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GRADE / DEGREE

Department of Psychology

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Terrorism Risk Perception and Individual Response in Canada:
A Social-Cognitive Perspective

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Terrorism Risk Perception and Individual Response in Canada: A Social-Cognitive Perspective

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Thesis submitted to the

Faculty of Graduate and Postdoctoral Studies

in partial fulfillment of the requirements for the degree of

Ph.D. in Experimental Psychology

School of Psychology

Faculty of Social Sciences

University of Ottawa

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395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence
ISBN: 978-0-494-50759-9
Our file Notre référence
ISBN: 978-0-494-50759-9

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Abstract

With the aim of shedding light on potential strategies to enhance preparedness for terrorism in Canada, the overarching goal of the present thesis was to develop, test, and refine a social-cognitive model of individual response to terrorism. The specificity of terrorism risk perceptions was explored in a first multi-hazard study, where they were compared with those of other hazards. Analyses performed on data of a national telephone survey on health risk perception (*N*=1,503) revealed that Canadians perceive terrorism as posing a relatively low, although uncertain threat. They also perceive themselves as having relatively little control over terrorism, perhaps resulting from the wider social contextual implications of this threat. In order to further clarify the nature of various cognitive dimensions of terrorism risk perceptions, identify potential social contextual factors of interest, and extend the examination to behavioural responses to terrorism, a qualitative analysis was performed on sections of interview transcripts, where individuals from across Canada discussed their concerns and decisions regarding terrorism (*N*=73). Six related overarching themes were discussed (Threat, Uncertainty, Control, Context Issues, Psychological Response, and Behavioural Response). Behavioural responses to terrorism were discussed in relation to psychological responses such as concern or worry, and both appeared to be determined by the same factors. From findings, a social-cognitive model was developed specifying cognitive and social contextual (i.e., perceptions of authorities' regulation of terrorism) determinants of psychological and behavioural responses to terrorism. This model was tested on data of a national survey on perceived terrorism threat and preparedness (*N* = 1,502). As expected, worry and behavioural responses to terrorism were associated with similar cognitive and

social contextual factors. Worry also partially mediated relationships of these factors with behavioural responses. Indices reflecting a greater perceived terrorism threat were associated with both favourable and unfavourable responses. By contrast, perceived coping efficacy emerged as the cognitive factor associated with the most favourable responses. Specific findings underscore the dangers of strategies that overemphasize the threat of terrorism in order to promote individual preparedness, and highlight the value of strategies aimed at enhancing individuals' perceived ability to cope with potential emergencies.

Acknowledgements

At this moment, I picture myself six years ago, taking the year to carefully look into graduate school, fulfil my dream of being a ski bum, and do some travelling. Who could have known that a terrorist attack on the United States would put a damper on these plans? What is more, who could have known that I would eventually write a doctoral dissertation on this very topic? I guess things just fall into place...

Here I am: Five years of doctoral studies culminating to this very point, which seemed so far away until only recently. This is crazy! Where do I begin to thank everyone who helped me through this journey? First, I would like to thank my advisor, Louise Lemyre, for taking a chance by welcoming as a graduate student some random girl who e-mailed her one day. I consider myself extremely fortunate to have worked with her, as I have continually been inspired by her drive and passion for research. I have seen her team grow tremendously over the years, and it is so incredibly pleasant to witness success where it is most deserved.

I am also thankful for the plethora of fascinating research opportunities that have come my way, which would not have been possible without funding from the chemical, biological, radiological, and nuclear (CBRNE) Research and Technology Initiative (CRTI), Health Canada, the McLaughlin Centre for Population Health Risk Assessment, the Ontario Graduate Scholarship (OGS) Program, the Social Sciences and Humanities Research Council (SSHRC) of Canada, and the University of Ottawa. As a result of these projects, I have had the chance to work with a number of amazing people including Christine Dallaire, Daniel Krewski, Louise Legault, Pierre Mercier, and Michelle C. Turner. My experience with these individuals is a testament to the richness and value of

interdisciplinary research. Christine and Pierre were also members of my thesis committee, to whom I would like to extend my gratitude for their valuable feedback on earlier drafts of this dissertation.

Of course, I cannot forget the contribution of my fellow fembots, Nancy Beauregard, Stacey Gibson, Marie-Pierre L. Markon, and Heather M. Orpana. I have learned so much from all of you (from creating a briefcase file to structuring an article-based thesis). You are all true inspirations and I look forward to our continued collaboration and, more importantly, friendship in years to come.

Finally, there is no way I would have been able to accomplish this feat without the support of my friends and family: My mother has always been supportive of my interest in psychology, while my father has always given me some food for thought. Abla, Chantal, Chris, Claire, Heather, Indie, Paul, and Sarah kept me sane by encouraging me to relax and/or come out and play every once in a while. Last, but certainly not least, I am indebted to Stuart for his support and affection throughout this endeavour. To Stuart: Boop…boop, boop!

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Introduction

The attacks of September 11 and Anthrax events of 2001 have undoubtedly had an enormous global impact. In addition to playing a clear part in changing the political climate of a significant number of nations, the occurrence of these events has been for North Americans particularly important as a wake up call that no nation is immune to the threat of terrorism. This recognition of terrorism as a global threat has pushed preparedness at the forefront of public health issues in countries across the globe, including Canada. As a result, there has been a call for research aimed at understanding terrorism in order to identify potential strategies to improve the management of its associated health risks.

Reflecting this trend, research on terrorism has been on the rise, with a sharp increase in papers published in 2003 compared to previous years (starting from 1990) according to a bibliometric analysis (Bouchard, McGirr, & Sampson, 2005). Not surprisingly, a significant portion of this research has focused on the impacts of events such as the attacks of September 11, 2001, or the 2004 Madrid and 2005 London bombings (Fischhoff, Gonzalez, Small, & Lerner, 2003; Halpern-Felsher & Milstein, 2002; Huddy, Feldman, Capelos, & Provost, 2002; Miguel-Tobal, Cano-Vindel, Iruarrízaga, González-Ordi, & Galea, 2005; Rubin, Brewin, Greenberg, Simpson, & Wessely, 2005; Schuster, Stein, Jaycox, Collins, Marshall, Elliott, et al., 2001). Much of this work stresses the fact that the psychological and behavioural consequences of terrorism can have the longest-lasting effects (Hyams, Murphy, & Wessely, 2002; Kunreuther, 2002; Lemyre, Clément, Corneil, Craig, Boutette, Tyshenko, et al., 2005; Lerner, Gonzalez, Small, & Fischhoff, 2003; Stein, Tanielian, Eisenman, Keyser,

Burnam, & Pincus, 2004). Such research has been useful by providing insight into what impacts governments could prepare for in relation to possible future attacks (Lemyre et al., 2005). However, the spectrum of preparedness activities does not only include those surrounding attacks themselves.

In both theory and practice, it is acknowledged that the aim of terrorism is to instil fear among the public in order to achieve a political goal (Garrison, 2003). Furthermore, the simple *threat* of terrorism can be as potent as the act in causing disruption among the public. For example, when letters containing Anthrax spores were found in the United States in 2001, Toronto public health officials were swamped with calls regarding suspicious packages. Members of the public displayed a great deal of concern, flooding medical clinics with complaints of flu-like symptoms (Bridson-Boyczuk, 2001). Despite all the upheaval, none of the suspicious packages reported by Torontonians were found to contain Anthrax.

Although anecdotal, examples such as this emphasize that the public's perceptions, feelings, and behaviours regarding terrorism threats be equally considered in frameworks aimed at enhancing terrorism risk management (Lemyre et al., 2005). This requires empirically-based models of the processes involved. Fortunately, the increasing number of studies on terrorism conducted in the United States and United Kingdom often include an assessment of the public's perceptions, feelings, and behaviours in relation to potential future events, not only its reactions following a specific event. This information is of clear value to the design of models that can inform risk management strategies in the U.S. and U.K. contexts. However, its generalizability to Canada is questionable. In the absence of a recent high profile attack on Canada, the perceptions, feelings, and

behaviours that Canadians adopt in relation to terrorism are likely to differ in important ways from those adopted by citizens of countries directly affected by terrorism. Research is needed on these factors in order to shed light on potential strategies to improve terrorism preparedness in the Canadian context.

With this in mind, the aim of current thesis was to review, apply, and refine existing theory on the perception of health risks as it might apply to terrorism. The thesis is presented as a series of articles prefaced by a general introduction and followed by a general discussion. As terrorism is relatively unexplored within Canada, the work it entailed was both exploratory and theoretically-based. Using data from a national survey on health risk perception (Krewski, Lemyre, Turner, Lee, Dallaire, Bouchard, et al., 2005), the way terrorism is perceived relative to a number of other health hazards on some key cognitive dimensions was first explored. In a second study, a qualitative analysis was performed on transcripts of face-to-face interviews that were held with individuals across Canada about their concerns and decisions regarding terrorism. This analysis helped to clarify the nature of various cognitive dimensions of terrorism perceptions, identify potential social contextual factors of interest, and explore how these might be related to individual response to terrorism. Based on these findings, a social-cognitive model was developed linking these elements, and tested on data from a second national survey that specifically focused on perceptions and individual response to chemical, biological, radiological, nuclear, and explosives terrorism (Lemyre, Lee, & Krewski, 2005).

CHAPTER 1: THEORETICAL CONTEXT

Terrorism

Defining Terrorism

Although terrorism has been around for at least 2000 years, challenges remain in the particular manner in which to define this threat. Garrison (2003) was able to identify seven key components of terrorism from his review of the literature; that is, that it represents an "(1) intentional, (2) rational, (3) act of violence (4) to achieve a political goal (5) by causing fear (6) in the target audience or society (7) in order to change behaviour in that audience or society" (p. 41). However, others emphasize that the precise nature of this phenomenon can be quite diverse (Crenshaw, 2000). Indeed, events can range from cyber-terrorism to wide-scale nuclear bombings or from hijackings to the deliberate spread of disease. People's images of terrorism are also transitory, often shaped by the cultural and historical contexts of where they live. No evidence is more compelling of this ever-changing face of terrorism than the events of September 11, 2001.

For many in North America, this momentous day was a wake-up call to "a harsh reality that had previously been but a peripheral concern" (Fischhoff, Gonzalez, Small, & Lerner, 2005, p. 124). This day not only drastically changed the social fabric of the United States; it forcibly reminded the world of the global nature of the threat of terrorism. Indeed, the face of terrorism today is that of a worldwide phenomenon, to which Canada is not immune. Accordingly, the Canadian Security Intelligence Service (CSIS) continues to stress that Canada is a potential target, due to its solidarity with the United States and involvement in the fight against terror (CSIS, 2007).

Although no wide-scale attack has recently taken place on Canadian soil, a review of the literature reveals that this country is no stranger to terrorist activity. Between the years of 1973 and 2003, Canada witnessed a number of events including (at least) 6 hijackings, 2 airplane bombings, 73 disruptive hoaxes, 9 hostage takings or kidnappings, 4 letter bombs, 170 bombs, firebombs, and arson, 59 threats, 35 attacks on individuals, 45 acts of vandalism, 14 plots and foiled attacks, and 32 instances of support (Leman-Langlois & Brodeur, 2005). Even if it is acknowledged that the chances of an attack are remote, the catastrophic potential of such events cannot be ignored (Waeckerle, Seamans, Whiteside, Pons, White, Burstein, et al., 2001). Moreover, "pervasive agreement that the effects of terrorism extend well beyond its immediate victims and physical destruction to include a much broader target population" has been noted (Huddy et al., 2005, p. 593). This becomes particularly evident as some of the consequences of terrorism are reviewed.

Consequences of Terrorism

Terrorist events have the potential to inflict tremendous damage. Indeed, it has been noted that such events can change "political, economic, cultural, and psychological forces that powerfully influence how we live, work and play" (Alavosius, Braksick, Daniels, Harshbarger, Houmanfar, & Zeilstra, 2002, p. 4). The events of September 11, 2001, for example, not only eroded the sense of safety of countless Americans. As an assault on national values and policies, these events touched citizens throughout the United States. They also led to significant changes in security policy, raising fears about the loss of civil liberties (Greenberg, Craighill, & Greenberg, 2004). Given its highly political nature, terrorism undoubtedly represents a complex societal issue. Nevertheless, several of its higher-order effects can be traced to reactions that take place at the level of

the individual, emphasizing the need to understand individual processes. Accordingly, an extensive body of research on the effects of such disasters points to emotional and behavioural consequences of terrorism as posing the greatest challenge (Hyams et al., 2002; Lemyre et al., 2005; Stein et al., 2004).

Psychological Consequences

Terrorism is recognized for its potential to cause considerable stress not only among its victims, but also among those who have had no direct experience with an attack (Thompson, Schlehofer, Bovin, Dougan, Montes, & Trifskin, 2006; Schuster et al., 2001). A number of large-scale reviews identify posttraumatic stress disorder (PTSD) as the most frequently researched and most likely psychopathology to follow a disaster (DiMaggio & Galea, 2006). With regards to terrorism more specifically, a meta-analysis of published and unpublished papers from 1980 and on estimates that the prevalence of posttraumatic stress disorder ranges between 12 and 16% in the year following an incident. A review by Stein et al. (2004) suggests that individuals directly exposed to mass violence experience a wide range of other psychological symptoms, including other anxiety disorders and depression. Also common are sub-clinical psychological symptoms that might follow an attack such as posttraumatic symptoms that do not meet the criteria for PTSD.

