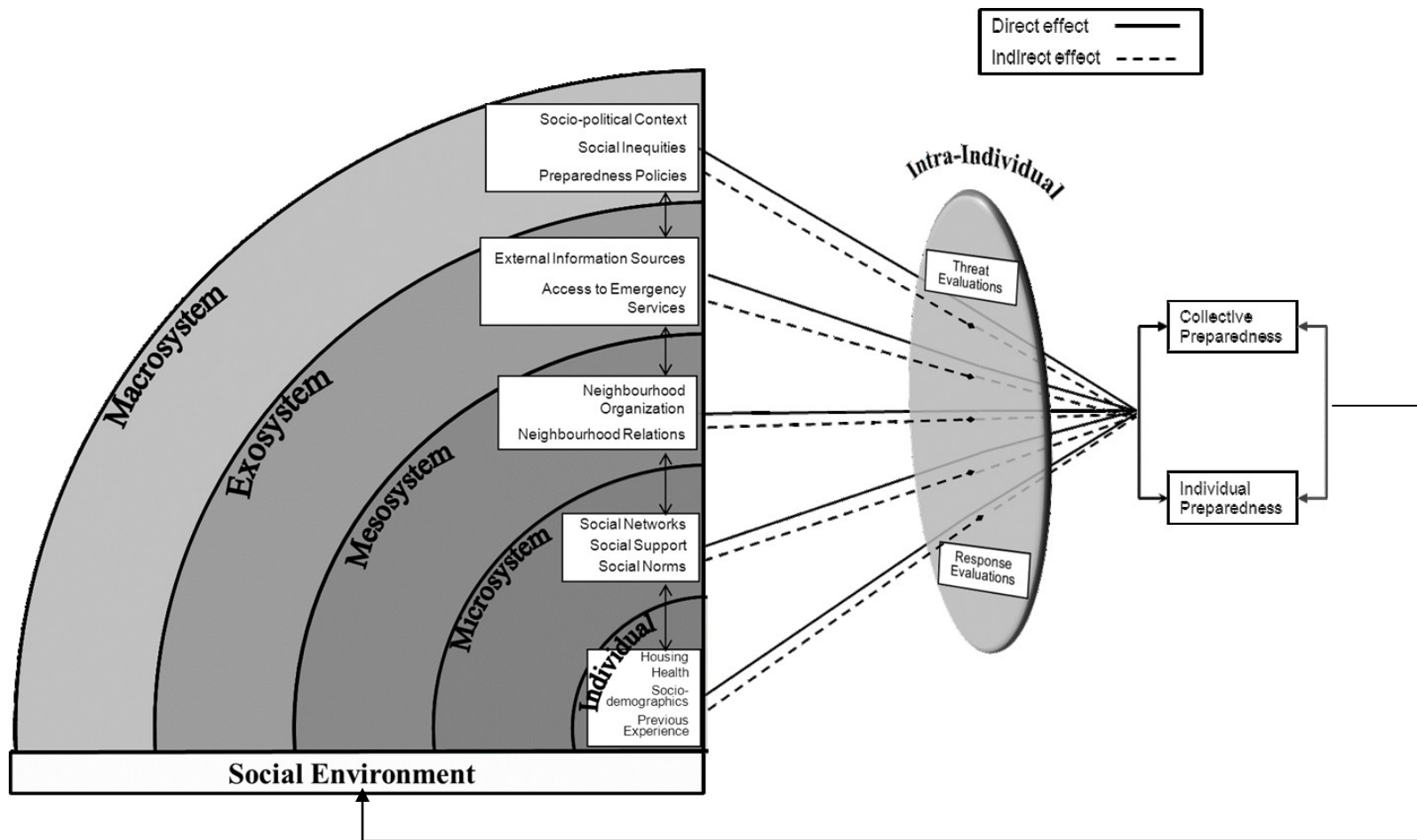


Figure 5: Proposed model of social environment and emergency preparedness

The schematic organization of the model is guided by the social environmental perspectives on health and well-being described earlier. For example, the selected indicators represent examples of socially-based determinants of preparedness, some of which correspond either directly or indirectly to various *Social Determinants of Health* as identified in Canada (Mikkonen & Raphael, 2010). Moreover, the social-ecological composition of the model is inspired and adapted by Urie Brofenbrenner's *Ecological Systems Theory* (1979), and similar models of protective health behaviours (i.e. Kumar et al., 2011; Taylor et al., 1997), as reflected in the presentation of nested levels (i.e. individual, microsystem, mesosystem, exosystem, and macrosystem). Note that community context in this model is included in the mesosystem as opposed to the exosystem; while community context is certainly assumed to exert an indirect influence on the individual, it is similarly expected to exert a direct influence; this direct influence is central to the assertions forwarded in this thesis, and as such, the neighbourhood in this case has been conceptualized as part of the mesosystem. An additional level of intra-individual categorization is included to further delineate between individual-level elements that can be situated within a social environmental context, and internal processes such as cognitions. In this model, factors at all levels are hypothesized to have direct links to preparedness behaviours, as per the pathways suggested above. Furthermore, each of the social environmental factors presented here are also hypothesized to indirectly impact disaster-related protective behaviours through their influence on intra-individual indicators (i.e. threat evaluations and response evaluations). While the possibility of these mediational relationships have been put forward elsewhere (Stevens et al., 2009; Goodwin, Willson, & Stanley Jr, 2005), there has been very little empirical research aimed at testing these

indirect relationships (Lee, Lemyre, Turner, Orpana, & Krewski, 2008; Riad & Norris, 1998).

Another noteworthy feature of the proposed conceptual model is the inclusion of collective preparedness as an outcome variable. While the focus of this thesis is certainly individual preparedness, it remains that emergency preparedness involves participation at several levels, including the community and institutions. While the preparedness activities at these higher levels may involve different processes, the improvement of individual preparedness rates subsequently improves the preparedness of the collective as well. Finally, the model is viewed as recursive and that improvements to both individual and collective preparedness may subsequently lead in turn to changes within the social environments of individuals, through the building of social networks, community interactions, access to emergency services, and related improvements in social inequities/preparedness policies.

The proposed model in Figure 5 provides a comprehensive framework from which to examine and test a number of possible relationships between social environmental factors and individual preparedness. In order to effectively demonstrate the complete effects of these inter-relationships, however, a complex multi-level design is required, which is beyond the scope of this thesis project. Instead, as a first step in exploring and testing this model, a partial model that examines three iterations of these proposed relationships in a Canadian context is presented in Figure 6. First, the existence of social networks, social support, and positive neighbourhood relations are expected to be associated with both increased preparedness behaviours, as well as the intra-individual predictors of preparedness (i.e. increased threat evaluations and response evaluations). Second, differences in cognitive appraisals related to threat (i.e. risk perceptions and coping

efficacy) are expected to explain the proposed relationship between sociodemographic characteristics and preparedness behaviours. Third, the contextual effect of neighbourhood deprivation is expected to predict differences in individual preparedness, over and above individual-level factors such as sociodemographic characteristics and previous experience.

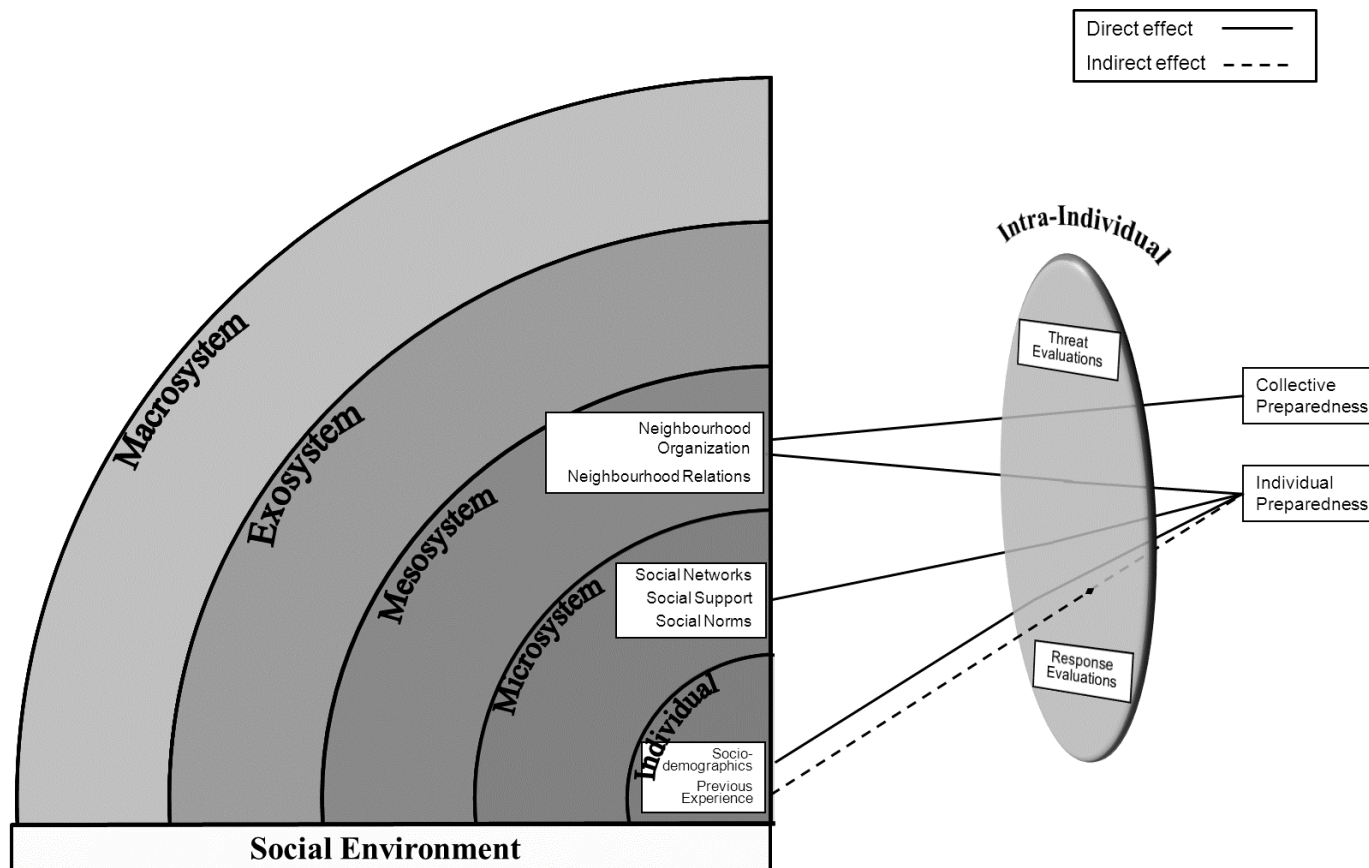


Figure 6: Testable model of social environment and emergency preparedness

Objectives, Hypotheses, and General Overview of Methods

In light of the dearth of research exploring the interaction of individual factors and socio-environmental factors in emergency preparedness, both in the Canadian context and elsewhere, the overarching goal of this thesis is to examine how the social environment fosters preparedness and other pre-event protective behaviours in Canadians. The relationships in the testable model presented in Figure 6 will be analyzed in a series of three studies. These studies were developed to explore the role of social environmental features at multiple socio-ecological levels: the individual, the microsystem (social networks), and the mesosystem (the community). The specific objectives of these studies, along with information regarding the general overview of research methodology for each, are provided below.

Article 1: Conceptualizing individual preparedness. The main objective of this study was to position social environmental features in relation to more commonly studied aspects of preparedness, by:

1. Exploring the subjective meaning that individuals attribute to the notion of preparedness;
2. Examining how this conceptualization is framed by perceptions of threats and corresponding adaptive strategies; and,
3. Identifying how social environmental features (i.e. social networks, community ties, local contexts) relate to attitudes about individual preparedness.

In order to achieve this objective, a qualitative approach was taken in order to gather detailed knowledge about preparedness attitudes in a Canadian context – something that is currently lacking in the existing literature (Levac et al., 2012). It also provided a foundation for exploring the broad system of inter-relationships that exist between social

environmental elements and associated processes of preparedness (Becker et al., 2012). Thus, this study provided a more comprehensive introduction to the role of social environmental context in preparedness, from which further hypotheses testing in a quantitative capacity could be informed.

The data collected for this study derived from eleven qualitative interviews conducted with local senior residents in the city of Ottawa, Canada. The decision to focus on one homogenous sample allows for a better understanding of shared patterns that might emerge when discussing the topic of preparedness, and its relation to social environmental phenomena.

To facilitate the data collection, an interview guide consisting of mainly open-ended questions was developed by the author in collaboration with a number of colleagues who have experience in the research area, or with qualitative research methods more generally. The interview questions focused on each respondent's past experiences with emergency events, as well as present and anticipated perceptions and behaviours about emergency preparedness and response. The interview schedule also included questions about the respondent's social environment (i.e. social networks, neighbourhood relations), both in general, and in the specific context of emergency preparedness and response. A copy of the interview schedule can be found in Appendix A.

Interviews were recorded and transcribed verbatim. The written transcripts were analyzed using methods based on *Interpretative Phenomenological Analysis*, or IPA (Smith, Flowers, & Larkin, 2009; Kumar et al., 2011). This approach is designed to examine how participants make sense of their world and their lived experience, while acknowledging the researcher's active role in this pursuit (Smith et al., 2009; Smith & Osborn, 2008). Thus, the qualitative analysis of these interviews provided the opportunity

to examine how individuals give meaning to the phenomenon of preparedness beyond the traditional strategy of quantifying these behaviours. It also enabled positioning of the respondent's subjective narrative within a social environmental context, thereby allowing the nuances of social environmental agency – in this case, via the respondent's existing social relationships – to be explored and explained in detail.

Article 2: Explaining social environmental differences in preparedness via cognitive appraisals. The information gathered in Study 1 provided some much needed context in terms of how Canadians develop their attitudes about hazards and risk, as well as emergency preparedness. It also provided some much-needed information about how certain shared experiences informed participant attitudes towards individual preparedness and related processes, such as risk perceptions and coping evaluations. While this qualitative research provided rich information about the experiences of this group of individuals, generalizations cannot be extended from these results due to sampling constraints and the nature of the analyses. Supplementing these results with quantitative data was required to provide further support for these relationships in a more generalizable manner. To this end, the main objective of Study 2 was 1) to test whether differences in hazard-related cognitive appraisals explained commonly demonstrated relationships between sociodemographics (an individual-level feature of the social environment) and anticipated protective behaviours. Other objectives of this thesis were to examine the relationship between these sociodemographic characteristics and 2) perceptions regarding terrorist threats and 3) anticipated response in regards to terrorism threats. These objectives are represented by the following hypotheses:

- H1) That sociodemographic characteristics (i.e. increased age, female gender, lower education, lower income, and visible minority status) would predict

lowered levels of anticipated protective behaviours (i.e. emergency response intentions)

- H2) That some sociodemographic characteristics (i.e. increased age, lower education, lower income, and visible minority status) would predict lowered risk perceptions and lowered coping efficacy, while female gender would predict increased risk perceptions and lowered efficacy
- H3) That differences in cognitive appraisals of threat would mediate the relationships between sociodemographic differences and anticipatory protective behaviours.

This objective was achieved by analyzing data from a national survey on terrorism risk perceptions, using a stratified sample of the Canadian public ($N = 1502$). More specifically, this was a secondary data analysis of the *National Public Survey of Perceived Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Terrorism Threat and Preparedness* (Lemyre et al., 2007). The survey was informed and developed in part by a series of group interviews from across Canada, which the author of this thesis contributed to in terms of development, facilitation, and data analysis (Gibson et al., 2007). Sections of the survey used in the present study are presented in Appendix B.

The survey assessed anticipatory protective behaviours in the event of a future terrorist attack (i.e. evacuation of the city or region; receiving vaccination; taking prescribed medication such as antibiotics; undergoing decontamination treatment, such as a public shower; agreeing to remain inside a building for protection (sheltering-in-place); agreeing to strictly isolate oneself from others (quarantine); and going to a public shelter). Perceptions regarding several dimensions of cognitive appraisal regarding terrorism threats, including risk perceptions (i.e. perceived probability, perceived seriousness, and perceived

personal impact) as well as perceived coping efficacy, were also recorded. This allowed for the investigation of possible differences in anticipated emergency behaviours among socially-disadvantaged groups, as well as the testing of mediation models to examine the possible explanatory role of cognitive appraisals in these potential behavioural variations.

The associations between sociodemographics, cognitive appraisals, and emergency preparedness and response have been previously studied at length (Bateman & Edwards, 2002; Lindell & Hwang, 2008; Riad & Norris, 1998), although few studies have examined these relationships within a Canadian context. Given that social context – with specific implications for any given country – plays a role in the dynamics under which sociodemographic disparities in behaviour play out, this examination of sociodemographic differences in anticipated emergency protective behaviours provided important information about the nature of these relationships for Canadians. Furthermore, the roles of sociodemographic characteristics and cognitive hazard appraisals have been independently studied at length in relation to individual emergency behaviours, and the possible explanatory role of cognitive hazard appraisals in sociodemographic disparities in emergency behaviours has been alluded to on several occasions (Goodwin et al., 2005; Stevens et al., 2009); however, this mediational pathway has not been extensively tested. Therefore, this study provided important insight regarding one possible mechanism by which social-environmental characteristics at the individual-level interact with intra-individual cognitive factors, possibly hindering emergency preparedness and response within these groups.

Article 3: Exploring contextual factors in emergency preparedness. The analyses in Study 2 were an important contribution to better understanding how social demographic characteristics – which implicate the individual's social environment –

correspond to hazard-related cognitive appraisals, and how variations in these appraisals might be associated with differences in anticipated protective behaviours in regards to a terrorist event in Canada. This study also provided a quantitatively-based elaboration of the findings in Study 1, incorporating social environmental context into the investigation of two commonly studied factors in preparedness: specifically, risk perception and coping efficacy. In order to build further on the investigation of the interaction of social environmental features in preparedness as outlined in the previous studies, the main objective of Study 3 is to explore the role of neighbourhood social context in emergency preparedness for a major disaster. Since the main focus of this study is community-level (i.e. contextual) factors, another objective of this study will be to examine these relationships in terms of individual-level outcomes as well as community-level outcomes. These objectives are thus refined by the following hypotheses

- H1) That deprived neighbourhood structure will be associated with lowered levels of anticipated emergency response at the individual level
- H2) That deprived neighbourhood structure will be associated with lowered levels of anticipated individual response aggregated to the neighbourhood level

These hypotheses will be tested via a secondary data analysis of the *Emergency Response Program Communications Tracking – Benchmarking Survey*, conducted by the City of Ottawa’s *Office of Emergency Management* (OEM) in December, 2004 ($N = 804$). This survey was created to establish a baseline level of awareness and preparedness behaviour among residents of the city of Ottawa (City of Ottawa, 2005). The survey assessed residents’ perceptions about whether they could effectively respond in the event of a major disaster, based on criteria related to emergency preparedness planning (i.e. “The members

of my family would know where to meet; I know I would be self-sufficient for 72 hours; I have a system in place to check on others in my neighbourhood or social circle, who may need help in an emergency; I know where to get information about what to do during the emergency”). Information regarding sociodemographic characteristics and previous experience with disasters was also collected via this survey. The items used for analysis in this thesis are presented in Appendix C. Conversely, neighbourhood structure was assessed via the creation of an index based on related scales of neighbourhood context (Pampalon, Hamel, De Koninck, & Disant, 2007; Carstairs & Morris, 1989; Townsend, 1987), using variables from the 2006 *Canadian Census of the Population* (Statistics Canada, 2013a) aggregated to the neighbourhood level using forward-sortation area (FSA) identifiers. Contextual effects of neighbourhood deprivation were examined in a multilevel modeling (MLM) analysis, controlling for more commonly studied individual-level factors such as sociodemographics and previous experience with disasters. This allowed for an examination of the independent role of contextual neighbourhood factors on emergency preparedness, and measured outcomes at the individual level as well as the community level.

This study provided an important contribution to our understanding of how the social make-up of the neighbourhood can directly facilitate or hinder individual emergency preparedness, with implications for the preparedness of the entire community. By controlling for individual-level factors more commonly associated with preparedness, and by situating the analysis in a multi-level framework, the relative importance of social environment at the community level was emphasized. This provided quantitative support for the qualitative findings reported in Study 1, and made an important contribution to the study of the relationship between preparedness and social environmental context at higher

levels, which has been given very little empirical attention in disaster research (Becker et al., 2012; Paton et al., 2008).

The results of each of the three studies outlined above, along with discussions regarding the implications of the reported findings, are presented in the following chapters of this thesis.

A note on local context: City of Ottawa. As described above, two of the thesis studies described above were developed and carried out on samples in Ottawa, Canada. Given the emphasis on contextual relevance presented throughout this thesis, a brief description of the area and the related rationale for its predominant inclusion in the current project is presented below.

Background. Ottawa is the national capital and fourth largest municipality in Canada. According to the 2006 *Canadian Census of the Population* (Statistics Canada, 2013a), the population of the broader Census Metropolitan Area (CMA) of Ottawa-Gatineau is 1, 130, 760; the median age of residents is 38.4, which is lower than the national and provincial averages (Statistics Canada, 2013b). Economically, Ottawa is considered a relatively affluent area compared to Ontario and the rest of Canada: It has a higher median income, a lower unemployment rate, and a comparable proportion of families reporting income below the low-income cutoffs (Statistics Canada, 2013b). A breakdown of comparative socioeconomic and demographic information based on the 2006 *Canadian Census of the Population* (Statistics Canada, 2013a) is presented in Table 1.

Table 1

*Distribution of socioeconomic and demographic characteristics for the City of Ottawa
based on 2006 Canada Census (Statistics Canada, 2013a)*

Indicator	Categories	Frequency	Percentage
Age ^a	20-24	78 465	9%
	25-34	150 955	18%
	35-44	183 210	22%
	45-54	180 865	21%
	55-64	125 235	15%
	65 and over	132 405	16%
Gender ^a	Male	406 590	48%
	Female	444 540	52%
Household Income ^b	\$10 000 - \$19 999	11 205	4%
	\$20 000 - \$39 000	38 175	12%
	\$40 000 - \$59 000	45 705	15%
	\$60 000 - \$99 000	94 300	30%
	\$100 000 and over	117 505	38%
Education ^c	No High School Diploma	162 410	18%
	High School Diploma	219 975	24%
	Apprenticeship or Trades	68 860	8%
	College or CEGEP	162 590	18%
	Undergraduate Degree	194 460	21%
	Graduate Degree	106300	12%

Note. Municipal totals computed from census data previously aggregated to the Forward Sortation Area (FSA) level.

^a Total population 20 years and over (N = 851 135)

^b 20% sample data (N = 312 765)

^c Total population 15 years and over (N = 914 605)

History of Disasters. According to the *Canadian Disaster Database* (Public Safety, 2013), the Ottawa region has been exposed to a number of natural and man-made hazards since 1900. This includes a number of small tornadoes, minor and moderate earthquakes, flooding, and severe weather events (i.e. Heat waves, droughts, winter/ice storms, and severe thunderstorms). Notable major events in recent history include a local flood in 1996 that resulted in structural damages of \$21 million; a major ice storm in 1998 that resulted in a state of emergency being declared in Eastern Ontario and Québec, with over 1 million people losing power and a reported \$7 billion in damages; a major power blackout in 2003 that affected 55 million residents in Ontario and the Northeastern United States; and a moderate-level earthquake in 2010 that caused minor damage and prompted the evacuation of schools and government buildings.

Rationale for inclusion. While the events listed above have not historically resulted in considerable fatalities or injuries when compared to events in other regions, the potential threat of a future major disaster in Ottawa does exist, given the numerous forms of hazard susceptibility that exist. In addition to these natural hazards, a risk of man-made threats such as terrorism must also be considered since Ottawa is the national capital and is home to several government agencies, buildings, and embassies. Thus, investigating current individual preparedness attitudes and behaviours is worthwhile.

Conducting research in a location such as Ottawa also provides an excellent baseline for future research in Canada. More specifically, if the role of social environment in preparedness is first demonstrated in a region with relatively low exposure to past major disasters and a relatively privileged socioeconomic distribution, it provides a more conservative comparison group for future studies, including those in areas with greater or varied disaster exposure as well as more complex social environmental disorganization.

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CHAPTER 2: SUBJECTIVE CONCEPTUALIZATIONS OF PREPAREDNESS IN A
SOCIAL ENVIRONMENTAL CONTEXT

Running head: THE MEANING OF PREPAREDNESS

The Meaning of Preparedness: A qualitative study on emergency preparedness among
elderly residents in Ottawa, Canada

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Abstract

Facilitating emergency preparedness among individuals continues to be a major challenge for both disaster researchers and policy makers. In addition to the often reported low rates of individual preparedness, research has demonstrated that differences exist between perceived preparedness and actual reported behaviours (Ablah, Konda, & Kelley, 2009). One emerging criticism arising from this discrepancy is that the assessment of perceptions and behaviours related to preparedness are often limited to quantitative checklists and scales, which limits our understanding of the meaning that individuals ascribe to disaster-related protective behaviours. This study addresses this shortcoming by presenting results from a series of qualitative in-depth interviews with a group of elderly residents in Ottawa, Canada (N=12). Findings demonstrate that the conceptualization of preparedness is closely tied to individual perceptions related to more general self-concept of resourcefulness, rather than a prescribed set of actions. In addition, these subjective conceptualizations are positioned within the individual's social environments, and are strengthened by perceptions regarding social networks, social support, and features of their particular living environments. Specifically, the respondents discussed a number of positive, supportive elements of their social environments that contributed to their feelings of preparedness. These findings demonstrate the importance of considering subjective meaning in the conceptualization of preparedness, as well as the very important role that social environment plays in these perceptions and behaviours.

The Meaning of Preparedness: A qualitative study on emergency preparedness among elderly residents in Ottawa, Canada

Emergency preparedness plays a vital role in mitigating the potential negative outcomes of large-scale disasters. After an initial event takes place, government mobilization and response can take upwards of 72 hours (Government of Canada, 2012); it is therefore essential that individuals take precautions *before* the onset of an emergency, to ensure they are personally prepared to manage any potential after-effects. This includes actions such as gathering emergency supplies and preparing emergency response plans. Unfortunately, motivating individuals to prepare for disasters has been a complex task, and despite an increase in public education campaigns, studies indicate that people remain generally unprepared for potential large-scale events (Lemyre, Lee, Turner, & Krewski, 2007; McIvor, Paton, & Johnston, 2009). Research in disaster mitigation has improved our understanding of why people prepare for emergencies, mainly through the identification of specific determinants of preparedness and preparedness intentions: These include relevant attitudes and beliefs (Lee & Lemyre, 2009; Lindell & Perry, 2012), and more recently, salient components within the social environment (Paton, Smith, Daly, & Johnston, 2008). While efforts to isolate these behavioural precursors are crucial, research has largely neglected the potential benefit of examining the broader subjective *meaning* individuals attribute to the concept of preparedness (Becker, Paton, Johnston, & Ronan, 2012), especially when positioned within the relevant social context. The present study exercises this opportunity by examining the meaning of individual preparedness as it is conceptualized in a group of senior residents in Ottawa, Canada.

Factors Related to Preparedness

In an effort to understand what drives individual preparedness, researchers have identified a number of important contributing factors. The most commonly studied determinants include a number of internal cognitive-affective processes, such as risk perception and personal efficacy (Lee & Lemyre, 2009; Lindell & Perry, 2012). For example, it has been widely demonstrated that in order for preparedness to occur, an individual must first believe that a legitimate threat exists regarding the potential hazard in question (Slovic, 1999). This can be especially problematic in areas where the probability of a particular event occurring is low. Furthermore, researchers have demonstrated a tendency for people to underestimate risks to themselves in relation to others – a concept known as *optimistic bias* (Weinstein, 1987) – which may also contribute to low rates of personal preparedness (Spittal, McClure, Siegert, & Walkey, 2008). Looking beyond risk perception, attitudes about the suggested mitigation activities themselves also relate to preparedness outcomes (Basolo et al., 2009). Individuals are not likely to prepare unless they believe they are capable of carrying out these prescribed actions (Grothmann & Reusswig, 2006; Paek, Hilyard, Freimuth, Barge, & Mindlin, 2010), and that these activities will actually be effective at mitigating or preventing negative outcomes (Murphy, Cody, Frank, Glik, & Ang, 2009; Paton et al., 2008).

Recently, it has been argued that in order to truly understand individual preparedness, research must extend beyond a focus on the internal processes described above, and incorporate pathways originating from the individual's social environment (Solberg, Rossetto, & Joffe, 2010; Spittal et al., 2008). To be sure, disasters and major emergencies occur in the social domain (Paton & Johnston, 2006), and are dependent on regional susceptibilities including those related to social environmental circumstances. By

extension, individual preparedness must be examined within this framework in order to effectively address potential barriers. For example, research suggests that local context must be considered, since the type of outcomes individuals have experienced in past emergency events may influence risk perception for future events (McGee, McFarlane, & Varghese, 2009). Thus, having limited experience with disasters, or having experienced disasters without extensive personal loss, may result in lower perceived risk (Solberg et al., 2010) or a reduced belief that taking precautionary action is necessary to protect oneself (Horney, Snider, Malone, Gammons, & Ramsey, 2008). These issues should be taken into consideration when examining preparedness rates, especially in the context of a particular region where the frequency and severity of these events may be relevant.

The importance of social environmental context is not limited to regional variations in disaster experience, however. For example, participation in the community has been linked with intentions to prepare (Paton et al., 2008), as this can help individuals identify potential disaster-related needs and resources, and increase information flow with regards to hazards and their mitigation. Likewise, social networks have been shown to influence preparedness through the existence of relevant social norms (Wood et al., 2011). Taken together, it becomes clear that facilitating preparedness requires recognition of the mitigating forces within a particular social environmental context in addition to understanding the internal processes that drive disaster-related protective behaviours. While there has been an increased focus on social environmental context more recently (Vaughan, 2011), this area of investigation remains largely understudied (Becker et al., 2012).

One major problem with current research is that the determinants under study – whether pertaining to internal processes, or larger social environmental elements – are usually examined in isolation of one another (Kumar et al., 2011). Thus, there is a missed

opportunity to explore how these issues come together to provide a more complete narrative of how individuals conceptualize their own emergency preparedness. Since preparedness takes place within the context of individual psychological processes as well as experiential elements and social environmental dynamics, it would be useful to examine these components from a more holistic perspective. When considered together, these elements have the potential to provide a more comprehensive depiction of how individuals frame and conceptualize personal preparedness through the interaction with their social context (Becker et al., 2012). For instance, integrating social context into the examination of internal processes related to preparedness is useful when applied to regional threats, since potential hazards are also based on physical and social contextual susceptibilities (Phillips, Thomas, Fothergill, & Blinn-Pike, 2010); while many of the strategies to encourage preparedness are certainly applicable across a wide variety of hazards and populations, it remains that the generalizability of specific issues in one local context may not apply to another (Solberg et al., 2010). Therefore, giving special attention to contextual specificities in addition to more general preparedness processes is certainly worthwhile (Basolo et al., 2009).

Measurement of Individual Preparedness

When examining individual preparedness across a number of hazards and populations, researchers may choose to focus on the general level of preparedness as perceived by respondents, or by contrast, report the actual specific preparedness activities undertaken. When both strategies are employed simultaneously, evidence suggests that a discrepancy exists between levels of perceived preparedness and the corresponding levels of actual preparedness reported (Ablah et al., 2009; Basolo et al., 2009). This type of disconnect has serious implications for disaster mitigation, since individuals may not

partake in official emergency preparedness activities because they already feel adequately prepared (Ablah et al., 2009). Reasons for these reported inconsistencies may certainly be linked to the pathways outlined above, originating from issues related to risk perceptions and efficacy beliefs. However, it should be noted that these discrepancies may also be indicative of limitations regarding how researchers measure and define preparedness. Specifically, studies on individual preparedness usually involve summing up preparedness activities, or using scales to measure attitudes related to perceptions (Solberg et al., 2010). Components are thus broken down into measurable and quantifiable units, which provide researchers and policy makers with useful data to help predict and explain behaviour; however, these methods fail to ascertain how people conceptualize preparedness more globally. In other words, differences in perceived preparedness and actual preparedness may also be a function of how individuals define the very concept of what it *means* to be prepared. Unfortunately, there is a present lack of understanding regarding how individuals interpret and create meaning with regards to hazards and their mitigation (Reser & Morrissey, 2005).