In a telephone survey of the U.S. public five days following the attacks of September 11, 2001, 44% of adults reported at least one substantial stress symptom (e.g., repeated, disturbing memories, thoughts or dreams about the event; trouble falling or staying asleep; having difficulty concentrating; Schuster et al., 2001). In a similar survey following the bombings of July 7, 2005, 31% of Londoners reported at least one

substantial stress symptom (Rubin et al., 2005). As a last example, 76.7% of respondents in a survey of the Israeli public reported at least one traumatic stress-related symptom. This last study took place in 2002, 19 months after the onset of ongoing terrorist attacks on Israeli society (Bleich, Gelkopf, & Solomon, 2007). Clearly, terrorism can have a marked impact on mental health. According to Hyams et al. (2002), such symptoms can pose a challenge to the mental health system because the general level of fear and anxiety resulting from an attack can remain high for years and potentially aggravate pre-existing psychopathology.

Behavioural Consequences

In light of terrorism as a source of considerable stress, individuals may be compelled to modify their behaviours in order to cope with their feelings. According to Hyams et al. (2002), substance use is among the most notable behavioural consequences of terrorism. In a survey of Manhattan residents 5 to 8 weeks following the attacks of September 11, 2001, 28.8% of respondents reported having increased their use of either one of cigarettes, alcohol, or marijuana (Vlahov, Galea, Resnick, Ahern, Boscarino, Bucuvalas, et al., 2002). More specifically, greater alcohol consumption was most common (with 24.6% of respondents reporting increased use). Also, increase in substance use was found to be more frequent among respondents experiencing PTSD or depression.

Consistent with these findings, a study of outpatients treated for substance abuse revealed that their use of tobacco increased significantly more than that of clinical staff members in relation to the events of September 11, 2001. Outpatients also scored higher than clinical staff on overall stress experienced in relation to the attacks. On the whole,

higher overall stress scores were associated with greater increases in tobacco use (Creson, Schmitz, Sayre, & Rhoades, 2003).

In another example, 13% of members of a sample of survivors of the September 11, 2001 attack on the Pentagon reported that they had used more alcohol than they had intended following the attack. Further analyses revealed that respondents suffering from PTSD were over five times more likely to report increased alcohol use compared to others (Grieger, Fullerton, & Ursano, 2003). Clearly, behavioural changes such as these may further compromise the health of individuals, putting additional strain on an already overwhelmed health care system (Hyams et al., 2002; Stein et al., 2004).

In addition to substance use, changes in travel decisions have been identified as a common reaction to terrorism. It was noted that, "few domains have been affected by terrorist attacks as much as travel" (Fischhoff, Bruine de Bruin, Perrin, & Downs, 2004, p. 1301). Indeed, an estimated 40 to 50% of reserved trips were cancelled in the days following the attacks of September 11, 2001 (as cited in Gössling & Hall, 2006). Also, similar changes aimed at reducing risk (e.g., limiting travel plans, scanning for suspicious faces, avoiding some areas) emerged as the most commonly reported behavioural consequences of these events in one study (Thompson et al., 2006). Not surprisingly, the financial burden of responses such as these is a major issue. In Canada, disruption following the events of September 11, 2001 is estimated to have cost the airline industry $150,000,000 (Fiorino, 2001). Of course, airport restrictions partly contributed to these figures. Nevertheless, a significant and ongoing drop in demand for international travel observed among Canadians at that time (Harumi & Lee, 2005) suggests that consumer behaviours may also have played a role.

Terrorism Risk Management

Taken together, findings reviewed above highlight the need to resolve not only the direct effects of terrorism, but also individuals' psychological and behavioural reactions as these may have indirect, longer-term effects on the health and welfare of society. As such, it appears particularly suitable to conceptualize terrorism as a threat to public health and safety. Defined as "the broad collection of activities involved in addressing health and safety risks" (Health Canada, 2006, p. 2-5), risk management is therefore crucial in this respect.

In order to be effective, terrorism risk management strategies need to account for the full range of psychological and behavioural consequences of terrorism (Lemyre et al., 2005). They also need to consider ecological and contextual factors that shape individuals' concerns and beliefs (Reissman, Klomp, Kent, & Pfefferbaum, 2004). An important consideration relates to the quality of individuals' experience with terrorism within the context of their daily lives.

Experience of Terrorism and Timing

A first aspect to consider of one's experience with terrorist events entails timing. Evidently, disasters are complex events. In its simplest form, however, the disaster process can be characterized by pre-event, event, and post-event phases (Kelly, 1999). In a similar vein, individuals' experience with disasters can be divided into pre- and post-event phases. Indeed, timing related to individuals' experience with terrorism can have important implications on the way they perceive, feel, and behave. Drawing from the disaster literature, Lazarus and Folkman (1984) underlined how the different phases of an event could each provide "its own characteristic significance" (p. 147). At the pre-event

phase, the issues of greatest relevance to individuals include whether the event will take place, when it will take place, and what will take place. Individuals may also want to determine whether, to what extent, and how they can manage the threat. By contrast, the issues of greatest relevance to individuals following the event are likely to relate to how to best manage the damages sustained and the implications of these for the future.

Having largely taken place after an event, the majority of research on terrorism documents the manner in which future attacks are perceived as likely and are feared, as well as the tendency for individuals to engage in a variety of behaviours in order to cope with this fear (Bleich et al., 2007; Boscarino, Figley, & Adams, 2003; Redlener, Markenson, Grant, Berman, & McKenzie, 2004; Rubin et al., 2005; Schuster et al., 2001). However, Americans certainly did not react to terrorism the same way before the events of September 11, 2001 than they do now. A study of U.S. adolescents' perceptions of dying found that those surveyed after these events perceived the chance of dying to be dramatically higher than did adolescents surveyed before these events, suggesting that heightened feelings of vulnerability to death might have extended beyond the terrorist attacks (Halpern-Felsher & Millstein, 2002). Such findings also indicate that individuals having a pre-event experience with terrorism are less likely to perceive it as an overt threat compared to those who have experienced an attack.

This important distinction is reflected in a comparison of observations made of American and Canadian samples. More specifically, findings of a number of studies reveal that members of the American public are quite concerned about the possibility of a future attack on the United States. For instance, 76% of Americans participating in a national survey three years following the events of September 11, 2001 reported that they

were concerned that another attack would take place in the United States (Redlener et al., 2004). By contrast, only 7.8% of Canadians who participated in a national survey in the same year reported that they were highly worried about risks from terrorism (Krewski et al., 2005). Similar findings were observed in Gibson and her colleagues' interviews with members of the Canadian public that took place that fall (Gibson, Lemyre, Clément, Markon, & Lee, 2007). Again, most respondents did not feel threatened by terrorist attacks in Canada.

Experience of Terrorism and Frequency

In addition to timing, the degree of experience that individuals have with terrorism can play a part in their reactions to terrorism. For example, similar items were used to measure stress reactions in studies by Schuster et al. (2001) and Rubin et al. (2005) reviewed above. While a high proportion of respondents in both studies reported experiencing at least one symptom of substantial stress, such stress reactions were less frequent among Londoners following the public transit bombings compared to the U.S. public following the attacks of September 11, 2001. Acknowledging that a variety of factors could have accounted for this difference (i.e., lower loss of life, lesser television coverage, or longer delay at the time of the survey in the case of London), the authors offer two additional hypotheses.

First, these researchers suggest that previous experience with IRA terrorism in London lessened emotional reactions to these bombings. Accordingly, they found that stress reactions among Londoners who reported a previous experience with terrorism were significantly less pronounced relative to their counterparts (Rubin et al., 2005). This finding may relate to the notion of resilience, where exposure to terrorism would have

enabled these individuals to develop ways to adapt to such events (Reissman et al., 2004). Second, they suggest that enhanced preparedness might have contributed to attenuated emotional reactions. In August of 2004, a nation-wide campaign took place involving the dissemination of leaflets across U.K. households providing information on what to do in case of a major incident (HM Government, 2004). An analysis comparing respondents who had read the leaflet to those who had not revealed that the former were less likely to have altered their travel intentions following the attacks.

Implications of Experience for the Canadian Context

Taken together, these findings suggest several possible characteristics of individual response to terrorism within the Canadian context. First, since no event of great magnitude has recently taken place on Canadian soil, Canadians may be less apt to view terrorism as an important issue. Yet, they may be at increased vulnerability to stress reactions if an event were to occur, given that terrorist events infrequently take place in Canada. At the same time, this relative inexperience with terrorism may foster a sense of helplessness, since Canadians have not had the experience required to develop the set of skills needed to face an event. Informing them about preparedness may prove to be particularly useful by empowering individuals, thereby encouraging them to be involved in the preparedness process. Notwithstanding these insights, more empirical research is needed to shed light on individual response to terrorism within the Canadian context. Theoretical foundations for this work can be drawn from a variety of existing literatures, beginning with stress and coping theory.

Theoretical Foundations for Research on Individual Response to Terrorism

Stress and Coping

History

Due to the pervasive association between terrorism and stress, understanding of individual response to terrorism might be guided by psychological theory on stress and coping. In fact, an abundant body of research on this phenomenon might shed light on the nature of some of the processes involved. The popularity of stress research is attributed to Hans Selye's work on the general adaptation syndrome (1956). In this early work, stress was understood as patterned physiological responses resulting from the presence of noxious situations or stimuli (Thoits, 1995). More recent theories, however, conceptualize stress as resulting from an interaction between the individual and his or her environment. Lazarus and Folkman's cognitive-appraisal theory of stress and coping (1984) is among the most prominent of such theories.

Cognitive-Appraisal Theory of Stress and Coping

In this model, the experience of a stressful event or situation is believed to elicit cognitive appraisal processes, where the individual experiencing the stressful situation evaluates its implications in a primary "threat" appraisal (the degree of threat, harm, loss or challenge it poses) and what can be done to deal with it in a secondary "coping" appraisal (the resources available to deal with the event). In turn, the individuals' overall appraisal of the situation will determine which strategies he or she will use to cope with it.

Because a wide variety of coping strategies are identified in the literature, stress researchers have favoured distinguishing these on the basis of larger, more encompassing

categories (Ebata & Moos, 1991; Lazarus & Folkman, 1984). Indeed, two broad dimensions have been identified by various coping measures (Herman-Stahl, Stemmler, & Peterson, 1994). For instance, Lazarus and Folkman (1984) distinguished coping strategies on the basis of their function; that is, whether efforts are aimed at changing the stressful situation (problem-focused coping) or regulating emotional reactions to the stressful situation (emotion-focused coping). Similarly, Ebata and Moos (1991) distinguished approach from avoidance coping strategies. More specifically, they defined the former as "cognitive attempts to change ways of thinking about the problem and behavioural attempts to resolve events by dealing directly with the problem or its aftermath" and the latter as "cognitive attempts to deny or minimize the threat, and behavioural attempts to get away from or avoid confronting the situation or to relieve tension by expressing one's emotions" (p. 34). In general, it is assumed that individuals who perceive themselves as having the resources necessary to deal with the situation are more likely to use problem-focused or approach coping, whereas individuals who do not are more likely to use emotion-focused or avoidance strategies (Thoits, 1995).

As aforementioned, Lazarus and Folkman (1984) underline how individuals' cognitive appraisals of an event might vary at different phases as it unfolds. Unfortunately, their classification of coping as problem- or emotion-focused does not capture this temporal aspect of coping. To address this gap, Schwartzer and Taubert (2002) distinguished among reactive coping, anticipatory coping, preventive coping, and proactive coping in their proactive coping theory.

Proactive Coping Theory

According to this perspective, individuals engage in reactive coping in response to harm or loss experienced in the past, whereas they engage in anticipatory coping in response to an imminent threat in the near future. Preventive coping refers to actions aimed at dealing with an uncertain potential threat in the distant future, whereas proactive coping is aimed at dealing with upcoming challenges that are seen as potentially self-promoting.

Given that no terrorist attack has recently taken place on Canadian soil and that the occurrence of attacks in the future remains uncertain, individual behaviours adopted by Canadians in response to terrorism could be understood within the framework of stress and coping as a form of preventive coping in response to the pending threat of terrorism. On the other hand, the wide breadth of stress and coping theory makes it difficult to fully account for more specific aspects of this phenomenon. As a public health and safety issue, individual response to terrorism could also be considered within the more specific domain of health. Hence, research in the area of health risk perception might provide more pertinent theoretical foundations.

Health Risk Perception

History

In 1962, Rachel Carson published *Silent Spring* – a work characterized by its social criticism of pesticide use and the chemical industry. Aside from being recognized as one of the best non-fiction books of the twentieth century, this work is often cited as the launching point for environmental policy and reform movements. Not surprisingly, the beginnings of research in risk perception can be traced to this era, in the midst of

much public debate over the use of novel technologies (Slovic, 1987; Sunstein, 2002). Specifically, it became increasingly clear to experts that the health risks with which most people were concerned did not coincide with technical estimates of risk (Slovic, 1987). Nevertheless, these health risk perceptions were known to influence public policy, market processes, and individual behaviour (Krewski, 1993; Vertinsky & Wehrung, 1990). From this issue emerged risk perception as a research area aimed at understanding the gap between public risk perception and expert risk assessments. Significant contributions were made from a wide variety of fields including geography, sociology, political science, anthropology, and psychology (Slovic, 1987). The integral contribution of the latter was largely due to Tversky and Kahneman's (1974) work on probability assessment and decision-making under uncertainty.

Decisional heuristics and biases under risk and uncertainty. Tversky and Kahneman's (1974) work can be regarded as an extension of normative models of decision-making under risk and uncertainty that are founded on the principles of reasoning and rational thought (e.g., expected utility theory; von Neumann & Morgenstern, 1944). However, it addressed the then increasingly acknowledged limits of these models to account for individuals' tendency to depart from rationality in their decisions. In a well-cited paper, Tversky and Kahneman (1974) presented some examples of experimental choice problems to illustrate how people systematically departed from rationality in their choices. For example, they found that people overestimated the importance of outcome probabilities on their decisions between two options with uncertain (or probabilistic) outcomes when probabilities were small, and underestimated

their importance when they were moderate to large. They suggested such phenomena resulted from the use of heuristics and biases while judging low probabilities.

Heuristics were described as simple, efficient rules that can explain how people make decisions, come to judgments, or solve problems when facing complex problems or incomplete information. While efficient and adaptive under most circumstances, these rules could lead to systematic cognitive biases. Among those identified were the availability (i.e., when the probability of an event is judged to be high because memory for the event is readily accessed), representativeness (i.e., when the probability of an event is judged on the basis of the probability of another event to which it has several similar critical features), and anchoring and adjustment (i.e., when the probability of an event is anchored onto judgments made in a first step and subsequently adjusted according to circumstances) heuristics.

The relevance of these heuristics to risk perception was acknowledged from the beginning. For instance, Lichtenstein and her colleagues (Lichtenstein, Slovic, Fischhoff, Layman, & Combs, 1978) studied perceived mortality rates of common illnesses and accidents, and observed the tendency for subjects to overestimate low, and underestimate high mortality rates. These authors argued that the availability heuristic might explain findings, given that many of the overestimated causes of death entailed sensational events for which vivid images might more readily come to mind (Lichtenstein et al., 1978). Inspired by this research, Fischhoff and his colleagues (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978) sought to identify additional factors responsible for this phenomenon. Their work evolved into one of the leading approaches to studying risk perception, the psychometric approach.

Psychometric approach – Cognitive dimensions of risk. Among all approaches developed to study perceptions of hazards (e.g., Joffe, 2002a, 2002b; Morgan, Fischhoff, Bostrom, & Atman, 2001; Steg & Sievers, 2000), there is no doubt that the psychometric approach (Fischhoff et al., 1978) has enjoyed the most popularity. In this approach, respondents are asked to rate a list of hazards in terms of nine dimensions: i) whether the hazards are novel, ii) known to science, iii) controllable, or iv) evoke considerable dread; v) whether exposure to them is unknown, or vi) involuntary; and vii) whether their effects are immediate, viii) catastrophic, or ix) severe (Fischhoff et al., 1978). In previous studies, factor analyses of respondents' ratings on each dimension collapsed across hazards have typically indicated that between two and three latent factors explain variations in response: dread, novelty, and (at times) number of exposed (Sjöberg, 2000; Slovic, 1987). Later studies revealed that dread largely conveyed the seriousness of the consequences of hazards, whereas novelty conveyed a sense of uncertainty surrounding hazards (Slovic, 2002). In order to further clarify the nature of these factors, Fischhoff and his colleagues computed a score for each hazard on dread and novelty using respondents' ratings. They then plotted each hazard within a two-factor space comprising these factors, revealing that hazards scoring high on both dread and novelty were those found to generate the highest degree of concern among members of the public (e.g., pesticides and nuclear power).

Despite the pervasiveness of this approach in research on risk perception, its ability to account for individual processes in risk perception has more recently been questioned (Langford, Marris, McDonald, Goldstein, & O'Riordan, 1999; Siegrist, Keller, & Kiers, 2005; Schütz, Wiedemann, & Gray, 2000; Sjöberg, 1996, 2000; Sjöberg, Moen,

& Rundmo, 2004). A first difficulty rests in the fact that the methodology of the psychometric approach entails that distinctions between types of hazards are emphasized rather than individual differences. Also, the initial development of the approach for use in the study of technological hazards may pose problems. More recently, research has indicated that technological hazards are quite distinct from other hazards, such as those related to lifestyle, in terms of both hazard control and knowledge (Frewer, Howard, Hedderley, & Shepherd, 1998). Thus, the qualitative dimensions that characterize risk perceptions of other types of hazards may differ from those found to characterize the risk perceptions of technological hazards. Similarly, relationships hypothesized to exist for technological hazards may not apply to other types. A second limitation relates to the fact that no theoretical models have explicitly been articulated about the way the qualitative dimensions that underlie perceived risk interact to predict response.

Finally, a driving force behind research on risk perception has been the assumed impact of risk perception on psychological and behavioural response. While there has been some research on the latter, less research has *explicitly* examined the relationship between risk perception and psychological response. In a related fashion, Schütz et al. (2000) have observed that the term risk perception is used to describe both "attitudes and intuitive judgments about risk/.../[and] more general evaluations of and reactions to risk" (p.1). Likewise, Sjöberg (1998) noted that one issue in research on risk perception is the "problem of differentiating between emotional and cognitive reactions to threats and hazards" (p.85). Distinguishing risk perception from psychological reactions is clearly critical to achieving a better understanding of processes involved in the public's response to risk.

Risk Perception and Response

Psychological response to risk. In light of its basis in public concern over environmental risk, it is not surprising that work on the relationship between perceptions of risk and psychological response has focused on worry or fear-related processes. In health risk perception research, worry has been considered as an affective reaction as well as a preoccupation with thoughts about an uncertain event (Kobbeltved, Brun, Johnsen, & Eid, 2005; Sjöberg, 1998). According to Borkovec, worry refers to "a chain of thoughts and images negatively affect-laden and uncontrollable" and is recognized as a process rather than a state of being (Borkovec, Robinson, Pruzinsky, & DuPree, 1983, p. 10; Borkovec, Ray, & Stober, 1998; Kelly & Miller, 1999). Hence, worry is predominantly considered a cognitive activity, although one that is intimately linked with affect. Moreover, distinctions are often made between the different domains in which it is taking place (Eysenck & VanBerkum, 1992; Tallis, Eysenck, & Mathews, 1992). As a psychological reaction to risk, worry is therefore often considered to be specific to the domain (or source) of risk in question (that is, one's level of worry about the hazard posing the risk).

A series of studies by Dröttz-Sjöberg and Sjöberg (1990; Sjöberg, 1998) in the context of nuclear risk demonstrate that risk perceptions are significantly, yet only weakly positively related to worry. Sjöberg (1998) argues that these results support "theories which assume that emotional reactions are largely independent of the cognitive system" (p. 91). Nevertheless, the mechanisms explaining the relationship between risk perception and worry continue to be the subject of debate among risk researchers. As emphasized by Rundmo (2002), "when thinking about a risk source or potential hazard,

people may be worried or feel unsafe" (p.119). However, worry has also been known to have an impact on the way individuals perceive risk (Constans, 2001; MacLeod, Williams, & Bekerian, 1991). These contrasting ideas are reminiscent of two existing positions on the relationship between risk perception and psychological response, referred to as processing theories and appraisal theories (Kobbeltved et al., 2005).

Processing theories describe the way affect influences perceptions of risk. This particular viewpoint has gained considerable popularity in recent years. For instance, Finucane and her colleagues (Finucane, Alhakami, Slovic, & Johnson, 2000) observed in a series of studies that providing information designed to alter the way people feel about a hazard systematically influenced the way they evaluated the risk associated with this hazard. Referred to as the "affect heuristic", Slovic (2002) later accounted for this tendency in his description of the processes involved in risk perception. Specifically, he distinguished between two modes of thinking on which people draw when they perceive risk: A) The analytic system that computes both risk enhancing and mitigating factors to produce perceptions of risk and B) the experiential system that makes use of affect-laden images and associations that have personal meaning. Further support for the role of affect in risk perception was observed in a series of studies by Lerner and her colleagues (Lerner & Keltner, 2000, 2001; Lerner, Gonzalez, Small, & Fischhoff, 2003) who found that anger and fear had differential effects on risk perceptions, including those related to terrorism. Specifically, they found that respondents who read a text designed to elicit anger in relation to the events of September 11, 2001 rated the risks associated with various facets of terrorism as lower, whereas respondents who read a similar text designed to elicit fear rated these as higher.

Given the inherently threatening nature of some hazards, risk perception processes may themselves have an impact on anxiety or other psychological states. In contrast to processing theories, appraisal theories consider affect to arise from perceptions of risk. For example, based on a review of the literature and empirical findings, Roseman, Antoniou, and Jose (1996) refined a model specifying the cognitive determinants (i.e., uncertainty, control) of 17 different emotions (i.e., surprise, fear, sadness, pride, etc.). Unfortunately, undisputable empirical evidence of this process has been scarce in the context of risk. Studies have revealed that perceptions of cancer risk are significant predictors of cancer worry. For instance, a study among men attending their regular prostate cancer screening revealed a strong relationship from perceived risk of prostate cancer to prostate cancer worry (Schnur, DiLorenzo, Montgomery, Erblich, Winkel, Hall, et al., 2006). Likewise, findings of a national survey of over 6,000 Americans revealed that risk perceptions regarding colon cancer, breast cancer, and prostate cancer significantly predicted worry about these types of cancer, respectively (Zajac, Klein, & McCaul, 2006). However, the cross-sectional nature of these studies does not dismiss the possibility that cancer worry led to heightened risk perceptions. In contrast, more compelling evidence is provided by Kobbeltved et al.'s (2005) five-month longitudinal study of military sailors, which yielded greater support for the impact of risk perceptions onto worry than the reverse.

No matter what perspective is taken, the evidence seemingly points in favour of a relationship between risk perception and psychological responses such as worry. However, very few studies have focused on the link between risk perceptions and worry as it relates to terrorism. Moreover, the bulk of this literature has conceptualized risk

perception as a single construct, despite the predominant idea that risk perceptions are multidimensional. It therefore remains to be determined whether a similar relationship would be observed within the context of terrorism and whether it would hold true across the various dimensions of risk perceptions, such as those reflecting "dread" or the "unknown".

Behavioural response to risk. Despite the limited literature on the hypothesized relationship between terrorism risk perceptions and psychological response, a significant amount of research has documented a relationship between risk perceptions and behaviours. For instance, risk perceptions have been associated with socio-political behaviours such as public opposition to the implementation of various technologies (Flynn, Burns, Mertz, & Slovic, 1992), political activism (Lee, Hazard, & Yang, 1994), and consumer habits (Yeung & Morris, 2001).

With regards to terrorism, a number of studies have documented a relationship between terrorism risk perceptions and travel decisions (Fischhoff et al., 2004; Sönmez & Graefe, 1998a, 1998b). Sönmez and Graefe (1998a) found that perceptions regarding the risk of various travel destinations were not only associated with a greater concern for safety in evaluating destination alternatives, but also with the extent of information seeking about destinations and propensity for international travel. While the risk index used by these researchers applied more broadly to perceptions of the risk of various travel destinations, it included an item on perceived terrorism risk. However, these authors found in another study that more specific perceptions of terrorism risk were significant predictors of intentions to avoid travelling to Africa and the Middle-East (Sönmez & Graefe, 1998b).

In a more recent study, Fischhoff and his colleagues (Fischhoff et al., 2004) found that individuals who perceived the risk associated with travelling to a particular destination as greater than what they would be willing to accept (i.e., personal risk threshold) were more likely to report that they would cancel a trip to that destination if they won a free trip. Similarly, Han (2005) found that perceived terrorism risk was among the strongest predictors of intended choice of travel style (i.e., full package tour, partial package tour, independent travel) while vacationing in Australia and Japan, in that respondents who perceived greater risk were more likely to select a full package tour.

Towards positive response. From this review of the literature on response to risk, it is evident that the majority of research has framed the impacts of terrorism risk perceptions on individual response in negative terms, as fear-based avoidance responses. Unfortunately, this tendency may have obscured the potential for responses of a more positive nature to ensue, such as enhanced preparedness among individuals and communities. In potential support of this idea, talking to others about one's thoughts and feelings about what happened frequently emerged as a public reaction to terrorism in surveys led by Rubin, Schuster, and Torabi (Rubin et al., 2005; Schuster et al., 2001; Torabi & Seo, 2004). Such exchanges may not only help individuals resolve their feelings about terrorism; they provide a context wherein information about how to prepare for terrorism can be shared. Also promising is the fact that 15 to 18% of members of the public surveyed in these studies reacted by preparing for potential future attacks (Rubin et al., 2005; Schuster et al., 2001; Torabi & Seo, 2004).