Incorporating a discourse on meaning into the current literature involves an assessment of the subjective and contextual experiences which underlie quantified measurements of perceived and actual preparedness. This emphasis on the experiential creation of meaning regarding preparedness could also provide more understanding of the complex interrelationships between commonly-studied internal cognitive processes, and would allow for the inclusion of narratives implicating wider societal and contextual influences, as mentioned above. This requires a greater application of qualitative research in complement to the overwhelmingly quantitative base of literature on the precursors to preparedness (Becker, Johnston, Paton, & Ronan, 2009). Unfortunately, there are few

qualitative studies that examine the decision-making process of preparing for future emergencies from the perspective of the general public, and even less that examine both the individual and social environmental features related to preparedness (Lee, Dallaire, & Lemyre, 2009). Most qualitative studies with the general public focus instead on attitudes and behaviours in the timeframe after an incident has occurred (Buckland & Rahman, 1999; Messias, Barrington, & Lacy, 2012). These studies certainly offer important insights into the nuances of decision-making in disasters and provide important confirmatory support for related studies using quantitative assessments of preparedness; however, since the effectiveness of preparedness strategies are based on pre-event behaviours, it remains that similar qualitative investigations in the time before an event occurs are needed in order to truly improve our understanding of the barriers to individual disaster mitigation.

Goals and Objectives of the Present Study

To address the concerns outlined above and provide a useful perspective on preparedness attitudes in a specific social environmental context, the current study examines the subjective understanding of individual preparedness as it is conceptualized in a group of senior residents in Ottawa, Canada. This qualitative investigation explores the meaning of preparedness in relation to relevant attitudes and behaviours, in the context of various individual, interpersonal, and social environmental circumstances.

Method

Sample

Interviews were conducted with local senior residents in the city of Ottawa, Canada. Ottawa is the 4th largest city in Canada, and the national capital. While no major disasters have occurred in the city's recent history, it is regularly exposed to potentially damaging natural hazards such as tornadoes, earthquakes, flooding, and severe weather events (Public

Safety Canada, 2013). Furthermore, the threat of man-made events, including terrorism, is salient given the high proportion of government buildings and international embassies.

In the current study, senior residents with similar sociodemographic backgrounds were selected so that perceptions about preparedness could be examined from the perspective of one homogenous group. A total of 11 senior residents (8 women and 4 men) participated in the interviews, ranging in age from 66-86 years old (average age was 75.8 years). The majority of the participants were retired, while two were still actively employed. When asked to describe their current or past employment, responses included backgrounds in engineering, healthcare, education, the federal public service, construction, and linguistics. A few of the respondents stated they had not been formally employed but were responsible for maintaining the home. Participants resided in various neighbourhoods across the city, mostly in the central east and west. Most had lived in their neighbourhoods for several decades, with an average length of residence of 26.4 years (ranging from 5 to 45 years). The majority of the respondents lived with a partner or family member, while three participants lived alone.

Materials

An interview guide consisting of mainly open-ended questions was developed by the author, in collaboration with a number of colleagues who have experience in the research area, or qualitative research methods more generally. As an initial step, a pre-test of the interview schedule was conducted with four individuals to gather feedback regarding the wording of the questions and the general progression of the interview schedule. A copy of the final interview schedule is presented in Appendix A.

At the outset of each interview, the respondent was given a sheet with four questionnaire-type statements regarding their own preparedness behaviours, and asked to

rate their agreement on a seven point Likert-type scale. These questions were used to introduce the topic of emergency preparedness, and to help generate discourse, rather than to collect data. As such, the quantified results of the questionnaire items are not reported here. However, during the interview, each question was reviewed with the respondent, and they were asked to describe and elaborate on their answers to facilitate a richer discussion. The four questionnaire items derived from the statement “In the event of a large-scale emergency, where power and communications were out...”, where respondents were asked to rate their agreement with the following items: “The members of my household/family would know where to meet”; “I know I would be self-sufficient for at least 72 hours”; “I have a system or plan to check on others in my neighbourhood or social circle who may need help during an emergency”; and “I know where to get information about what to do during the emergency.” At the outset of the interview, the respondents were asked to describe their answers to these items, and their responses were recorded.

The qualitative interview questions focused on each respondent’s past experiences with emergency events, as well as present and anticipated perceptions and behaviours about emergency preparedness and response (for example, “Can you tell me about a time in your past when you’ve experienced an unexpected event that could be considered a large-scale emergency?”, and “How do you think you’d respond if the same thing happened today?”) The interview schedule also included questions about the respondent’s social environment (i.e. social networks, neighbourhood context), both in general (for example, “How would you describe the neighbourhood where you live, to someone not from here?”), and if applicable, as it relates to emergency events (for instance, “If there was an emergency, do you think you would count on these individuals for help? Why/why not?”). Prompts were provided in the schedule to help the interviewer facilitate and maintain the discourse with

the respondent; however, the prompts were not typically required over the course of the interviews, and were minimally used. Conversely, respondents were encouraged to discuss their thoughts and experiences freely, even if the topic diverged somewhat from the precise line of questioning. Furthermore, while most interviews followed the general chronology of questions in the guide, this ordering was not prescriptive, and the interviewer modified the questions when appropriate to allow a more fluid discourse with each respondent. A copy of the interview schedule, complete with prompt suggestions, can be found in Appendix A.

Procedure

Volunteers were recruited through written and verbal announcements made at local community centres, houses of worship, and senior centres. In addition, posters were disseminated through a number of local online bulletin boards. As a final step, the recruitment poster was circulated using a snowballing technique: the first author sent a series of emails to colleagues who were known to have direct or indirect contact with individuals belonging to the target sample, and a request was made to forward the recruitment posters to any potentially interested parties. Participants were successfully recruited through each of the various strategies described above.

All interviews were conducted by the first author. The location of the interviews was determined based on the preference of the participant: Two were conducted in a private room at the university; three were conducted off campus in public meeting rooms that allowed for confidentiality; and the remainder were conducted at the respondents' homes. Participants first read and signed a consent form outlining the details of the study, and were invited to ask any questions they had before the interview began. Each session lasted between 30-60 minutes. Interviews were tape recorded with the respondents' permission, and were subsequently transcribed verbatim.

Analysis

The written transcripts were analyzed using methods based on *Interpretative Phenomenological Analysis*, or IPA (McGee et al., 2009; Smith, Flowers, & Larkin, 2009). This qualitative approach is designed to examine how participants make sense of their world and their lived experience, while acknowledging the researcher's active role in this pursuit (Smith et al., 2009; Smith & Osborn, 2008). As further described by Fade, "IPA is phenomenological in that it seeks an insider perspective on the lived experiences of individuals, and interpretative in that it acknowledges the researcher's personal beliefs and standpoint and embraces the view that understanding requires interpretation" (Fade, 2004, p.648). Since the main goal of this approach is to discern the subjective meanings that particular experiences and events hold for individuals, it is well-suited for research in psychology, and health and social psychology in particular (Biggerstaff & Thompson, 2008; Brocki & Wearden, 2006; Smith, 2004; Smith et al., 2009). As this study is concerned with how respondents experience emergency events and the meaning of preparedness in their social environment, IPA was chosen as a guiding approach for the current analysis.

The procedures described below follow the general guidelines set out for conducting an effective IPA study (Fade, 2004; Smith et al., 2009; Storey, 2007). As a first step, the main author (SG) listened to each recording a number of times while reading the corresponding transcript, to ensure that the respondent's accounts were understood in their entirety. Notes were then made on the written transcripts to document significant passages and acknowledge the personal reflections of the researcher, in order to maintain transparency of the interpretative process (Storey, 2007). Next, the formal coding of the transcript followed, to identify emerging themes based on the previously identified notes

and reflections. Themes reflected in participant statements were initially highlighted without a coding grid, to avoid minimizing the individual experience of each respondent. Once the entire interview was reviewed for significant statements, the emerging themes reflected in the statements were listed with general thoughts about the interview. These same procedures were then conducted for each subsequent interview, allowing any relevant themes to emerge independently in each interview. It should be noted that in one instance, two respondents in a spousal relationship requested that they be interviewed together. Since this changes the dynamic of the interview process and the subsequent results, it was decided that the interview would not be formally coded.

Once all the interviews had been coded, the emerging themes were examined and grouped based on theoretical similarities. The themes were then reorganized to reflect possible overarching patterns and relationships. A coding grid was produced that represented these shared themes, and excerpts were re-examined to ensure that the reorganization and renaming was appropriate based on the particular context of a given passage. Each of the newly coded themes was then examined to confirm its presence in the majority of the interviews; less prominent themes were only included in the coding grid if they demonstrated a particular significance for an individual. Passages that indicated conflicting perceptions among participants were also retained and documented. As a final step, the primary researcher (SG) re-read the interviews again with the inclusion of the coded themes, to ensure that the emerging patterns found did not detract from the overall discourse of each individual interview.

Following the original analysis, a second researcher (LS) conducted a peer audit, reviewing two of the formally coded interviews to pinpoint any questionable or vague interpretations on the part of the primary researcher (SG). During this process, the

researcher (LS) was given access to all the pertinent documents (transcripts and recordings, initial notes, lists of emerging themes and reflections, development of coding grid, and files containing all the formally coded excerpts for each emerging theme) for reference. As an added step, the auditing researcher (LS) then independently re-coded a third transcript independently by using the final coding grid, and the results of both researchers' analyses were compared to identify any major discrepancies. It should be noted that this last procedure was not intended to obtain a quantitative measure of 'inter-rater reliability', which demonstrates that the coding scheme is consistently applied across researchers; this objective would be inconsistent with the main subjective and interpretative tenets of IPA research (Yardley, 2008). Rather, in this instance, re-coding was conducted to identify any major areas of concern regarding the primary researcher's analyses and subsequent findings. In the current study, minor differences were found in the conceptualization of operational definitions; these differences were easily reconciled through a follow-up discussion, to the satisfaction of both researchers.

For the purposes of evaluating the validity of this analysis, Yardley's (2008) criteria were utilized. Specifically, *sensitivity to context* (allowing themes and meanings to naturally emerge from the data) was ensured by selecting a more homogenous sample, conducting the interviews in the participants' preferred location, using open ended questions, and supporting the emergent themes with numerous verbatim transcript excerpts as reviewed by a second researcher (LS). *Commitment and rigour* (reflecting completeness of the subsequent analyses) was maintained through the thoroughness of the methodology employed, and by ensuring that emerging themes were well-represented by all, or a majority, of the respondents. *Transparency and coherence* (i.e. clarity of the study goals and methodologies) was upheld in this study by clearly outlining the study goals and

methodologies used, and by maintaining an exhaustive documentation of the analysis procedures which were reviewed by a second researcher (LS). Finally, the *impact and importance* of this study is reflected in the communication of both theoretical and practical implications, which will be described in subsequent sections below.

Findings

Over the course of the interviews, discussions about past emergencies focused mainly on three previously-occurring large-scale events in Ottawa. The most discussed topic was the North American ice storm, which struck eastern Ontario, southern Québec, and the Maritime provinces in January 1998. The storm resulted in 30 fatalities and left millions without power – some for days, and others for weeks and months (mostly in rural areas). Two other events were discussed to a slightly lesser extent: The northeast blackout of 2003, which affected 10 million people in Ontario over the course of 24 hours, and a moderate 5.0-magnitude earthquake felt in Central/Eastern Ontario and Western Quebec in June 2010, which was the largest earthquake felt in Ottawa in 65 years and caused infrastructure damage to several buildings. Neither of these events was associated with fatalities or major injuries, although the potential for more severe outcomes was present in both cases.

Reported preparedness among participants

During initial readings of the transcripts it was revealed that overall, emergency preparedness was not a pressing subject in the lives of the participants. Most respondents admitted they had not given much conscious thought to issues surrounding emergency preparedness prior to volunteering for the present study, although a few had thought about the potential of future large-scale emergencies and by extension, their own relative preparedness. Regardless, not one of the participants reported having engaged in any formal

preparedness activities when asked, and no participants had any formal emergency plans in place at the time of the interviews.

Despite a reported lack of preparedness among the participants, respondents expressed an overall shared belief that they would fare well in the event of a future emergency. This revealed a consistently related discrepancy between attitudes and personal behaviours. Stated otherwise, most respondents felt they were well-enough prepared despite not having any emergency plans in place. This was a particularly interesting finding that subsequently instigated a deeper examination of the interview transcripts, and led to an understanding of how participants gave meaning to the concept of emergency preparedness. An outline is presented below.

The Meaning of Preparedness: Emergence of Themes

While keeping in mind the observed divergences regarding the participants' disclosures noted above, an attempt was made to discern how these individuals conceptualized and evaluated their own sense of being prepared for a future emergency. When specifically asked why they felt sufficiently prepared for an emergency, the most common answers given by participants made reference to their personal ability to cope – both psychologically, and instrumentally. A general impression of perceived confidence among the participants in this context appeared throughout the interviews, and thus a major theme emerged from the data framing the meaning of preparedness in terms of *perceived resourcefulness*. Furthermore, this principle attribution seemed to be strengthened both directly and indirectly by the shared presence of *positive social environments* among the participants. More specifically, various facets within the individual's social environment seemed to provide the respondents with added frames of reference from which to derive and apply this sense of personal efficacy. This realization was represented by the

emergence of three related yet distinct themes: *experiences with local hazards*, *relationships with social networks*, and *the community environment*. A graphical representation of these themes is provided in Figure 7. Detailed descriptions of these four major analytical themes and how they collectively illustrate the meaning behind respondents' personal preparedness attitudes is presented below.

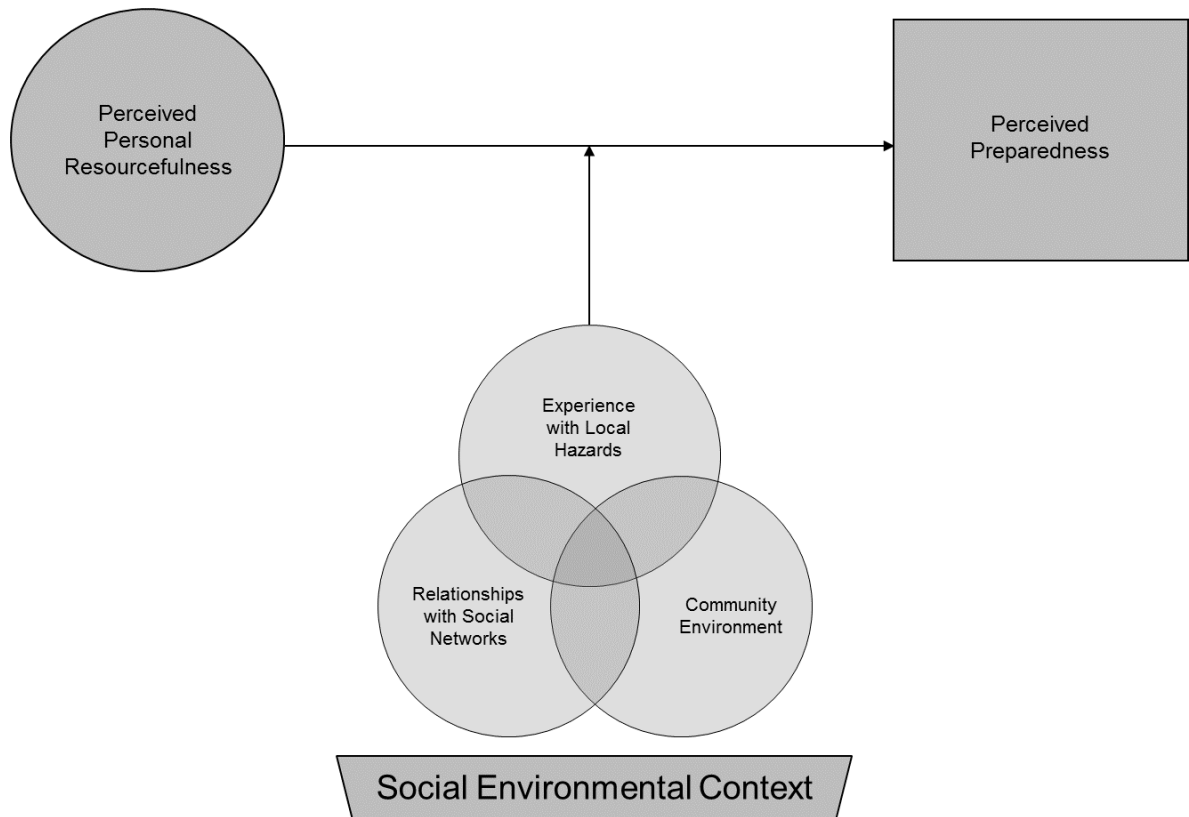


Figure 7: Graphical representation of emergent themes related to social environment and subjectively conceptualized preparedness

Perceived Resourcefulness. As mentioned above, the participants shared a conviction that they had the necessary tools to cope with any future major emergency events. Despite not having plans in place, it was found that the majority of participants believed they would be able to successfully respond in an emergency. In light of the present analysis, it was revealed that the great majority of respondents shared an optimistic outlook, rooted in positive feelings about their overall resourcefulness. These sentiments stemmed mainly from two types of statements: The first related to a reliance on psychological resources stemming from personality characteristics, evidenced by participants describing themselves as calm, rational, independent, and self-sufficient; and secondly, a belief that the participants already had access to any material resources that would be needed to respond effectively. Both of these sub-themes are described below.

Psychological resourcefulness. Having a capable and resilient character emerged among most of the participants as one prominent explanation for being able to respond well in a disaster. For instance, when asked why they thought they would cope well in a future emergency, the great majority of respondents shared sentiments similar to the following: *“I think we had an attitude, and maybe you’ll find this with your other people. Anyone who has lived a long time usually is quite resourceful. And they’re practical, and they do what they have to do. And they get after it and do it.”* (MHB) Another participant reflected on their ability to remain calm when asked the same question: *“I’m pretty logical, pretty collected. I’m not saying there wouldn’t be some fear there, but I doubt very much that I would panic”* (JDG) To be sure, being logical and calm was perceived as an important strength in light of the uncertainty and uncontrollability that participants associated with emergency events:

Well, having been through the ice storm, I know what happens to the city when it shuts down. I'm not the kind of person who gets upset if they can't control what's going on around them. I don't see the reason for getting panic stricken. I guess I'm a fairly rational person (JCH)

While some participants such as JCH made reference to their perceptions from past experiences with large-scale emergencies, participants more commonly extrapolated from personal emergencies such as home invasions, residential fires, or the illness or death of their loved ones. Regardless, the salience of this theme was reflected throughout the interviews and often emerged when participants described the reasons they believed themselves to be prepared for an emergency – even when no actual plans had been made for such events. For example, with regards to the following excerpt, the participant (NGB) had just acknowledged that she may not have enough supplies on hand in an emergency, and no tangible plans in place for emergency response. However, she believed she would cope well with a large-scale emergency based on descriptions she later gave about her reactions to other events, including losing a child to illness, her own medical challenges, and getting divorced. When asked about large-scale emergencies, she stated:

I've had a lot of things to cope with in my life, different losses and things like this, so I've gone through all this and have been able to come through it okay, to cope with it well. So I think I'm as prepared pretty well as I could be (NGB).

Statements such as these illustrate that the participants perceived themselves as having been generally resilient – and indeed, most participants voluntarily shared their past personal experiences with hardships which had been overcome. In effect, having a level-headed, resilient character thus emerged as one of the prominently conceptualized forms of “preparedness” described by most of the participants in these interviews.

Material resourcefulness. The shared perception that participants could cope in an emergency was supported by numerous statements that participants assumed they already had access to everything they would need in a large-scale disaster, and could find ways to cope within those means. For instance, when answering the initial questions about preparedness behaviours, almost every participant maintained that they could sustain themselves for 72 hours in a future emergency, despite not having assembled an emergency kit. When asked to elaborate on the supplies they had available, most comments referred to having food and water, as well as items needed in a power-outage, such as flashlights, batteries, and radios. There was very little discussion about other possible necessities such as medications or medical devices, despite several participants making reference to various medical conditions. Instead, the main concern voiced by participants was for nutrition and staying warm, as represented by statements such as this:

Yes. We have a generator, and like I said, we have a gas fireplace. We have flashlights. We have a pantry down in the basement full of food, everything from water to you name it, food to eat. You might change your food a little bit because your freezer can go on the blink for three days and that would be the end of that. You would have the barbeque, you know, so you could work with it. (BCM)

A number of participants specified that having these supplies did not reflect a conscious act to engage in emergency preparedness; rather, it was a reflection of how they conducted themselves in daily life. As one respondent noted, “*at the present time, we have so much food in the house, it’ll last us probably two weeks; but that’s not preparedness, it just happens*” (BZK). Another respondent echoed this positioning of gathering supplies as part of their routine behaviour:

Well, as far as food is concerned, I am the type of person that keeps my pantry well stocked. I don't wait until I'm out of something before I replenish. I replenish ahead of time. I say I don't panic. (EWR)

As outlined in the statement above, the concept of having daily supplies on hand not only reflected a perception of being able to cope in an emergency, but it was directly connected in some cases to attributions made about personality and character:

Well as I was saying to you earlier, I don't panic, its logical thinking: so you don't have any heat, so you wrap yourself in a blanket and put on an extra sweater, pull out your winter coat, you know those kinds of things. So you don't have any light but you do have candles and flashlights and those kinds of things. May not have any power so you don't have any water but on the other hand I've got bottles of water around. (JDG) Thus, feeling prepared for an emergency was consistently tied to a belief in one's ability to respond to an emergency based on existing personal resources. There was very little deliberation about whether these resources may be insufficient in the event of a large-scale disaster, even though the majority of participants acknowledged they had not thought about emergency preparedness before the interviews, and none had undertaken any formal emergency preparedness planning. As the interviews progressed, it became evident that the confidence expressed by participants was reinforced by their past experiences and subsequent perceptions in a number of relevant contexts: These included perceptions about local emergencies, relationships with social networks, and perceived neighbourhood environment. The relevance of these themes is detailed in the following sections.

Perceptions about local emergencies and preparedness. As mentioned above, most of the participants felt they would fare well in the event of a future large-scale emergency, despite not having participated in any formal emergency planning. When asked

why they felt they would cope well, the second most common answer given referred to perceptions about local emergencies. Indeed, it became evident during analysis of the interviews that the regional landscape did play a major role in respondents' self-evaluations about their own preparedness. Specifically, past experiences with disasters in the Ottawa area related to how respondents perceived both the threat of disasters, as well as the utility of preparedness.

Risk perceptions. The majority of the respondents in this study described their past encounters with large-scale emergencies as personally inconsequential – especially when discussing local hazards. In fact, many participants described these occurrences as more of a nuisance than an emergency. As one participant noted with regards to the North-eastern power outage: *“the blackout, I didn’t consider it an emergency. It was a nuisance; it was a pain, no power for three days. How tiresome – but it was the middle of the summer. So, you couldn’t get your house cool.”* (JDG). Other participants referred to minor interruptions in transportation, negligible damage to infrastructure, and having to make alternative arrangements for preparing food, such as using a fireplace or barbeque. Interestingly, in addition to dismissing the outcomes as inconsequential, a few participants actually recounted *pleasant* memories related to these events, including the following:

Actually, there were areas where there were a whole lot of people staying in houses...and then the power came back on and they didn’t leave, because they were having such a good time there. I thought that was kind of amusing. You’d think they’d want to get back to their place. (NGB)

Generally speaking, the consequences experienced by these participants were indeed relatively minor. However, almost every respondent did recognize that others were adversely affected during these events, including individuals known to the respondents. For

example, one respondent was outside the city during the major blackout, but made reference to the effects on others living in her apartment residence:

I was out of town at my little place that was so sustained on the resources that were there. And I felt badly for everyone else, because they did suffer because the backup generator didn't work, and there were lots of older people in the building (MHB)

Many of the comments made about people being adversely affected by these events referred to individuals living outside the city, which the participants did not consider to be personally relevant. However, some respondents, such as the participant quoted above, did acknowledge more serious outcomes within close proximity to themselves. Another interviewee spoke of his own neighbour in this regard: *"I mean, it didn't affect my life at all. In fact it's very interesting – this guy up on the canal, he had an extension cord going from somebody's house to his house, just to keep body and soul together."* (BHD)

Despite the numerous acknowledgements that these events did in fact lead to adverse outcomes for others, most participants did not recognize the potential for future events to impact them personally. As one participant openly acknowledged, *"I have no idea. I have no idea because I've never had the experience, so I really don't know"* (MCG). That said, a minority of the respondents did in fact see the potential for future severe events in Ottawa. What seemed to set these participants apart was personal experience with more severe emergency events, such as major hurricanes, earthquakes, and tornadoes. For instance, one respondent (BZK) stated that he personally experienced Hurricane Hazel, a deadly 1954 storm that killed 81 people in Toronto, Canada. When asked to describe his other past experiences – with regards to the major events in Ottawa in particular – he shared the majority view that they had been relatively trivial events. However, he also

acknowledged the potential that these events, and others, carried in terms of more severe consequences:

[The ice storm], all that basically resulted in was our confinement to the house. It would have been quite bad, I think, had there been an electrical failure at the same time, which there was in many places in Quebec and so on. But we survived that one. The third one was – this is a very minor thing – but we had a little minor earthquake. But there would be potentially a catastrophe in Ottawa if there was a major earthquake. Our house was built in 1876, so whether or not it would survive is another matter. It seems to have survived everything so far.

[...] But there are also some other potential things in Ottawa...we've never been terrorized. And there's a potential that there could be a terror bomb or even worse, the Parliament Hill. And the other thing is that there could be a biological bomb instead of a physical bomb. So I don't know that we're prepared for that type of thing [...] That was basically...Oh, there is another one, the possibility that the internet, with cyber terror, that I don't think has really been addressed...And many people will lose their access to banking, they'll lose their access to online activity, they'll lose their access to friends and things. (BZK)

Similarly, another respondent described her experience witnessing the aftermath of a major earthquake in San Salvador, including her presence during a subsequent tremor:

I was on two Habitat for Humanity builds down in San Salvador. And the first one was right after an earthquake. There had been quite a disaster. And on my building site there was another earthquake. [...] There was a hill over across a valley and then this big hill, and I could see what I thought was smoke. And I asked one of the men, and he said no, he said that's dust from the shaking and it has come up. And a lady had been

over there picking coffee beans, and she was buried alive. Yes, that really was very sad.

(SML)

After relaying this experience, she stated that it was because of this incident that she believed a more severe event in Ottawa was possible: “*That it can happen anytime, anywhere.*” (SML)

While this pattern of personal experience being tied to risk perception was noted in several interviews, at least one participant’s responses differed slightly. In this case, the respondent (MHB) did not witness any major incidents, but was quite aware that the potential for more serious disasters was a threat. She did make several references throughout her interview to her career in nursing and public health, and not surprisingly, most of the potential threats she described were related to issues of public health, such as infectious disease and contamination water supplies. As such, it appears that for this participant, her background provided her with the context to foresee more serious events happening in Ottawa. Generally speaking, however, the regional experience of disasters – which was relatively minor – seemed to play a role in how participants framed the threat of future events.

Perceptions about preparedness. Despite a few participants acknowledging the potential for severe threats, it remained that a common lack of concern regarding these events was a major reason for the participants not participating in formal preparedness activities. Several participants stated outright that the past events they experienced were not severe enough to warrant making plans:

If I thought that this was an earthquake zone, I might do something about it – and we’ve had tremors...we’ve had three tremors since we’ve been here, but you barely notice them. I worry about the devil I know, not the one I don’t know. (BHD)

When another participant was asked why he hadn't prepared, a similar reference to past experiences was made, both in terms of major disasters and personal life events:

It's probably because over the life, things have been pretty good. There hasn't been really much of a setback anywhere or a struggle anywhere. We have not been involved in anything real serious; I would have to say perhaps we were a bit complacent. (BCM)

In these instances, the quality of the personal experience remains salient and reinforces the assumption that if future events occur, they will be similarly experienced without major consequences. In the case of BC, there is even an acknowledgement that this logic may not be sound, and that it has rendered him complacent – something that was also acknowledged by one other participant (MCG).

A connection was found in some interviews between these past experiences and perceptions regarding the *utility* of personal preparedness for future events. Some participants did not see any benefit to making personal plans, including one participant who described preparedness as a “*waste of time, expenses, and money*” (BHD). However, other participants did express a belief that preparedness was important despite their own lack of planning. For instance, this participant discussed the importance of education regarding the mitigation of pandemic infectious disease:

Say with a pandemic, like a flu pandemic or something now, it's so important to hand wash and to make people aware of this, to always be washing their hands and to prevent the flu from spreading. So a lot of it is doing education – I think about hand washing, and things like this. (NGB)

Even among those participants who believed that preparedness had some inherent benefit, there was also a strong belief that preparedness efforts may not be realistic or

effective. Examples of this included statements such as: *“I think being prepared is good, but some things can’t be prepared for...and you may go down with the best of them, so that’s what will happen”* (SML), and *“I don’t believe anyone is 100% prepared for emergencies. I really don’t. There’s always something you miss, or you forget, or you panic”* (EWR). These attitudes seemed to reinforce participants’ beliefs that they were sufficiently prepared for an emergency given their existing mental and material resources, especially in the present context of local hazards and threats.

Relationships with social networks. In addition to local context, another way in which social environment appeared to relate to the perceived resourcefulness of the participants was through the nature of their relationships with close social networks. Throughout the discussions, it was revealed that all the participants were well-connected in terms of family ties, as well as through friends in various social communities. Positive attitudes towards these close social contacts were marked by statements describing a high level of reciprocal support, which had implications for the participants’ attitudes about their level of preparedness. A description of these connections is detailed below.

Family networks. Most of the respondents reported they had close personal relationships with family members, with whom they stayed in touch regularly. Although there was some variability in the geographical proximity of these relational networks, most of the participants did have at least one family member close by. In this particular sample, two-thirds of the participants were living with a spouse, common-law partner, or close relative, while the remaining participants were living alone. When asked to describe who their closest relatives were in terms of emotional ties, all the participants made reference to their children. Most of the participants also made reference to siblings and extended family with whom they kept in regular contact.

In terms of the quality of these close relationships, participants often described interactions that involved regular and reciprocal support: The participants shared stories of both giving and receiving help from their relatives, in both day-to-day activities and more personal events. Some narratives focused on instrumental support with daily tasks, such as getting a ride from a relative to buy groceries or helping out younger family members with babysitting. For example, one participant described this dynamic of exchange she shared with her son:

Since his partner is out in Edmonton for five weeks, he is a single father baching [sic] it. So at one point he had a meeting at night. And ‘mom can you feed the boys?’ ‘Sure.’ And then he was great because he got back here at about 10:30, the boys were sound asleep, so he did some work on my computer because my computer wasn’t working properly. So, quid pro quo. (JDG)

The preceding excerpt is a direct example of the reciprocity of support taking place with this participant and her family. By and large, this shared experience among the participants was extrapolated from various statements about giving and receiving help that surfaced throughout the interviews. For instance, one participant discussed the sharing of emotional support within her family in times of personal crisis, first in terms of receiving help: “*When my husband died, I phoned my daughter. I said I can’t cope alone. She dropped everything and came here and stayed with me for six weeks*” (EWR). She later described how she has helped other family members in similar situations: “*When my sister lost her husband, she phoned and said (brother-in-law) is in the hospital now and he’s not coming out and I can’t cope alone. I just dropped everything and went. She was living in Belleville at the time, and I went and stayed with her for two weeks*” (EWR).