While the above findings entail reactions to a specific event, one could speculate that similar behaviours might result from terrorism *risk perceptions*. Indeed, a potentially

positive aspect of heightened risk perceptions involves their relationship with individuals' health protective behaviours. They have been found to be associated with a wide variety of health behaviours, ranging from driving safety practices to home radon testing (Chaudhary, Solomon, & Cosgrove, 2004; Weinstein & Lyon, 1999). Nevertheless, research in this area is plagued by mixed findings. Despite the fact that studies have often found a positive association between perceived risk and health protective behaviour, some have revealed a negative association, or no association at all (Rimal & Real, 2003; van der Plight, 1996). Potential explanations for these findings (i.e., those related to the need to account for affect and perceived control) can be drawn from the literature on health behaviour models.

Health Behaviour Models

History

Health behaviour models first appeared in the 1950s, around the same time that important issues were beginning to surface in the study of persuasive communication. As early as 1953, Janis and Feshbach revealed that messages containing a high level of information about the risks associated with poor dental habits (highly fear-arousing messages) produced the most short-lived impact on dental habits, whereas messages containing only a moderate amount of risk information (mildly fear-arousing messages) produced the most long-lasting effect. Hence, emerging from this literature is a first potential explanation for mixed findings in research on risk perception and health behaviour: that perceptions of risk arouse fear, which can inhibit action if the level is too high (Chaffee & Roser, 1986; Rimal & Real, 2003).

Finally, the presence of mixed findings in research on risk perception and health behaviour may relate to the need to account for additional cognitive dimensions. Indeed, the majority of health behaviour models also consider individuals' perceptions of the degree of control they can exert over health hazards as antecedents of health protective responses. Examples include but are not limited to the health belief model (HBM), protection motivation theory (PMT; Rogers, 1975, 1983), the extended parallel process model (EPPM; Witte 1992, 1994, 1998), the "risk as feelings" model (Loewenstein, Weber, Hsee, & Welch, 2001), and the social-cognitive model of disaster preparedness, as an example of a more specific model (Paton, 2003; Paton, Smith, & Johnston, 2005).

Health belief model. The HBM is recognized as the oldest and most resilient of such models. It was developed in the 1950s by social psychologists Hochbaum, Rosenstock, and Kegels in response to the failure of a free tuberculosis health screening program (Rosenstock, 1974). It stipulates that engagement in protective behaviour in response to a hazard results from one's i) perceived susceptibility to the health threat, ii) perceived seriousness of the given health threat, iii) perceived barriers to performing the behaviour, iv) perceived benefits of performing the behaviour, and v) exposure to cues to action; that is, advice or recommendations from another party. As such, the theory not only includes perceptions of the level of threat (points i and ii), but also perceptions related to behaviours that can control it (points iii and iv).

Protection motivation theory. Rogers' PMT (1975, 1983) arrived a little later as a specific attempt to clarify understanding of why persuasive communications attempting to arouse fear did not invariably promote precautionary motivation and self-protective action (Ruiter, Abraham, & Kok, 2001). According to this model (see Figure 1),

individuals go through two key appraisal processes when faced with a health hazard. The first process involves the appraisal of the degree of health risk posed by the hazard (threat appraisal or perceived threat), while the second involves an appraisal of possible ways to control this risk (coping appraisal or perceived control). According to the theory, individuals evaluate both the level of threat associated with the item as well as their ability to cope with it. If the level of threat is deemed high, fear is aroused. However, the individual will only attempt to avert the threat if he or she deems her ability to cope with it as sufficient. Thus, individuals will be most motivated to protect themselves by engaging in health behaviour when both perceived risk and perceived control are high.

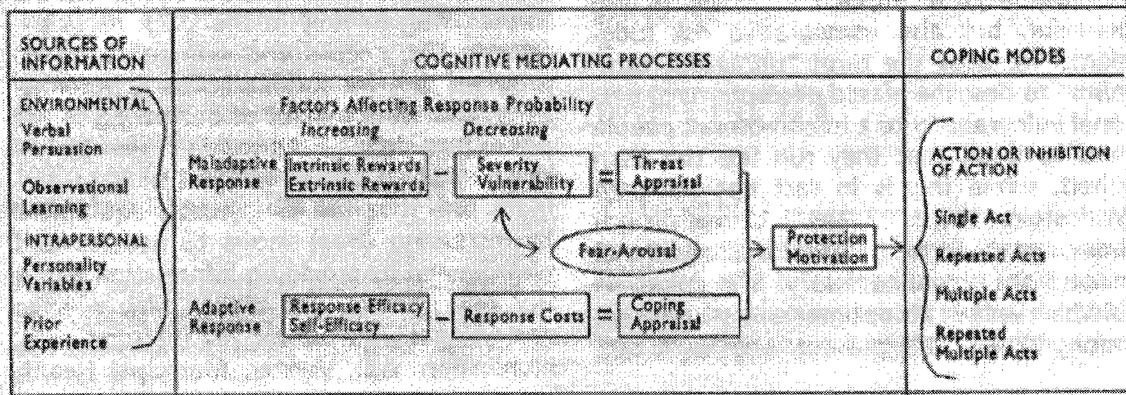

Figure 1. Protection motivation theory (adapted from Rogers, 1983).

Extended parallel process model. Witte's EPPM (Witte, 1992, 1994, 1998) is similar to PMT (see Figure 2). However, in addition to differentiating threat appraisal (perceived threat) from coping appraisal (perceived control) processes, it specifies two types of behaviours individuals may adopt in response to the health hazard. Danger control behaviours entail adaptive actions such as attitude, intention, or behaviour changes that control the danger, whereas fear control behaviours consist of emotional processes such as defensive avoidance (inaction) or reactance (doing the opposite of what is recommended).

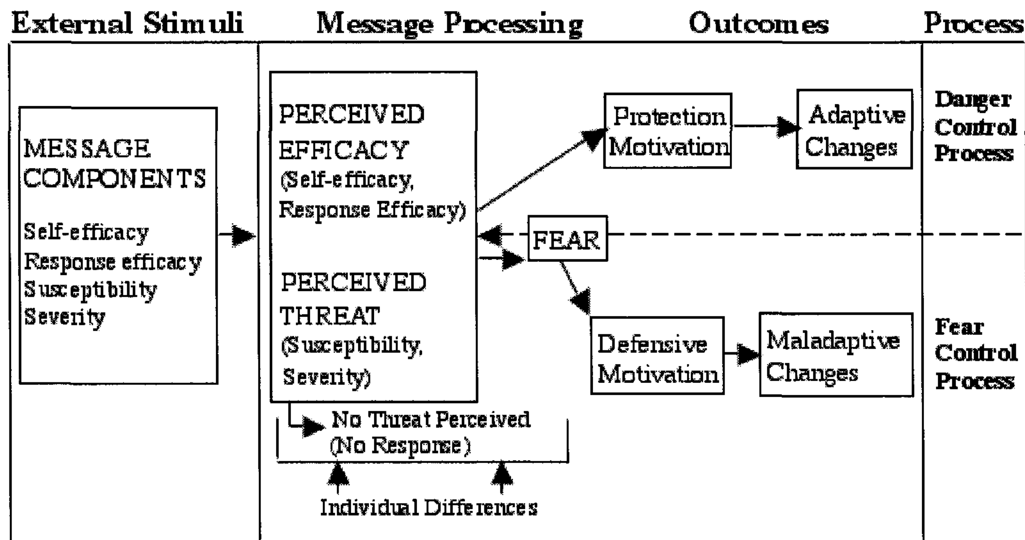

Figure 2. The extended parallel process model (Witte, 1992).

Risk-as-feelings model. More recently, Loewenstein and his colleagues (Loewenstein et al., 2001) developed on the basis of a vast array of psychological research their "risk-as-feelings" hypothesis of decision making under risk and uncertainty. As most models, it posits that cognitive processes are involved in the perception of risk, and that the outcome influences behaviour. However, the cognitive processes are shaped by, and exert an influence on affect (Loewenstein et al., 2001). Moreover, affective factors may also exert a direct influence on behaviour. Hence, the model postulates that behaviour is directly preceded by both cognitive and affective processes that are reciprocally related (Figure 3). One benefit of this model is to account for a wider range of psychological phenomena involved in the response to hazards, including worry, dread, and anxiety, in addition to fear (Loewenstein et al., 2001).

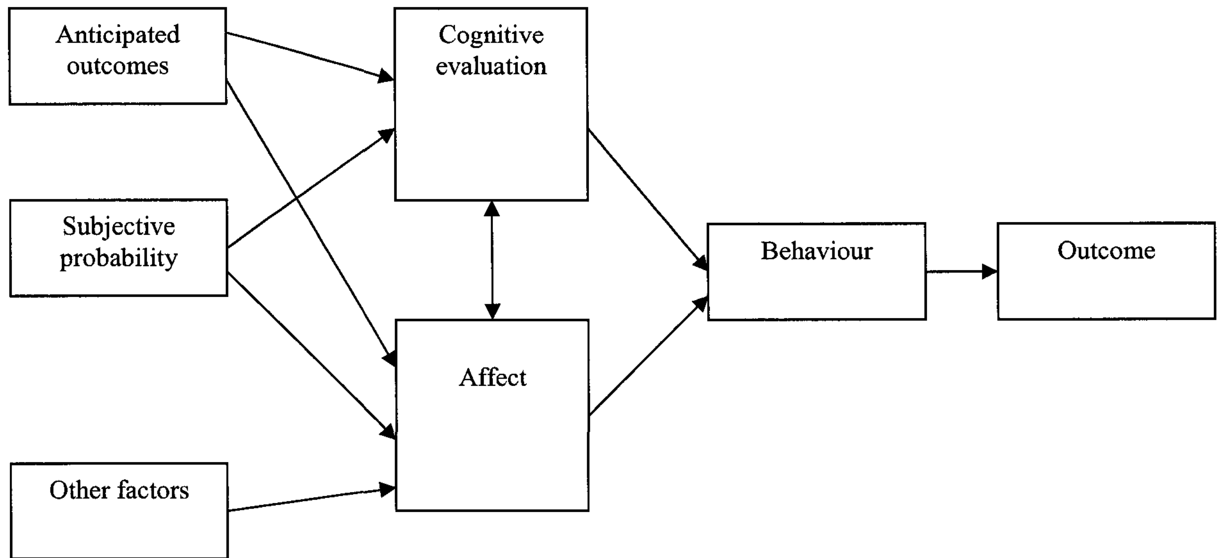

Figure 3. The “risk-as-feelings” model (Loewenstein et al., 2001).

Social-cognitive model of disaster preparedness. As a last example, Paton and his colleagues developed a social-cognitive model for the specific purpose of understanding individual disaster preparedness (Paton, 2003; Paton et al., 2005). As shown in Figure 4, the model begins by identifying factors that motivate individuals to prepare for a disaster (precursor variables). These include critical awareness about the hazard, risk perception, and hazard anxiety. Once motivated to think about the hazard (i.e., awareness, risk perception, and anxiety are high), individuals make judgements about the actions that might help reduce its impacts. This "intention formation" phase is similar to "coping appraisal" specified in PMT and the EPPM. Judgements include whether personal actions will be successful (outcome expectancy), whether one has the ability to perform them (self-efficacy), and one's tendency to adopt problem-focused coping strategies in stressful situations (problem-focused coping). Finally, whether intentions to prepare lead to the actual adoption of preparedness behaviours depends on a number of additional factors, including the availability of resources for implementation (response efficacy), perceptions regarding who is responsible for safety (perceived responsibility), sense of community, trust in institutions and information sources, as well as timing of the hazard activity. As discussed later, this model has the advantage of addressing some of the major limitations that are common to most other health behaviour models.

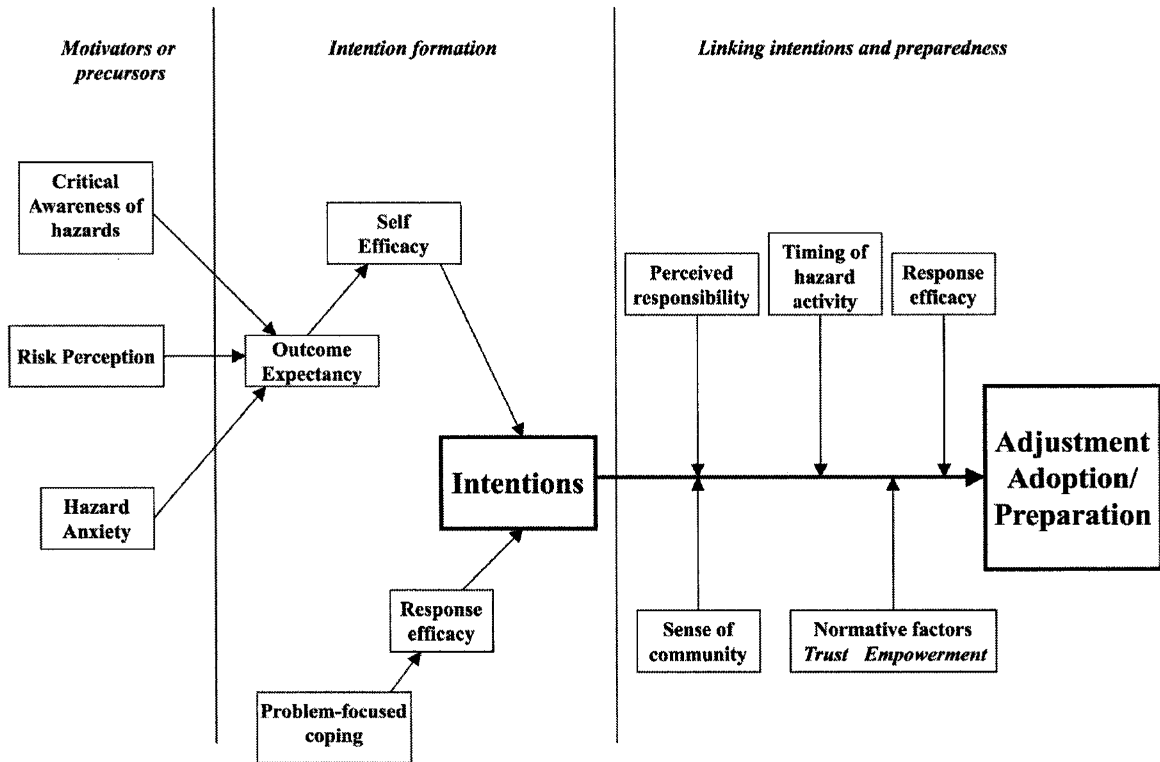

Figure 4. A social-cognitive model of disaster preparedness (Paton, 2003; Paton et al., 2005).

Limits of Health Behaviour Models

Despite the fact that research on heath behaviour models has been increasing over the past two decades (Noar & Zimmerman, 2005), a number of shortcoming have been noted. For instance, Sutton (1998) has commented on the fact that much of the variance in behaviour is left unexplained by these models.

Model specificity. A first culprit may be an overgeneralization of their applicability across different health issues. Indeed, hazards can vary from one another in important ways. As noted by Schütz and his colleagues (2000) an important distinction to make relates to whether hazards relate to lifestyle, or whether they are environmental in nature (as the former are under personal control, whereas the latter are often the result of societal activities). Indeed, research has shown that technological hazards are quite distinct from other hazards, such as those related to lifestyle, in terms of controllability and level of knowledge about them (Frewer et al., 1998). Other research findings suggest that distinctions could go even farther. An analysis of data from a Canadian national survey revealed that health risk perceptions were structured into three dimensions, each characterized by a type of hazard (i.e., Environmental, Therapeutic, or Social; Lemyre, Lee, Mercier, Bouchard, & Krewski, 2006). Such distinctions might be indicative of the need to tailor health behaviour models to the specific health issue of interest, as did Paton and his colleagues in their model of disaster preparedness (2003; Paton et al., 2005). This should not be taken to mean that existing models should not be applied, but rather that exploratory work is needed within the context of the health hazard of interest to identify those aspects of the model in need of revision or elaboration. A comparison of different hazards on various attributes would prove to be a useful first step.

The social context. A second factor that might contribute to the high proportion of unexplained variance by health behaviour models is likely the fact that these models tend to overlook larger, societal factors that might contribute to the behaviour of individuals. Joffe (2002b) notes, "there is little development of an emphasis upon interaction with others and its impact upon thought and behaviour, other than by way of a fairly narrowly defined notion of 'subjective norm'" (p. 572). This need to understand individual processes from within their larger social context has been expressed elsewhere (Bruchon-Schweitzer, 2002; Stokols, 1996). Hence, models need to elaborate on social factors that might be involved in the way individuals respond to various hazards. This is one area where the literature on health risk perception provides deeper insights.

Recent trends not yet discussed regarding health risk perception research entail an increased emphasis on the importance of trust to the public's reaction to health risk issues. Based on their review of the literature, Covello and his colleagues added trust in institutions to the list of factors determining the level of emotionality of reactions to risk (Covello, Peters, Wojtecki, & Hyde, 2001), emphasizing that these reactions may shape behaviours in turn. Accordingly, it is noted that information on where trust is placed, by which population segments, and for what reasons is a key ingredient of effective risk management (Berry, 2004; Slovic, 1993).

Siegrist and his colleagues used the term social trust to describe individuals' "willingness to rely on those who have the responsibility for making decisions and taking actions related to the management of technology, the environment, medicine or other realms of public health and safety" (Siegrist, Cvetkovich, & Roth, 2000, p. 354). Since authorities are primarily responsible for many steps in the terrorism risk management

process (i.e., risk identification, analysis, and prevention), members of the public must rely on them in this way. Hence, their views of the way authorities carry out their roles in the management of terrorism risks may prove to play an important part in their responses to terrorism. Indeed, similar factors were included in the social-cognitive model of disaster preparedness espoused by Paton and his colleagues (2003; Paton et al., 2005).

Proposed Model of Individual Response to Terrorism

In the literature reviewed thus far, a number of factors were examined that could be incorporated into a model of individual response to terrorism. For instance, research using the psychometric approach has emphasized the importance of "dread' and "unknown" dimensions of hazard perceptions (Fischhoff et al., 1978). Moreover, considerable overlap among different models of health behaviour point to additional cognitive dimensions to consider (Weinstein, 1993). Nevertheless, other factors may exist that are unique to individual response to terrorism. Additional research is required to identify these factors so that a more complete model of this process may be developed that can ultimately enable the design of more effective terrorism risk management strategies.

Drawing from the available literature, a preliminary model was therefore proposed as shown in Figure 5. It served as the framework on which to base empirical investigations of individual response to terrorism in the current thesis. Based on the model, it was assumed that individual response to terrorism is a function of cognitive factors such as those identified in the literature on health risk perception and health behaviour models. However, it was also recognized that important social contextual

factors might be identified that contribute to individual response to terrorism. The components of the model are discussed in detail in the sections that follow.

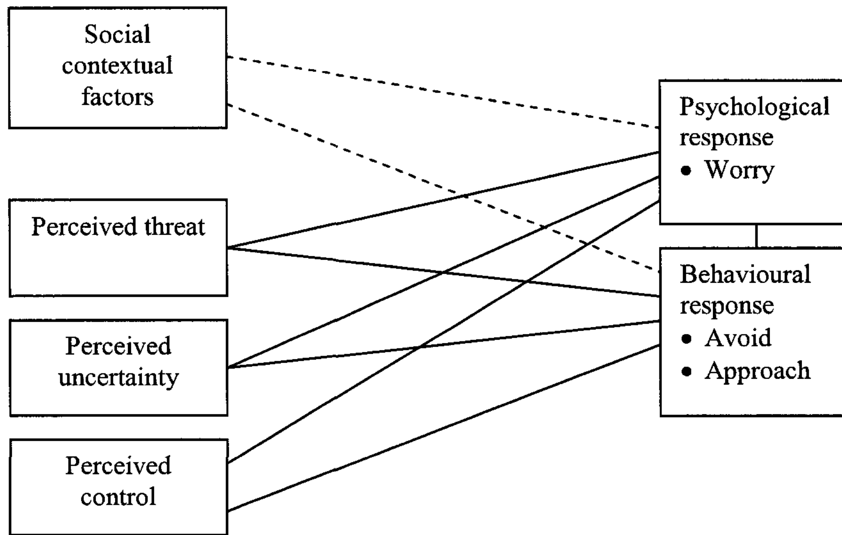

Figure 5. Proposed model of individual response to terrorism.

Cognitive Factors

Perceived Threat

Reminiscent of "dread", a first common assumption of many models of health behaviour is that the extent to which individuals believe their health is threatened by a particular hazard is an important predictor of the way they respond to this hazard. Such beliefs may involve individuals' perceived seriousness of associated health outcomes or perceived likelihood that these will occur, but in essence reflect their degree of perceived threat. Hence, the proposed model included perceived threat as a cognitive dimension reflecting the extent to which individuals perceive terrorism as posing a threat.

Perceived Uncertainty

By contrast to the literature on models of health behaviour, the literature on health risk perception touches upon the dimension of novelty or the "unknown". According to Slovic (1987), this dimension is defined at its high end by hazards perceived as unobservable, unknown, new, and delayed in their manifestation of harm (Slovic, 1987). Given the considerable uncertainty surrounding terrorism in terms of the likelihood and type of attack, as well as the extent of its consequences (Kunreuther, 2002), this preliminary model also included perceived uncertainty as a cognitive dimension that reflects the extent to which individuals believe that there is general uncertainty surrounding terrorism.

Perceived Control

An important contribution of the literature on models of health behaviour is the emphasis put on the importance of individuals' beliefs regarding the effectiveness or readiness with which they can control the particular hazard (and, hence, its impacts) to

their subsequent responses. Broadly characterized as perceived control, such beliefs may involve individuals' perceptions of their ability to control the threat, or of the effectiveness of these efforts (Walker, 2001; Witte, 1998). Like perceived threat, perceived control over a particular threat has been found to be a robust predictor of behavioural responses aimed at averting it (Skinner, 1996). Although less research has examined the relationship between this type of variable and psychological response, several studies have revealed an association between broader constructs of perceived control (i.e., perceptions of control that are not specific to a particular health hazard) and psychological well-being (Skinner, 1996; Frazier & Waid, 1999). Therefore, the proposed model included perceived control as a last cognitive dimension that reflects the extent to which individuals believe that they can personally control the threat of terrorism.

Social Contextual Factors

In order to address overlooked societal factors that might also contribute to the way individuals respond to hazards, the model additionally accounted for the potential contribution of social contextual factors. Trust in terrorism risk management authorities and related constructs served as a starting point, since Covello and his colleagues identified institutional trust as a determinant of the level of emotionality of reactions to risk (Covello et al., 2001). This model component, however, required exploratory work in order to identify more specific aspects of its nature.

Individual Response to Terrorism

Finally, the model assumed that individual response to terrorism encompasses psychological and behavioural responses, which might be considered as more specific aspects of general stress reactions.

Psychological Response

A first variable that might be considered as such is worry (Mathews, 1990; Sjöberg, 1998). In line with research on health risk perception, the model therefore included worry as a psychological response to terrorism. While conceptualized as a cognitive activity in the psychological literature (Borkovec et al., 1983; Borkovec et al., 1998; Kelly & Miller, 1999), worry distinguishes itself from the cognitive dimensions of perceived threat, uncertainty, and control by way of its intimate link with affect (Sjöberg, 1998). Nevertheless, the literature appears to suggest that worry is significantly related to these dimensions. Accordingly, the model stipulated that worry about terrorism would be at its highest if this hazard were perceived as threatening, uncertain, and uncontrollable.

In addition to being intimately linked with affect, worry has been described as a special state of the cognitive system that is adapted to anticipate possible future danger, as part of which possible aversive outcomes and ways of avoiding them are mentally rehearsed (Mathews, 1990). Thus, worry about terrorism was considered to potentiate other responses to terrorism, such as those aimed at coping with this threat.

Behavioural Response

As noted above, an important distinction is made between avoidance- and approach-type coping responses. Similarly, behaviours observed in the existing literature on terrorism have either entailed avoiding terrorism through travel decisions or approaching the issue through preparedness and planning for a potential event. Although more research was required in order to establish empirically-based categories of behavioural response to terrorism, the proposed model recognized that individuals can adopt different types of behaviours in response to the threat of terrorism. Similar to

avoidance-type coping, a first category entailed preventive behaviours that are focused on the avoidance of terrorism. Examples could include the avoidance of places or activities that may bring terrorism to mind. Reminiscent of approach-type coping, a second, more positive category of behaviours entailed those wherein individuals approach the issue of terrorism by discussing it with others or by preparing for a possible future scenario.

Objectives, Hypotheses, and General Overview of Methods

In light of the relative lack of research on psychosocial aspects of terrorism in Canada and the need for empirically-based models to guide strategies aimed at improving preparedness, the overarching goal of this thesis was to further develop, test, and refine the preliminary proposed model of individual response to terrorism presented in Figure 5 through a series of four articles. Specific objectives of each of these articles are presented in the following sections along with general information about the studies from which data were drawn for the analyses.

Article 1: The Specificity of Terrorism Risk Perceptions

In the first article, the primary objective was:

1. To gain a contextualized understanding of cognitive dimensions of terrorism risk perceptions by:
    1.1. Providing empirical evidence of the way terrorism is perceived in general and on the key cognitive dimensions of threat, uncertainty, and control compared to other hazards; and
    1.2. Examining the relationship between these perceptions and worry about terrorism and comparing it with that of perceptions and worry associated with other hazards.

In order to achieve this objective, analyses were performed on data collected as part of a Canadian national survey on health risk perception and acceptability ($N = 1{,}503$) (Krewski et al., 2005). This survey took place as part of a larger project funded by Health Canada (*Public Perception and Acceptable Levels of Health Risk Among Canadians*; Krewski, Lemyre, Bouchard, Brand, Dallaire, & Mercier, 2005). A printed full report of the entire project can be obtained from the Research Management and Dissemination Division of Health Canada's Applied Research and Analysis Directorate (Krewski et al., 2005).