While the above statements refer to examples of support and reciprocity in life events unrelated to major disasters, respondents also extended these experiences to validate their beliefs about family support when discussing large-scale emergencies. In effect, all the participants stated they felt they could count on their family for help if they needed it in an emergency. It should be noted that most of the participants were referring to hypothetical future events, since they had not personally been severely affected by large-scale emergencies in the past. However, a few participants did provide concrete examples of help that was given and received in the context of large-scale events. For instance, as one respondent recounted: “*I know that after the earthquake, my daughter called from downtown to see if I was okay*” (JCH). Another participant explained her own role in assisting her adult son during the ice storm:

But my son and his family lived south of Ottawa, down near Kemptville, and they were out [of power] for a long, long time, almost a week. And as soon as the roads were passable, I went down, I took candles to them. I don't know why, but I always stash candles. I like them. And down there they were almost \$7 each because of the scarcity. And I brought back their laundry and did it and took it back, all folded. We were able to keep in touch that way, but it was over a day and a half I think before I heard from them. (SML)

These past experiences with familial support networks led to a belief among participants that they would have assistance from family in the event of a large-scale emergency, “*because we're very close and we've had a history of helping one another.*” (MCG)

Friends and social community. In addition to family networks, all the respondents reported having positive social ties beyond relational connections. Strong connections to

religious communities were most prominently mentioned, as remarked upon by eight of the respondents. References were also made to non-religious peer social groups such as an engineering wives' club (EWR), linguistic meet-up groups (MCG), and a square-dancing group (BCM). For most of these participants, the social networks that have emerged from these groups are central in their lives:

Most of my close contacts are church friends, so I mean that's sort of a hub; and the church, as you know, is just five minutes away and the majority of my friends are people that I know and interact with there and are in touch about other things as a result; but also having lived in the same community for 35 years and raised my children here, we have ongoing family connections going back to when the kids were little too and most of those again are church people, but not exclusively. (JCH)

As with their family ties, participants saw these connections as a source of instrumental and emotional support – both in the past, and when anticipating future emergency events. For example, one participant (BHD) described how his church group reached out to him when his wife was ill: *“My wife has had a medical issue to deal with. She had a tumour removed from her brain, and immediately when that happened, food flooded in from the church that we go to.”* When asked about whether he felt these connections could be a source of support in a future emergency, he replied, *“I mean, the relationship is such, I could phone any one of them and say [wife's name] and I are coming to stay with you, and there would be no questions asked. Churches are very powerful that way”* (BHD). This sentiment regarding the reliability of their peer social groups as a source of support in a future emergency event was echoed by other respondents, and most of the participants felt quite confident that if needed, they could receive help.

An added feature of these connections also emerged: In some cases, providing support was extended beyond informal exchanges and included organized participation in volunteering efforts. Seven of the participants stated that they had participated in formal volunteering actions; much of the focus of this volunteer work was directly related to church activities, but references were also made to volunteer work in the greater community, including neighbourhood associations (JDG, EWR) and community theatres (MHB). Most of the described activities involved tasks unrelated to emergencies, but two participants (JDG and MHB) did recall volunteering during the ice storm. More specifically, one participant recalled that she “...*made food out of our church and helped people who were desperate*” (MHB). In another discussion, the level of coordination involved in the volunteer response was more involved, comprising several churches and many volunteers:

Not our church, the cathedral downtown – which is a great, big, heavy duty, essentially a commercial kitchen...so there was a whole group of us and it went on for days, but people gathering at 9 and 10 o’clock in the morning to bake bread and slice meats and to roast meats and package up individual meals and that kind of thing. (JDG)

The extensive references made to the reciprocal ties within these social communities suggested that belonging to these social networks provided the participants with reassurances that they would be supported if there was a future large-scale emergency. This appeared to be reinforced by their knowledge of, and participation in, organized volunteering activities within these organizations that are aimed at helping those in need – including within the context of a large-scale crisis such as the ice storm.

Neighbourhood characteristics. The respondents were also invited to share their thoughts and experiences in relation to aspects of their neighbourhood social environment.

Since the present discussions focused on personal preparedness in the home, a discourse was facilitated regarding the respondents' perceptions of their living environments, including the people living in close proximity to them, as well as the characteristics of the neighbourhood itself. The statements that emerged from this discourse reflected positive attitudes overall, with specific elements contributing to the participants' feelings of confidence regarding potential personal outcomes in a future disaster.

Contact with neighbours. When asked about social ties and social support in their neighbourhood, all of the respondents had positive impressions to share. Some of the participants knew their neighbours well and described an atmosphere grounded in reciprocal supportive relationships, which involved such activities as watching each other's home while on vacation and other helpful behaviours. Once again, these discussions mainly referred to non-emergency situations, though to a lesser extent there was some discussion about support being shared in past large-scale emergencies as well. The following excerpt describes one participant's experience with her neighbours and the salience of these supportive relationships during a major fire that had broken out in her apartment complex:

Well, because of the camaraderie within this complex, everybody phones one another, and they help one another. When we had that fire, I know all the ladies on the other end were all gathered in one apartment. And we didn't do that here because well [neighbour] was away and [other neighbour] and I had talked. We knew everything was all right, and I don't know where the other people were. No, it wouldn't bother me if there was an emergency. We would all get along somehow.

(EWR)

While some of the participants echoed similar close ties with their neighbours, it should be noted that many of the participants alternatively described their relationships

with neighbours as more casual, involving little more than exchanging greetings in the street. For instance, one respondent noted:

I would say that Ottawa south, at least this area here, there's not a lot of intercourse among people that as far as I can see, you know. Like if you went say four houses down and ask that fellow if he has any close relationship with the chap next door, probably not, you know. Like they'd nod to each other when they're driving their cars out of the drive way or something like that. (BHD)

Despite the fact that this type of impersonal interaction was commonly portrayed, the belief that neighbours would be helpful and supportive in an emergency was not diminished. Indeed, the great majority of the participants felt that they would still be able to count on their neighbours for help in such an event, and that they would be willing to help their neighbours as well. To illustrate, the following excerpt regarding the ice storm was shared by the same respondent quoted above, who had previously noted the impersonal nature of these neighbourly relationships:

I went over next door and helped my buddy. There was a tree that came down and I helped him cut it up so that he could move in his back yard and various things like that. But that's all [...] I felt sorry for it, and I would have put up if [other neighbour's name] who went, you know, he had an electrical power cord across the street or something, if he'd want to come and stay here, he would have been welcome to do that. (BHD)

In this quote, the participant shares his past experience with helping a neighbour during an emergency event, and asserts that if needed, he would have helped another neighbour who had been struggling as well. While this respondent did not have close ties with his

neighbours, the connections were friendly and amicable, as reflected in the above statement. Overall, the participants shared these positive attitudes towards their neighbours.

When asked why participants felt secure in their beliefs regarding the reliability of their neighbours, respondents often spoke of an overall sense of trust shared among the residents. As already mentioned above, most of the participants had a friendly relationship with their neighbours, and when asked specifically if their neighbours could be trusted, all the participants responded affirmatively. This was true both for those who had close ties to their neighbours, as well as those whose relationship was more casual. When asked why this trust existed, one respondent answered, *“Because we’ve known them for twenty years, because experience has shown that we can rely on them. And we might not be close friends with some of them, but we work very well together. We’re good neighbours.”* (MCG)

Positive living environments. The positive affirmations given about the respondents’ neighbours extended to the general impressions the participants had about their neighbourhoods overall. When asked to describe their neighbourhoods, the two features most commonly discussed included an overall sense of convenience based on the presence of available amenities, and a feeling of safety. The following excerpt is representative of the kind of descriptions given to this extent:

Actually it’s a very nice neighbourhood, and very safe. I feel it’s a very safe neighbourhood. And we have good high schools and schools around, and we have the [veteran’s hospital] a block away and the [local assisted-living residence], which is a retirement home. And we do pastoral care work there as well. It’s a very nice community. It’s a 15-minute walk up to [shopping mall]. We have a library there, drugstore. Everything you need is up there. (NGB)

There was a definite focus on the benefit of having services nearby, such as transit, banks, drugstores, and grocery stores. While most of the participants did not discuss the utility of these amenities in the context of a large-scale emergency, their existence provided participants with the ability to remain independent and self-sufficient, which, as noted above, were important aspects of their perceived efficacy with regards to preparedness.

The second prominent neighbourhood feature that appeared to be shared among the participants was a sense of personal safety. Most of the participants felt their neighbourhoods were very secure. For instance, as one respondent describes her apartment building:

Well, we're conscious of security in the building. You know, people are not supposed to...we do not let people in if we don't know them. And, you know, we all have locks on the doors and stuff like that. So, yes, it's much more secure I think than my [previous] house was. (JCH)

There were a few participants who indicated that a small amount of crime existed in their neighbourhoods; however, these participants did not feel personally threatened by these isolated incidents. Additionally, participants often attributed these acts to individuals who were not directly connected to the neighbourhood. For example, when asked if there was anything he disliked about his neighbourhood, the following participant responded:

Well we do have...Well, I don't say I dislike it. We have a certain amount of theft that goes on from people that are wandering around. So we haven't had really very much in the way of loss. We've lost five garbage cans with wheels on them because people steal them so that they can go around and collect bottles and take them back to the store.

(BZK)

When participants were asked why they felt safe in their neighbourhoods, most referred back to the sense of interpersonal trust they felt with regards to their neighbours, as described in the previous section. The prevalence of communication around the neighbourhood also contributed to some participants' feelings about the level of safety in their community. This included informal communication among neighbours: *"I have no evidence for it, you know, other than I never hear anything about anything going wrong...well anyway, we've never had anything stolen, I don't think, and I've never heard of anybody having anything stolen"* (BHD). A few participants described more formal community initiatives, such as neighbourhood bulletins and affiliated groups: *"And we do have a neighbourhood watch program, and they're in touch with people regularly"* (JDG). Whether formal or informal, neighbourhood communication did appear to be a salient feature of the participants' communities, which in turn contributed to their feelings of general safety.

In the process of reviewing the transcripts, it thus became apparent that the trust and sense of security felt within the neighbourhood appeared to support the participants' feelings of personal efficacy and resourcefulness in the event of future emergency. For many of the respondents, past experiences with community organizations also contributed to an overall belief that support would be available in future events. For example, one participant discussed the sense of community that exists in her apartment complex, which is structured as independent living units for seniors: *"This place opened eleven years ago and there's a lot of the same people here and a lot of them volunteer doing stuff around the complex, so they care about the place"* (JCH). When asked about her options for response in the event of a major emergency, the same participant responded, *"Where we live, we*

have an arrangement with [building across street]. If for any reason this place were not to be habitable, we could go there; and the same holds true the other way” (JCH).

On a related note, many of the participants also had positive personal experiences with local emergency responders in their neighbourhoods, which contributed to their feelings of safety and security, and by extension, a belief that they would be supported in the event of a major emergency. The experiences described by the respondents included personal health crises and minor neighbourhood disruptions, and in all cases, the participants felt they were properly assisted by local responders. One participant felt particularly comforted by her experience following the major fire in her apartment building:

But what I was so amazed at, and really why I wanted to tell you this was the wonderful way that the firemen took care of us. They were up here twice. Four of them came up, the ones on night duty, came up, rapped on my door. They rapped on my door; they nearly knocked the door down to make sure I was okay. And they insisted that I was all right. And when the new crew came in, four more of them came up, and they were the nicest, most handsome young men. I was delighted. I was very impressed with their care. They were really wonderful. (EWR)

When asked whether she felt this experience would repeat in the event of a future emergency, she replied,

Definitely, because when we had that fire, the place was crawling with police. We had emergency people in this building for months afterwards. OC Transpo [local transportation agency], they had buses here for people on that second floor who had no place to go who were fired out. I was astounded. I was very proud of the way they handled it. (EWR)

Thus, it became clear through the analyses of the respondents' narratives that their neighbourhood living environments were perceived as friendly and safe, and that respondents felt they had access to supportive neighbours if they required assistance. Furthermore, respondents described neighbourhoods in close proximity to resources that allowed them to independently maintain their social interactions and day-to-day needs, and which could be important in the event of an emergency. Finally, these positive feelings about their neighbourhood were reinforced by statements regarding their experiences with local emergency services, which were marked by positive interactions and overall satisfaction with the assistance they received when needed.

Discussion

The goal of this study was to examine the meaning that individuals apply to the concept of preparedness, with the additional objective of exploring this meaning within a social environmental context. To date, most research has measured individual preparedness through the use of checklists, or scales that assess individual knowledge about hazards and their mitigation. While these methods are useful for quantifying beliefs and behaviours, they overlook the subjective meaning individuals might ascribe to the state of 'being prepared' (Becker et al., 2012). This is important, since research has shown that self-reported ratings of perceived preparedness are often higher than reported rates of actual mitigation activities (Ablah et al., 2009; Basolo et al., 2009). Indeed, this divergence was found in the present study as well: When asked about specific preparedness activities as recommended by emergency managers, it was revealed that none of the respondents had created an emergency plan or assembled emergency supply kits; despite these attestations, the participants stated that they felt well-prepared for an emergency. The present study allowed for an extraction of the underlying reasons for these existing discrepancies through

the qualitative analysis of participants' subjective narratives; this has not been possible in previous studies reporting differences based on quantitative comparisons (Becker et al., 2009). These detailed accounts demonstrated how respondents subjectively characterized the meaning of preparedness in different terms than the behaviour-based operationalizations employed by experts in the field; this is not entirely surprising, given that distinctions have also been reported between experts and the public with regards to the conceptualization of risk (Fischhoff, Slovic, & Lichtenstein, 1982). Moreover, this study provided a platform to explore the relevance of various relevant social environmental contexts in preparedness – not only in terms of their link to protective behaviours, but also in terms of how they operate in the very formation of residents' subjective conceptualizations of preparedness.

The Subjective Meaning of Preparedness

In general, participants reported they had not given much thought to the topic of preparedness prior to volunteering for this study. This is not entirely surprising, given that the local region has been exposed mainly to minor hazard events, with more moderate events being fairly limited in geographic scope. Nonetheless, the participants shared many opinions and thoughts about their attitudes regarding preparedness. When asked about their own levels of preparedness, most participants stated that they felt prepared, and the most common reason given was because they had confidence in their existing personal resources. These included psychological resources such as the ability to remain calm under pressure, to think logically, and having an overall resilient character. In addition, participants felt they had access to sufficient material resources, such as a regular abundance of food and water, an alternative means to prepare food and stay warm (i.e. fireplace, barbeque), and for some, access to supplies such as batteries and radios. This focus on regular household supplies as a measure of self-appraised preparedness has been demonstrated elsewhere

(Becker et al., 2012), and it has been suggested such assessments may lead to overconfidence about coping in a major disaster (O'Sullivan, 2009). In the present study, many participants considered the cultivation of these supplies part of their daily life and a further representation of their logical nature, rather than an act of preparedness; this type of subjective representation of preparedness was similarly reported by Becker in colleagues (Becker et al., 2012).

The prominent discourse on personal resourcefulness ultimately translated to an understanding among this study's researchers about the greater meaning of preparedness for this group of individuals. More specifically, the respondents saw being prepared as possessing certain personal characteristics as outlined above, which were further reflected in supportive quotidian habits. In other words, the concept of being prepared was very much rooted in their sense of self as 'capable'. This type of self-characterization shares some commonalities with the concept of *self-efficacy*, which has been widely studied in disaster literature in relation to preparedness but with largely mixed reported results (Lindell & Whitney, 2000; Paek et al., 2010). Unlike most studies that examine self-efficacy for particular behaviours, the focus of the current study was a more general sense of confidence. In this context, the findings suggest that higher levels of self-efficacy may indeed be positively linked to *perceived* levels of preparedness; conversely, this appraisal may also attenuate one's belief that additional preparedness actions are necessary in order to mitigate personal disaster risk, thereby contributing to the aforementioned discrepancies between perceived and actual preparedness.

This meaning participants constructed with regards to individual preparedness (i.e. as a function of more general personal characteristics) was found to be facilitated in part by experiences originating from the participants' social environmental contexts – a finding that

has been reported in a similar qualitative study on preparedness (Becker et al., 2012). Firstly, in regards to the role of local context, participants spent a great deal of time discussing past experiences with disasters in this particular region. These experiences were generally minor with regards to negative personal outcomes, and in most cases this translated to a shared belief among many participants that future events in this area would also be relatively benign. Research has previously demonstrated that experiencing temperate personal outcomes might reduce levels of risk perception for future events (Heller, Alexander, Gatz, Knight, & Rose, 2005; Spittal et al., 2008); one study in particular found this to be especially true for older, long-term residents (Heller et al., 2005). This phenomenon, often referred to as *normalization bias* (Mileti & O'Brien, 1992), may warrant particular attention in local contexts where past emergency events have been relatively minor in severity. On the other hand, many participants also demonstrated awareness that other individuals nearby had suffered more serious consequences in these same events; this knowledge did not alter their own perceived susceptibilities in future events either, however. Research elsewhere has indeed shown that vicarious experiences of negative outcomes such as these are not linked to protective behaviours for future disasters (Paton, Johnston, Bebbington, Lai, & Houghton, 2001); instead, it may reflect a type of *optimistic bias* of perceived positive outcomes for the self in relation to others in the context of potential threats (Solberg et al., 2010). The current findings suggest that this comparative bias may actually be reinforced by the participants' conception of preparedness, because the assessment of future vulnerability is being framed in terms of existing personal characteristics instead of variable and circumstantial susceptibilities.

Beyond local context, the confidence participants had in their available resources was supplemented with a variety of positive social connections marked by interactions of

reciprocal support. This included family and friends, as well as contacts within various social communities, such as churches and social clubs. While the respondents asserted they felt capable of responding effectively in a future disaster because of their own available mental and material resources, they also expressed the belief that they could count on their family and close friends for assistance in the event of a future emergency. Many gave examples of personal challenges in the past that were mitigated with emotional or instrumental support from their family and friends, including a few examples during past emergency events; in turn, the respondents felt they could access these resources in future emergencies. In this particular group of residents, however, it should also be noted that the participants were equally, if not more, involved in providing this support as they were in receiving it. Most of the support given was informal, but several of the participants had also volunteered more officially in their communities. As such, participants' feelings of confidence with regards to their ability to cope in a future event were also framed in their past experiences of being able to help others: Indeed, proponents of social capital state that participation in community groups, and contributing to them, creates trust and feelings that helping behaviours will be repaid when assistance is needed (Dynes, 2006).

Previous studies have shown that individuals who receive social support specifically with regards to preparedness behaviours are more likely to prepare themselves (McGee et al., 2009). These networks may provide information about potential threats and mitigation activities (Heller et al., 2005; Wood et al., 2011), and the perception of shared norms that reflect positive attitudes about preparedness may encourage future behaviour in individuals (Becker et al., 2012). In the present study, however, there was very little reference made to discussions about preparedness taking place within these contexts. In fact, most participants claimed they had not given much thought to preparedness before volunteering for this

study. Instead, the perception of reciprocal social support reinforced the belief among participants that their existing resources (i.e. their ability to help others, and receive help when needed) were reflective of their overall ability to cope in an emergency, and by extension, self-confidence in their preparedness.

The identification of supportive social ties as a source of reinforcement for their perceived preparedness was further demonstrated in participants' descriptions of their neighbourhood contexts. More specifically, the respondents all had friendly relationships with their neighbours, and although many of these relationships were impersonal and casual, all the participants felt they could count on their neighbours for help in an emergency. While some participants cited previous concrete examples of support they had received from these social contacts, other participants extrapolated the future availability of these resources from feelings of general trust and reciprocity among their neighbours. This is once again indicative of perceived social capital. At the community level, social capital has been tied to taking protective action in the midst of a disaster (Kim & Kang, 2010), as well as increased positive outcomes following a disaster (Moore et al., 2004). However, the link between social capital and preparedness before an event is unclear and continues to be debated (Bihari & Ryan, 2012; Buckland & Rahman, 1999; Kim & Kang, 2010). In the present study, it appears that the presence of social capital in the community serves as additional reinforcement for the confidence participants have in their existing resources as a sufficient assessment of preparedness, in conjunction with their perceived support among close social networks.

In terms of the actual neighbourhoods themselves, participants described safe and secure living environments, and having access to a range of services. While the reported sense of belongingness and attachment to these neighbourhoods varied across participants,

each had overall positive impressions of their living environments. Researchers have suggested that attachment to a neighbourhood may be more important for motivating protective behaviours than satisfaction alone, however (Stedman, 2002), especially when mitigation activities may also preserve the built environment. Furthermore, disaster researchers have identified the importance of community networks as information sources in a large-scale disaster (Marsh & Buckle, 2001; Perry & Lindell, 2003); however, none of the participants reported discussing preparedness in this context. On the other hand, some participants asserted that communication among neighbours about neighbourhood happenings reinforced feelings of security and safety for the participants, which did contribute to their overall feelings of confidence and perceived preparedness. Participants also felt they were well-positioned in an emergency because they had access to various useful amenities, such as hospitals, grocery stores, and collective community spaces – all potentially beneficial to have nearby in a disaster, and thereby supportive of any feelings of confidence the participants shared.

Finally, the sense of security participants felt in terms of future emergency events was reflected in statements about previous experiences with emergency responders. These situations ranged from personal emergencies to small-scale disasters such as a building fire. In all cases, participants felt that the emergency responders were available when needed, and acted competently. Research has shown that having confidence in government with regards to emergency response is related to perceived individual preparedness (Basolo et al., 2009), but the link to actual preparedness is not straightforward. For example, studies have shown that too much confidence in institutional emergency response may attenuate feelings of personal susceptibilities, and be related to lowered actual preparedness (Becker et al., 2012; McGee et al., 2009). While there is no evidence that confidence in emergency

responders influenced preparedness directly in the present sample, it remains that the feelings of security and safety related by the participants in regards to their neighbourhood contexts did provide further support for their shared perspective that they were well equipped to respond in a future event.

In summary, the apparent discrepancy between perceived preparedness and reported preparedness activities as outlined by the participants in this study seemed to originate in the participants' conceptualization of preparedness, which was framed in terms of one's personal belief in their ability to cope, more so than an adherence to prescribed preparedness activities. This formulation of the meaning of preparedness was further reinforced by the existence of an auspicious social environment, including a local context where major disasters are fairly uncommon experiences, and future events were considered by most to be unlikely. These social environments were also marked by the prevalence of favourable living environments, in addition to the existence of social networks and relationships marked by trust, reciprocal support, and community involvement. These social environmental attributes enriched the participants' perceived availability of resources, thus enhancing feelings confidence with regards to their own ability to respond and by extension, their perceived preparedness.

Implications for Research and Policy

The findings presented above have important research and policy implications. First, the importance attributed to social environment in these interviews supports the assertion that regional and population-specific considerations should be recognized in preparedness strategies whenever possible and appropriate, in balance with elements that operate in an all-hazards approach (Paton & Johnston, 2006). Future research should also be careful to evaluate the determinants of preparedness while keeping in mind the possible

variations in social environment that may impact these pathways (Patterson, Weil, & Patel, 2010). Furthermore, these results validate claims that researchers should give more consideration to how residents make meaning with regards to their own preparedness, when exploring these determinants (Reser & Morrissey, 2005). In the present study, divergences between perceived and actual preparedness were not only linked to risk perceptions and efficacy beliefs, but also the very way in which preparedness was operationalized by respondents. Comparisons between perceived and actual preparedness may therefore be based on qualitatively different constructs, which is important when discussing barriers to individual preparedness in disaster research.

The fact that residents in this study conceptualized preparedness as a part of an existing self-concept as opposed to a set of prescribed behaviours may help explain why current preparedness campaigns are ineffective at motivating preparedness. More specifically, the current goal of most emergency preparedness campaigns is to increase knowledge and awareness about hazards and their mitigation (Basolo et al., 2009). It is believed that effectively providing this information should convince people to prepare, but research indicates these strategies are often not effective (Ablah et al., 2009; Basolo et al., 2009; Sagala, Okada, & Paton, 2009). To be sure, if participants feel that preparedness is something they already possess as part of their identity, providing information about potential hazards and prescribed mitigation activities alone may not be sufficient to motivate people to create emergency plans and gather supply kits. Furthermore, if this appraisal is strongly rooted to the social elements of one's self concept, attempts to challenge this identity (for example, through the dissemination of current preparedness initiatives that suggest they are not prepared) may actually be met with indifference, or even resistance. This phenomenon has been discussed in related areas of health promotion,

such as vaccination campaigns, (Fortune & Wilson, 2007; Invernizzi, Falomir-Pichastor, Munoz-Rojas, & Mugny, 2003). Likewise, Solberg and colleagues (Solberg et al., 2010) also suggest in their review of the international literature that appealing to social identities may be one way of improving individual preparedness. Future research should thus explore the role of social identities in the formation (and transformation) of attitudes and behaviours regarding preparedness.

In the current study, the respondents saw themselves as strong, capable, and resilient, and many participants used these strengths to provide support to others in their social networks and greater community. As such, appealing to their self-identified roles as helpers and the importance of formal preparedness to enhance these roles may have more salience for these individuals than efforts to increase their knowledge and risk perception for hazards. Researchers have argued in the past that appealing to personal risk perceptions is not as effective as focusing on more general societal risk perceptions (Kim & Kang, 2010; Sjöberg, 2003), and given the demonstrated tendency in the current study towards optimistic bias, it would seem that focusing on these individuals' roles as sources of strength and support in their communities may be more effective at motivating further preparedness actions. This notion is further supported by Becker and colleagues (Becker et al., 2012), who found that respondents were more likely to have a sense of responsibility towards individual preparedness when they were actively involved in their communities. Researchers may wish to further explore the role of the social dimensions of risk in facilitating preparedness, and policy makers may wish to review their preparedness strategies in terms of the message they wish to convey.

On a related note, for the participants in this study, it was clear that their social environments included a wide range of social networks. While the respondents did not

report discussing preparedness with these contacts, focusing on these networks may present future opportunities to increase preparedness behaviours. As previously mentioned, social networks can facilitate preparedness through the provision of information, and researchers argue that dissemination of preparedness initiatives from multiple channels – especially when those channels are trusted sources – are more effective than information provided by emergency management sources alone (Basolo et al., 2009). Of course, engaging with these networks to encourage the sharing of information presents its own challenges. Dynes (2006) suggests utilizing community organizations, such as faith-based organizations, to appeal to individuals about preparedness. For the most part, these organizations are more likely to be concerned with community service (Patterson et al., 2010) and are often open to the idea of reaching out to those less fortunate; at the same time, it has been shown that these organizations do not often consider preparedness for their own benefit (for further discussion, see Patterson et al., 2010). Emergency managers may therefore wish to engage with organizations in their communities to facilitate the dissemination and encouragement of individual preparedness strategies. Community organizations have been shown to provide assistance to individuals in the aftermath of a disaster (Koh & Cadigan, 2008; Moore et al., 2004), so it makes sense to consider them as facilitators of preparedness as well. In turn, promoting a social climate that embraces the utility of active preparedness will reinforce norms among its members, which has been shown to facilitate individual preparedness as well (Wood et al., 2011).

Limitations and future directions

This study examined how social environment operated in the creation of meaning with regards to preparedness in a small, purposive sample of elderly residents in Ottawa, Canada. While the sampling strategy used here provided rich information about the shared

experiences of this group, it is highly context-specific, and is not necessarily generalizable to the wider population. This is typical of most qualitative research, where the goal is not to extrapolate to large groups, but to offer nuanced information that can help inform future research. It would be advantageous to consider supplementing the findings in these interviews with comparable quantitative research to examine the salient themes and relationships in a more controlled and generalizable domain, while keeping in mind the possible relevance of social environmental specificity. For example, the current study took place in a region with relatively limited past exposure to major hazard events, in a comparatively affluent municipality with ample social services. To be sure, similar studies conducted in areas with greater social disorganization or more pervasive past experiences with major disasters could certainly yield somewhat different results. This study provides an excellent point of comparison to explore these nuances in the future.

One reason the elderly were chosen as the homogenous demographic in this study was made in part because they are often distinguished as a ‘vulnerable’ group in disasters (Lemyre, Gibson, Zlepzig, Meyer-Macleod, & Boutette, 2009), and research has shown that elderly individuals often face special challenges in disasters (Klinenberg, 2002), and by extension, in the effective undertaking of individual preparedness (Peek, 2010). However, as stated here and elsewhere (Dynes, 2006; Fernandez, Byard, Lin, Benson, & Barbera, 2002; Peek, 2010), it should be noted that being elderly in and of itself is not a source of increased susceptibilities to negative outcomes or preparedness barriers; rather, these challenges are usually tied to “...impaired physical mobility, diminished sensory awareness, pre-existing health conditions, and social and economic constraints” (Fernandez et al., 2002, p.67). While some of the respondents did report having health issues that could create special needs or complicate their ability to respond in an emergency, these

participants did not appear to experience any obvious social or economic disadvantage based on the information in their individual narratives, personal demographic information, or in the descriptions and researcher observations of their residential neighbourhoods in which the majority of these interviews took place. As such, given the strong social ties and relatively privileged backgrounds of the participants, it remains that in future disasters they may actually be in a relatively advantageous position despite their lack of preparedness. Paton and colleagues (2001) reported in their research that the oldest age group actually reported lower psychological vulnerability and more social support than younger residents in the aftermath of a disaster, which may be indicative of having a positive pre-disaster social environment.

While the demographic background of this particular sample does not limit the significance of the findings or their implications, it remains that individuals experiencing more social disadvantage may have very different conceptualizations of preparedness, including how these beliefs operate in relation to the self and the social environment. It would therefore be useful in future research to conduct similar interviews with elderly residents in other contexts, as well as with other purposive samples in general, to further explore the development of meaning with regards to preparedness and the role of social environmental elements for these groups. Again, this research could be supplemented with quantitative investigations to test emerging relationships between internal processes, social environmental characteristics, and preparedness behaviours, as appropriate, to help inform policy makers about how best to approach targeted preparedness strategies.

Conclusion

In summary, the present study demonstrates that in the greater discourse about individual emergency preparedness, it is important to consider the subjective meaning that

residents form with regards to this protective action, in addition to measuring levels of perceived and actual preparedness. For this particular group of respondents, preparedness was equated with having a logical and resilient character and access to resources and support in daily life; this belief appeared to have more salience for participants than performing prescribed activities, such as having an emergency plan or assembling emergency kits. In addition, this conceptualization was strengthened by the experiences participants had in various facets of their social environment, including the quality of their past experiences with disasters in the region, access to plentiful and supportive social contacts, demonstrating regular helping behaviour in their community, and living in seemingly safe and resource-rich neighbourhoods. These factors indirectly provided confirmatory reassurance that no increase in their preparedness activities was needed. While the role of social networks in the current context may seem to act as a barrier to preparedness, it also provides opportunity: Specifically, focusing on existing social networks, and related concepts such as social capital, allows for the acknowledgement of these systems as "...active resources, not passive victims, shifting the focus away from human vulnerability toward an emphasis on human capability" (Dynes, 2006, p. 23).

While these circumstances were specific to this group of individuals and may not reflect preparedness conceptualizations in the general population, these results emphasize the need to consider social environmental context in the effort to increase individual emergency preparedness. This requires additional studies that explore residents' narratives surrounding preparedness, which can be accomplished using various qualitative research designs, as well as quantitative research that explores and verifies specific pathways implicating social environmental elements – for instance, the role of risk perceptions and coping appraisals in preparedness as they relate to various demographic groups, or the role

of socially-based neighbourhood factors in preparedness. Continued attention to social environmental context is important because, as Oliver-Smith (1996) writes, "...early positive responses to disasters should be based on greater local understanding of social and physical environments for the reduction of both short and long-term losses" (p.306). The present study reflects this perspective, and is thus a valuable contribution to the disaster management literature.

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Foreword to Chapter 3

The first article provided subjective context in terms of how people develop their attitudes about preparedness, and produced detailed information on the interplay between social environmental factors and the internal processes commonly associated with emergency preparedness, such as coping efficacy and risk perceptions. As a result, one major finding was that this group of individuals did not see the threat of disasters as severe, partly due to their past experiences over the years overcoming emergencies and other personal hardships. Since the sample employed in that research was a group of elderly residents, it is possible that their age, or their relatively privileged social position, played a role in these attitudes and beliefs in addition to the reported factors in their social environment.

The following thesis study supplements these findings with quantitative data from a public survey to provide further insight regarding the nature of these relationships and strengthen the validity of current findings. To this end, this second study will explore more precisely the role of various demographics (including age, as well as SES, etc.) in the formation of cognitive appraisals related to terrorism threats (including coping efficacy and risk perceptions), and their relationship to subsequent preparedness/response behaviours. These analyses will demonstrate whether differences in social demographics with regards to preparedness can be explained by differences in these cognitive appraisals, or whether social environmental characteristics may play a more direct role.

CHAPTER 3: EXAMINING SOCIODEMOGRAPHICS AND THE MEDIATING ROLE
OF COGNITIVE APPRAISALS IN PREPAREDNESS

RUNNING HEAD: Predicting emergency response among Canadians

Predicting emergency response intentions among the Canadian public: Examining
sociodemographics and the mediating role of cognitive appraisals for terrorist threats

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Abstract

A great deal of research in emergency preparedness has examined differences in behaviour based on sociodemographic attributes (Phillips, Thomas, Fothergill, & Blinn-Pike, 2010). While some researchers have claimed that these differences may be related to differences in cognitive-affective appraisals, such as risk perception and coping efficacy, this relationship is rarely tested empirically in the literature. The following study is a secondary analysis using data from a national survey on Canadians' perceptions of terrorism threats (Lemyre, Lee, Turner, & Krewski, 2007). The current investigation examines the mediational role of cognitive-affective appraisals on the relationship between sociodemographic attributes and anticipated emergency response in the context of potential terrorism threats, in a representative sample of the Canadian public (N=1502). Findings reveal that the unique contributions of a number of sociodemographic characteristics such as gender, age, education, and income were significantly related to anticipated emergency response. In addition, cognitive-affective appraisals including two measures of risk perception for terrorism threats were found to differ significantly by sociodemographic attribute, and were also significantly related to anticipated emergency response. A multiple mediation test revealed that with the exception of gender, these differences in risk perception did not significantly explain the aforementioned differences in anticipated response in the context of sociodemographic characteristics. These results demonstrate that while these individual-level differences in appraisal are important considerations in emergency preparedness and response, further research should also consider the broader contextual factors relevant to at-risk demographic groups to better explain these relationships. Implications for future research and policy are discussed.

Predicting emergency response intentions among the Canadian public: Examining sociodemographics and the mediating role of threat appraisals for terrorist threats

As with many emergency events, terrorist attacks usually occur with little or no warning. The unpredictable quality of these threats is compounded by the fact that terrorist attacks can take a number of forms: Chemical, biological, radiological, nuclear, and other explosive attacks (CBRN-E); agricultural terrorism; and even cyberterrorism. In order to ensure that physical, psychological, and material damage to the public is minimized, emergency managers and public safety officials must be able to respond with diverse measures; this can include orders of evacuation, sheltering-in-place, mass decontamination, and quarantine, among others. While unique obstacles threaten the successful execution of each of these actions, their ultimate effectiveness is commonly hinged on the public's willingness and ability to respond to such emergency directives. Past research has identified a number of related factors that may hinder the uptake and execution of response directives. These include cognitive components, such as risk perception and coping efficacy (Lee & Lemyre, 2009; Gibson, Lemyre, Clément, Markon, & Lee, 2007; Riad, Norris, & Ruback, 1999; Rogers, Amlot, Rubin, Wessely, & Krieger, 2007), and socially-relevant demographic attributes, including age, gender, income, education, and ethnicity (Riad et al., 1999; Bateman & Edwards, 2002; Phillips et al., 2010; Ablah, Konda, & Kelley, 2009). Additional links between sociodemographic features and cognitive threat appraisals for emergency events have also been established (Vaughan & Nordenstam, 1991; Botzen, Aerts, & van den Bergh, 2009). However, few studies to date have explicitly examined the nature of these interconnected relationships – for instance, whether the association between sociodemographic factors and emergency response might actually be *explained* by differences in cognitive threat appraisals. As such, the goal of this study is to explore the

direct and indirect relationships between various sociodemographic factors, cognitive threat appraisals, and emergency response intentions in the context of terrorism threats.

Links between sociodemographics and emergency response

One major component in emergency response involves the public's reaction to official instructions provided by emergency managers. The successful implementation of these behaviours is an important mitigating factor in the reduction of personal negative consequences. This may be especially salient for those social groups who are more susceptible to the negative consequences of emergency events, such as those with lower income, lower education, women, the elderly, and visible minorities (Ng, 2009; Botzen et al., 2009; Lemyre, Gibson, Zlepnig, Meyer-Macleod, & Boutette, 2009). Unfortunately, research on natural disasters suggests that emergency warnings and directives can be less effective in mobilizing these at-risk groups (New York Academy of Medicine, 2004; Phillips et al., 2010; Perry, Lindell, & Greene, 1982; Fothergill & Peek, 2004). For example, Perry and his colleagues (1982) found that in response to flood warnings, Mexican-Americans were less likely to evacuate than whites. Lower flood responses have been similarly reported for the unemployed and low-income women (Fothergill & Peek, 2004). Gladwin and Peacock (1997) found that the poor, the elderly, and ethnic minorities were less likely to evacuate during a hurricane. In other instances, however, these lower response rates are not found (Zhang, Prater, & Lindell, 2004; Bateman & Edwards, 2002).

Researchers argue that social group differences in disaster-related susceptibility, consequences, and behaviours are rooted in more general social vulnerability. This perspective acknowledges that it is not the sociodemographic feature in and of itself that produces this vulnerability, but rather, the related social inequalities imposed on individuals belonging to these social groups (Phillips et al., 2010). These social determinants of

disadvantage have been widely studied in related research on health, and their link to health behaviours has been well established (Hobfoll, 2002; King et al., 2005; Cooper & Guthrie, 2007). The term *vulnerability* should be interpreted with caution, however. While increased risks and susceptibilities may be present in these groups, it stands that each disadvantaged social group also has the potential to act as valuable resources in the mitigation process, through their knowledge and experiences. The term *vulnerable* potentially and inadvertently ignores these assets, and shifts the focus of this increased risk from the pathways to the individual (Lemyre et al., 2009). Stated otherwise, the negative connotation associated with the term '*vulnerable*' may inadvertently marginalize these individuals further. As such, the terms *at-risk* and *higher-risk* are more appropriate in the context of this study, and will be used instead.

As mentioned above, the decision to respond to official emergency messages and warnings is made in the context of pre-existing psychosocial, physical, and economic circumstances which may hinder effective response. For example, low-income families must dedicate more financial resources to basic necessities, so that the required resources for emergency response (i.e. transportation, finding alternative shelter, staying home from work) are more difficult to manage (Dash, McCoy, & Herring, 2010). Likewise, some at-risk groups, such as the elderly, are more prone to isolation (Klinenberg, 2002; Fernandez, Byard, Lin, Benson, & Barbera, 2002), making it more difficult to ensure they receive, and can respond to, emergency messages. Social conditions can also lead to differential affective reactions to the emergency messages themselves, which may influence individual responses. For instance, the New York Academy of Science conducted a large-scale study on potential individual reactions to a smallpox outbreak, including one's willingness to follow vaccination protocols (Lasker, 2004). It was shown that trust in officials was a major

component in this decision-making process, and that at-risk groups such as visible minorities, immigrants, and those with lower SES reported higher levels of distrust (Lasker, 2004).

Research such as that outlined above has led investigators to understand that individuals do not make emergency response decisions based solely on the content of warning messages, nor exclusively on their material resources, but also on the manner by which they interpret their personal circumstances and the information available to them (Sagala, Okada, & Paton, 2009). A major component of this process often studied by researchers in emergency preparedness involves examining the evaluations made by individuals regarding the inherent danger of the hazard in question; this concept is commonly represented by cognitive threat appraisals such as risk perception and coping efficacy, which are discussed in more detail below.

The role of cognitive threat appraisals in preparedness and response

While it is important to acknowledge the complexity of emergency response behaviours, and the contribution of various other factors, it remains that how one perceives a threat is also an important indicator of how they will respond in an emergency (Fischhoff, de Bruin, Perrin, & Downs, 2004; Lee & Lemyre, 2009). As Perry and his colleagues (1982) argue, “For any adaptive response to be defined as necessary, the individual must perceive the threat described in the hazard warning as real. Unless the warning is *believed* to be valid, individuals are not likely to undertake protective measures” (p.98). Indeed, research on emergency preparedness in the face of terrorism threats has shown that risk perception is a major factor in people’s decisions to engage in preparedness behaviours (Lee, Dallaire, & Lemyre, 2009; Lee & Lemyre, 2009; Rogers et al., 2007). This has also

been demonstrated in research on various natural disasters (Miceli, Sotgiu, & Settanni, 2008; Mulilis & Duval, 1997).

As with research on emergency response behaviours, some evidence suggests that socially disadvantaged groups interpret the risk of emergencies differentially (Stevens et al., 2009; Botzen et al., 2009; Fothergill & Peek, 2004). For instance, studies have reported that when marginalized individuals are more skeptical of warning messages, they may also perceive the messages as conveying a lower level of danger (Perry et al., 1982; Fothergill & Peek, 2004). Likewise, Vaughan (1995) found that those with a low SES were more likely to minimize chronic risks, especially when they were related to economic factors. It should be noted, however, that the size and direction of these differences in risk perception has not been consistently reflected in empirical data (Vaughan & Nordenstam, 1991; Dash et al., 2010): There have been reports of higher perceived risk among economically and ethnically diverse groups in emergency events, while other research has found no such difference (Fothergill & Peek, 2004; Phillips et al., 2010; Fothergill, Maestas, & Darlington, 1999).

Some researchers believe that such inconsistent findings in the risk perception literature could be related to differences in the operationalization and measurement of threat appraisals (Vaughan & Nordenstam, 1991). To begin, there is a great deal of evidence that individuals' risk perceptions differ, depending on who is targeted by the risk. It has been well-documented, for instance, that individuals have a pervasive tendency to perceive lower risks to themselves than they perceive for others – a phenomenon referred to as *optimistic bias* (Weinstein, 1987; Sjöberg, 1999). Along these lines, it is possible that when judging the risk of events such as terrorism, individuals primarily consider the impact of more widespread societal consequences – such as indirect effects and psychosocial sequelae in others – versus their own personal risk.

Over the past three decades, research in risk perception has also striven to explore the qualitative nature of threat appraisals, demonstrating the importance of looking beyond probabilistic judgments of harm or mortality when conducting research on risk perceptions (for example, Lee & Lemyre, 2009; Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Slovic, 1987). Lee and colleagues (2009) found that terrorism risk perceptions could be represented by four inter-related cognitive dimensions: Perceived Probability, Seriousness, Personal Impact, and Coping Efficacy. The first three dimensions roughly correspond to the extent to which the consequences of terrorism are understood and viewed as serious, while taking into account both personal and societal targets; the last (perceived coping efficacy) reflects the degree to which these consequences are perceived as controllable. Additional analyses revealed that these cognitive threat dimensions were differentially associated with related affective and behavioural outcomes, further demonstrating the complex nature of this much-researched construct.

Towards a better understanding of risk perception and emergency response in higher-risk groups

The research reviewed above suggests that in order to effectively provide emergency response instructions to higher-risk groups, the potential accompanying barriers must be considered. As outlined above, two factors often examined in the literature include sociodemographics, and cognitive appraisals such as risk perception. Associations between these factors and emergency response behaviours have been investigated independently, but few attempts have been made to determine whether differences in cognitive appraisals may explain the behaviour differences between sociodemographic groups (Bateman & Edwards, 2002; Riad & Norris, 1998; Lindell & Hwang, 2008). These studies offer important contributions, but unfortunately they either provide insufficient statistical information to

properly assess mediation (Lindell & Hwang, 2008; Riad & Norris, 1998), or focus on one sociodemographic feature in isolation (Bateman & Edwards, 2002). Moreover, the differentiation between personal and societal risk, or whether the individual is considering the likelihood, the severity, or the controllability of the hazard in question, are important distinctions that must be specified. While researchers generally understand risk perception as a complex phenomenon, the elements of cognitive threat appraisals are usually ignored or examined in isolation, thereby limiting our understanding of their association with emergency response behaviours. As such, examining the mediating effects of various threat appraisal elements in combination would greatly improve our understanding of these relationships.

Goals and Objectives

In order to better understand the barriers to effective mobilization, the goal of the current study is to examine the role of risk perception in the relationship between sociodemographic attributes and emergency response behaviours, using data from a previously conducted national survey on Canadians' perceptions regarding terrorism threats (Lemyre et al, 2007). The objectives of the present study are to first predict emergency response intentions from a series of sociodemographic attributes (gender, age, income, education, and visible minority status). The relationship between these sociodemographics and multiple cognitive threat appraisals will similarly be explored. Finally, the mediating effects of these cognitive dimensions in the relationship between sociodemographics and emergency response intentions will be explicitly tested via multiple mediation analyses. The conceptual diagram for these objectives, in the context of the literature review presented above, is presented in Figure 8.

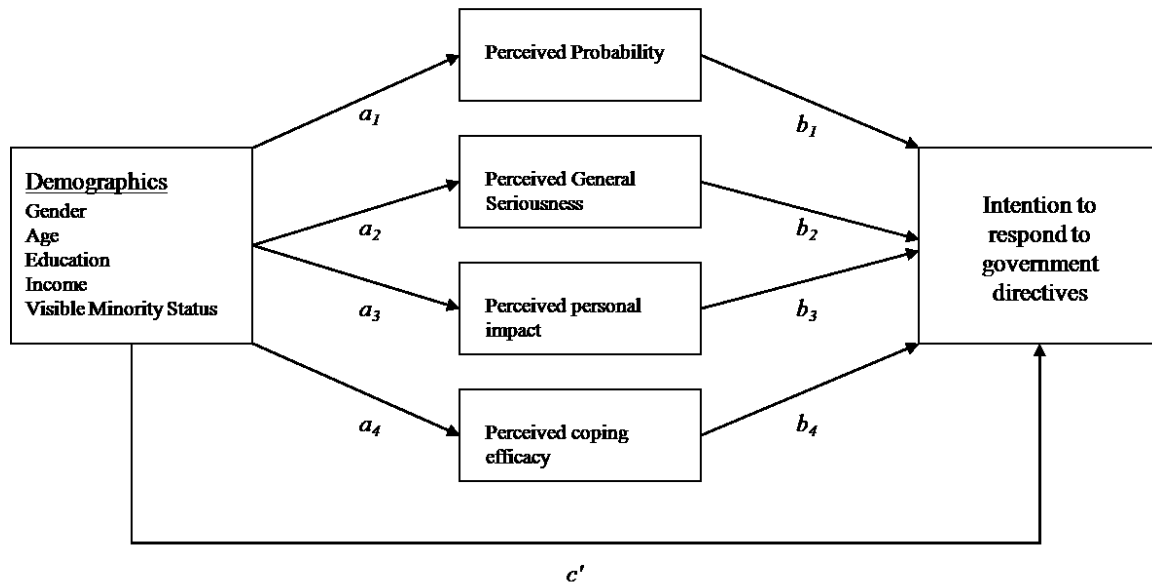


Figure 8: Model specifying relationships between sociodemographic variables, threat appraisal items, and emergency behavioural intentions.

Method

Participants

Respondents from the *National Public Survey of Perceived Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Terrorism Threat and Preparedness* (Lemyre et al., 2007) included 1502 individuals over the age of 18 (51.3% women and 48.7% men), as part of a stratified random sample of the Canadian public. The final sample was weighted to be representative of the population in terms of residential region (i.e. Atlantic region [Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick]; Quebec; Ontario; Prairies [Manitoba and Saskatchewan]; Alberta; and British Columbia. Territories were not included in this sample), age group (18-24, 25-34, 35-44, 45-54, 45-54 and 55-over), and gender for each region, as reflected in 2001 Census data.

Measures

All measures used in the present study were created during the original development of the survey. A description of the variables selected for use in the present investigation is provided below.

Emergency response intentions. To assess emergency response intentions, respondents rated their willingness to follow government-issued emergency instructions in reference to a potential future terrorist attack (“If terrorism occurred, government authorities might request cooperation from the public in a number of ways. Please indicate how willing you would be to perform each of the following if you were asked to by government authorities.”) The behavioural responses in question included: Evacuation of the city or region; receiving vaccination; taking prescribed medication such as antibiotics; undergoing decontamination treatment, such as a public shower; agreeing to remain inside a building for protection (sheltering-in-place); agreeing to strictly isolate oneself from

others (quarantine); and going to a public shelter. Respondents answered on a five-point Likert scale as follows: 1 = Not at all; 2 = A little; 3 = Moderately; 4 = Very much; 5 = Extremely.

Cognitive Threat Appraisals. Based on previous analyses examining the factor structure of cognitive appraisals for terrorism threats (see Lee & Lemyre, 2009), perceptions of terrorism were assessed on four cognitive factors: Perceived Probability, Perceived Seriousness, Perceived Personal Impact, and Perceived Coping Efficacy. Perceived probability was calculated by averaging respondents' scores on their attitudes about both the perceived likelihood and the perceived uncertainty of five different terrorist events (i.e. chemical, biological, radiological, nuclear, and explosives terrorism). The remaining scales were created by averaging the scores of respondents' attitudes regarding each factor (perceived seriousness, perceived impact, and perceived coping efficacy) on the same five terrorist events (i.e. chemical, biological, radiological, nuclear, and explosives terrorism). Ratings for all items were based on a 5- point Likert-type scale (1 = not at all, 5 = extremely).

Age. Age was measured by asking respondents '...in which of the following age categories do you belong?' As previously stated, age-group categories included 18-24, 25-34, 35-44, 45-54, 45-54 and 55-over. If a respondent refused to answer this question, it was duly noted.

Gender. Gender was measured by having the interviewer note the gender of the respondent during the interview.

Education. Education was measured by asking respondents to identify their education category ('In which education category do you belong?') Categories included: 'Some/completed elementary school'; 'some/completed high school'; 'some/completed

community college (CEGEP in Québec)'; 'some/completed university'; 'some/completed graduate school'; and 'refuse to answer'.

Income. Income was measured by asking participants to identify the category which best represented their total household income. Categories included 'under \$19 999'; '\$20 000 - \$29 999'; '\$30 000 - \$39 999'; '\$40 000 - \$49 999'; '\$50 000 - \$59 999'; '\$60 000 - \$69 999'; '\$70 000 - \$79 999'; and '\$80 000 and over'. A 'refuse to answer' category was also included.

Visible minority status. Visible minority status was assessed by asking respondents 'Are you a member of a visible minority group?' If the respondent answered yes, they were asked to specify the group as a follow-up question. If respondents did not know the answer, the interviewer noted the response.

Procedure

A nationally-representative survey on Canadians' perceptions of terrorism threats was originally conducted via telephone interviews between November 15th and December 15th, 2004. Stratified random sampling was achieved by using random digit dialling. The 1502 interviews completed represented 9.7% of valid answered calls. During administration of the survey, lists of items within sections were sequenced randomly to balance for possible order effects. Interviews lasted approximately 35 minutes.

Analyses

All analyses were conducted using PASW Statistics 18 (formally SPSS). Variables were first screened for missing data, outliers, and normality, as well as for violation of assumptions related to regression analysis. One variable (income) was found to be higher in missing values (11.5%), relative to other variables; these cases were subsequently estimated

using the multiple imputation (MI) feature¹. The dependent behavioural variables were then pooled by averaging respondents' ratings for each of the behavioural mobilization items. Survey weights were used throughout all analyses, to ensure that the sample would be representative of the Canadian population. Design effects related to this stratified sampling procedure have been examined in a random subsample of variables, and are found to be close to 1 (ranging from 0.99 to 1.00); this indicates that analyses of the data using simple random sample variances would be adequate.

The relationships between sociodemographics, risk perception items, and emergency response intentions were examined² using the SPSS macro and accompanying syntax for multiple mediation tests, as introduced by Preacher and Hayes (2008). In this particular method, multiple mediators can be tested simultaneously, which allows for a comparison of the combined and individual mediating effects, while reducing possible error relating to multiple inferential tests. Unlike the widely used causal steps approach made popular by Baron and Kenny (1986), this approach *directly* calculates mediated effects by calculating the product of the coefficients for the *a* and *b* paths (*ab*) in each mediation model (see Figure 8). This is widely accepted as a logical way to quantify mediated effects (Hayes, 2009; Preacher & Hayes, 2008; MacKinnon, Fairchild, & Fritz, 2007). Significance testing of the effects is then conducted via bootstrapped bias-corrected confidence intervals for each indirect effect. This method is considered a powerful and valid strategy to directly test indirect (mediated) effects (MacKinnon et al., 2004; Hayes, 2009).

¹ MI produces several datasets on which to perform analyses (in this case, five datasets), with results pooled by data analysis software. Since this pooling option was not available for the current analysis, each dataset was examined to rule out major discrepancies in the results, with the first imputed dataset being used in this analysis.

² In all instances, the predictor variables (i.e. gender, age, education, and income), were examined in a manner congruent with standard multiple regression analyses: That is, along with the combination of all predictors, each was examined independently while controlling for the other predictors in the model. For comparative purposes, the analyses were also run separately for each individual predictor, thereby preserving the shared variance in addition to the unique contribution. Given the similarity of the findings for these two approaches, and for the sake of brevity, the findings of this latter approach are not subsequently discussed in this paper. However, the results may be obtained by contacting the first author.

In calculating the mediation tests, the syntax also provides results for each individual path in the model. It should be noted that the reporting of these individual paths is not necessary to demonstrate a mediation effect, since they are reflected in the point estimates of the indirect effects. However, these paths (specifically, the relationship between the sociodemographic variables and emergency response intentions, as well as the relationship between sociodemographic variables and the risk perception variables) are independently relevant to the current study. As such, these unmediated results are presented initially below, followed by the mediation results.

Results

Since this analysis utilizes listwise deletion for all missing cases on predictor, mediator, and outcome variables, a total of 50 participants were removed from all subsequent analyses. In terms of emergency behavioural intentions, participants reported agreement with the response category that they would be *quite likely* to follow emergency directives ($\bar{X} = 4.82$, $SD = 0.88$). Mean scores for the risk perception items were as follows, from highest to lowest: Perceived general seriousness ($\bar{X} = 4.02$, $SD = 0.83$); perceived personal impact ($\bar{X} = 3.55$, $SD = 0.99$); perceived coping efficacy ($\bar{X} = 2.86$, $SD = 1.06$); and perceived probability ($\bar{X} = 2.19$, $SD = 0.77$). Frequencies for each of the socio-economic variables are presented in Table 2. Bivariate correlations for all the variables of interest, including emergency behavioural intentions, risk perception items, and sociodemographics, are provided in Table 3. Results revealed small but significant correlations between emergency response intentions and all demographics except for visible minority status; this could be related to sampling restrictions (see discussion for an

elaboration). Since meaningful conclusions about this potential relationship cannot be established, this variable is not considered in subsequent analyses.

Table 2

Frequencies of sociodemographic variables (N = 1502)

Variable	Categories	Frequency	Percentage
Age	18-24	175	11.7%
	25-34	251	16.8%
	35-44	340	22.7%
	45-54	292	19.5%
	55-64	197	13.2%
	65 and over	241	16.1%
Noted Gender	Male	731	48.7%
	Female	771	51.3%
Income	Under \$19 999	158	11.9%
	\$20 000 - \$29 000	167	12.5%
	\$30 000 - \$39 000	166	12.5%
	\$40 000 - \$49 000	159	11.9%
	\$50 000 - \$59 000	151	11.3%
	\$60 000 - \$69 000	129	9.7%
	\$70 000 - \$79 000	88	6.6%
	\$80 000 and over	314	23.6%
Education	Some/completed elementary school	57	3.8%
	Some/completed high school	379	25.4%
	Some/completed community college or CEGEP	433	29.0%
	Some/completed university	443	29.7%
	Some/completed graduate school	182	12.2%
Visible Minority Status	Yes	95	6.4%
	No	1379	93.6%
	Don't know	28	2

Note. Frequencies do not sum to N due to missing data

Table 3

Intercorrelations between emergency behavioural intentions, sociodemographics, and threat appraisal variables

	1	2	3	4	5	6	7	8	9	10
1. Emergency behavioural intentions	--	.09**	.06*	.13***	.13**	.00	.11***	.20***	.23***	.03
2. Age		--	.08**	-.07**	-.11***	.01**	.02	-.11***	.01	-.08**
3. Gender			--	.03	-.09**	-.09**	.15***	.19***	.18***	-.09***
4. Education				--	.34***	-.06*	-.15***	-.08**	-.07**	.09**
5. Income					--	.05	-.05*	-.01	-.03	.09**
6. Visible minority status						--	-.02	-.06*	-.02	-.01
7. Perceived probability							--	.35***	.36***	-.05
8. Perceived personal impact								--	.64***	-.04
9. Perceived general seriousness									--	.00
10. Perceived coping efficacy										--

* $p < .05$, ** $p < .01$, *** $p < .001$

Predicting emergency response intentions for terrorism threats

Sociodemographic factors. The linear combination of the four sociodemographic variables explained 4% of the variance in emergency response intentions, with an adjusted R^2 of 0.04, $F(5, 1463) = 15.59, p < 0.001$. In terms of the residual of each sociodemographic variable (after controlling for the other predictors), it was found that higher age ($\beta = .06, t = 4.06, p < 0.01$), female gender ($\beta = .11, t = 2.39, p < 0.05$), higher level of education ($\beta = .08, t = 3.52, p < 0.01$), and higher income ($\beta = .04, t = 4.19, p < 0.001$) all contributed significantly to the prediction of emergency response intentions, with squared semi-partial correlations ($\underline{sr}_i^2$) of 0.011, 0.004, 0.008, and 0.011, respectively; thus, the unique contributions of each of these variables, as represented by the sum of their squared semi-partial correlations, represented 3% of the variance in emergency response intentions, while the combination of these variables contributed an additional 1% in shared variance. A summary of these relationships are provided in Table 4.

Table 4

Total (unmediated) and indirect (mediated) effects of threat appraisal on the association between the unique contributions of sociodemographic factors and emergency response intentions.

Independent variable (IV)	Mediator (M)	Effect of IV on M (a)	Effect of M on DV (b)	Total effect of IV on DV (c)	Indirect effect (ab) BCa ^a 95% CI
Age	Total			.06(.01)***	-.01 (-.02, .00)
	Probability	.00(.01)	.05(.03)		.00 (.00, .00)
	Seriousness	-.01(.01)	.18(.04)***		.00 (-.01, .00)
	Impact	-.08(.02)***	.09(.03)**		-.01* (-.01, .00)
	Coping	-.04(.02)*	.02(.02)		.00 (.00, .00)
Gender ^b	Total			.11(.05)*	.10* (.07, .13)
	Probability	.24(.04)***	.05(.03)		.01 (.00, .03)
	Seriousness	.31(.04)***	.18(.04)***		.05* (.03, .09)
	Impact	.40(.05)***	.09(.03)**		.03* (.01, .07)
	Coping	-.18(.06)**	.02(.02)		.00 (-.01, .00)
Education	Total			.08(.02)***	-.03* (-.04, -.01)
	Probability	-.12(.02)***	.05(.03)		-.01 (-.01, .00)
	Seriousness	-.06(.02)**	.18(.04)***		-.01* (-.02, .00)
	Impact	-.10(.03)***	.09(.03)**		-.01* (-.02, .00)
	Coping	.07(.03)**	.02(.02)		.00 (.00, .01)
Income	Total			.04(.01)***	.00 (.00, .01)
	Probability	.05(.01)	.05(.03)		.00 (.00, .00)
	Seriousness	.01(.01)	.18(.04)***		.00 (.00, .01)
	Impact	.02(.01)	.09(.03)**		.00 (.00, .00)
	Coping	.02(.01)	.02(.02)		.00 (.00, .00)

Note: Standard errors are presented in parentheses

^a Bias corrected and accelerated bootstrapping confidence intervals

^b 1 = male (ref); 2 = female

* $p < .05$, ** $p < .01$, *** $p < .001$

Cognitive threat appraisal dimensions. With the cognitive threat appraisal items subsequently added to the equation in a second step, the full (total effects) model, which included all sociodemographics and cognitive appraisal variables, explained 10% of the variance in anticipated mobilization, with an adjusted R^2 of 0.10, $F(8, 1454) = 21.31, p < 0.001$. Cognitive threat appraisal dimensions contributing to the prediction of emergency response intentions, over and above the sociodemographic variables, included higher perceived general seriousness of terrorism threats ($\beta = .18, t = 5.05, p < 0.001$), and higher perceived personal impact of terrorism threats ($\beta = .09, t = 2.91, p < 0.01$). Perceived probability of terrorism threats and perceived coping efficacy did not significantly predict emergency response intentions (see Table 4). The unique contributions of perceived seriousness ($\underline{sr}_i^2 = 0.016$) and perceived impact ($\underline{sr}_i^2 = 0.005$), represented 2% of the added variance in emergency response intentions, meaning the combination of the cognitive appraisal variables contributed an additional 4% in shared variance to the final model, over-and-above the sociodemographic variables.

Predicting threat appraisals for terrorism threats

An examination of the relationship between the sociodemographic variables and the various threat appraisal variables revealed mixed results, which are presented in Table 4. It should be stressed that the results in this section represent the independent contribution of each sociodemographic variable in predicting the threat appraisal items while controlling for the other sociodemographic variables in the model. Since the threat appraisal items were mediators and not analyzed as outcome variables in this analysis, the unique variance contributions of each sociodemographic variable in the prediction of each cognitive appraisal variable ($\underline{sr}_i^2$), as well as the combined variance for the sociodemographics in predicting each cognitive appraisal item were not calculated. Such a task would involve a

considerable number of separate analyses that are beyond the scope of this paper. Instead, the significance tests for each of the a paths in the four mediation analyses are subsequently presented.

In terms of each sociodemographic variable, it was found that age (after controlling for the other predictors) predicted lower perceived personal impact for terrorism threats ($\beta = -.08, t = -4.90, p < 0.001$), as well as lower perceived coping efficacy ($\beta = -.04, t = -2.25, p < 0.05$), but was not found to significantly predict perceived probability or perceived general seriousness of terrorism threats. By contrast, it was found that gender (after controlling for the other predictors) was significantly related to all four threat appraisal items. Specifically, females reported a higher perceived probability ($\beta = .24, t = 5.94, p < 0.001$), higher perceived general seriousness ($\beta = .30, t = 7.14, p < 0.001$), and higher perceived personal impact ($\beta = .40, t = 7.94, p < 0.001$) of terrorist threats in Canada, but a lower perceived coping efficacy for these threats ($\beta = -.18, t = -3.31, p < 0.001$). Education (after controlling for the other sociodemographic predictors) also significantly predicted threat appraisals in all sub-categories. For instance, education was negatively associated with perceived probability of terrorism threats ($\beta = -.12, t = -6.07, p < 0.001$), as well as the perceived general seriousness of terrorism threats ($\beta = -.07, t = -3.09, p < 0.01$), and the perceived personal impact ($\beta = -.10, t = -4.07, p < 0.001$). By contrast, education was positively associated with a higher perceived coping efficacy for terrorism threats ($\beta = .07, t = 2.66, p < 0.01$). Stated otherwise, both female gender (after controlling for the other predictors) and lower education (while controlling for the other predictors) significantly predicted higher perceived risk perception (as represented by probability, personal impact, and general seriousness), and lower perceived coping efficacy.

Mediation tests (indirect effects)

As previously mentioned, the indirect relationship between the sociodemographic variables and emergency response intentions, as explained through differences in cognitive threat appraisals, was tested by calculating the coefficients of the ab path for each mediation model – in other words, the product of the $IV \rightarrow M$ path (a path), and the $M \rightarrow DV$ path (b path) for the combined and individual threat appraisal items – and testing whether these products significantly differ from zero. The bootstrapped results of these total and partial *indirect* (i.e. mediated) effects, which include both the point estimates and the bias-corrected and accelerated confidence intervals (CIs), are presented in Table 4. As with all previous analyses, each sociodemographic variable was examined while controlling for the other predictors in the model. A more detailed summary of these analyses is provided below.