The survey questionnaire was developed by members of the project team (including the author of the present thesis) in a series of group meetings held throughout the summer and fall of 2003. It was designed in part to follow up a previous similar survey conducted in 1992 (Slovic, Flynn, Mertz, & Mullican, 1993), and in part to investigate perceptions of the risk posed by a wider range of population health hazards to the health of Canadians (Krewski et al., 2005; Krewski, Lemyre, Turner, Lee, Dallaire, Bouchard, et al., 2006; Lee, Lemyre, Legault, Turner, & Krewski, in press). Its design was also guided by findings of secondary analyses performed by the author of the current thesis on data of the previous survey (Lee, Lemyre, Mercier, Bouchard, & Krewski, 2005; Lemyre et al., 2006). Sections of the survey used in the present thesis are presented in Appendix A.

The survey assessed perceptions of the health risk posed to Canadians by a number of health hazards, as well as more general beliefs pertaining to health risks and their management. It also included a section wherein perceptions of five target hazards—motor vehicles, climate change, recreational physical activity, cellular phones, and

terrorism—were assessed both in terms of general first impressions and on a number of key dimensions including perceived threat, uncertainty, and control. By analyzing this data, it was therefore possible to determine how general first impressions of terrorism differ (or not) from those of these other hazards and how perceptions of terrorism differ (or not) from those of other hazards on some key dimensions. Hence, the unique features of individuals' perceptions of terrorism could be revealed, providing a more contextualized understanding of the manner in which this hazard is perceived.

Article 2: Development of the Social-Cognitive Model

Analyses performed in article 1 represented an important first step towards understanding individual response to terrorism. However, behavioural aspects of individual response to terrorism were not examined in the survey from which data were drawn. Hence, further elaborating the proposed model of individual response to terrorism presented above was not possible in article 1. This gap was addressed in article 2, where the objective was:

2. To develop an empirically-grounded social-cognitive model accounting for cognitive, social contextual, psychological, and behavioural aspects of terrorism wherein:
    2.1. The meanings of concepts of interest are clarified;
    2.2. The types of behaviours that characterize response to terrorism are identified; and
    2.3. Other potentially important social contextual dimensions are identified that might relate to individual response to terrorism.

For the purpose of this article, a qualitative analysis was performed on transcripts of individual and group interviews with members of the Canadian public ($N = 73$). These interviews were also conducted as part of *Public Perception and Acceptable Levels of*

Health Risk Among Canadians (Krewski et al., 2005). Similar to the national survey, sections of the interviews focused in more detail on terrorism and a subset of other target hazards (motor vehicles, climate change, recreational physical activity, cellular phones, and carcinogens). More specifically, respondents discussed whether they were concerned with each of these hazards and whether they had made any changes in their behaviour because of these concerns. Hence, an analysis of the section on terrorism could not only provide further clarifications on the specific nature of cognitive dimensions that may be related to individual response to terrorism, it could also clarify the nature of individual response to terrorism (psychological as well as behavioural) and how it relates to these cognitive dimensions. Moreover, qualitative analyses have the added benefit of providing deeper insight into contextual factors that may shape individuals' beliefs and behaviours (Tulloch & Lupton, 2003). Hence, the identification of social contextual factors associated with individual response to terrorism was facilitated. Interview guidelines provided for sections of interest in the present thesis are presented in Appendix B.

Article 3: Preliminary Analyses on Model Components

The analysis performed in article 2 helped to clarify important components of the proposed model, providing clues about which social contextual factors are of interest. As a next step, article 3 had the objective of:

3. Providing converging evidence of the nature of some specific components of the model developed in article 2 in a more representative sample through:
   - 3.1. Latent factor modeling of cognitive, social contextual, and behavioural aspects of terrorism.

For these analyses, data were drawn from the *National Public Survey of Perceived Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Terrorism Threat and Preparedness* (N = 1,502) (Lemyre et al., 2005). Development of the survey questionnaire was led by the author of the current thesis and based on general findings from the national survey on health risk perception and acceptability (Krewski et al., 2005), a pilot questionnaire-based study on psychosocial aspects of CBRNE terrorism (Geffken-Graham, 2004; Lee & Lemyre, 2004; Lindsay, 2004), as well as a series of group interviews that were held in the fall of 2004 with individuals from across Canada (Gibson et al., 2007). Most of the major issues that emerged regarding measures used in article 1 (e.g., perceived threat, perceived control) were considered and addressed in the design of this survey. Sections of the survey used in the present thesis are presented in Appendix C.

Article 4: Evaluation of the Social-Cognitive Model

Finally, with concepts and variables clarified, the objective of article 4 was:

4. To evaluate (or explore, where appropriate) the specific tenets of the model developed in article 2, adapted on the basis of results from article 3 in a more representative sample.

Based on the preliminary proposed model, the following general hypotheses were developed:

H1) Perceptions of terrorism on various cognitive dimensions will be associated with psychological and behavioural responses to terrorism.

H2) Social contextual factors will emerge as additional variables associated with psychological and behavioural responses to terrorism.

H3) However, the nature of relationships of cognitive and social contextual factors with behavioural response will depend on the type of response behaviour.

H4) Last, psychological response to terrorism will be associated with behavioural response to terrorism, in part mediating the relationships of cognitive and social contextual factors with behavioural response to terrorism.

Results of each study are presented and discussed as a series of articles in the following four chapters.

CHAPTER 2: THE SPECIFICITY OF TERRORISM RISK PERCEPTIONS

Running head: COMPARING TERRORISM RISK PERCEPTIONS TO PERCEPTIONS OF OTHER HAZARDS

Exploring the Specificity of Terrorism Risk Perceptions: A Multi-Method, Multi-Hazard Approach

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University of Ottawa

Abstract

A defining feature of terrorism is its potential to evoke considerable fear regardless of its low probability of occurrence. Moreover, mere *perceptions* of terrorism threat are sufficient to cause real and long-term damages. Developing ways to effectively manage terrorism therefore requires a better understanding of the way individuals perceive this threat. Using a multi-hazard approach, the present study aimed at identifying specific characteristics of Canadians' perceptions of terrorism. Perceptions of terrorism and four other hazards (motor vehicles, climate change, recreational physical activity, and cellular phones) were assessed using a word-association technique and rating scales reflecting key cognitive dimensions (threat, uncertainty, control) and worry reactions. Data were collected as part of a national telephone survey on health risk perception (N=1,503). Relative to other hazards, Canadians perceived terrorism as posing a lower threat, as more uncertain, and as less controllable. Positive associations of perceived threat and of perceived uncertainty with worry about terrorism were observed. However, perceived control was unexpectedly positively associated with worry about terrorism. Together, cognitive dimensions only accounted for a modest portion of the variance in worry about terrorism. Findings suggest that additional social contextual factors be identified and considered in research on the perception of terrorism.

Exploring the Specificity of Terrorism Risk Perceptions: A Multi-Method, Multi-Hazard Approach

Deemed “a new species of trouble” (Slovic, 2002a), terrorism is known for its potential to evoke considerable fear regardless of its low probability of occurrence. Indeed, numerous studies have stressed the fact that psychological and behavioural responses to this highly feared threat can have the longest-lasting effects (Hyams, Murphy, & Wessely, 2002; Kunreuther, 2002; Lemyre, Clément, Corneil, Craig, Boutette, Tyshenko, et al., 2005; Lerner, Gonzalez, Small, & Fischhoff, 2003; Stein, Tanielian, Eisenman, & Keyser, 2004). Contributing to the pervasiveness of such responses is the fact that they can be driven by perceptions of terrorism threat, regardless of whether it is actually present (Jenkin, 2006; Kasperson, Renn, Slovic, Brown, Emel, Goble, et al., 1988; Lemyre, Clément, Corneil, Lee, Gibson, Gaylord, et al., 2005; Slovic, 2002a, 2002b). Developing methods to effectively manage terrorism therefore requires a better understanding of the way individuals perceive this hazard.

While several approaches have been developed to study the way individuals perceive hazards (e.g., Joffe, 2002a, 2002b; Morgan, Fischhoff, Bostrom, & Atman, 2001; Steg & Sievers, 2000), there is no doubt that the psychometric approach of Fischhoff and his colleagues (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978) has enjoyed the most popularity. In this approach, respondents are asked to rate a list of hazards in terms of nine dimensions: i) whether the hazards are novel, ii) known to science, iii) controllable, or iv) evoke considerable dread; v) whether exposure to them is unknown, or vi) involuntary; and vii) whether their effects are immediate, viii) catastrophic, or ix) severe (Fischhoff et al., 1978). In previous studies, factor analyses of

respondents' ratings on each dimension collapsed across hazards have typically indicated that two latent factors explain variations in response, often referred to as "dread risk" (which conveys the seriousness of the consequences of hazards) and "unknown risk" (which conveys a sense of uncertainty surrounding hazards) (Sjöberg, 2000; Slovic, 2002b; Slovic, Fischhoff, Lichtenstein, & Roe, 1981). In order to further clarify the nature of these factors, Fischhoff and his colleagues computed a score for each hazard on dread and unknown using respondents' ratings. They then plotted each hazard within a two-factor space comprising these factors and found that hazards scoring high on both dread and unknown were those that generated the highest degree of concern among members of the public (e.g., pesticides and nuclear power).

More recently, some shortcomings of the psychometric approach have been highlighted (Schütz, Wiedemann, & Gray, 2000; Sjöberg, 1996; Siegrist, Keller, & Kiers, 2005). Specifically, concern has been expressed about the potential for these factors to account for individual differences in response to hazards (Langford, Marris, McDonald, Goldstein, & O'Riordan, 1999; Siegrist et al., 2005; Schütz et al., 2000). As noted by Siegrist et al. (2005), the analytical strategy used by Fischhoff and his colleagues identifies factors that distinguish different types of hazards based on their potential to generate concern rather than describing the processes involved in individual response to a particular health hazard.

An even more important limitation, which can be extended to much of the research on risk perception relates to Schütz et al.'s (2000) observation that "risk perception" is used to describe both "attitudes and intuitive judgments about risk/.../[and] more general evaluations of and reactions to risk" (p.1). Even the "dread" factor consists

of both cognitive dimensions (e.g., perceived controllability, voluntariness, catastrophic potential, fatality of consequences) and affective responses (e.g., dread) (Fischhoff et al., 1978; Slovic, 1987; Slovic, 2002b).

Unfortunately, these points have meant that less research on risk perception has explicitly distinguished cognitive from psychological reactions. On the contrary, models of health behaviour not only shed light onto important cognitive dimensions predicting behavioural response; fear appeal models, in particular, also specify how these dimensions relate to individuals' psychological responses (e.g., fear) in order to predict health behaviour. While a variety of models fall within this category (e.g., protection motivation theory, parallel response model; extended parallel process model; Leventhal, 1971; Rogers, 1975, 1983; Witte, 1998), there is considerable overlap among them. Reminiscent of the "dread" factor (Fischhoff et al., 1978), a first common assumption of these models is that fear drives response to a particular hazard, and is driven by the extent to which individuals perceive this hazard as a serious and likely threat to health (perceived threat). In support of this, perceived threat has been associated with increased negative affect such as worry or fear (Ruiter, Verplanken, Kok, & Werrij, 2003; Sjöberg, 1998; Takao, Motoyoshi, Sato, & Fukuzono, 2003).

A second commonality of models of health behaviour relates to the importance placed on individuals' perceived level of control over the health threat. Such perceptions are recognized as robust predictors of behaviours aimed at averting the threat and preserving health (Skinner, 1996). Although less research has examined the relationship between perceived control and affective response, several studies have revealed an association between broader constructs of perceived control (i.e., perceptions of control

that are not specific to a particular health hazard) and psychological well-being (Skinner, 1996; Frazier & Waid, 1999). Hence, perceived control might be expected to predict decreased negative affect.

Despite the advantages of health behaviour models in describing key factors involved in the way individuals respond to health hazards, a major limit of much of the literature in this area is the fact that the same models are generalized to describe individual response to a wide range of hazards (for examples, see Murray-Johnson, Witte, Patel, Orrego, Zuckerman, Maxfield, et al., 2004; Witte & Allen, 2000). Yet, few studies have simultaneously examined and compared the validity of model parameters across different hazards. It therefore remains unclear whether cognitive dimensions are equally important to individual response across hazards. The study of hazards one at a time also gives rise to questions regarding the ecological validity of respondents' evaluations. Indeed, people are exposed to a number of health hazards at any given point in time—some deemed important, others not—and this entire array represents the context wherein their responses to health issues are based (Lemyre, Lee, Mercier, Bouchard, & Krewski, 2006).

One potential solution to this problem involves using a multi-hazard approach. With this approach, perceptions of different hazards can be compared, thereby revealing the specific characteristics of perceptions of each of them. Findings of research on the psychometric approach and on models of health behaviour suggest that common cognitive dimensions predicting individual response to hazards include i) perceptions of the level of threat it poses, ii) its unknown or uncertain nature, and iii) one's level of control over it. Additionally, these should be considered as distinct from, yet related to

psychological responses to hazards, such as fear or worry. Therefore, it may be useful to start by comparing hazard perceptions on the key cognitive dimensions of perceived threat, uncertainty, and control, as well as worry as a psychological response. Nevertheless, it is clear that additional cognitive dimensions may be of special importance to different hazards. Assessing perceptions of different hazards with open-ended questions and comparing responses may help to address this issue.

Using data from a national survey on health risk perception (Krewski, Lemyre, Turner, Lee, Dallaire, Bouchard, et al., 2005, 2006), the primary objective of the present study was to gain a better understanding of perceptions of terrorism and resulting worry relative to other hazards within the Canadian context. First, Canadians' most salient thoughts of terrorism as well as four other hazards (motor vehicles, climate change, recreational physical activity, and cellular phones) were assessed by a word association task. This enabled a comparison of the prominence of threat, uncertainty, as well as control in perceptions of terrorism relative to those of other hazards, and helped identify additional cognitive dimensions of special importance to terrorism. Second, Canadians' perceptions of terrorism were compared to those of other hazards on the dimensions of threat, uncertainty, and control, in addition to worry. Last, the nature of relationships among these cognitive dimensions and worry was examined and compared across hazards. Based on the existing literature, it was expected that worry about each hazard would be positively associated with perceptions of threat and uncertainty, and negatively associated with perceptions of control regarding the hazard. It was believed that this multi-method, multi-hazard approach would favour a more contextualized understanding of terrorism health risk perceptions and worry.

Method

Participants

One thousand five-hundred and three (1,503) respondents (721 men, 782 women) participated in telephone interviews as part of the study. The sample was stratified to resemble the Canadian adult population in terms of province of residence, as well as age group (18 to 29, 30 to 34, 35 to 44, 45 to 54, 55 to 64, and 65 years or over) and gender within province according to 2001 Census data.

Measures

The content of the telephone survey was designed in part to follow up a previous similar survey conducted in 1992 (Slovic, Flynn, Mertz, & Mullican, 1993), and in part to investigate perceptions of the risk posed by a wider range of population health hazards to the health of Canadians (Krewski et al., 2005; Krewski et al., 2006). Questions of the full survey were designed to assess different aspects of health risk perception and acceptability (details about the full survey tool can be found in Krewski et al., 2005, 2006).

A series of group meetings were held throughout the summer and fall of 2003 among members of the project team (including the author of the current thesis) to develop the survey questionnaire. The questionnaire was first drafted in English and was translated into French by a professional English-French translator. The translated questionnaire was then verified by two bilingual individuals and a second professional English-French translator.

In order to shed greater light onto some processes involved in health risk perception, more in depth information was gathered on five health hazards: motor

vehicles, climate change, recreational physical activity, cellular phones, and terrorism. The hazards were selected by members of the project team to reflect opposite spectrums of controllability, with motor vehicles, recreational physical activity, and cellular phones representing fairly controllable hazards, and climate change and terrorism representing relatively less controllable hazards. Some researchers have noted that distinguishing lifestyle (i.e., hazards that are under personal control and are subject to personal decisions) from environmental hazards (i.e., that result from societal activities or natural processes) may be useful from a psychological perspective (Schütz et al., 2000). Hence, motor vehicles, recreational physical activity, and cellular phones may be conceptualized as lifestyle hazards, while climate change and terrorism may be conceptualized as environmental hazards.

During the survey, a word association task was employed to assess respondents' first thoughts of each hazard. Slovic and colleagues began using word association tasks as a way to study processes involved in risk perception, arguing that findings can provide insight into the contents of people's representational systems (Benthin, Slovic, Moran, Severson, Mertz, & Gerrard, 1995; Slovic et al., 1993; Slovic, Kraus, Lappe, Letzel, & Malmfors, 1989). Respondents were asked to provide the first word or image they had in mind while hearing about each of the hazards ("When you hear the term health risks from [motor vehicles, climate change, recreational physical activity, cellular phones, or terrorism], what is the first word or image that comes to mind?").

Following the word association task, respondents were asked to rate the five hazards in terms of cognitive dimensions: i) the risk posed by the hazard to their personal health ("To what extent is/are [motor vehicles, climate change, recreational physical

activity, cellular phones, or terrorism] a risk to your personal health?"), ii) the level of uncertainty surrounding the hazard ("What level of uncertainty do you think there is, in general, about [motor vehicle, climate change, recreational physical activity, cellular phone, or terrorism] risks?"), and iii) their degree of personal control over the hazard ("How much personal control do you have over [motor vehicle, climate change, recreational physical activity, cellular phone, or terrorism] risks?") in addition to iv) the extent to which they worry about the hazard ("To what extent do you worry about [motor vehicle, climate change, recreational physical activity, cellular phone, or terrorism] risks?"). Although the item on perceived risk to personal health was not specifically designed to reflect the construct of perceived threat, this item could serve as a proxy measure, since the notion of health risk may encompass the probability that the hazard will have negative consequences as well as the seriousness of these consequences. To provide their answers, respondents used a 4-point Likert-type scale (1=almost no/none, 2 = slight, 3 = moderate, 4 = high), including a fifth response category to indicate they did not know or had no opinion (5 = don't know/no opinion).

Information was also gathered on education (some/completed elementary school, some/completed high school, some/completed community college or CEGEP, some/completed university, some/completed graduate school) and household income (under $19,999; $20,000-$29,999; $30,000-$39,999; $40,000-$49,999;...; $80,000 and up), allowing for the control of background variables in the analyses.

Procedure

The survey was administered between February 22, 2004 and March 25, 2004 by a local consulting firm. A random-digit dialling method was applied to identify potential

respondents, with a maximum of five call-backs in the case of unanswered calls. Once a household was contacted, the adult whose birthday was closest to the day of the call was asked to participate in the survey. A total of 26,223 numbers were dialled. Of these numbers, 21.4% were not valid and 18.9% were unanswered calls. The 1,503 interviews completed represented 5.7% of the all dialled numbers. The remaining portion of numbers was shared among refusals to participate (44.4%), call-backs (5.4%), and elimination due to completed quotas (4.2%).

Data were collected using Computer Assisted Telephone Interviewing (CATI), which improves flow of survey administration and reduces errors in data entry. For survey items of interest to the present thesis, all items pertaining to the same hazard were presented sequentially, resulting in five sections (one for each hazard). Each section began with the word association task. This was followed by items assessing the various dimensions of respondents' perceptions, which were sequenced randomly in order to control for order effects. The order of presentation of sections on the different hazards was also sequenced randomly to control for order effects. Survey administration took approximately 30 minutes and was conducted in the official language of the respondents' choice.

Data Analyses

Content analyses. Word associations generated by risks from each hazard were subjected to a content analysis. In a first step, word associations were grouped according to semantic meaning in order to facilitate screening for emerging concepts. For example, "Collision" (as a word associated with motor vehicles) would have been placed in the same group as "Car crash". In a second step, semantically grouped word associations

were read and re-read to identify preliminary themes and categories for each hazard. When respondents provided more than one idea or image as a word association (e.g., "jogging and heart", "guns and fear"), only the first was coded. Responses relevant to emerging categories were identified and examined using the method of constant comparison (Glaser and Strauss, 1967) in that each word association was compared with the rest to establish analytical categories. When necessary, categories were added to reflect as many nuances of the data as possible (Pope, Ziebland, & Mays, 2000). One researcher coded all the data, while a second independent rater coded a random sample of 10% of the word associations for each hazard in order to establish inter-rater reliability. The validity of the analytical categories was assessed in terms of Kappa's inter-rater reliability coefficient.

Quantitative analyses. Design effects due to sample stratification were computed for a random subset of variables and were found to be close to 1 (.93 to 1.00), indicating that analyses of data using simple random sample variances would be adequate, although slightly conservative. Prior to analyses, all variables were screened in SPSS 15.0 for accuracy of data entry and missing values. Entries of 5 (don't know/no opinion) were treated as missing values. An examination of Skewness and Kurtosis revealed significant departure from normality of most variable distributions. Nevertheless, multiple linear regression analyses are robust to departures from normality in large samples (Tabachnick & Fidell, 2001). Therefore, the decision was made to perform sequential multiple linear regression analyses including perceived threat, perceived uncertainty, and perceived control as predictors of worry about each health hazard (step 2), controlling for effects related to demographic variables (step 1) (this decision was also based on the fact that

ordinal logistic regression analyses produced similar results). A *p* value of .05 was used as a criterion for all tests of significance.

Results

Content Analyses

A wide variety of word associations were provided for each hazard, with the number of emerging themes ranging from 17 for recreational physical activity to 23 for terrorism. Satisfactory agreement was observed for all items, ranging from a Kappa coefficient of .77 for word associations to "risks from recreational physical activity" to a Kappa coefficient of .90 for word associations to "risks from motor vehicles".

Emerging themes could loosely be classified as those reflecting potential impacts of the hazard once its health risks are incurred (e.g., injury), descriptions of health risks associated with the hazard (e.g., whether the hazard is controllable, uncertain, high in risk, or low in risk), more specific examples of health risks associated with the hazard (e.g., a particular type of health risk or specific situation involving the health risk), individual behaviours (e.g., any preventative or risky individual behaviour that may change the level of associated health risks), management issues (e.g., higher-order, as opposed to individual actions or regulations that control the level of associated health risks), benefits associated with the hazard, specific populations (e.g., types of individuals, seemingly mentioned as examples of "vulnerable" groups, since the hazard is of relevance to them), socio-political factors (e.g., political or societal issues related to the hazard), and general images of the hazard (e.g., images that are a slight variation of the hazard itself). Emerging categories are presented in Tables 1 through 5. For the sake of simplicity, discussion of the results is organized according to the above broad categories

for each hazard. The percentage of word associations coded under each category of themes across hazards is summarized in Table 6.

Risks from motor vehicles. The themes emerging from word associations to the term "risks from motor vehicles" are presented and described in Table 1 along with the proportion of word associations that reflected each theme. This term most frequently elicited thoughts or images reflecting examples of health risks associated with motor vehicles, including accidents (48.8%), pollutants (2.6%), driving conditions (2.1%), and the technical condition of the vehicle (1.0%). Relative to other hazards, respondents most frequently had thoughts or images that alluded to individual behaviours related to motor vehicles (e.g., 17.7% risky driving behaviours, 1.9% safe driving behaviours, and 0.6% insurance), specific populations (e.g., 5.1% other drivers), and management issues (e.g., 1.7% vehicle safety features, 0.2% law). Relative to other hazards, it was also the least likely to elicit thoughts or images related to potential impacts of motor vehicle risks (e.g., 5.7% environmental health impact, 4.7% human health impact, 0.5% level of emotional impact, and 0.3% cost). Aside from those who were unable to provide a word association (1.4%), or who provided a word association that did not relate to any main theme (0.3%), remaining respondents either described associated health risks in term of their level (2.5%), mentioned a type of motor vehicle as a general image (2.3%), or benefits that might be derived from motor vehicles (0.7%).

Table 1

Words Associated to the Term Risks From Motor Vehicles

Theme	Category	Frequency
Accidents Pollutants Driving conditions Technical condition of vehicle	Example	54.5
Risky driving behaviour Safe driving practices Insurance	Individual behaviour	20.2
Cost Environmental health impact Human health impact Level of emotional impact	Impact	11.2
Other drivers	Specific population	5.1
Level of perceived risk	Description	2.5
Type of motor vehicle	General image	2.3
Law Vehicle safety features	Management issues	1.9
Benefits	Benefits	0.7
Don't know/No opinion	Don't know/No opinion	1.4
Other	Other	0.3

Table 2

Words Associated to the Term Risks From Climate Change

Theme	Category	Frequency
Weather Human health impact Endangerment Glacial melting Level of emotional impact Economic impact Warm places	Impact	43.1
Global warming Ozone depletion Environmental health Greenhouse effect	Example	38.3
Level of perceived risk Uncertainty/Lack of awareness Uncontrollable Debate surrounding risk	Description	4.6
Change not related to climate change Broad notion of change	General image	3.0
Political activism Industrialization	Socio-political	1.6
Adaptations Preventative action	Individual behaviour	1.5
Don't know/No opinion	Don't know/No opinion	6.1
Other	Other	1.9

Table 3

Words Associated to the Term Risks From Recreational Physical Activity

Theme	Category	Frequency
Human health impact	Impact	34.9
Types of activities Accidents Environmental risk	Example	31.1
Risky sport practices Safety sport practices Inactivity/Availability of opportunity	Individual behaviour	10.2
Benefits	Benefits	5.7
Level of perceived risk Level of controllability Debate surrounding risk	Description	4.6
Sporting environments	General image	1.4
Level of knowledge Health care	Management issues	1.3
Athletes/Participants Young people	Specific population	1.2
Don't know/No opinion	Don't know/No opinion	7.7
Other	Other	1.8