For gender. A significant total indirect effect, combining all risk perception items, was demonstrated between gender (after controlling for other sociodemographics) and emergency response intentions, with a point estimate of .10 ($CI_{.95} = .07, .13$). Indirect partial effects also demonstrated specific mediation effects for two of the risk perception items: Perceived general seriousness, with a point estimate of .05 ($CI_{.95} = .03, .09$); and perceived personal impact, with a point estimate of .03 ($CI_{.95} = .01, .07$), meaning that the relationship between female gender and increased mobilization could be explained via an increase in both the perceived impact and perceived seriousness of terrorism threats.

In a follow-up analysis, the *direct effect* of gender on emergency response intentions was calculated, to determine the magnitude change in the *total effect* after controlling for the risk perception items. Results demonstrated that when controlling for the risk perception, the relationship between gender and emergency response intentions was no

longer statistically significant, ($\beta = .02$, $t = .47$, $p > 0.05$), signifying that the link between gender and emergency response intentions was fully mediated by the risk perception variables.

For education. To explore the mediation effect of the combination of threat appraisal items on the relationship between education (after adjusting for other sociodemographics) and emergency response intentions, total indirect effects were calculated, with a statistically significant point estimate of $-.03$ ($CI_{.95} = -.04, -.01$). Partial indirect effects for perceived general seriousness $-.01$ ($CI_{.95} = -.02, -.00$) and perceived personal impact $-.01$ ($CI_{.95} = -.02, -.00$) reflect similar results. At first glance, this would suggest that the relationship between higher education and higher anticipated mobilization can be explained via *lower* overall threat appraisals. However, the presence of opposite signs between the negative indirect effect and the positive total effect (see Table 4) suggest a *suppression* effect, rather than a mediation effect.

To confirm the presence of a suppression effect, a follow-up analysis calculated the direct effect of education on emergency response intentions while controlling for the risk perception variables. Results were statistically significant, ($\beta = .10$, $t = 4.15$, $p < 0.001$), with larger coefficients when compared to the total effect ($\beta = .08$, $t = 3.52$, $p < 0.01$). This offers additional support of a suppression effect for risk perception on the relationship between education and emergency response intentions. Additional analyses ruled out the potential explanation of an interaction effect between education and risk perception, as evidenced by a non-significant *deviation from linearity* test using the SPSS ANOVA function, $F(3, 1493) = 1.71$, $p > 0.05$. See discussion for an elaboration of these results.

For age. No mediating effects were reported for age (after adjusting for other sociodemographics) and emergency response intentions, when examining the combined

(total) effect of the cognitive threat appraisal variables.(see Table 4). A slight indirect partial effect for perceived personal impact was found, as reflected in a point estimate of -.01 ($CI_{.95} = -.01, -.00$); the magnitude of this effect is quite small, however, and should be interpreted with caution. No other partial indirect effects were statistically significant.

For income. Total and partial indirect effect tests failed to find any mediation effect of cognitive threat appraisals, either in combination or independently, on the relationship between income (after controlling for other sociodemographics) and emergency response intentions (see Table 4).

Discussion

This study enhances current knowledge regarding the importance of sociodemographics and threat appraisals, including risk perception, as they apply to emergency response behaviours, in the context of Canadian terrorist threats, and our understanding of the process by which sociodemographic factors are linked to emergency response intentions. Until now, research examining the role of these social and cognitive dimensions has not explicitly tested the nature of these relationships. As expected, many sociodemographic attributes and threat appraisal dimensions were significantly related to emergency response intentions, with a few noted exceptions. Certain sociodemographic features were additionally associated with various threat appraisal dimensions, although again, the results were varied. When examining the specific mediating relationships, results were complex: Findings included full mediation effects, partial mediation effects, and no mediation effects, all involving variably significant dimensions of risk and coping efficacy. Details of these results are presented below.

Factors associated with intention to follow emergency directives

Overall, respondents reported that they would be likely to follow emergency directives given to them, in the event of a pending terrorist threat. These results differ from a similar American study, where up to 30% of respondents stated they would not follow government emergency directives (Lasker, 2004). However, these two studies were similar in that some at-risk groups did report a significantly lower likelihood of response in both cases, including those with lower education and lower income (*ibid*). This is consistent with other existing studies on emergency response behaviours and at-risk groups (Fothergill, 2004; Lindell & Perry, 2004; Fothergill & Peek, 2004). Researchers suggest that social class, which often encompasses these two indicators, may impact emergency response for a number of reasons, including possible differences in risk perceptions (Lindell & Hwang, 2008; Stevens et al., 2009; Botzen et al., 2009), differences in affective reactions to warning messages (Lasker, 2004), and divergent access to necessary resources, such as transportation and basic supplies, which can affect coping perceptions (Gheytanchi et al., 2007). As mentioned earlier, however, research on social class and emergency response is mixed, and those with lower education and lower income are not always less likely to respond (Kim & Kang, 2010; Riad et al., 1999). Nonetheless, in the context of the current study of anticipated responses to pending terrorist threats, it does appear that individuals with lower socioeconomic status are less likely to follow emergency directives.

When examining the individual contribution of each of the sociodemographic variables (after adjusting for each of the remaining sociodemographics), it was found that gender and age were also associated with intention to follow emergency directions, with women and older respondents reporting a significantly higher likelihood of response. Gender differences in emergency response behaviours have been examined quite

extensively (Enarson & Morrow, 1998; Riad et al., 1999; Bateman & Edwards, 2002; Enarson, 2010; Fothergill, 2004; Peacock, Morrow, & Gladwin, 1997), and research has demonstrated that women are often more likely to exhibit self-protective behaviours in an emergency, including responding to warning messages (O'Brien & Atchison, 1998; Bateman & Edwards, 2002; Stevens et al., 2009; Riad et al., 1999). Researchers argue that cognitive explanations, such as lower risk tolerance (Fothergill, 1996), are important considerations. However, social circumstances, including the pivotal role women undertake as managers in their family and social contexts, (Enarson, 2010; Bateman & Edwards, 2002) also help to explain these disparities. Similarly, our finding that older respondents are more likely to respond to emergency messages is also echoed in related studies (see Perry & Lindell, 1997). For instance, in a review of warning responses across several man-made and natural emergency events, Perry and Lindell (1997) reported that the elderly were no less likely to respond to emergency directives, and in some cases, were more likely than younger individuals.

While the present findings suggest that women and the elderly are not at higher risk in terms of lowered emergency response intentions in the current context, it must be noted that in some cases, despite the *intention* to respond, practical obstacles exist that can limit the ability of these individuals to take action. For instance, the elderly face higher rates of isolation, mobility issues, and medical conditions that may inhibit successful response behaviours (Klinenberg, 2002). Likewise, in some circumstances, socially-constructed gender roles leave women at a disadvantage in terms of their ability to respond: The prominent caregiving role that many women assume in their social environment, for instance, may preclude their taking immediate personal action (Enarson, 2010). In other cases, women may have disproportionate limitations in terms of the needed resources in

emergency response (Bateman & Edwards, 2002). As such, it is important to remember that while these groups may not be at risk due to lower response intentions, consideration should still be given to the socially-based obstacles these individuals face.

In the current study, the only sociodemographic group that was not significantly correlated with the intent to follow emergency directives was visible minority status. This contrasts with other studies on visible minorities and emergency response (Lasker, 2004; Riad et al., 1999), but supports existing research where these racial and ethnic differences are not found (Smith & Mccarty, 2009; Ablah et al., 2009). In the current study, the sample of visible minority respondents was quite low relative to the visible minority population in Canada, which may have contributed to the results. As such, any follow-up investigations regarding the emergency response intentions of visible minority groups in Canada should strive to obtain a more representative sample, in order to minimize such issues. Another consideration is that Canada has a wide multicultural distribution, and the social history of race relations is different in Canada than in the United States, where much of the literature on differential responses among visible minority groups is based. While this does not diminish the importance of examining potential barriers among visible minority groups in Canada, researchers should consider the complexity of the cultural distribution in Canada when designing studies to address this issue.

It should be noted again that the analyses conducted in the current study examined the differences in sociodemographic attributes that were unique to that particular demographic characteristic, while adjusting for shared variance in the other sociodemographic traits. In practical terms, sociodemographic profiles are more complex, and do involve interactions between many of these variables. Decisions surrounding the measurement of these attributes are often considered in light of study objectives and

preferred analytic procedures (in this case, for instance, standard multiple regression), which may or may not affect result outcomes and interpretations. Ultimately, there is value in gaining knowledge about these decisional processes, whether it incorporates the overlapping explanatory power of related sociodemographics, or specifically controls for them. The findings reported here suggest that the unique contributions of the sociodemographic factors independently contributed to the prediction of emergency response intentions; however, shared explanatory power of the combined profiles also contributed to this outcome. Indeed, individuals at increased risk can, and often do, belong to more than one at-risk social group, and this cannot be ignored in the context of these findings. Thus, while studying the interaction effects of these sociodemographic factors was beyond the analytic scope of this paper, researchers and policy makers should take this point into consideration when interpreting the results of studies involving sociodemographic groups.

Beyond the aforementioned associations involving sociodemographics, the intent to follow emergency directives was also significantly predicted from some of the threat appraisal variables, and overall, these items accounted for a greater proportion of variance in emergency response intentions than the sociodemographic variables; this reflects the importance of considering cognitive processes in behaviour intentions. Not all dimensions contributed equally to the model, however. Specifically, the intent to follow emergency directives was successfully predicted from a higher perceived personal impact and a higher perceived general seriousness regarding the risk of terrorism threats. These items concern the relative consequences of terrorism threats as they relate personally to the individual, as well as society in general (Lemyre et al., 2007). Perceived probability was not associated with intent to respond, which is not entirely surprising, for two reasons: Firstly, the reported

perceived probability of terrorist threats was quite low overall, and previous analyses on this dataset showed that reported preparedness for these events was also very low (Lee). Secondly, past research has demonstrated that in decision-making, the likelihood of a hazard's occurrence is less important than the perceived consequence (Sjöberg, 1999; Lion, Meertens, & Bot, 2002). As with perceived probability, one's perceived ability to cope was not associated with government-issued emergency response intentions. This differs from earlier work (Lee & Lemyre, 2009) which found that coping efficacy was positively related to individual preparedness behaviours, which focused on actual behaviours such as assembling an emergency kit, and seeking information. One explanation for this difference is that individuals who have already completed preparedness behaviours may subsequently believe they are better equipped to cope with such events. By contrast, this study focuses on response intentions that would be directed by external sources. Thus, if an individual believes they would respond to these prescribed directions, the importance of their own personal ability to manage the event may be considered irrelevant.

The varying predictive power of these threat appraisal dimensions demonstrates the importance of considering more than traditional probabilistic judgments of harm or mortality when conducting research on risk perception (Lee & Lemyre, 2009). Furthermore, the differentiation of the risk target (i.e. the self versus society) should be an important consideration for risk communication strategies. Since the current aim of many risk-reducing interventions is to reduce knowledge deficit and change perceptions of risk (Renner & Schwartz, 2003), these facets must be understood and accounted for in future research and policy.

Explaining sociodemographic differences in response intentions via threat appraisals

The interceding role of threat appraisals in the relationship between sociodemographics and the intention to follow emergency directives was tested via multiple mediation analysis. With regards to gender, it was found that women have higher threat appraisals regarding the consequences of terrorism threats, which in turn contributed to their increased intention to respond. These findings are consistent with other research on women and risk perception as well as response behaviours (Bateman & Edwards, 2002), which suggest that it is a lower tolerance for risk that drives women to a higher likelihood of response.

Results initially suggested that threat appraisals were also found to explain differences in response with regards to education level, given the statistically significant indirect effects; however, subsequent analyses determined that this conversely reflected a suppression effect. Both suppression and mediation are assessed using the same statistical techniques, in that each is quantified by measuring the change in the relationship between an independent and dependent variable once it is included in the analysis (McKinnon, 2000). A mediator variable will account for some or all of the predictive validity in an independent variable when it is added to the model, resulting in a reduced direct effect compared to the unmediated total effect. If a significant indirect effect (*ab* path) is reported within this context, a mediation effect is assumed. By contrast, a suppressor variable's inclusion in the model increases the predictive validity of an independent variable by suppressing some of the predictor's remaining error variance, resulting in an increased regression weight in the direct model in comparison to the unmediated model (Tzelgov, 1991). As with the present analysis, when an indirect effects statistic is negative, this relationship is termed *inconsistent mediation* (Mackinnon, 2000). While it was believed this

may be due to a possible interaction effect regarding education and age, analyses revealed this relationship was in fact linear.

Given the findings with regards to education, threat appraisals, and emergency response intentions in the present study, the relationship between higher education and higher emergency response intentions was not explained by risk perception; rather, the magnitude of this relationship was actually masked to some extent by concomitantly lower levels of risk perception. These opposing relationships may seem counterintuitive, but they have been previously demonstrated in separate analyses (Stevens et al., 2009; Botzen et al., 2009), and make sense in the current context as well. For instance, the threat appraisal in this study concerns terrorism threats specifically. The threat of terrorism was given exceptional attention by policy makers following the attacks of September 11th, 2001, which may have amplified its perceived threat among the general public (Lee & Lemyre, 2009; Botzen et al., 2009); nonetheless, the threat of terrorism in Canada relatively low compared to many other large-scale hazards (Lee, Lemyre, & Krewski, 2010), and the perceived risk of an attack has been tied to larger socio-political attitudes (Gibson et al., 2007). As such, it is possible that individuals with higher levels of education have greater access to information delineating these relative risks. Secondly, while lower risk perception was linked overall to lower levels of response intentions, it is entirely possible that other factors were more saliently linked to response intentions and education level. For instance, it has been shown that individuals with higher education demonstrate greater confidence in institutional responses in emergencies (Lasker, 2004), which may explain the higher rate of response intentions relative to education level. Furthermore, as mentioned earlier, sociodemographic characteristics do not operate in isolation from one another. Those with higher education are more likely to have higher incomes as well, for instance; this increased

social privilege may dispose these individuals to greater instrumental means for undertaking the activities in question, making it easier to assert their intentions to respond in future events.

The relationship between higher age and higher likelihood of response was not well explained by differences in cognitive threat appraisals. Older respondents did report a lower perceived impact and lower coping efficacy, and there was a partial indirect effect reported for perceived impact on response intentions; however, the magnitude of this effect was so small that further interpretations of this result were abandoned. Otherwise, there were no significant mediating effects found for income or visible minority status. As mentioned earlier, the sample size for visible minority status was quite small (see Table 2), which may have biased the results. Along the same lines, while the distribution of income was less problematic, it remains that the range had significantly more high-income respondents, and due to the categorization of income level, there may have been a ceiling effect at the highest end of the distribution. These factors may have complicated the analyses.

Limitations and future directions

As often reported with complex social psychological research, a few methodological limitations were inevitable, and should be noted. First, the nature of the cross-sectional design makes it impossible to delineate the temporal order of some of the predictors and mediators in these analyses. Also, while mediation analysis is a powerful tool for examining possible causal relationships, this study design cannot definitively confirm these causal assertions. Secondly, the outcome measured in this study focuses on *intentions* to respond, which may not predict the actual response in the future. A longitudinal study could explore this possible difference but would require substantial resources. Third, since the data is self-reported, it is subject to the possibility of related

biases. The limited response rate somewhat affects the generalizability of the findings regarding less widely sampled demographic groups (such as visible minorities, and those with lower income). In order to account for this shortcoming, the sample was stratified to resemble the Canadian population on a number of dimensions, using 2001 Census data.

On a theoretical level, this study is generally concerned with individual-level characteristics. The relatively modest explanatory power of the full model, along with the fact most relationships between social demographics and emergency response behaviours were not significantly explained by cognitive threat appraisals, suggests that other factors should be considered in future research. Indeed, while cognitive factors such as risk perception are important considerations when predicting behaviours, they do not take into consideration the social conditions that make responding possible. For instance, having access to pertinent information, as well as the instrumental means to respond are also important requirements for a successful individual emergency response. These resources may be facilitated or hindered by access to social networks, social support, material resources, and individual health, as well as higher-order contextual factors, such as neighbourhood characteristics and community resources (Klinenberg, 2002; Riad et al., 1999; Kim & Kang, 2010). Since these resources are sometimes less prominent in the social environments of at-risk groups (Li, Savage, & Pickles, 2003; Cacioppo & Hawkley, 2003; Saegert, Thompson, & Warren, 2001), they should be considered carefully in future research, when attempting to understand the mechanisms by which emergency directives are successful.

Conclusion

This study offers a significant contribution to the literature on emergency response and at-risk groups. Firstly, it provides a novel investigation of the relationship between

social and cognitive factors related to emergency response, as it relates to various at-risk groups in the realm of the Canadian context. While past research on decision-making in emergencies has been associated with both cognitive appraisals and sociodemographics, the pathways involving these factors have not been explicitly examined. This study directly tests the nature of these relationships, thereby providing some much-needed clarity about the complexity of these intertwined concepts. Moreover, this investigation explores how different facets of risk perception function in these aforementioned relationships. Given the numerous ways that risk perception is defined and measured, this delineation of the construct is an important contribution to the understanding of how individuals in at-risk groups perceive hazards, such as those associated with emergency events.

Finally, this study examines perceptions in the anticipatory stage of the disaster cycle, which is an important contribution to emergency management. Certainly, if discrepancies in emergency response intentions exist even before an event occurs, policymakers should take the opportunity to address the unique needs and circumstances of individuals within these groups. Focusing on determinants that may impact both the social and cognitive processes by which differences occur may help reduce stigmatization in emergencies, and improve current emergency plans and educational preparedness materials. Indeed, if researchers and emergency managers wish to mitigate the negative outcomes of emergencies – including the added harm sustained by socially disadvantaged groups – existing strategies must consider these precursors to successful emergency response behaviours.

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Contributions of Co-Authors and Authors' Note

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Foreword to Chapter 4

The previous study offered an important examination of how socially-relevant demographics, which are an important feature of the social environment, are related to preparedness. The study also showed that in many cases, cognitive appraisals did not explain differences in preparedness behaviours, suggesting that other factors may be contributing to these differences. Researchers have suggested the need to explore higher-order contextual variables, such as neighbourhood social environmental characteristics. As outlined in Article 1, higher-order factors, including community relationships and neighbourhood characteristics, played a role in how individuals perceived their own ability to respond in a future emergency. Since Article 1 used qualitative methods to explore these relationships, however, generalizations could not be made from the results.

The next study addresses these limitations by using quantitative data to test the relationship between neighbourhood contextual factors and individual and neighbourhood preparedness in a Canadian context, by means of a multilevel analysis. In addition, since previous experience was shown to be a salient feature of preparedness decisions in Article 1, this study will explore the role of neighbourhood factors in preparedness while controlling for previous experience and other relevant sociodemographic attributes, thus providing information about the importance of higher-order factors over and above well-known individual factors. This will contribute to our understanding about how the social makeup of a neighbourhood can facilitate or hinder emergency response. While previous experience and individual factors are important, a comprehensive understanding of emergency response must also include these higher-order considerations.

CHAPTER 4: EXAMINING THE ROLE OF NEIGHBOURHOOD CONTEXT IN
EMERGENCY PREPAREDNESS

RUNNING HEAD: The role of neighbourhood context in preparedness

The role of neighbourhood context in anticipated emergency mobilization:

A multilevel analysis

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Abstract

There has been growing criticism in research examining individual emergency preparedness that investigations of possible precursors are largely focused on individual-level variables, while ignoring broader social context (Reser & Morrissey, 2005). In addition, the majority of studies that do investigate higher-order determinants usually measure these constructs at the individual level, thereby failing to truly capture the influence of the broader social environment. The present study uses multilevel modeling to examine whether the socioeconomic organization of a neighbourhood predicts anticipated emergency mobilization at both the individual and neighbourhood level, over and above individual-level effects, in a sample of residents in Ottawa, Canada (N = 804). Results reveal that while the economic attributes of the neighbourhood were not significantly related to anticipated emergency response, the social make-up of the neighbourhood was significantly related to both individual and neighbourhood-level protective behaviours. This relationship remained significant even after controlling for statistically significant individual-level factors such as previous experience with disasters, gender, and age. These findings have important implications for research in emergency preparedness as well as policy and practice related to disaster mitigation strategies.

The role of neighbourhood context in anticipated emergency mobilization:**A multilevel analysis**

In the context of disaster management, the facilitation of emergency preparedness at the individual and household level is a crucial component in the mitigation of negative outcomes associated with both natural and man-made emergency events. In Canada and elsewhere, however, encouraging these precautionary actions has proven to be a challenging task, despite government strategies to inform residents about hazards and emergency preparedness (Public Safety Canada, 2010). Recently, there has been growing criticism of these campaigns and their theoretical underpinnings (Ablah, Konda, & Kelley, 2009; Basolo et al., 2009), which have focused almost entirely on cognitive-affective determinants of individual behaviour such as risk perception, hazard knowledge, and attitudes about prescribed mitigation activities. While these factors are indeed important in the facilitation of disaster-related protective behaviours, it remains that disasters and their mitigation take place within a broader social context (Solberg, Rossetto, & Joffe, 2010). As such, researchers have called for more empirical studies exploring the higher-order determinants of individual preparedness and emergency planning (Paton, Smith, Daly, & Johnston, 2008; Vaughan, 2011). One area gaining increasing attention is the salience of neighbourhood factors in the facilitation of personal preparedness (Paton et al., 2008; Kim & Kang, 2010); however, most of this research focuses on individual perceptions, with very few studies the actual contextual effects of neighbourhood factors on preparedness over and above the effects of individual-level determinants. As such, the present study addresses this dearth by examining the contextual role of socially-based neighbourhood conditions on anticipated emergency mobilization at both the individual-level and the community-level, in a Canadian context.

Looking beyond the individual in emergency preparedness

In order to better understand what motivates or hinders individual emergency preparedness, studies have identified a number of important psychosocial correlates (see Solberg et al., 2010, for a review). A large bulk of this research has explored the role of cognitive-affective processes on behaviour, such as threat appraisals such as risk perception (Martin, Martin, & Kent, 2009; Lee & Lemyre, 2009), and coping appraisals such as self-efficacy and response-efficacy (Grothmann & Reusswig, 2006; Lindell & Perry, 2012). While this research has not yielded entirely consistent results (Murphy, Cody, Frank, Glik, & Ang, 2009), it has led to a general understanding that individuals will only undertake preparedness activities if they perceive the threat as legitimate and the prescribed protective actions as feasible and effective (Grothmann & Reusswig, 2006; Lindell & Hwang, 2008).

Other research has focused on factors that might directly influence these internal processes. For instance, studies examining the role of previous disaster experience have argued that exposure to minor or benign outcomes in previous events may lead to lowered perceptions about the potential severity of anticipated events and the utility of precautionary action, thus hindering preparedness activities (McFarlane, McGee, & Faulkner, 2011; Lindell & Hwang, 2008). These results have not been consistent, however (McGee, McFarlane, & Varghese, 2009). Alternatively, a number of studies have examined preparedness differences based on sociodemographic attributes (Fothergill, Maestas, & Darlington, 1999; Lindell & Perry, 2004; Fothergill & Peek, 2004). For example, it has been suggested that those with lower incomes may have limited means to gather and maintain supplies for emergency kits, or to evacuate if necessary (Dash, McCoy, & Herring, 2010). Individuals with lower education also face barriers to preparing: For instance, they are less likely to use the internet to find protective health information

(Wizowski, Harper, & Hutton, 2002), which is a major means of dissemination for preparedness campaigns; also, challenges with understanding protective health information (including emergency preparedness) are more likely to occur if it is not written at a broadly accessible literacy level (Wizowski et al., 2002; Phillips, Thomas, Fothergill, & Blinn-Pike, 2010). Finally, elderly residents may have additional physical barriers which also impact their ability to access information and mobilize in response to warnings (Fernandez, Byard, Lin, Benson, & Barbera, 2002; Peek, 2010). These relationships are not always reported, however, and some studies have found no differences in behaviour among demographically-based social groups (see Phillips et al., 2010).

While this research has contributed significantly to our understanding of preparedness behaviours, it reflects a focus on the investigation and measurement of individual-level elements. This is problematic, since as previously mentioned, individual preparedness takes place within a broader social environmental context (Smith, 2006; Vaughan, 2011). It has been suggested that a number of forces operating in various facets of the social environment have the potential to facilitate or hinder individual emergency preparedness as well, and may help to explain the widely varying results often reported with individual-level investigations (Masten & Obradovic, 2008). For example, the link between sociodemographic attributes and barriers to preparedness is often based in greater social disadvantage (Klinenberg, 2002; Cutter & Emrich, 2006), which implicates various aspects of social environment that may certainly be relevant to the discourse on preparedness. As such, situating individuals within their broader social environment and delineating how these contextual factors contribute to the facilitation of individual preparedness may help to reconcile some of the inconsistencies reported with regards to

individual-level determinants, and provide emergency managers with better tools to encourage preparedness behaviours.

The importance of neighbourhood context in disasters

There is an understanding among researchers in the fields of geography, sociology, and public health that factors inherent in the notion of *place* contribute to health outcomes and differentials in related behaviours – at times, independently of other salient individual-level characteristics (Cummins, Curtis, Diez-Roux, & Macintyre, 2007; Poortinga, Dunstan, & Fone, 2008). As stated by Cummins and colleagues (2007), “Geographers and sociologists have long argued that place is relevant for health variation because it *constitutes* as well as *contains* social relations and physical resources” (p.1825). Stated otherwise, place effects on health are a function of the resources provided through neighbourhood organization and structure, as well as the availability of individual resources of those residing within the community. This perspective has also been put forward more recently in the field of community psychology, in recognizing that community resources are essential in the provision of support and the promotion of individual and collective well-being (Nelson & Prilleltensky, 2005); this diverges from more traditional psychological paradigms, which usually describe social processes at the level of the individual (Howarth, 2001).

Numerous pathways linking health and health behaviours to contextual elements of place have emerged over the last several years, usually implicating material or relational resources. For example, research has shown that adverse health outcomes can be linked to the material organization of the neighbourhood, including the prevalence of poor housing conditions and insufficient access to amenities that can help facilitate health and healthy behaviours (Poortinga et al., 2008; Cummins et al., 2007). Other researchers have examined

neighbourhood socioeconomic conditions and found contextual level effects on health associated with lower neighbourhood income and lower employment rates, which are thought to reflect greater neighbourhood deprivation (Hillemeier, Lynch, Harper, & Casper, 2003; Pampalon, Hamel, Gamache, & Raymond, 2009). In addition to these material pathways, researchers have also drawn attention to the role of community social elements in health. For instance, neighbourhood social capital and social cohesion are thought to increase access to psychosocial support, as well as information and resource sharing with regards to health and health behaviours (Scheffler & Brown, 2008; Poder & He, 2010); indeed, lower levels of social capital and social cohesion have been associated with poorer health outcomes in low-income neighbourhoods (Li, Savage, & Pickles, 2003; Saegert, Thompson, & Warren, 2001; Stafford et al., 2003).

The consideration of community factors in the context of general health and well-being has been extended to the field of disaster research as well. Indeed, studies examining the susceptibilities and negative outcomes from various major disasters have led to the understanding that "...the factors that have been identified as increasing vulnerability to disaster have also been identified as increasing vulnerability to poor health" (Lindsay, 2003, 296). This includes factors tied to the neighbourhood environment. For example, it has been suggested that neighbourhood socioeconomic stratification may impact exposure to disaster-related stressors and access to resources (Kaniasty and Norris, as cited in Moore et al., 2004); moreover, it has been argued that neighbourhoods with higher proportions of single-parent households, low-income families, and public housing are more susceptible to complications from health pandemics, due to a lack of resources for medications, limited proximal access to quality health care, unstable employment with limited benefits, and more limited social support networks (Bouye et al., 2009).

Neighbourhood context has also been found to play a role in decisions related to individual response during disasters. For example, studies examining evacuation decisions in the wake of Hurricane Katrina reported that concerns about previously existing neighbourhood crime were reflected in residents' fears of their homes being looted, and a subsequent resistance to evacuating (Elder et al., 2007). Moreover, among those residents who did evacuate, the decision was made in the context of relational exchanges between community-level social networks (Messias, Barrington, & Lacy, 2012). This is consistent with similar research examining decisions about taking protective action during Hurricane Ivan (Kim & Kang, 2010), and reflects the understanding that neighbours and community-level networks are often the first real "responders" in an emergency event (Uscher-Pines, Chandra, Acosta, & Kellermann, 2012). In the aftermath of a major disaster, community capacity is considered an important factor in both individual and community recovery (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008; Dynes, 2006). Economically disadvantaged communities are often found to be less resilient in a disaster (Levac, Toal-Sullivan, & OSullivan, 2012), and the structure of the community in the advent of a disaster can lead to recovery efforts being marked by a strengthening or weakening of community ties (Passerini, 2010).

In light of this evidence, emergency managers have begun to understand that the mitigation of disaster effects is in part a function of the proportion of a community who are able to respond with the necessary protective behaviours (Smith, 2006). The initial steps toward recovery and rebuilding are based at least in part in the social organization of the community, requiring some level of knowledge of relevant resources (Oliver-Smith, 1996; Vaughan, 2011); thus, the focus on community characteristics and processes in disasters should also be taken into account when examining emergency preparedness for these

events, in order to effectively mitigate negative outcomes and maximize resiliency for individuals and communities.

Research on individual preparedness in a neighbourhood context

Several authors have stressed the importance of considering neighbourhood factors in preparedness research (Lindell & Perry, 2012; Paton et al., 2008; Bihari & Ryan, 2012; Kim & Kang, 2010; Smith, 2006). Smith (2006) argues that the salient influences of community on individual behaviour can be traced to both relational and structural factors, but research has focused mainly on the former. In terms of preparedness, this body of literature has largely concentrated on a number of distinct yet related constructs that ultimately reflect the strength of community ties. For example, studies have linked individual preparedness with higher perceived neighbourhood cohesion and social capital (Bihari & Ryan, 2012; Buckland & Rahman, 1999; Becker, Paton, Johnston, & Ronan, 2012), although other studies have failed to find a relationship between social capital and preparedness (Kim & Kang, 2010; Hausman, Hanlon, & Seals, 2007). Bihari and Ryan (2012) demonstrated that higher levels of place attachment were associated with preparedness, and related work by Stedman (2002) reported that place attachment was related to place-protective behaviour. Finally, community participation has been significantly associated with preparedness intentions (Paton et al., 2008). It is believed that positive interactions of the individual and their local context, as represented by these findings, can set the stage for individual proactive behaviour, either by influencing motivations and norms, or by contributing to community capacity to undertake these behaviours (Wakefield, Elliott, Eyles, & Cole, 2006).

These findings support the assertion that perceptions about community and related social interactions are important considerations in the facilitation of individual

preparedness. Researchers who have explored these processes in regards to related environmental action, however, argue that examining relational dynamics alone may be inadequate when exploring the relevance of local social contexts and conditions for behaviour (Wakefield et al., 2006), and that proper identification of community susceptibilities must include an examination of relevant social, economic, and environmental attributes as well (NOAA Coastal Services Center, as cited in Delestienne, 2004). This requires an increased focus on the structural components of neighbourhood context, in addition to the relational processes as outlined above. For instance, researchers argue that psychosocial constructs such as place attachment can be influenced by the social organization of the environment itself (Wakefield et al., 2006), and that "...certain environmental features may set the stage for neighbourhood social interactions" (Cohen, Inagami, & Finch, 2008, p. 198).

Unfortunately, the current available research on structural elements of social organization in communities in relation to emergency preparedness is very limited, focusing mainly on home ownership and length of residence in the neighbourhood (DiGian, 2005; Mulilis, Duval, & Bovalino, 2000; Spittal, McClure, Siegert, & Walkey, 2008). For example, Mulilis, Duval, & Bovalino (2000) found an association between home ownership and increased preparedness. Spittal and colleagues (2008) similarly reported that home ownership was tied to increased preparedness and mitigation activities, along with increased length of residence. In DiGian's (2005) study of cyclone preparedness, similar associations were reported for residences who had lived in the area for the longest period of time (more than 20 years); however, she also found that residents who had lived in the area for less than five years also demonstrated higher rates of preparedness. It was speculated

that recent cyclones in the area may have led new residents to ensure they were prepared before moving into the region (DiGian, 2005).

While the research on the role of neighbourhood attributes in preparedness is limited, Mileti (as cited in Lindsay, 2003) points to neighbourhood characteristics such as income level, education, housing, and employment among the factors that contribute to disaster susceptibility; as such, these factors may also act as barriers to preparedness. As Levac and colleagues (2012) write, “Preparedness involves identifying the contextual issues and conditions which contribute to vulnerability, as well as the individual and collective strengths to respond effectively to an adverse situation” (p. 727). Indeed, in her work on community needs and emergency preparedness, Delestienne (2004) outlined a number of factors that increased a community’s social vulnerability to disasters, and interfered with preparedness uptake: these included ratios of residents with less than a high-school diploma, households living below the poverty level, and number of renter-occupied units. Similar research on health and health behaviours provides further indication of the possible neighbourhood features implicated in disaster-related protective behaviours. For example, neighbourhood level disadvantage, as measured by numerous indicators including single-family households, unemployment, and families living below the poverty line, has been associated with lower levels of collective efficacy (Cohen et al., 2008). Furthermore, many community-level variables which are often tied to neighbourhood deprivation – such as lower rates of home ownership and higher rates of unemployment – have been associated with decreased protective health behaviours (Cubbin & Winkleby, 2005), and also have a negative impact on neighbourhood relational processes such as social capital, social cohesion, and trust (Ross, Mirowsky, & Pribesh, 2001).

A note on the measurement of community effects

One major limitation of the existing studies on neighbourhood factors in emergency preparedness is that the measurement and analysis of contextual determinants is generally carried out at the individual level. This is problematic, since “physical environments, although experienced at the individual level, exist at the ecological level” (Wakefield et al., 2006 p.42). Moreover, it has been argued that protective or risk factors that exist at the individual level – such as housing, income, and education – can and should be measured at multiple levels (deFur et al., 2007); this would improve the explanatory contribution of these factors in different social environmental capacities. This differentiation in measurement level as it relates to a constructs’ impact is more routinely operationalized in social geography as *compositional* versus *contextual* effects: More specifically, “Compositional effects are the individual’s social and economic characteristics, while the contextual effects refer to the community’s social and economic environment” (Lindsay, 2003, p.294). Similarly, while individually measured perceptions of community characteristics and processes provide valuable information about how these factors operate on an individual level, the contribution of neighbourhood social context in preparedness can most effectively be assessed if it is measured at the neighbourhood level. These distinctions do not imply, however, that impacts measured at one level should be considered at the expense of the other (see Macintyre, Ellaway, & Cummins, 2002, for further discussion); rather, consideration should be given to exploring both the individual and the contextual impacts, in order to more fully capture the impact of neighbourhood factors in preparedness. This requires a research design and analysis method that recognizes the delineation of contextual and compositional effects, such as those implemented in multilevel modeling. This methodology has been successfully used in studies related to

health: As reported in their synthesis of 86 studies employing multilevel techniques to examine small area effects, Riva, Gauvin, and Barnett (2007) found that almost every study reported statistically significant contextual-level effects on health, and half reported that these effects remained significant after controlling for individual-level effects such as age, gender, and SES. As Smith (2006) argues, “a two-level (individual in the community) conceptual model [should also] be employed to research the influences that affect the uptake of protective behaviors” (p159). Unfortunately, this approach is rarely undertaken in current individual preparedness research.

In light of the conceptual and measurement limitations in current preparedness research as outlined above, the current study investigates the contextual effects of neighbourhood social organization on emergency preparedness, in a Canadian context. This includes an examination of individual emergency planning behaviours in the context of traditionally studied individual-level determinants (i.e. previous experience, sociodemographic attributes), as well as community-level social organization (represented by variables related to housing, education, income, employment, and resident status). A multilevel modeling design will examine both compositional and contextual effects related to preparedness for individuals as well as communities.

Method

Participants

A previously collected dataset from the municipal *Emergency Response Program Communications Tracking – Benchmarking Survey* (City of Ottawa, 2005) included a total of 804 individuals over the age of 18, as part of a nested random sample. Quotas were set in order to gain responses from urban and rural residents from west, central, and east geographic regions in Ottawa (7% rural, 50% urban, and 40% suburban); however, the final

sample was weighted to reflect the natural distribution of residents across the city both rural and urban/suburban settings. In terms of residency, 65% of the sample had lived in Ottawa for more than 10 years. A total of 60% of the respondents were women and 40% were men. While the survey was conducted in both English and French, the vast majority of interviews (98%) were conducted in English. A breakdown of the socio-economic demographics of the respondents, including age, income level, education level, working status, and visible minority status, is presented in Table 5.

While the present sample was targeted and weighted to be representative of the geographic distribution across the city, it was not sampled to represent the sociodemographic characteristics of the residents. However, when compared to data collected from the 2006 *Canadian Census of the Population* for the Census Metropolitan Area of Ottawa (Statistics Canada, 2013a), the distributions are fairly equivalent (see Table 1). Notable discrepancies include a slight oversampling of female respondents (59.5% vs. 52% in the census); an undersampling of individuals with a household income over \$100 000 (24% vs. 38% in the census); and differences in category extremes with regards to income, as reflected in a concurrent underrepresentation of individuals without a high school diploma (6.6% vs. 18% in the census) and overrepresentation of individuals with graduate degrees (27.2% vs. 12% in the census).

Table 5

Frequencies of previous experience and individual sociodemographic variables (N = 804)

Variable	Categories	Frequency	Percentage
Age	18-24	79	10.3%
	25-34	111	14.6%
	35-44	162	21.3%
	45-54	175	22.9%
	55-64	118	15.4%
	65 and over	118	15.5%
Noted Gender	Male	325	40.5%
	Female	479	59.5%
Income	Under \$15 000	41	6.9%
	\$15 000 - \$24 999	40	6.8%
	\$25 000 - \$39 000	76	13.0%
	\$40 000 - \$59 000	113	19.3%
	\$60 000 - \$99 000	177	30.1%
	\$100 000 - \$119 000	55	9.4%
	\$120 000 or more	85	14.5%
Education	Some high school or less	52	6.6%
	High school	170	28.3%
	Trades/vocational	43	5.4%
	Non-university certificate/diploma	133	16.9%
	Undergraduate	174	22.2%
	Graduate degree	213	27.2%
Previous Disaster Experience ^a	Infectious disease	155	19.3%
	Blackout	749	93.9%
	Terrorist attack	23	2.9%
	Major flood	111	13.9%
	Major fire	86	10.8%
	Contamination of water supply	62	7.8%
	Chemical spill	56	7.0%
	Major storm	675	84.6%

Note. Frequencies do not sum to N due to missing data^a Percentages represent proportion of respondents who answered yes to having experienced each item

Measures

All individual-level measures used in this study were originally developed as part of the *Emergency Response Program Communications Tracking – Benchmarking Survey* (City of Ottawa, 2005), while the neighbourhood organization measures were created using data from the 2006 Canadian Census of the population (Statistics Canada, 2013a).

Descriptions of the selected measures are as follows:

Anticipated response to major disasters. Respondents stated whether they would be able to respond effectively in a major disaster by rating their agreement with the following four questions: “In the event of a major disaster where power and communications are out, 1) The members of my family would know where to meet; 2) I know I would be self-sufficient for 72 hours; 3) I have a system in place to check on others in my neighbourhood or social circle, who may need help in an emergency; 4) I know where to get information about what to do during the emergency”. Respondents answered on a seven-point Likert scale that ranged from 1 (strongly disagree) to 7 (strongly agree). Non-responses were also recorded.

Previous experience. Respondents were asked to indicate whether they had personally experienced any major disasters. Specifically, respondents were asked, ‘Have you personally experienced any of the following major disasters? That is, have any of these major disasters occurred where you’ve lived?’ Respondents were then given a list of potential events (see Table 5). Answers were recorded as yes/no, and a cumulative score of experienced events was also compiled.

Age. Age was measured by asking respondents ‘...in what year were you born?’ If a respondent refused to answer this question, it was duly noted.

Gender. Gender was measured by having the interviewer note the gender of the respondent during the interview.

Education. Education was measured by asking respondents, ‘What is the highest level of formal education you have received?’ Categories are summarized in Table 5.

Income. Income was measured by asking participants to identify the category which best represented their total household income in the previous year, before taxes. Categories are summarized in Table 5.

Neighbourhood social organization. An index of social organization was created, using items from the 2006 Canadian Census of the population, and aggregated to the forward sortation area (FSA) level (See Figure 9). The selection of items was based on the literature summarized in the previous section, and also inspired by well-known deprivation indexes (Pampalon & Raymond, 2000; Pampalon et al., 2009; Townsend, 1987; Carstairs & Morris, 1989). The index included the following variables: Proportion of individuals aged 15 years and over living alone; proportion of lone parent families; the employment/population ratio of people aged 15 years and older; the proportion of individuals aged 15 years and over who have no high school diploma; proportion of individuals whose place of residence has changed in the last year (1 year mobility); home ownership rate; and the proportion of persons in private households with incomes below the Statistics Canada low-income cut-off (LICO) – defined as those who spend 20% more of their income than the average on food, shelter, and clothing. Cut-off scores are based on both family size and geographic area (Statistics Canada, 2012). The items were analysed and combined using principal components analysis (PCA), as described in the sections below.

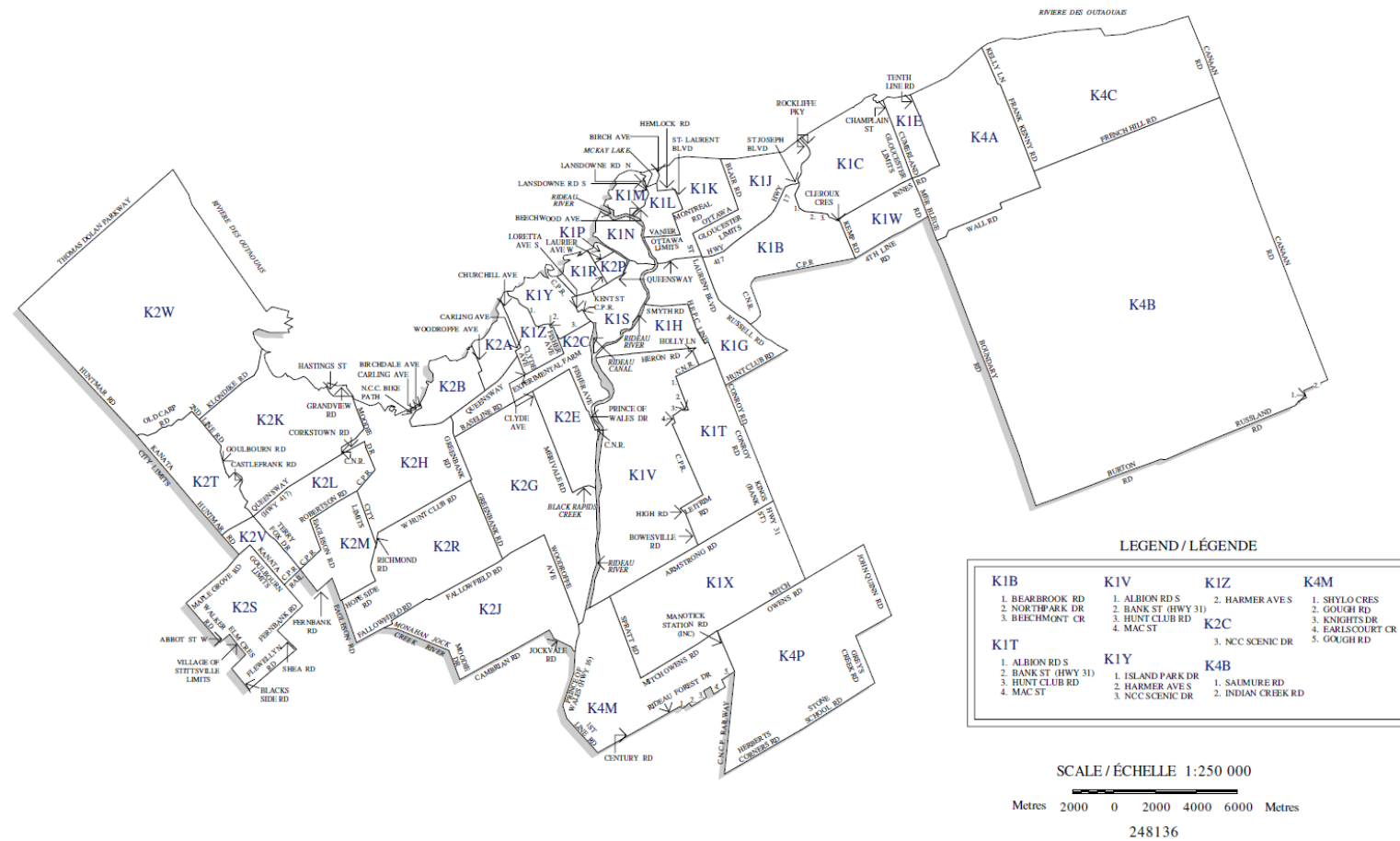


Figure 9: Map of Forward Sortation Areas in Ottawa, Canada (Canada Post, 2013)

Procedure

City of Ottawa Preparedness Survey. The original survey on individual preparedness behaviours and awareness of municipal preparedness strategies was conducted via telephone interviews between December 7th and December 20th, 2004. A total of 804 interviews were completed, representing 10% of all dialled numbers, and 25% of eligible answered calls. The interviews lasted an average of 13 minutes.

2006 Census of Canada. The Canadian Census collects data on the entire Canadian population, including Canadian citizens, landed immigrants, and non-permanent residents. It employs a stratified systematic cluster sample, using dwellings as clusters. It is distributed every five years. The 2B questionnaire used in this study consists of ten questions collecting information for each household member on their age, sex, marital status, mother tongue, and relationship to the respondent, as well as additional information on a variety of topics, such as information related to the household dwelling (including the item used in this study), and variety of socio-economic questions. The 2B questionnaire is distributed to every one in five households (Statistics Canada, 2010a).

In the case of the 2006 Census, approximately 98% of households were self-enumerated and returned the questionnaire by mail, while 18% of those respondents responded via the internet. Approximately 2% of households were enumerated by having an enumerator visit the household and collect questionnaire data via an interview (Statistics Canada, 2010b). The overall response rate for the long form questionnaire was 4% (Statistics Canada, 2010a).

Analyses

All analyses, with the exception of the multilevel modeling analysis described below, were conducted using PASW Statistics 18 (formally SPSS). Variables were first

screened for missing data, outliers, and normality, as well as for violation of assumptions related to regression analysis. Respondents who reported an invalid Forward Sortation Area (FSA), including one located outside the central metropolitan area (CMA) of Ottawa, were removed from further analysis, leading to a final sample of 762 respondents, living in 44 neighbourhoods (FSA). One variable (income) was found to be higher in missing values (26%) relative to other variables (which were all below 5% missing). To determine whether the missing values were considered *missing at random* (MAR) with regards to the dependent variable, an independent samples t-test was run, comparing the missing and non-missing responses on the dependent variable. The test revealed the two groups did not differ significantly on the outcome variable, suggesting that the variable was indeed MAR. Since income was a variable of interest for this analysis, missing values were subsequently estimated using the multiple imputation (MI) feature¹. The dependent behavioural variables were then pooled by averaging respondents' ratings for each of the behavioural mobilization items. Survey weights were used throughout all analyses, to ensure that the sample would be representative of the municipal population.

Creation of neighbourhood index. As an initial step, the neighbourhood social organization index was created from the Census variables via principal components analysis (PCA) with varimax rotation using PASW Statistics 18. This approach was chosen over an additive approach so that the weight assigned to each item would be based on their statistical relationships to the other items in the analysis, in the context of this specific geographic area - the municipality of Ottawa. Similar indices measuring deprivation in Canada and New Zealand have been created using PCA (Pampalon & Raymond, 2000;

¹ The MI feature creates single or multiple imputation datasets; since this variable does not appear to be *missing not at random* (MNAR), a single imputation dataset was created.

Pampalon et al., 2009; Salmond & Crampton, 2012). A summary of this analysis is provided the following section and reflected in Table 6.

Predictor variable selection. There were several variables of interest for this study, at both individual and contextual levels. As with a simple OLS regression, the number of predictor variables in an analysis must be considered in respect to sample size; in the case of multilevel modeling, the recommendation is 10-20 group-level observations for each predictor in the model. Experts suggest that variable selection be made a priori, or alternatively, by allowing the data to guide selection decisions (Dedrick et al., 2009). As such, a preliminary, single-level sequential regression was conducted with all the variables of interest, using PASW 18. First, previous experience with emergency events was entered into the model as a covariate, since this has been routinely shown to be related to preparedness (Paton, Johnston, Bebbington, Lai, & Houghton, 2001). Next, the individual-level characteristics – gender, age, education, and income – were entered into the model. Finally, the newly created neighbourhood indices (described in the results section below) were entered into the model. Those variables which were not significantly related to preparedness were dropped from the subsequent multilevel analysis.

Multilevel analysis. To test whether the contextual effect of neighbourhood social organization predicted differences in preparedness for both individuals and neighbourhood groups, over and above any compositional effects of related individual characteristics, a multi-level analysis was conducted using MlwiN 2.10. This approach is recommended as the appropriate method for examining data involving nested groups (for example, individuals within neighbourhoods), and has been particularly well-received in research investigating neighbourhood effects (Riva, Gauvin, & Barnett, 2007; Krieger, Williams, & Moss, 1997). Specifically, multilevel models allow for the acknowledgement of variations

at both the individual and group levels, which is a significant limitation in single-level regression analyses (Snijders & Bosker, 2011)

As a first step in this analysis, a variance component model was constructed without explanatory factors, in order to determine how much variance in preparedness could be attributed to differences at the individual level, versus differences at the neighbourhood level (Model 1). Then, the individual-level and neighbourhood-level variables of interest (based on the results of the initial regression analysis, as outlined below) were included in three steps: First, the covariate (previous experience) was entered into the model (Model 2). The specific contributions of the significant individual-level demographics were then entered into the equation, after controlling for previous experience (Model 3). Finally, the neighbourhood-level variables were entered into the model, after controlling for both previous experience (Model 4), as well as statistically significant demographic characteristics (Model 5). Residual plots at both the individual and neighbourhood level were subsequently examined to test the final model for outliers and heteroscedasticity, with no discernible problems. The parameter estimates for this analysis were obtained using restricted iterative generalized least squares (RIGLS), due to the modest number of forward sortation areas sampled. Model goodness-of-fit was calculated using a likelihood ratio test. Significance tests were based on Wald tests for both fixed and random components.

Results

Creation of neighbourhood organization indices

The data set demonstrated good suitability for this analysis, as reflected in a Kaiser-Meyer-Olkin (KMO) value of 0.76, and several correlations above 0.3. For this analysis, only those components whose eigenvalues exceeded 1.00 were retained. Since this approach, known as Kaiser's criterion, has been shown to overestimate the number of

components (Pallant, 2005), the eigenvalue criteria were verified using parallel analysis, which generates eigenvalues from a similarly sized, randomly generated data set (7 variables X 740 respondents) (Watkins, 2006) Both tests confirmed the appropriate retention of two components, from which the neighbourhood organization index was created. The results for this analysis, including the rotated factor loadings and communalities, are provided in Table 6.

Table 6

Factor loadings, communalities (h^2), and percents of explained variance of principal components analysis with varimax rotation of neighbourhood deprivation items.

Item	Component	Component	h^2
	1	2	
Proportion living alone	.93		.90
Proportion single parent families	.79		.85
Proportion of movers (at 1 year)	.93		.90
Home ownership rate	-.99		.97
Proportion of LICO ^a families	.92		.92
Employment rate		-.79	.64
Proportion of those with less than high school		.81	.67
Percent of variance explained	60.2	23.3	

Note. Emerging solution using eigenvalue criterion of 1; Component labels were 1 = Neighbourhood social deprivation and 2 = Neighbourhood economic deprivation.

^a LICO = Low-income cut-off

The two component solution explained a total of 83.5% of the variance. The first component, which included the proportion of individuals living alone, proportion of single parents, mobility, home ownership rate, and proportion of low-income families, accounted for 60.2% of the total variance. These items correspond to related indices examining social deprivation, which refers to relations within the family and the community (Pampalon et al., 2009). As such, this factor was named *Social Neighbourhood Organization*. The second component, which included the proportion of individuals without a high school diploma and employment rate, accounted for 23.3% of the variance. These items correspond to related measures of economic disadvantage and deprivation, which refers to accessing the goods and conveniences part of modern life (Pampalon et al., 2009). As such, this factor was named *Economic Neighbourhood Organization*. There was a weak positive correlation between the two components ($r = .11$).

Standardized factor scores on the two components were calculated using the regression method in PASW for each participant based on their Forward Sortation Area (FSA), and saved for subsequent analyses. It should be noted that because the nature of these scores reflect processes tied to social disadvantage and deprivation, a higher score indicates a more detrimental neighbourhood organization. Neighbourhood scores for each of the Forward Sortation Areas Social Neighbourhood Organization ranged from -1.68 to 2.39 and 3 scores for Economic Neighbourhood Organization ranged from -3.30 to 2.37. As Factor scores, they were standardized (Mean=0, SD=1)

Preliminary variable selection

Bivariate correlations between all variables of interest are presented in Table 7. The results of the sequential multiple regression analysis are presented in Table 8; since this analysis deletes cases listwise, a total of 22 cases were removed, for a final N=740. As

previously mentioned, the sequential multiple regression included previous experience entered as a first step, the individual-level SES variables entered in a second step, and the two neighbourhood variables entered in a final step, as predictors of anticipated emergency mobilization. The final model revealed that the full model significantly predicted anticipated emergency response, $R^2 = 0.05$, $F(7, 739) = 14.01$, $p < 0.001$. Generally speaking, participants felt moderately prepared for a future emergency ($\bar{X} = 4.35$, $SD = 1.45$). As expected, the number of previously experienced events ($\bar{X} = 2.39$, $SD = 1.07$) was positively associated with a greater anticipated ability to respond, ($\beta = .24$, $t = 4.80$, $p < 0.001$). Furthermore, after adjusting for previous experience, female gender ($\beta = .35$, $t = 3.30$, $p < 0.01$) was also related to anticipated emergency response. Social neighbourhood organization was also significantly related to anticipated response, with a more detrimental social organization predicting lower anticipated ability to respond ($\beta = -.13$, $t = -2.47$, $p < 0.05$). The economic neighbourhood organization variable, as well as the other individual-level variables (education, income, and age), were not significantly related to anticipated emergency response in this final model. However, it should be noted that age was significantly related to anticipated emergency response in the previous step ($\beta = .01$, $t = 2.16$, $p < 0.05$); this suggests the possibility that the attenuated effect of age may be partly explained by neighbourhood social organization. As such, age was retained in the final model, since partialling out the contextual effects via multilevel modeling may provide further information regarding these relationships. Previous experience, gender, and social neighbourhood organization were also retained for the final analysis.

Table 7

Intercorrelations between anticipated emergency mobilization, sociodemographics, and neighbourhood social deprivation variables

	1	2	3	4	5	6	7	8
1. AEM	--	.18***	-.03	.03	.11**	.08*	-.11**	.05
2. PE		--	.08*	.10**	-.05	-.01	-.06	-.03
3. Education			--	.39***	-.06*	-.07*	.02	-.13***
4. Income				--	-.08*	-.08*	-.20***	-.08*
5. Gender					--	.01	.00	-.03
6. Age						--	-.08	.03
7. SNO							--	-.05
8. ENO								--

Note. AEM = Anticipated emergency mobilization, PE = Previous experience, SNO = Social Neighbourhood Organization, ENO = Economic Neighbourhood Organization, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 8

Summary of sequential regression analysis with previous experience, individual-level sociodemographic variables, and neighbourhood organization variables as predictors of anticipated emergency mobilization

Predictor	β	t	R^2
Step 1			
Previous experience	.24	4.83***	
			.03***
Step 2			
Previous experience	.24	5.01***	
Education	-.04	-1.11	
Income	.03	1.02	
Gender	.35	3.27**	
Age	.01	2.16*	
			.04**
Step 3			
Previous experience	.24	4.94***	
Education	-.02	-0.70	
Income	.02	0.46	
Gender	.35	3.30**	
Age	.01	1.89	
Social Neighbourhood Organization	-.13	-2.47*	
Economic Neighbourhood Organization	.06	1.27	
			.05*

* $p < .05$. ** $p < .01$. *** $p < .001$.

Multilevel analysis of anticipated emergency response

Results for the fixed and random effects of the five multilevel models predicting anticipated emergency response are presented in Table 9. The variance component model (Model 1) revealed an intra-class correlation of 0.04; thus, differences at the neighbourhood level accounted for 4% of the total variation in anticipated emergency response. Model 2 confirmed a statistically significant, positive relationship between the covariate of previous experience, and anticipated emergency mobilization. With the demographic variables added (Model 3), gender and age were both significantly related to anticipated mobilization, with females and older residents reporting higher anticipated mobilization after adjustment for previous experience. Model 4, which examined the association between neighbourhood-level social organization and anticipated mobilization, after adjusting for previous emergency experience, indicated that a more detrimental neighbourhood-level social organization was significantly related to lower reported anticipated mobilization. The final model, which included all variables, demonstrated similar results to the previous models, with the exception of age, which was no longer found to be statistically significant. This final model explained 16% of the variance at the neighbourhood level, and 5% of the variance at the individual level.

Estimation using multilevel random-slope models demonstrated that regression slopes for each of the independent variables did not vary significantly among neighbourhoods. In other words, the reported relationships between anticipated mobilization and previous emergency experience, gender, age, and neighbourhood social organization did not vary significantly from one neighbourhood to the next.

Table 9

Summary of multilevel hierarchical regression analysis for anticipated emergency response (unstandardized coefficients)

	Model 1	Model 2	Model 3	Model 4	Model 5
Fixed Part					
Constant	4.354***	3.803***	3.221***	3.822***	3.258***
Previous emergency experience		0.229***	0.239***	0.226***	0.235***
Gender (reference cat: male)			0.354***		0.351***
Age			0.007*		0.007§
Social Neighbourhood Organization				-0.143*	-0.133*
Random Part					
Wald test (df)	4.273(1)*	3.000(1)*	3.402(1)*	4.876(1)*	4.696(1)*
Neighbourhood variance (σ^2_u)	0.083	0.069	0.074	0.057	0.064
Residents variance (σ^2_e)	2.043	1.993	1.951	1.99	1.949
Goodness of fit					
χ^2 (df)		22.33(1)***	39.07(3)***	26.95(2)***	42.94(4)***
$R^2_{.2}$ (Neighbourhoods)		0.117	0.086	0.21	0.163
$R^2_{.1}$ (Individuals)		0.059	0.048	0.08	0.054

§ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

The present study provides an important contribution to our understanding of emergency preparedness in a number of ways. First, it extends the limited base of literature examining the role of neighbourhood factors in emergency preparedness. The exclusion of social environmental context at various levels of analysis, including the neighbourhood, has been an ongoing criticism in disaster preparedness research (Solberg et al., 2010; Paton & Johnston, 2006). Most research to date has focused exclusively on individual-level determinants of preparedness, such as risk perceptions, previous experience, and sociodemographic characteristics (Solberg et al., 2010). While studies have demonstrated that the importance of these factors cannot be understated, they are usually examined in isolation of the broader social context; this has ultimately limited their explanatory power through an erroneous reductionism of the manner in which they function. Conversely, by positioning these constructs within a social environmental context, a greater understanding of how these processes play out in different environments can be achieved. Researchers have addressed these criticisms by recently beginning to investigate factors and processes that operate at broader levels; however, these studies often examine individual-level perceptions of these constructs, rather than measuring and testing the true contextual effects (Moore et al., 2004). The present study examined both individual-level and neighbourhood-level determinants of preparedness, and demonstrated the unique contributions of both compositional and contextual elements.

Individual-level variables

In terms of individual-level variables, a positive relationship was found between previous experience for emergency events, and anticipated emergency response. This finding has been demonstrated in numerous studies examining individual-level

preparedness, suggesting that previous experience motivates individuals to prepare for future events (Horney, Snider, Malone, Gammons, & Ramsey, 2008); however, other research has demonstrated a bias towards overconfidence for future events when these past experiences involved personally benign outcomes (McGee et al., 2009). In this sample, the most frequently reported disaster in this sample was a major ice storm that occurred in 1998, which led to some property damage and a temporary loss of power in some areas; the second most widely reported experience was a blackout, which most likely referred to the Northeastern Blackout of 2003 where residents in this region were without power for upwards of 48 hours. While this study did not measure the perceived magnitude or valence of these experiences, a related study of qualitative interviews with local residents in Ottawa described the collectively perceived effects of these events as fairly inconsequential (see Chapter 2 of this thesis). While the nature of qualitative research is such that these descriptions cannot be systematically generalized to the current sample, it does suggest the possibility that the consequences of these events were not severely felt by Ottawa residents. Future research should continue to explore how elements in the regional setting may interact with perceptions of past experience and preparedness for future events.

With regards to individual-level demographics, findings revealed that female gender and higher age were positively related to higher perceived anticipated emergency response. This is consistent with other studies examining these factors (Riad, Norris, & Ruback, 1999; Lee, Lemyre, Turner, Orpana, & Krewski, 2008). Interestingly, in the present analysis the association between age and preparedness was actually attenuated once neighbourhood-level social organization was included in the model; this suggests that the relationship between older age and preparedness may be partly explained by neighbourhood-level effects. The suggestion that reported disparities in preparedness based

on age may be related to elements of the social environmental context has been put forward elsewhere (Peek, 2010, also see Chapter 2 in this thesis); as such, these findings reinforce the need to examine individual-level determinants such as sociodemographic attributes within the context of broader social forces (Vaughan, 2011; Phillips et al., 2010).

The remaining individual-level sociodemographic variables selected for this study – namely, income and education – were not found to be significantly related to anticipated emergency response. This runs counter to a great deal of research that posits a positive relationship between individual preparedness and higher levels of both income and education (see Fothergill & Peek, 2004; Dash et al., 2010). A few points to consider include the relatively high overall levels of both income and education in the present sample, which may have attenuated the independent effects of these indicators. As mentioned previously, Ottawa is a relatively affluent region, compounded by a high proportion of respondents with graduate degrees and a low proportion of those with less than high school education in the present sample when compared to a more complete sample in the *Canada Census of the Population*. There was also a significant proportion of missing data in the measurement of income in the survey sample; while this was not a concern for the present analysis due to the fact that no statistically significant differences in the dependent variable were reported for respondents who abstained from providing this information, it is still an important consideration in the interpretation of these results. Follow-up studies that attempt to capture a more variable range of income and education levels in different locations would be useful. For instance, it has been suggested that individual-level determinants of preparedness may be more salient in particular settings, and less so in others (Cummins et al., 2007). This reinforces once again the importance of examining these determinants in the context of broader social conditions.

Neighbourhood-level variables

The most instrumental contribution of this study was that it provided a much-needed examination of neighbourhood-level contextual variables as they relate to individual and community level preparedness. This approach is gaining attention among disaster researchers (Paton et al., 2008; Kumar et al., 2011; Kim & Kang, 2010), but the empirical base remains largely underdeveloped (Becker et al., 2012). In the present study, a more disadvantaged social neighbourhood organization – as represented by higher rates of residential mobility, higher rates of people living alone, higher rates of single-parent households, higher rates of households living under the poverty line, and fewer rates of home ownership – was significantly related to lower anticipated emergency response for both individuals and communities. It should be emphasized that these conditions were not necessarily a reflection of the personal circumstances of the participants living in these areas, but rather the collective organization of the neighbourhood overall. This relationship held even after controlling for the previously discussed individual-level correlates of preparedness, adding further salience to this contextual influence. This echoes the extensive research which has demonstrated the independent role of neighbourhood context on related protective health behaviours, over and above the effects of individual determinants (Ross & Mirowsky, 2008; Cubbin & Winkleby, 2005; Macintyre et al., 2002).

These findings demonstrate that the structure of the neighbourhood itself plays a role in the preparedness of individuals, and in the rates of collective preparedness within these areas. To date, similar studies have focused on relational dynamics such as social capital, social cohesion, and community participation (Paton et al., 2008; Kim & Kang, 2010). Research focusing on these processes has been important for highlighting the significance of contextual influences in behaviour. However, it remains that these

constructs largely reflect individual perceptions about community relations, and do not represent the actual community structure, which carries an inherent potential to provide or hinder the provision of resources (Moore et al., 2004). This is important, since:

The impact of a natural event on any given community...results from a complex set of interacting conditions, some having to do with geography and location, some with the dwelling, and still others with the social and economic characteristics of the people living there. (Morrow, 1999, p.2)

Thus, research on community processes should be supplemented and triangulated with investigations examining the overarching social structures within these neighbourhoods.

In addition to finding a significant relationship between neighbourhood social organization and preparedness, the introduction of this contextual variable into the analysis resulted in a considerable increase in explained variance for the model of preparedness aggregated to the neighbourhood level, with a similar yet modest increase also found at the individual level. Thus, while neighbourhood factors are certainly important for individuals in the facilitation of preparedness, they are especially salient for the effective uptake of protective behaviours in the community as a whole. Assessing the relevance of community features is an important step in capitalizing on the benefits of collective action and community preparedness (Paton & Johnston, 2006; O'Brien, 2008), which is an essential component of any disaster mitigation strategy (Murphy, 2007). For instance, knowing the organization of the community helps emergency managers identify strengths and barriers as they exist within a particular community, which can inform them on how to better link and coordinate preparedness initiatives within existing social structures; in turn, this can help promote interaction between residents and improve knowledge transfer (Bihari & Ryan, 2012), as well as increase collective capacity overall (Lindsay, 2003).

It should be noted that in contrast to the social neighbourhood organization index, the second neighbourhood-level variable that represented contextual economic disadvantage – as represented by higher unemployment rates and higher proportion of residents with less than high school education – was not significantly related to anticipated emergency response. As with the independent variable, this may be a function of the compositional effects of the communities; in other words, the present sample had disproportionately high levels of education and income levels, which may also attenuate economic impacts at the neighbourhood level. Future studies in different regions with different socioeconomic variations may provide further insight into the nature of this possible association. Regardless, these results indicate that the social organization of the community structure appears to be more important than the economic characteristics of the community. This strengthens the arguments of researchers who have purported the importance of creating and promoting opportunities for social cohesion, social capital, and related community dynamics to facilitate preparedness (Koh & Cadigan, 2008; Hausman et al., 2007). It is believed that by doing so, community norms for preparedness may be increased, which in turn can improve rates of personal preparedness (Hausman et al., 2007).

Limitations and Future Directions

As with all empirical groundwork, the present study does have some conceptual and methodological limitations which should be considered in the development of future research. First, the individual level measures used in this study were originally created and developed for a purpose other than the present study; as such, some of the categories and the operationalization of concepts – especially with regards to education and income level – were not ideal.

There are also several points to consider with regards to the conceptualization of neighbourhoods in this study. First, as first detailed in the qualitative study in Chapter 2, it should be stated that neighbourhoods are only one variation of ‘place’ that has relevance for individuals and the promotion of emergency preparedness. Researchers have pointed to the significance of communities that are defined by shared interests as well, such as churches, schools, the workplace, among others (Cummins et al., 2007; Patterson, Weil, & Patel, 2010), and further research should consider examining the strength of different types of place in the facilitation of preparedness.

On a related note, the operationalization of geographically-bound neighbourhoods is complex, and should be taken into consideration when conducting research in this type of framework. For example, the current study delineated neighbourhoods based on Forward Sortation Areas (FSA), which are based on postal routes and can be very broad in terms of geographical area and the homogeneity of neighbourhood organization. This method does not take into account the social and economic features that often differentiate one residential neighbourhood from the next (Mujahid & Roux, 2010). As such, the use of postal code data to define neighbourhoods is not ideal (Mujahid & Roux, 2010). Unfortunately, as this was a secondary analysis of an existing dataset, a more precise specification of neighbourhood boundaries was not possible. Even when a more rigorous method to define neighbourhood is used, however, Cummins (2007) points out that not all residents will define neighbourhoods by equivocal standards. Ideally, having qualitative narratives that help identify possible idiosyncrasies may help refine measures of neighbourhood and support quantitative findings with regards to community determinants.

Researchers must also keep in mind that neighbourhoods are dynamic and fluid entities which change over time. Moore (2004) argues that examining a community at one

time-point may not truly reflect how these indicators and dynamics may operate as the community moves through different phases of a disaster. To be sure, the present study is a cross-sectional design, which captures the social organization of a neighbourhood and related preparedness behaviours as they exist in a specific timeframe. Future research that examines these structures and dynamics over several time points may be particularly useful for emergency managers in terms of dedicating and improving resources to increase preparedness and community capacity. Of course, this type of research requires considerable financial and logistical resources. As such, the present study provides an informative and valuable contribution.

One final word of caution pertains to the categorization and comparison of neighbourhoods in terms of 'disadvantage'. Researchers have suggested that the perception of one's social position in relation to another's can amplify the perceived negative impacts of social disadvantage (Marmot, 2003). For example, it has been argued that making comparisons to groups that are more privileged or have more advantageous conditions can weaken social cohesion in the more disadvantaged group; this is a gradient effect, meaning that it can occur across all levels of social strata (Marmot, 2003; Pampel, Krueger, & Denney, 2010). As such, researchers and policy makers should keep this in mind when attempting to draw attention to the required resources that may be unequally distributed throughout a region. The present sample had relatively high levels of income and education both at the community level and at the individual level, and the magnitude of the relationship between social neighbourhood organization and preparedness was similar across neighbourhoods. However, in another sample with more apparent inequities between neighbourhoods and participants in terms of social and economic attributes, the nature and magnitude of these relationships may present differently. In either case, researchers and

policy makers should exercise caution when attempting to discern community features that hinder or facilitate preparedness, so as not to isolate the populations needing the most help. For instance, in order to maximize the utility and benefits of knowing which community features influence preparedness, researchers and policymakers should consider undertaking community mapping initiatives that draw attention to the strengths and potential resources in various communities, in addition to identifying barriers. This would allow for the building of community capacity by addressing community needs and reinforcing collective efficacy.

In conclusion, this study provides an important and much-needed contribution to the field of disaster management, by exploring the role of neighbourhood context in the facilitation of emergency preparedness, both for individuals and communities. The social organization of the neighbourhood itself was shown to be associated with preparedness levels, over and above the effects of more commonly-studied individual level variables. This has important implications for emergency preparedness strategies, which focus mainly on the dissemination of information about hazards and specific preparedness activities. Unfortunately, these strategies have not encouraged individual preparedness to the extent that emergency managers and researchers in disaster mitigation have hoped they would (Rohrmann, 2000; Cubbin & Winkleby, 2005). This points to the erroneous reduction of focus on individual-level processes in terms of research and policy regarding preparedness. As stated by Cubbin and Winkleby (2005), the “exclusive focus on increasing individuals’ knowledge will have a limited effect on changing their behaviors unless contextual influences at the neighbourhood level are also addressed” (p.567). To be sure, this study provides an important initial step towards improving our understanding of neighbourhood context in emergency planning and preparedness.

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CHAPTER 5: GENERAL DISCUSSION

The goal of the present thesis was to reposition individual emergency preparedness in a social environmental context. This contribution was accomplished through development of a theoretical model emphasizing multiple levels of social environmental determinants in preparedness adapted from theories such as Bronfenbrenner's Ecological Systems Theory (1979) and the *Social Determinants of Health* (Mikkonen & Raphael, 2010), as well as empirically testing several of these relationships using a multi-method and multi-hazard approach. As a first step, a qualitative study with a group of elderly residents was conducted to explore subjective representations of preparedness. Findings demonstrated that perceptions about available mental and material resources and elements of local context were important components in participants' evaluations of their own preparedness, and that the presence of supportive social networks also contributed to anticipated outcomes in future emergency events. This study helped to position the theoretical framework empirically, as it emphasized the influence of both individual and broader processes in perceptions and behaviours related to emergency preparedness. Then, in order to delineate the qualitative findings more precisely, two quantitative studies followed. The second study explicitly tested whether cognitive-affective processes such as risk perception and coping could explain differences in anticipated emergency response based on a number of sociodemographic characteristics often tied to variations in social environment, including age, gender, income, education, and visible minority status. Results from this study showed that by and large, differences in emergency response based on sociodemographics could not be mediated by appraisals. This offered further support that research must look beyond internal processes as explanatory factors in preparedness, and consider higher-order factors of social environment (Uscher-Pines, Chandra, Acosta, &

Kellermann, 2012; Solberg, Rossetto, & Joffe, 2010). In response, the third study examined the role of neighbourhood social environment in emergency planning and preparedness, with related individual-level characteristics being taken into account through a multilevel investigation. Note that in the present thesis, the examination of community context is conceptualized as a function of the social-ecological layer defined as the mesosystem, as opposed to Bronfenbrenner's (1978) conceptualization of community as an indirect influence in the exosystem; while the indirect influence of the community is certainly reflected in the thesis findings, the salience of community factors was a primary contention of this thesis, and as such its operationalization here differs from traditional definitions.

The following sections discuss the findings from each these studies in view of relevant implications for future research in preparedness, and general policy and practice implications related to emergency preparedness and disaster mitigation. An overview of the conceptual and methodological limitations of the thesis and some brief concluding remarks will follow.

Subjective Conceptualizations of Preparedness in a Socio-environmental Context

Researchers have criticized the design of current preparedness strategies and the corresponding underlying research, stating that too much focus is placed on changing individual risk perceptions and providing information about hazards and protective action (Ablah, Konda, & Kelley, 2009; Basolo et al., 2009) while ignoring broader considerations of the social environment which may themselves act as barriers or facilitators of preparedness (Becker, Paton, Johnston, & Ronan, 2012; Paton, Smith, Daly, & Johnston, 2008). Furthermore, some research has suggested that a comprehensive understanding of preparedness behaviours requires supplementing the current use of checklists and questionnaire scales with research examining the meaning individuals ascribe to the very

concept of preparedness (Becker et al., 2012). In direct response to these criticisms, the first study explored subjective conceptualizations of individual preparedness among a group of Ottawa residents through a series of qualitative interviews, while simultaneously taking into consideration various aspects of social environmental context.

Through the analysis of interview transcripts, it was revealed that participants had not actively participated in much emergency preparedness planning or activities. This was not surprising, given the low rates of preparedness reported in Canada more generally (Public Safety Canada, 2010), and the relative infrequency of disaster occurrences in this region. However, most participants believed they were adequately prepared, and all the participants thought they would cope well in a future event despite not having plans in place. This observed discrepancy is in line with a number of studies that demonstrate higher levels of reported perceived preparedness in relation to actual preparedness levels (Ablah et al., 2009; Basolo et al., 2009). The majority of these past studies relied simply on comparisons of quantitative ratings, however, which did not allow for an examination of the reasons behind these discrepancies. By contrast, these interviews highlighted the important connection participants made between their perceived level of preparedness and their perceptions regarding their ability to cope with adversity more generally. In other words, the participants did not conceptualize preparedness as a function of prescribed preparedness activities, even after being asked directly about these behaviours. Instead, when asked why they felt prepared, they attributed their satisfactory preparedness to the lack of past disasters they had experienced in the area, as well as their presently available resources. This included psychological resources tied to having a resilient and logical character, as well as material resources such as a fully stocked pantry and access to alternative cooking and heating sources. These attitudes are closely related to constructs of

coping efficacy and self-efficacy, which have certainly been linked to reported preparedness in past studies (Grothmann & Reusswig, 2006; Lindell & Perry, 2012). The present findings add context to the mechanisms linking these constructs and demonstrate the central role of general attitudes as they are applied to a specific undertaking.

The confidence participants had in their ability to cope with future events was supported by a number of elements represented in the social environment. This reinforces the growing appeals from disaster researchers that elements of the social environment must be considered in addition to individual characteristics and internal processes, in order to properly understand motivations and barriers to individual preparedness (Reser & Morrissey, 2005; Solberg et al., 2010). For instance, the regional history with regards to major disasters was a very salient theme, and the participants most likely to recognize the potential for more severe future events were also the respondents who had personally experienced greater negative outcomes in other disasters, mostly outside of Ottawa.

In addition to the local context, the social environments of the participants were marked by consistently positive and available supportive resources. For example, all the participants could identify sources of emotional and instrumental support in their social networks of family and friends. While only a few respondents gave concrete examples of how these networks were accessed in past local emergencies, all the participants felt confident that they could receive support from their social networks in future events. Research has demonstrated the importance of having access to social networks during and following major disasters to minimize negative personal outcomes (Messias, Barrington, & Lacy, 2012; Kim & Kang, 2010); moreover, researchers have claimed that social networks are important before a disaster, as they can influence precautionary behaviour through information exchange (Wood et al., 2011; Becker et al., 2012) and the reinforcement of

positive norms (Riad, Norris, & Ruback, 1999; Wood et al., 2011). In the present sample, none of the participants made reference to such processes in their own social circles, suggesting that active emergency preparedness is not a salient practice in their social networks either. In previous work examining risk perceptions for extreme-heat events among the elderly (Wolf et al., 2010), it was found that those individuals who did not consider themselves at risk for negative outcomes in future events had close social networks who felt the same way. Therefore, it is possible that the lack of existing norms for disaster-related precautionary action within their social networks coupled with a confidence that support is available when needed may actually dampen the perceived importance of these behaviours among the participants in this sample.

One recurrent theme in the present study was the salience of participants *providing* support to others. The respondents in this sample were overwhelmingly engaged within their social communities; for many this included religious institutions, while others were members of professional associations or leisure-based groups. Many of the participants formally volunteered through these associations, and believed that these communities would be a source of potential support for them in a future disaster. Community engagement coupled with feelings of trust and reciprocity among group members are indicative of an environment rich in social capital (Saegert, Thompson, & Warren, 2001; Putnam, 2000), which has been tied to positive outcomes *during* a disaster (Koh & Cadigan, 2008) and for recovery *after* an event (Dynes, 2006). Other researchers have claimed that social capital can facilitate protective health behaviours (Hawe & Shiell, 2000) through the sharing of information and access to resources, although the documented role of social capital in preparedness is still debated (Hausman, Hanlon, & Seals, 2007; Kim & Kang, 2010; Koh & Cadigan, 2008). In the present sample these mutually supportive

networks not appear to encourage preparedness, likely because it was not commonly discussed within the context of these groups. However, Murphy (2007) posits that the existence of social capital in the community before a disaster is still beneficial, as it may increase resilience to the negative outcomes of disasters by facilitating a community's internal capacity. In the present sample, it did appear that participants drew strength from the capacity of these organizations to provide support when needed. It should be noted that most of the discussions surrounding community engagement and support in the present sample referred to social communities, rather than geographical communities. However, participants also described their relationships with their neighbours as high in trust, and most participants expressed a sense of reciprocity between neighbours during their residence. As such, participants reported having both geographical and social community networks high in social capital, which contributed to their own feelings of confidence in their own preparedness.

This study provided a much-needed positioning of social environment in the wider emergency preparedness discourse. There is very little research examining a range of social environmental features simultaneously, especially in a Canadian context. The decision to conduct this research in the qualitative tradition allowed for an exhaustive and detailed examination of concepts, which was helpful in situating the present framework. The ensuing studies were designed to expand and further investigate some of the present findings using quantitative techniques. More specifically, as described above, internal processes such as lowered levels of risk perception seemed linked to preparedness decisions for this group of seniors; elsewhere it has similarly been demonstrated that the elderly do not perceive the personal risks from extreme-heat events as serious (Wolf et al., 2010; Sheridan, 2007) which may preclude them from engaging in appropriate protective

behaviours, although this is not consistently reported (McGee et al., 2009; Lindell & Hwang, 2008). Furthermore, the positive social environments described by this group could have been tied to their higher social status (as demonstrated by their professional backgrounds and more affluent neighbourhood environments), which has also been linked to differences in risk perception and emergency response (Bateman & Edwards, 2002; Riad et al., 1999). The second study in the thesis was thus designed to examine the relationships between sociodemographic characteristics (including age), threat appraisals, and preparedness behaviours more precisely.

The Role of Threat Appraisals in Explaining Socio-environmental Differences in Disaster-related Protective Behaviours.

The role of internal processes such as risk perception and coping efficacy are often at the heart of studies examining the precursors to preparedness (Riad et al., 1999; Vaughan, 2011). They are also believed to have some potential bearing on observed discrepant behaviours within high-risk groups often differentiated by their sociodemographic attributes (Bateman & Edwards, 2002; Riad et al., 1999). In practice, however, very few studies have explicitly tested whether cognitive-affective perceptions such as these actually explain differences in preparedness based on individual sociodemographic factors. Delineating the role of these internal processes as they relate to socially-relevant demographic attributes is an important step in positioning social environmental context in relation to individual differences. As such, the present study addressed these existing ambiguities by testing these relationships in a larger representative sample of Canadians, using data examining threat appraisals and anticipated response behaviours regarding terrorist threats.

To examine the role of threat appraisals in the relationship between sociodemographic attributes and emergency response, a multiple mediation analyses was carried out which yielded a number of important findings. First, as expected, greater intention to respond was significantly associated with higher perceived personal impact of terrorist threats and higher perceived seriousness of terrorism threats; these two constructs are analogous to personal and societal risk perception, which are often associated with emergency preparedness and response (Lee & Lemyre, 2009). Perceived probability of terrorism threats was not found to significantly predict intentions to respond, possibly due to the overall low levels of perceived probability in the sample as a whole. Other researchers have argued that probability is not as salient a dimension in risk perception as the perceived consequences, when discussing related behaviours (Sjöberg, 2003; Lion, Meertens, & Bot, 2002); the current findings also support this assertion. One unexpected result was the lack of a significant relationship between perceived coping efficacy and intentions to respond. This differs from earlier work predicting preparedness activities in the same sample (Lee & Lemyre, 2009), which did find a positive association between coping and preparedness. It should be noted, however, that the present study examined one's intention to respond to directions given by external sources; since the coping measure used here is also operationalized as a function of perceived control (Lee & Lemyre, 2009), it follows that it would not have the same significant relevance when making a decision to respond based on externally-sourced directives.

In terms of the relationships between sociodemographic attributes and preparedness, it was found that female gender was significantly associated with higher anticipated response; this relationship was fully mediated by higher overall levels of threat appraisals, and in particular, higher perceived impact and seriousness. This finding was not surprising,

as the relationship between female gender and increased risk perception is well-established (Riad et al., 1999; Lemyre et al., 2007), and its role in protective behaviour has been previously documented (Stevens et al., 2009; Bateman & Edwards, 2002).

While the above findings with regards to gender, threat appraisals, and anticipated emergency response were straightforward and expected, the same could not be said with the remaining demographic attributes. For example, none of the threat appraisal items, or anticipated response, was significantly related to visible minority status in the present study. Indeed, this was not entirely surprising, since these relationships are also not consistently reported in the literature on preparedness and response (Phillips, Thomas, Fothergill, & Blinn-Pike, 2010; Fothergill & Peek, 2004; Fothergill, Maestas, & Darlington, 1999). In the present study, the non-significant results could be a function of the low proportion of visible minorities sampled, but also the diverse multicultural distribution and cultural dynamics specific to the Canadian population. To date, much of the race-based research on preparedness originates from the United States, and often examines differences in specific racial groups, including Black and Hispanic populations (Vaughan & Nordenstam, 1991; Dash, 2010). These two major social groups often face particular social inequities in the American context, both generally and in regards to major disasters (Dash, 2010). The present study is useful as it shifts the focus to the Canadian context, and future research wishing to explore this relationship should consider salient race-based dynamics reflected in Canadian culture. For example, research has demonstrated particular challenges faced by Aboriginal groups in the wake of past floods in Manitoba (Buckland & Rahman, 1999), and in the mitigation of the H1N1 virus on remote reserves (Spence & White, 2010); future research should therefore be targeted to investigate challenges with particular salience in these socio-political contexts.

Unlike visible minority status, associations between response intentions and other socioeconomic attributes were determined to be statistically significant; however, aside from gender, none of these relationships were mediated by the noted differences in threat appraisals. This is a very important finding given that, as outlined above, risk perception is often positively linked to emergency response, and that lower levels of both risk perception and emergency response have been reported among socially disadvantaged groups. Indeed, these findings were also largely reflected in the present study, but the mediation analysis offers evidence that disparate outcomes in response are not a function of how these groups interpret a hazard's threat. This suggests that other factors should be considered when attempting to explain difference in anticipatory protective behaviours among at-risk groups. For example, researchers have argued that barriers to effective post-disaster response in economically disadvantaged populations are more directly related to a paucity of resources, whether relational or material (Uscher-Pines et al., 2012; Uscher-Pines et al., 2012; Phillips et al., 2010). This relates back to the qualitative study in Chapter 2, which emphasized the role of personal and social capacity in dealing with personal crises and the anticipated responses to future events.

One point worth noting in this study is that the variance explained by the analyzed model was fairly low. This outcome is congruent with other studies looking at individual-level factors and preparedness (Lindell & Hwang, 2008; McFarlane, McGee, & Faulkner, 2011). When taken together with the non-significant results in the mediation tests, further affirmation is provided that factors beyond internal processes and individual-level characteristics – perhaps social networks, community support, neighbourhood context – must be taken into account in order to more accurately understand preparedness behaviours. In order to make stronger generalizations from these claims, further evidence of social

environmental considerations in preparedness using larger samples and controlled analyses would be useful. As such, the final study in the thesis quantitatively examined emergency preparedness and response in relation to one element of the social environment: namely, the neighbourhood.

The Role of Higher-Order Contextual Factors in Emergency Planning among Individuals and Communities.

This study examined anticipatory emergency response in the context of both individual and neighbourhood-level variables – something that is lacking in preparedness research, despite recent calls for more attention to broader contextual variables (Masten & Obradovic, 2008; Solberg et al., 2010; Bouye et al., 2009). As mentioned throughout this thesis, most preparedness studies focus solely on individual-level variables, and studies that have explored neighbourhood factors often operationalize them at the individual level as well (for example, perceptions of social capital). By contrast, related research in health behaviours has demonstrated that neighbourhood context itself plays a role in individual response, over and above the contribution of commonly studied individual-level traits (Ross & Mirowsky, 2008; Poortinga, Dunstan, & Fone, 2008). Since research in preparedness – including in the present thesis – has demonstrated that individual-level factors such as previous experience and sociodemographic attributes are still important considerations, their contributions must still be taken into account in order to gain a clearer picture of the role neighbourhood context plays. Indeed, MacIntyre and colleagues (2002) echo the importance of examining both compositional (individual-level) and contextual components in neighbourhood research. As such, the present study featured the application of a multi-level model analysis, which allowed for a rare design in current preparedness

studies: Specifically, the direct testing of the role of neighbourhood context, in addition to (and while controlling for) related individual-level effects.

Findings in the multilevel model provided interesting and powerful insight into how factors at various social environmental levels relate to preparedness, both for individuals and communities. As expected, previous experience was significantly associated with anticipatory response. While the outcomes related to these personal experiences were not assessed in the present study, it was found that participants who had experienced a greater number of major emergency events reported a higher level of planning for future events. This is consistent with Weinstein's (1987) assertion that previous experience reinforces what steps are needed to respond effectively in future emergencies, thus encouraging planning and preparedness behaviour. The other included individual-level variables – namely, gender and age – were also significantly related to preparedness in the expected directions: female gender and higher age were associated with a higher level of emergency planning, which is consistent with results from the previous quantitative thesis study. In this particular study, it is not surprising that female respondents would also feel more prepared in terms of the particular outcome measures of planning how to contact loved ones and check on social networks, given their more prominent role as family caretakers (Enarson, 2010). Likewise, while the relationship between higher age and greater preparedness may seem at first glance to contrast with the findings of the initial qualitative study, the conceptualization of preparedness in this context focuses on relationships with social networks and self-sufficiency; indeed, while the respondents in the qualitative study had not prepared emergency kits or made formal emergency plans, they also reported having access to material resources and were engaged with their social networks. Thus, these findings offer generalizable support to the subjective analysis presented earlier.

While these individual-level factors provided useful information regarding preparedness, the main contribution of this study was the novel and powerful insight into how broader social environmental factors, such as neighbourhood context, relate to preparedness. In the present analysis, neighbourhood social organization was significantly tied to anticipated emergency response: More specifically, levels of anticipated emergency response were lower for respondents living in neighbourhoods with more frequent neighbourhood mobility, greater proportions of single parent families and people living alone, fewer home owners, and a greater proportion of families living in poverty, as defined by LICO scores (Statistics Canada, 2012). It is worth stressing that this relationship held for residents in all types of neighbourhoods, and through the use of the random slopes model specific to multilevel analyses, the assertion can be made these results were not simply a result of the composition of residents in the sample, but a wider contextual effect (Snijders, 2005). In other words, the social organization of the neighbourhood itself has some role in the effective planning individuals undertake for future emergencies. This relationship was maintained even when controlling for significant individual-level factors, adding further strength to the contribution of neighbourhood-level effects. While the increase in explained variance at the individual level was modest, the inclusion of the contextual variable led to a more noteworthy increase in the model's explained variance at the neighbourhood level, demonstrating the particular importance of social neighbourhood organization in community-level preparedness. In combination with the results presented above, this important finding has a number of important implications for future research and policy in emergency preparedness; these implications are detailed below.

Implications of Findings

The main goal of this thesis was to position individual preparedness within a social environmental framework. Applied research highlighting the interplay between individual processes and the wider social environment is considered an important and necessary advancement in the area of disaster mitigation (Masten & Obradovic, 2008; Vaughan, 2011); thus, the present thesis is an important contribution to the field. Furthermore, the use of a mixed-methods approach in this endeavour was ideal for such needed preliminary research. More specifically, the use of qualitative methods provided an excellent opportunity to initially position the phenomena of preparedness and the social environment, as well as allowed for a more nuanced investigation of the subjective context inherent in this health promotion strategy, which makes its widespread success so challenging. The quantitative methods then allowed for the testing of relationships in a more generalizable manner, which is crucial in research involving significant policy implications. The multilevel study in particular demonstrated how the complexity of social environmental levels can and should be investigated simultaneously in order to gain a more comprehensive understanding of the interaction between the person and their environment. These research findings have not only provided justification for the overarching goal of this thesis, but also carry important implications for the advancement of research and policy in the field of disaster management. These implications are outlined below.

Implications for Preparedness Research. The thesis findings have three important implications for future research in emergency preparedness and response. Specifically, future attempts to improve our understanding of individual emergency preparedness should be undertaken with the goal of integrating more social environmental factors. Secondly, research investigating internal processes in preparedness must be interpreted with caution

when social environmental context is not considered. Thirdly, this research highlights the need for emphasis on the role of social resources in the facilitation of preparedness planning and activities.

Further integration of social environmental factors. On a broad scale, the thesis findings support recent calls to incorporate more social environmental elements into research on individual preparedness in order to address the problematic reductionist approach that has instead focused mainly on internal processes (Reser & Morrissey, 2005). The theoretical framework presented in the first chapter of this thesis (see Figure 5) and the accompanying testable model (see Figure 6) provided a much needed integration of numerous social environmental factors based on a socio-ecological perspective, and point to the need for continued advancement in this area. To date, the amount of theory and research incorporating social environmental precursors to preparedness has been comparatively sparse (Becker et al., 2012; Paton, 2008), and only minimally applied in a Canadian context (Gibson, Lemyre, Clément, Markon, & Lee, 2007). Thus, this thesis offers an important base from which to extend this perspective, both in Canada and more generally. It should also be noted that the salience of social environment was established across a range of hazards, populations, and preparedness outcomes, which further emphasizes their importance in research directed at the all-hazards approach. The overarching concept of social environment is very broad, however, and these linkages represent just a few of the possible pathways that warrant attention. Thus, future research on preparedness must continue to explore how different aspects of social environment and their relevant features at multiple levels facilitate or hinder preparedness efforts.

Re-examination of internal processes. While the number of existing studies linking internal processes such as risk perception and coping efficacy to preparedness is substantial

(see Chapter 1 for an overview), the present findings suggest that caution should be applied in research examining these factors in isolation of broader social environmental considerations. In the study on Canadians' perceptions of terrorism threats and anticipated response (Chapter 3), it was revealed that differences in threat appraisals as they related to social demographics largely failed to statistically account for the differences in anticipated response. While the relevance of cognitive-affective processes still plays a role in helping explain preparedness behaviours, the findings presented here suggest that when considered in isolation, they provide insufficient information regarding the complex nature of preparedness and response behaviours. For example, social environmental barriers may preclude the uptake of preparedness and response despite appropriate threat appraisals. As such, future research should strive to examine the social environmental factors that might interfere with the successful implementation of these behaviours, in order to better inform preparedness strategies that currently rely primarily on the dissemination of information related to hazards and protective action.

Emphasis on social resources. Another major implication drawn from this thesis emerges from several of the study findings which point to the importance of having social resources in emergency preparedness. To date, most research in this area has focused largely on how preparedness may be encouraged through social norms or the role of social networks as disseminators of hazard and mitigation information (Wood et al., 2011; Riad, Norris, & Ruback, 1999; Lindell & Perry, 2012). In the qualitative study outlined in Chapter 2, formal preparedness was not a pertinent issue for the participants themselves, nor was it a salient feature in the descriptions given regarding their interactions with their social networks; this was quite possibly a reflection of the low occurrence (and therefore perceived relevance) of major disasters in their region. However, related dynamics that

were otherwise demonstrated between the participants and their social groups should be incorporated into future research in preparedness. For example, participants were all connected to *reciprocally* supportive social networks of family, friends, and for some participants, their neighbours; the experiences participants shared regarding these networks were marked by giving and receiving assistance, both in day-to-day tasks and in times of crisis. Furthermore, many of the participants strongly identified as members of social organizations such as churches, and made references to their volunteer behaviours as members of these groups – in some cases, during past disasters. Researchers may wish to examine whether reinforcing the importance of preparedness behaviours in the context of these roles encourages the uptake of protective behaviours, as opposed to principally appealing to the need for personal protection. Indeed, Solberg (2010) has also suggested the potential effectiveness of appealing to social identities in order to facilitate preparedness, a strategy also supported in related areas of health promotion (Invernizzi, Falomir-Pichastor, Munoz-Rojas, & Mugny, 2003; Wilson, Barakat, Vohra, Ritvo, & Boon, 2008).

The results of the multilevel study in Chapter 4 also point to the need for continued research on social resources in preparedness at the contextual level. As outlined above, a more disadvantaged social neighbourhood organization – as represented by higher rates of residential mobility, higher rates of people living alone, higher rates of single-parent households, higher rates of households living under the poverty line, and fewer rates of home ownership – was significantly related to lower anticipated emergency response for both individuals and communities, even when controlling for individual-level correlates of preparedness. These conditions collectively represented the social organization of the neighbourhood overall, and have been associated elsewhere with neighbourhood deprivation (Pampalon et al., 2009; 2010). Neighbourhoods with greater social deprivation

are thought to have lower levels of neighbourhood cohesion and social capital (Poortinga et al., 2008; Sampson, Morenoff, & Gannon-Rowley, 2002; Drukker & van Os, 2003), which are important in the formation of social ties and social resources (Fone et al., 2007). It should also be emphasized that while these social neighbourhood characteristics were significantly related to preparedness in the present study, the economic-based neighbourhood variable was not. Future studies on preparedness should consider examining more directly how contextually-measured social resources, such as social capital and community engagement, play a role in the preparedness of individuals and neighbourhoods.

Implications for policy and practice. In addition to the research implications outlined above, the thesis findings also provide important insight about the failed success of current preparedness strategies, and offer suggestions for improvement both in relation to the general population, and in special consideration of high-risk groups.

Improving preparedness strategies. As demonstrated here and elsewhere (Public Safety Canada, 2010), preparedness levels remain fairly low. A number of challenges persist in the promotion of individual preparedness behaviours in Canada: First, it must be noted that the occurrence of major disasters is relatively infrequent in many regions. Residents may not see a benefit to preparing based on their previous lack of experience with major events, as expressed by many participants in the qualitative study in Chapter 2. If residents believe they are sufficiently prepared given the risk of a *major* disaster occurring, current preparedness campaign messages are unlikely to be effective in many areas. Furthermore, based on past research (ex. Basolo et al., 2009) and the cautions outlined above, attempting to improve preparedness by simply appealing to risk perceptions or knowledge about these hazards and their mitigation – which continues to be the focus of many preparedness strategies – will not likely improve preparedness rates. Instead,

emergency managers should consider framing emergency preparedness strategies in relation to the *cumulative* risk that residents face with regards to both major disasters and the consequences that can arise during more commonly experienced minor events. Furthermore, emergency managers may wish to frame these activities as more general health promoting behaviours. As seen in the qualitative study in Chapter 2, participants did see the benefit of maintaining a sustained level of general supplies in order to be self-sufficient. As such, framing planning activities as useful for maintaining self-sufficiency in a variety of situations – such as personal emergencies and minor emergency events in addition to major emergencies – may address issues related to lower perceived risk.

The findings of the thesis emphasized the important role of social environmental context in preparedness, and the significance of personal and social resources in particular. Thus, the key to individual preparedness may be in the building of *capacity* within these social resources, rather than a focus on individual knowledge uptake and the gathering of supplies (Uscher-Pines et al., 2012). Capacity building refers to enhancing the *ability* of an individual and their community to address their existing needs and concerns (Hawe & Shiell, 2000). Indeed, researchers have already stressed the importance of community capacity building in community-level disaster preparedness (Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008; Paton & Johnston, 2006; O'Brien, 2008), and the ties between community preparedness and individual preparedness have also been discussed (Pooley, Cohen, & O'Connor, 2006). Based on this literature and the present findings, a focus on capacity should also be integrated into individual preparedness strategies.

Capacity building within social groups before a disaster could take several forms, and based on the findings of the qualitative study in Chapter 2 and the multi-level study in Chapter 4, should include both geographical and socially-based communities. For example,

preparedness planning can and should be encouraged within social organizations such as churches and other community groups. These organizations are often on the front lines following a disaster (Patterson, Weil, & Patel, 2010; Dynes, 2006) and have existing linkages with individual community members (Koh & Cadigan, 2008). If these groups are prepared, they can assist their members and others through existing volunteer networks. In addition to the resources these groups can provide to individuals in the aftermath of a disaster, they can also serve to inform and encourage individual preparedness within their membership as well. This might be an especially effective strategy if social identities do play a role in the uptake of preparedness messages, and the information is being endorsed by the social group itself.

Another reason why building capacity within communities is important is because not everybody has the *ability* to adhere to current preparedness recommendations. Maintaining adequate supplies of food, water, and other materials may be beyond the financial means of certain individuals. Thus, improving social linkages allows for those who are not prepared to have connections to other individuals and community groups who are prepared. Indeed, the existence of social cohesion and social capital in the community has already been linked to better individual outcomes during and following a disaster (Kim & Kang, 2010; Becker et al., 2012). The results of the qualitative study in Chapter 2 suggest that some individuals would be willing to take on a helping role in an emergency through their social organizations, but their ability to help might be limited if other relationships beyond their communities are not well established. Moreover, the multilevel study in Chapter 4 showed that the contextual effects associated with social resources were related to both individual and neighbourhood preparedness, reflecting arguments made by other researchers about the ‘supra-individual’ effects of neighbourhood context on

individual well-being in disasters (Smith, 2006). Improving social environmental resources within a community in addition to the current emphasis on stockpiling and planning adds resources to the community that can then be used in both the immediate response and the more distal recovery efforts – this important benefit is often overlooked in preparedness strategies (Usher-Pines et al, 2012)

Capacity building in communities is a complex task, however, and requires a number of considerations. First, special attention must be paid to both existing resources in a community as well as social-environmental barriers, such as the lack of available resources, problems with infrastructure, and sociocultural considerations (Pooley et al., 2006). As such, any measures applied at the community level should be participatory in nature – both in design and implementation – to ensure that community needs are met, and that implemented strategies maximize relevance to, and acceptance by, the targeted residents (Smith, 2006). This strategy has been promoted in various areas of public health (Wallerstein & Duran, 2006; O’Doherty & Hawkins, 2010). This type of engagement goes beyond unidirectional attempts to increase public acceptance or ascertain public opinion, incorporating legitimate public input into policy (O’Doherty & Hawkins, 2010). One recent example of a targeted participatory intervention to improve capacity and preparedness, while considering social environmental context, is the Canadian-based EnRiCH project (Enriching Resilience and Capacity for Health - O’Sullivan, 2012). Based on a previously developed framework, (O’Sullivan, Kuziemy, Toal-Sullivan, & Corneil, 2012), tailored emergency preparedness strategies were implemented in a number of Canadian cities based on the specifically identified needs and strengths of the communities, through the participatory engagement of residents. Evaluation of these projects is underway (RHRP, 2011); the findings presented in this thesis suggest that the implementation of

projects such as the EnRiCH initiative will be beneficial in improving capacity among individuals and communities beyond the utility of current informational strategies.

Special consideration for high-risk groups. While this thesis is directed at preparedness for the general public, a number of findings carried particular importance for the mitigation of negative disaster outcomes in high-risk populations. First, as previously mentioned, the mediation analysis in Chapter 3 showed that differences in emergency response intentions based on sociodemographic attributes were not due to reported differences in threat appraisals. Since this emphasizes the likely existence of features in the social environment that present barriers to preparedness and response for socially disadvantaged groups, they must be given greater attention in preparedness strategies (Uscher-Pines et al., 2012; Phillips et al., 2010). For example, there has been criticism against commonly-utilized web-based preparedness campaigns, as they might be biased against individuals with lower literacy rates, or certain cultural implications (Delestienne, 2004; Wizowski, Harper, & Hutton, 2002). This emphasizes the benefit of enhancing the capacity of social networks and communities, and using participatory approaches to facilitating preparedness through these resources.

The multilevel results in Chapter 4 also point to the added need for these measures in disadvantaged and deprived neighbourhoods, where high-risk groups are represented in greater proportion. These areas often have more social barriers and fewer social resources, so it is especially important for policy makers and emergency managers to create capacity in these areas. Community mapping of needs and assets, and the use of participatory strategies to compile this information, would be of particular benefit in these areas.

Furthermore, recognizing and accessing the strengths that are inherent in all high-risk social groups in this effort to increase capacity will mitigate further marginalization of these

populations (see Lemyre, Gibson, Zlepnig, Meyer-Macleod, & Boutette, 2009, for further discussion).

Conceptual and Methodological Limitations

As previously mentioned, this thesis has made an important contribution in expanding our knowledge of how social environmental context relates to preparedness. The theoretical framework and supporting studies were developed and carried out in light of the significant gaps that currently exist in the area of individual preparedness, both in a Canadian context and more generally. This preliminary work has important implications for both future research and policy, as outlined above; however, the exploratory nature of these contributions also lends itself to some conceptual and methodological limitations that should be addressed to better guide future advancements.

First, as previously mentioned, the concept of social environment is extremely broad in scope and there is no single guiding principle for its definition or measurement. This makes it difficult to formalize and operationalize an exhaustively inclusive conceptual model encompassing all relevant components. Instead, the present thesis model provides a framework that reflects a needed paradigm shift for considering individual preparedness in research and policy, and the subsequent testable model and supporting studies present but a few of the potential pathways in which social environment might relate to preparedness. As more research is conducted incorporating multiple facets and levels of social environment, however, a more precise understanding of these inter-related pathways can be established.

On a related note, many of the constructs and processes implicated within the social environment, both in this thesis and in related research, remain complex in their conceptualization and assessment. For example, there is some overlap in the definition and measurement of concepts such as social support, social cohesion, and social capital (Jenson,

2010). In the present thesis, the significance of social resources in preparedness is clearly demonstrated but the mechanisms by which they operate are less clear: Findings point to both the structural organization of one's social environment and the processes that result within them. A similar dilemma exists in health research, and researchers have discussed the importance of attempting to delineate between social environmental *motives* versus *means* (Pampel, Krueger, & Denney, 2010). The lack of specificity in the presented findings in this regard certainly requires follow-up research to address this ambiguity; however, this does not diminish the important contribution this novel research has made in establishing the role of social environment in individuals' readiness for future disasters, nor the foundation it provides for future investigation.

Another conceptual challenge relates to the assessment of individual preparedness. Each of the three studies examined slightly different measurements of preparedness, to collectively reflect the definition of preparedness as outlined in institutional strategies such as Public Safety Canada's *Get Prepared* campaign, including gathering supplies and making emergency plans (Public Safety Canada, 2012). However, the main focus in all studies was on individual *intentions* and *anticipated* behaviours, with some added discussion in the qualitative study focusing on previously completed actions. Like in all health behaviour research, there is debate as to the accuracy of reported intentions in predicting actual behaviour (Sutton, 2006). However, preparedness research by definition includes the examination of planned behaviours as they relate to disasters before they occur; therefore, asking about anticipated protective behaviours is a reasonable strategy in order to gain preliminary information about public levels of preparedness activities.

Another complexity of examining the concept of *individual* preparedness is that assumes some of the same shortcomings applied in this thesis to its most commonly studied

correlates: That is, a reduction of these outcome behaviours to the individual level, when they are actually occurring in a social environmental context. For example, individual preparedness for some may truly involve individual actions, whereas for others it may actually be a representation of behaviours driven and carried out by, or in conjunction with, another member of the individual's family or household. Thus, there is some ambiguity surrounding the accuracy of defining preparedness as an *individual* behaviour. To be sure, some preparedness addresses this by examining household preparedness as the unit of measurement (Statistics Canada, 2004), but the ambiguity of the term *household* presents a similar dilemma. This issue is important to acknowledge in terms of refocusing preparedness to emphasize the transactional relationship between the person and their social environment. However, one must also concede that ultimately the goal of preparedness research is to ensure that individuals can effectively mitigate the negative outcomes of disasters, and thus the importance of evaluating the level of their own perceived preparedness as an *endpoint* still remains, even in the absence of this nuanced information.

The complex and exploratory nature of this thesis extends challenges from the conceptual level to the methodologies of the supportive studies. Indeed, the veritable strengths of the mixed methods utilized in this thesis have been outlined above, and must not be underscored. However, as with all research examining complex psychological phenomena, some methodological shortcomings exist. To begin, both the quantitative studies presented above were carried out as secondary analyses, meaning the survey designs were not originally developed with this thesis goal or its objectives in mind. As a result, the concepts and items reflected in the data were not always ideal for the investigations under study, when compared to other possible options. For example, the

census data used in the multilevel study was chosen to reflect other scales examining social environmental characteristics at the neighbourhood level; however, the items themselves can also be considered proxies for more meaningful constructs such as social cohesion and social capital. Other comparable datasets such as the *General Social Survey* from Statistics Canada (Statistics Canada, 2004) would have provided arguably more appropriate items to be used as proxies; however, the survey does not sample the sufficient coverage needed for a multilevel analyses to be conducted, making the available census data preferable for this investigation.

Another challenge with the secondary data used in this thesis was the resulting sampling and categorization constraints may have attenuated statistical findings. For example, there was an underrepresentation of visible minorities in the mediation analyses which may have attenuated possible significant findings, and both the quantitative studies operationalized income levels in such a way that may have resulted in ceiling effects for these variables. Furthermore, in the third study, the neighbourhood identifiers were limited to broadly-defined postal information, which was problematic because community boundaries are often based on more socially relevant attributes (Cummins, Curtis, Diez-Roux, & Macintyre, 2007). Indeed, collecting original data to examine these concepts would have been ideal, but the cost and time constraints that accompany such an endeavour are beyond the scope of this doctoral project. Also, it must be noted that significant findings were demonstrated in the multilevel analysis despite these constraints, suggesting the reported effect size may actually be conservative, and may have been even greater if more appropriate parameters had been employed.

A methodological limitation pertaining to both qualitative and quantitative studies in this thesis was that the study designs were cross-sectional, meaning data was collected at

one time point only. Moore et al (2004) argue that examining preparedness at one point in time may not truly reflect how related indicators and dynamics operate as the community moves through various stages of the disaster cycle, since researchers have found that there is often a change in social environmental dynamics between individuals affected during and in the short- and long-term aftermath of disasters: For example, research has shown that in the acute phase of disaster response, helping behaviours and community cohesion increase, but tend to diminish in the longer recovery phase (Masten & Obradovic, 2008). Research utilizing a longitudinal or evaluative design would better capture the impact of social environmental characteristics on disaster preparedness and outcomes for individuals and communities; however, this type of research design is often not feasible due to expense and the underlying uncertainty that accompanies the prediction of most disaster occurrences.

Finally, it is worth noting that both the qualitative and the multilevel study were carried out on samples in Ottawa, Canada, and this regional context has particular characteristics that may limit the generalizability of findings to other regions. First, in terms of past exposure to major disasters, the region has mainly experienced minor events with outcomes limited to property and infrastructure damage. It stands to reason that future studies examining areas more regularly affected by major events – or likewise, more severe outcomes – may reveal further linkages between social environmental factors and preparedness. Secondly, as discussed in the chapters above, both Ottawa samples were relatively affluent and socially privileged. Since social environmental challenges are more pronounced in disadvantaged groups (who are also more negatively affected by disasters), it is imperative that further research be carried out in less privileged samples to ascertain the magnitude and nuances of social environmental influences on preparedness within these groups. While the particular context of this region must be considered when generalizing to

other areas, these studies provide an important contribution to future investigations as they provide an excellent point of comparison. To be sure, the findings revealed in these samples with relative social environmental privilege are most likely conservative in comparison to those with greater challenges; being able to make such comparisons in the future will certainly improve our understanding of the pathways between social environment and emergency preparedness.

Conclusions

In conclusion, the goal of this thesis was to position individual emergency preparedness in a broader social environmental context. This goal was achieved through the development of a conceptual model informed by research in both preparedness and relevant areas of study, and tested through the use of a mixed methods approach that provided a number of useful insights for further advancements in research, policy, and practice. This preliminary work can and should be expanded upon to further our knowledge of how the environments in which we live – geographically and socially – can create barriers but also opportunities in the effectiveness of preparedness efforts here in Canada, and elsewhere. Further longitudinal work, preferably with participatory elements, are needed to maximize the benefits of this ever increasing focus on the social environment in emergency preparedness.

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APPENDIX A : QUALITATIVE INTERVIEW SCHEDULE

Social Environment and Emergency Preparedness		
Interview Guide		
Introduction: I am a graduate student from the University of Ottawa studying emergency preparedness, and what people here in Ottawa think about their own preparedness. I am interested to learn about your opinions and experiences on this topic as a resident living in Ottawa. <i><pause></i> Today's interview should take about an hour. There are no right or wrong answers; we are simply asking for your thoughts and your perspective. You may choose to answer or not answer any of the questions I ask, and you may stop the interview at any time, if you wish. With your agreement, I would like to record the interview to ensure that I accurately document your views. Is this alright? <i><P></i> Okay. To give you an idea of how the interview will proceed, we're going to cover three main topics: First, we'll talk about emergencies, and emergency preparedness. Then I'll ask some questions about your social networks and preparedness. Finally, we'll talk briefly about your neighbourhood, and emergency preparedness. Do you have any questions before we begin? ASK - AGE? MARITAL STATUS? LIVE ALONE? WORKING/RETIRED?		
Topic	Questions	Probes
First, I would like to discuss how prepared you think you are for a large-scale emergency. By emergency, I mean a situation that poses an immediate risk to your health, life, or property – for example, a severe ice storm, or an infectious disease outbreak. To start, I'll just ask you some general questions		
General introduction	In general, how do you think you would cope in the event of a large-scale	

question	emergency, like an earthquake, or an ice-storm? Do you have any plans in place, for events such as these?	If no – why not? If yes, why? If yes, Can you describe them?
I'm going to ask you to read the following four questions about a few things that some people might do in a large-scale emergency. Please read each question, and mark to what extent you agree or disagree with each statement. (Give question sheet)Let's start by talking about each of the questions		
Preparedness in a social context	The first question asks if you and your family would know where to meet/how to contact each other. How did you answer this question? Can you explain why you answered as you did? Is this something that is important for you? Why or why not?	- Why do you think your family would know where to meet? - Why do you think your family would not know where to meet?
	The next question asks if you would be self-sufficient for 72 hours. How did you answer this question? Can you explain that answer a little for me? Is something important to you? Why or why not?	- What do you think you would need to be self-sufficient? - What would help you to be more self-sufficient?
	The next question asks whether you have a plan in place to check on your neighbours and those in your social circle. How did you answer this question? Can you describe your plan, and why you answered that way? Is this something important for you? Why or why not?	- Ask about system - Ask if others in social network might have such a system

	The last question asks if you would know where to get information about what to do during the emergency. How did you answer that question? Where would you get it? Is this something you think is important to know?	- Where would you get information?
Meaning behind concept of 'preparedness'	Looking at your answers, how would you say you rate yourself in terms of your overall preparedness?	- Generally prepared? - Generally unprepared? - Were your answers similar for all questions? Why or why not?
	Can you tell me why you think you're as prepared or unprepared as you are? What does it mean to be prepared? What does it mean to be unprepared?	- Does your answer have anything to do with your past experiences? - Does the way in which you answered have anything to do with who you are as an individual – how you are different from other people?
	Have you ever thought about these kinds of issues before being asked today?	- When? - Why? - Why not?
	Are you concerned about a major event happening in Ottawa?	- Why/why not? - Likely? - Risk to self? - Risk to others?
These survey questions ask about a future event. I'd like to talk now about an event that has already happened.		
Comparison of past behaviour and anticipated responses	Can you describe a time in your past where you've experienced an unexpected event that could be considered an emergency? Tell me about the emergency? Who was	- Natural disaster? - Household emergency? - Personal emergency? - Work emergency

	involved? What was your role – what did you do?	
	How did you respond in that situation? How did you feel at the time? How did you know what to do?	- Confident about your response? - Unsure about your response?
	Why do you think you responded that way? Do you think you responded well? Why/why not?	- Does it relate in any way to who you are, in general? - Is it part of your personality?
	How do you think you'd respond if the same thing happened today?	- Would you be better prepared? Why? - Would you be less prepared? Why? - Do you think having a plan was/would have been helpful?
Now I would like to ask you a few questions about your family and friends; that is, people you feel at ease with and can talk to about whatever's on your mind. Let's start with your family, first.		
Social networks and social support (GSS)	How many close relatives do you have, who you feel at ease with, can talk to about what is on your mind, or call on for help? In the past month, have you received any help at all from these individuals? Can you describe the help you've received? In the past month, have you given help to these individuals? Can you describe how you've helped? If there was an emergency, do you think you would count on these individuals for	- Who are they? - Do you live close to them? - How often are you in contact? - By doing domestic work, home maintenance or outdoor work? - By providing transportation or running errands? - By helping with child care? - By teaching, coaching or giving you practical advice? - By giving you emotional support? - By helping you in some other

	help? Why or why not? What would you need from them? DID THEY HELP IN PAST EVENT? Would they count on you? Why or why not? How would they count on you?	way?
	How many close friends would you say you have? That is, people who are <i>not</i> your relatives, but who you feel at ease with, can talk to about what is on your mind, or call on for help? In the past month, have you received any help at all from these individuals? Can you describe the help you've received? In the past month, have you given help to these individuals? Can you describe how you've helped? If there was an emergency, do you think you would count on these individuals for help? Why or why not? What would you need from them? DID THEY HELP IN PAST EVENT? Would they count on you? Why or why not? How would they count on you?	- Who are they? - Do you live close to them? - How often are you in contact? - - By doing domestic work, home maintenance or outdoor work? - By providing transportation or running errands? - By helping with child care? - By teaching, coaching or giving you practical advice? - By giving you emotional support? - By helping you in some other way?
Neighbourhood contacts	Thinking back to all the people who have helped you in the past month, and who you've helped, how many would you say live in your neighbourhood?	- Most live in your neighbourhood? - Most do not live in your neighbourhood?
Now I would like to talk a little more about where you live.		

Local Context	How would you describe the neighbourhood where you live to someone not from here? The region more generally? How about your home?	- Likes and dislikes - Social and economic conditions? - Local businesses? - Safety issues? - Changes over time?
	How attached to this area would you say you are?	- Were you born in the area? - DO YOU WORK IN THE AREA? - How long have you lived here? - Can you tell me your plans for the future here?
Trust (GSS)	Would you say that you generally trust the people in your neighbourhood?	- Have you always felt this way? - What made you feel this way?
	Would you say you're involved in your community? Could you describe any ways in which you are involved in your community? Other communities?	- Informal: friends, family etc. - Formal: volunteer organizations related to health or environment - Work Community?
Emergencies and Neighbourhood	Thinking about what we just discussed about where you live, do you think that you could count on your neighbourhood for help, if there was an emergency? Why, or why not? What do you think you would need from your neighbourhood, in an emergency? DID THEY HELP IN PAST EVENT?	- Could you get help from your neighbours? - Could you get help from neighbourhood businesses? - Could you get help from other neighbourhood organizations?
	Is there anything else your neighbourhood has to offer, in an emergency? Anything that would make	- ???

	responding to emergencies more difficult?	
Conclusion That is all of the questions I have for you. Is there anything more you would like to add at this point? Anything I didn't ask you about that you thought I would, or that I should? Thank-you very much for your time. The information you have provided is very important and will go a long way in helping us better understand what helps people to be better prepared in an emergency. If you have any questions about this study please contact myself, or any of the researchers listed on your consent form. We hope to have a summary of our findings completed in a few months time; if you would like a copy of the paper, just contact myself of the main researcher, and we'll be happy to provide you with one.		

APPENDIX B: PERCEIVED TERRORISM THREAT AND PREPAREDNESS

SURVEY QUESTIONS

INT01:

notes: _____ Phone: _____

project # 2068 _____

Good morning/afternoon/evening. My name is _____ of Goss Gilroy Inc. I am calling on behalf of the Institute of Population Health at the University of Ottawa. We are conducting a survey among Canadians about their opinions on various issues related to terrorism and terrorism preparedness. We are not selling anything. We are simply interested in your opinions. Your household has been selected randomly. To make sure I'm interviewing the right person in this household, I'd like to ask you a few introductory questions.

OK - continue	OK	=> /LASTQ
NA - No answer/ busy	NA	=> END
AP - Appointment (confirmed with respondent)	AP	=> CB
CS - Call back at a later time	CS	=> CB
RF - Refused - do not wish to complete survey	RF O	=> END
R2 - Refused - remove from list	R2 O	=> END
BC - Bad Contact Information	BC O	=> END
LN - Language Barrier, does not speak English or French	LN O	=> END
FR - French Interviewer Required	FR	=> END
DU - Duplicate Name	DU O	=> END
NB - Number blocked by Bell	NB	=> END

Q3:

Q3. Including everyone, how many people live in this household?

Refused 97

Q4:

(This includes those CURRENTLY living in the house, ie not those away at school)

Q4. Among these, how many males are 18 years of age and older?

Refused 97 O => INT02

Q5:

Q5. How many females are 18 years of age and older?

Refused 97 O => INT02

INT02:

In order to randomly select survey participants, we would like to know who in your household has a birthday closest to <date>? May I speak with this person? (IF SAME RESPONDENT) This survey will take approximately 30 minutes of your time. It has been reviewed and approved by the Ethics Board of the University of Ottawa. Your participation is completely voluntary and the information being collected will remain anonymous and strictly confidential. You are under no obligation to answer all questions and may withdraw your participation at any time. Can we begin now?

(IF NEW RESPONDENT) My name is _____ of Goss Gilroy Inc. I am calling on behalf of the Institute of Population Health at the University of Ottawa. We are conducting a survey among Canadian men and women about their opinions on various issues related terrorism and terrorism preparedness and would appreciate it if you participated in this project. We are not selling anything. We are simply interested in your opinions. This survey will take approximately 30 minutes of your time. It has been reviewed and approved by the Ethics Board of the University of Ottawa. Your participation is completely voluntary and the information being collected will remain anonymous and strictly confidential. You are under no obligation to answer all questions and may withdraw your participation at any time. Can we begin now?

OK - continue	OK	=> /LASTQ
AP - Appointment (confirmed with respondent)	AP	=> CB
CS - Call back at a later time	CS	=> CB
RF - Refused - do not wish to complete survey	RF O	=> END
R2 - Refused - remove from list	R2 O	=> END
LN - Language Barrier, does not speak English or French	LN O	=> END
FR - French Interviewer Required	FR	=> END
NA - No answer/ busy	NA	=> END

GENDER:

DO NOT READ Note Gender of Respondent

Male	01
Female	02

AGE:

Before we begin, I have one question to ask you for classification purposes only. In which of the following age categories do you belong?

18-24.....	01
25-34.....	02
35-44.....	03
45-54.....	04
55-64.....	05
65 and over	06
Refused to answer (do not read)	97

PRE2:

Now, here are some questions about the way you perceive different types of terrorism in Canada.

DEF1:

For the next 5 questions, we will use one of the most common definitions of the term “terrorist bombings”. Therefore, the term "terrorist bombings" refers to the use of common explosives such as dynamite.

Q14:

[illegible]

you think you would be able to cope with it?						
--	--	--	--	--	--	--

DEF2:

For the next 5 questions, we will use one of the most common definitions of the term “chemical terrorism”. Therefore, the term “chemical terrorism” refers to the release of harmful chemicals or gases such as Sarin nerve gas or Mustard gas.

Q20:

[illegible]

able to cope with it?						
-----------------------	--	--	--	--	--	--

DEF3:

For the next 5 questions, we will use one of the most common definitions of the term “biological terrorism”. Therefore, the term “biological terrorism” refers to the intentional spread of diseases such as Smallpox or Anthrax.

Q26:

[illegible]

DEF4:

For the next 5 questions, we will use one of the most common definitions of the term “radiological terrorism”. Therefore, the term "radiological terrorism" refers to the use of "dirty bombs" to spread radioactive materials. (If asked: dirty bomb or Radiological Dispersal Device (RDD) combines a conventional explosive, such as dynamite, with radioactive material.)

Q32:

[illegible]

DEF5:

For the next 5 questions, we will use one of the most common definitions of the term “nuclear terrorism”. Therefore, the term “nuclear terrorism” refers to the use of nuclear bombs.

Q38:

[illegible]

PRE8:

If terrorism occurred, government authorities might request cooperation from the public in a number of ways. Please indicate how willing you would be to perform each of the following if you were asked to by government authorities.

Q123:

	<i>1. Not at all</i>	<i>2. A little</i>	<i>3. Moderately</i>	<i>4. Very Much</i>	<i>5. Extremely</i>	<i>Don't Know/ No Opinion</i>
<i>Q123. Evacuation of the city or region</i>	☐	☐	☐	☐	☐	☐
<i>Q124. Receive vaccination</i>	☐	☐	☐	☐	☐	☐
<i>Q125. Take prescribed medication such as antibiotics</i>	☐	☐	☐	☐	☐	☐
<i>Q126. Undergo decontamination treatment such as public shower</i>	☐	☐	☐	☐	☐	☐
<i>Q127. Asked to strictly remain inside building for protection (sheltering-in-place)</i>	☐	☐	☐	☐	☐	☐
<i>Q128. Asked to strictly isolate oneself from others (quarantine)</i>	☐	☐	☐	☐	☐	☐
<i>Q129. Go to a public shelter</i>	☐	☐	☐	☐	☐	☐

PRE12:

Finally, I need some basic information about you. I will treat all of the following information as confidential.

Q161:

Q161. Are you a member of a visible minority group? If so, please specify the group.

Yes 01 O
 No 02
 Don't know 99

Q162:

Q162. In which education category do you belong?

Some/completed elementary school 01
 Some/completed high school 02
 Some/completed community college (CEGEP in Quebec) 03
 Some/completed university 04
 Some/completed graduate school 05
 Refuse to answer 98

Q163:

Q163. In which of the following classifications is your total household income before taxes?

Under - \$19,999 01
 \$20,000 - \$29,999 02
 \$30,000 - \$39,999 03
 \$40,000 - \$49,999 04
 \$50,000 - \$59,999 05
 \$60,000 - \$69,999 06
 \$70,000 - \$79,999 07
 \$80,000 and over 08
 Refuse to answer 98

INT99:

Those are all the questions I have for you. We appreciate your time and thank you very much for participating in this interview.

CO - Completion CO D => END

APPENDIX C: CITY OF OTTAWA – EMERGENCY RESPONSE SURVEY QUESTIONS

1.0 INTRODUCTION

Hi, my name is _____ and I'm calling on behalf of Phase 5, an independent research company. We're conducting a short survey among residents of the City of Ottawa and the outlying regions.

Would you be interested in participating?

- ☐ Yes, now is a good time (**CONTINUE**)
- ☐ Yes, but not right now (**SCHEDULE CALLBACK**)
- ☐ No (**THANK AND TERMINATE**)

IF HESITANT: We are not trying to sell you anything. The survey should take less than 10 minutes of your time and all of your answers will be kept completely anonymous and confidential.

☐	☐	☐	☐	☐	☐	☐	☐
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3.0 CURRENT LEVELS OF PREPAREDNESS AND PERCEPTIONS

- Using a scale from 1 to 7, where 1 means “not at all prepared” and 7 means “very well prepared”, how prepared or unprepared would you say **you are personally** in the event of a Major Disaster in the City?

Not at all prepared							Very well prepared	Don't know / no answer
1							7	9

Statement	Strongly Disagree 1						Strongly Agree 7	Don't know / no answer 9
during the emergency.								

6.0 PROFILING

Finally, I'd like to ask you a few questions that will be used for statistical purposes to assist in analyzing the information collected.

3. Have you ever **personally** experienced any of the following Major Disasters? That is, have any of these Major Disasters occurred where you've lived? How about a...?

INTERVIEWER NOTE: The Major Disaster does not need to have occurred in Ottawa – it could have occurred anywhere they've lived.

RANDOM PRESENTATION

Action	Yes 1	No 2	Don't know / no answer 9
a) Infectious disease outbreak	☐	☐	☐
b) Blackout or power failure	☐	☐	☐
c) Terrorist attack	☐	☐	☐

Action	Yes 1	No 2	Don't know / no answer 9
d) Major flood	☐	☐	☐
e) Major fire	☐	☐	☐
f) Contamination of the water supply	☐	☐	☐
g) Chemical spill	☐	☐	☐
h) Major storm such as an ice storm, tornado or hurricane	☐	☐	☐

4. In what year were you born?

— — — —

☐ No answer

5. What is the highest level of formal education you have received? **(READ LIST IF NECESSARY. ACCEPT ONE ANSWER ONLY.)**

Some high school or below

High school diploma

Trades certificate or diploma from a vocational school or apprenticeship training

Non-university certificate or diploma

Undergraduate university degree

Graduate university degree / post graduate studies

No answer

6. What was your total household income in 2003 before taxes? **(READ LIST IF NECESSARY. ACCEPT ONE ANSWER ONLY.)**

Under \$15,000

\$15,000-\$24,999

\$25,000-\$39,999

\$40,000-\$59,999

\$60,000-\$99,999

\$100,000-\$119,999

\$120,000 or more

No answer

7. What are the first three digits of your postal code?

— — —

8. **RECORD GENDER (DO NOT ASK)**

Male

Female

9. **RECORD LANGUAGE OF SURVEY (DO NOT ASK)**

English

French