Table 4

Words Associated to the Term Risks From Cellular Phones

Theme	Category	Frequency
Human health impact General dislike Level of emotional impact	Impact	37.2
Accident Radiation Related problems not affecting health Distraction Fire/Explosive potential	Example	22.6
Risk while driving Amount of use Preventative practices Don't have one	Individual behaviour	16.6
Level of perceived risk Uncertainty Acceptability Debate surrounding risk	Description	10.1
Telephone image	General image	1.3
Benefits	Benefits	1.0
Regulation and management	Management issues	0.5
Don't know/No opinion	Don't know/No opinion	9.0
Other	Other	1.7

Table 5

Words Associated to the Term Risks From Terrorism

Theme	Category	Frequency
Types of terrorism/Weapons Attacks (general or specific)	Example	44.7
State/Structure of society Political groups/Leaders Peace Information dissemination issues Government Country/Region Conflict	Socio-political	17.8
Social impact Level of emotional impact Human health impact General dislike	Impact	16.2
Uncontrollable Uncertainty Level of perceived risk Debate surrounding risk	Description	8.4
Perpetrator characteristics Groups Family and children	Specific population	4.7
Counter-terrorism policy	Management issues	1.7
Preparedness/Response	Individual behaviour	0.8
Don't know/No opinion	Don't know/No opinion	4.1
Other	Other	1.8

Table 6

Percentage of Word Associations Coded Under Each Category of Themes Across Hazards

Theme Category	Motor vehicles	Climate change	Recreational physical activity	Cellular phones	Terrorism
Example	54.5	38.3	31.1	22.6	44.7
Impact	11.2	43.1	34.9	37.2	16.2
Specific population	5.1	--	1.2	--	4.8
Description	2.5	4.6	4.6	10.1	8.4
General image	2.3	3.0	1.4	1.3	--
Benefits	0.7	--	5.7	1.0	--
Management issues	1.9	--	1.3	0.5	1.7
Socio-political	--	1.6	--	--	17.8
Individual behaviour	20.2	1.5	10.2	16.6	0.8

Risks from climate change. As shown in Table 2, "risks from climate change" most frequently elicited word associations reflecting potential impacts of climate change risks (e.g., 21.5% weather, 12.0% human health impact, 4.7% endangerment, 2.9% glacial melting, 1.5% level of emotional impact, 0.3% warm places, and 0.2% economic impact). Many respondents provided examples of health risks associated with climate change (e.g., 16.8% global warming, 9.4% ozone depletion, 8.8% environmental health, and 3.3% greenhouse effect), whereas others described these in terms of the level of perceived risk (1.6%), debate surrounding them (1.4%), uncertainty (0.9%), or as uncontrollable (0.7%). As general images, some respondents made reference to other changes that are not directly related to climate change (i.e., 2.1% seasonal changes) or mentioned the broader notion of change (0.9%). With the exception of terrorism, climate change was the only hazard in relation to which respondents mentioned word associations reflecting socio-political factors (e.g., 1.1% political activism, 0.5% industrialization). It was also among the hazards in relation to which respondents mentioned the fewest word associations reflecting individual behaviours (e.g., 1.0% adaptations, 0.5% preventative action).

Risks from recreational physical activity. Although none referred to death (see Table 3), respondents most often referred to human heath impacts (34.9%) in relation to the phrase "risks from recreational physical activity". As examples of health risks from recreational physical activity, they mentioned types of activities (21.6%), accidents (9.1%), as well as environmental risks (0.4%). As they did for motor vehicles and cellular phones, a relatively high proportion of respondents mentioned individual behaviours (e.g., 5.6% risky sport practices, 3.7% safety sport practices, 0.9% inactivity/availability

of opportunity) or mentioned benefits that may be derived from recreational physical activity (5.7%). By comparison, fewer respondents mentioned management issues (e.g., 0.9% education and awareness, 0.4% health care). Others described health risks in terms of the level of perceived risk (3.3%), controllability (0.7%), or debate surrounding them (0.6%). The remaining respondents either had sporting environments as a general image (1.4%) or mentioned specific populations (e.g., 0.9% athletes/participants, 0.3% young people).

Risks from cellular phones. Word associations to "risks from cellular phones" are shown in Table 4. Again, the majority of respondents mentioned potential impacts (e.g., 32.9% human health impact, 3.3% general dislike, 1.0% level of emotional impact). The proportion of respondents who thought of examples of health risks associated with cellular phones was also relatively high (e.g., 11.0% accidents, 6.6% radiation, 2.4% related problem not directly affecting health, 1.7% distraction, and 0.9% fire or explosive potential), as was that of those who thought of individual behaviours (e.g., 11.6% risk while driving, 2.3% amount of use, 1.9% preventative practices, 0.8% don't have one). Others described health risks in terms of either level of perceived risk (4.7%), debate surrounding them (3.7%), uncertainty (1.3%), or acceptability (0.4%). The few remaining imagined an actual telephone as a general image (1.3%), mentioned the benefits of cellular phones (1.0%), or referred to management issues (0.5%).

Risks from terrorism. As can be seen in Table 5, the term "risks from terrorism" elicited the widest range of themes. As for motor vehicles, the majority of respondents first thought about examples of health risks. More specifically, they mentioned a specific attack or referred to an attack in general terms (25.2%). Others thought about different

types of terrorism or weapons that might be used in an attack (19.5%). However, a distinguishing feature of these word associations was the prominence of themes reflecting socio-political factors. Indeed, respondents referred to political groups and leaders (7.2%), conflict (4.6%), various countries or regions (many of which are or have been involved in a conflict; 3.5%), information dissemination issues (1.0%), the current state and structure of society (0.7%), the government (0.6%), or to peace (0.2%). Also, terrorism was the only hazard in relation to which respondents mentioned management issues (1.7% counter-terrorism policy) more frequently than individual behaviours (0.8% preparedness and response). Although potential impacts were less frequently mentioned, many of these reflected death or intense emotion (e.g., 6.7% human health impact, 6.3% level of emotional impact, 1.7% social impact, and 1.5% general dislike). Respondents described health risks associated with terrorism in terms of the level of perceived risk (4.5%) or debate surrounding them (2.3%), as uncontrollable (0.9%), or in terms of uncertainty (0.7%). Finally, word associations of the remainder of respondents related to specific populations (e.g., 2.6% perpetrator characteristics, 1.7% non-political groups, 0.4% family and children).

Quantitative Analyses

In order to compare perceptions of terrorism to those of other hazards on key cognitive dimensions and worry, analyses were performed on respondents' ratings of each hazard on these criteria. Table 7 presents the means and standard deviations of respondents' ratings of each hazard on the dimensions of perceived threat, uncertainty, and control, in addition to worry. It was noted that items assessing perceived uncertainty generated a high proportion of "don't know/no opinion" responses (from 4.0% for

terrorism to 6.4% for cellular phones), suggesting that this cognitive dimension may not have been clearly understood.

Analyses of variance. To examine differences in ratings on the three dimensions (perceived threat, uncertainty, and control) as well as in worry by type of hazard, a series of repeated measures analyses of variance (ANOVAs) were performed with listwise deletion of cases who answered with ratings of 5 (don't know/no opinion). Final sample sizes were $N = 1,433$ for the analysis involving perceived threat, $N = 1,297$ for the analysis involving perceived uncertainty, $N = 1,446$ for the analysis involving perceived control, and $N = 1,466$ for the analysis involving worry. Investigation of Mauchly's Tests revealed significant violation of the assumption of sphericity in all cases. Therefore, Huynh-Feldt adjustments were made to degrees of freedom. Significant differences were observed for perceived threat, $F(3.95, 5653.33) = 367.55$, $MSE = .73$, $p < .001$, partial $\eta^2 = .20$; perceived uncertainty, $F(3.95, 5116.31) = 101.87$, $MSE = .67$, $p < .001$, partial $\eta^2 = .07$; perceived control, $F(3.67, 5298.60) = 855.34$, $MSE = .99$, $p < .001$, partial $\eta^2 = .37$; and worry, $F(3.98, 5831.19) = 221.85$, $MSE = .67$, $p < .001$, partial $\eta^2 = .13$. Comparisons of ratings of terrorism with those of other hazards demonstrated that perceived threat of terrorism differed from that of all other hazards, with the exception of recreational physical activity (all significant p values $< .001$). However, perceived uncertainty and control of terrorism each differed from that of all other hazards (all significant p values $< .001$).

Table 7

Mean Ratings (Standard Deviations) of Perceived Threat, Perceived Uncertainty, Perceived Control, and Worry by Hazard

Variable	Motor vehicles	Climate change	Recreational physical activity	Cellular phones	Terrorism
Perceived threat	$2.64\ (0.91)_a$	$2.37\ (1.01)_b$	$1.81\ (0.87)_e$	$1.65\ (0.92)_d$	$1.77\ (0.90)_e$
Perceived uncertainty	$2.74\ (0.88)_a$	$2.73\ (0.93)_b$	$2.32\ (0.88)_c$	$2.53\ (0.98)_d$	$2.91\ (0.92)_e$
Perceived control	$2.65\ (1.00)_a$	$1.81\ (1.00)_b$	$3.18\ (1.06)_c$	$2.82\ (1.29)_d$	$1.43\ (0.83)_e$
Worry	$2.50\ (1.04)_a$	$2.18\ (1.08)_b$	$1.83\ (0.96)_c$	$1.71\ (0.97)_d$	$1.92\ (0.97)_e$

Note. Means in the same row that do not share the same subscript as terrorism differ at $p < .05$.

Sequential multiple linear regression analyses. Tables 8 and 9 present correlations among demographic variables (age, gender, education, and income) as well as ratings of perceived threat, perceived control, perceived uncertainty, and worry for each hazard. It was decided to include gender and age as covariates in the first step of each sequential multiple linear regression analysis, since these variables were significantly associated with worry for most of the hazards (i.e., at least three out of the five, as shown in Table 8), and these variables have repeatedly been found to be associated with concern about health risks. Cases with missing values on variables included in each analysis were deleted listwise, resulting in $N = 1,411$ for motor vehicles, $N = 1,413$ for climate change, $N = 1,404$ for recreational physical activity, $N = 1,374$ for cellular phones, and $N = 1,420$ for terrorism. Using a Mahalanobis criterion of $p < .001$ ($\chi^2 = 20.52$ with 5 degrees of freedom), no multivariate outliers were identified for any of the analyses.

Results of sequential multiple linear regression analyses are presented in Table 10 after each step. In examining this table, it should be recalled that perceived threat, perceived uncertainty, perceived control, and worry were rated in relation to each hazard. With the obvious exception of age and gender, the variables included in each analysis are therefore distinct. The final models accounted for between 10.6% (recreational physical activity) to 29.1% (climate change) of the variance in worry about the hazards. The inclusion of ratings of perceived threat, perceived uncertainty, and perceived control in step 2 significantly improved the prediction of worry above and beyond age and gender for all of the hazards, with $\Delta R^2 = .19$, $F_{inc}(3, 1405) = 113.14$, $p < .001$ for motor vehicles; $\Delta R^2 = .29$, $F_{inc}(3, 1407) = 190.65$, $p < .001$ for climate change; $\Delta R^2 = .10$, $F_{inc}(3, 1398) =$

52.54, $p < .001$ for recreational physical activity; $\Delta R^2 = .19$, $F_{inc}(3, 1368) = 110.13$, $p < .001$ for cellular phones; and $\Delta R^2 = .20$, $F_{inc}(3, 1414) = 119.84$, $p < .001$ for terrorism. Further examination of individual predictors revealed that older age was associated with significantly less worry about motor vehicles, climate change, and recreational physical activity, while it was significantly associated with more worry about cellular phones. Female gender was associated with significantly greater worry about all hazards, with the exception of climate change. Ratings of perceived threat and uncertainty were consistently and significantly positively associated with worry about all the hazards. However, relationships between ratings of perceived control and worry varied according to the type of hazard: They negatively predicted worry about cellular phones, positively predicted worry about both climate change and terrorism, and failed to emerge as predictors of worry about motor vehicles or recreational physical activity.

Table 8

Spearman's Correlations of Perceived Threat, Perceived Uncertainty, Perceived Control, and Worry With Demographic Variables by Hazard

Variable	Age	Education	Gender	Income
	Motor vehicles			
Perceived threat	-.10***	.04	.06*	.03
Perceived uncertainty	-.02	-.03	.06*	-.05
Perceived control	.02	.01	-.11***	.09**
Worry	-.12***	-.02	.10***	-.02
	Climate change			
Perceived threat	.02	-.05*	.06*	-.08**
Perceived uncertainty	-.04	.09***	-.03	.02
Perceived control	-.04	.01	.04	.01
Worry	-.08**	.02	.03	-.04
	Recreational physical activity			
Perceived threat	-.09***	-.01	-.09***	.05
Perceived uncertainty	<-.01	-.06*	-.03	-.05
Perceived control	-.04	.20***	-.06*	.21***
Worry	-.11***	-.02	.03	-.02
	Cellular phones			
Perceived threat	-.11***	-.01	-.02	.03
Perceived uncertainty	-.01	.03	.02	-.05
Perceived control	-.04	.16***	<.01	.16***
Worry	-.01	-.02	.07*	-.10***
	Terrorism			
Perceived threat	.02	-.10***	.09***	-.05
Perceived uncertainty	-.08**	.03	.02	.01
Perceived control	.01	-.03	-.06*	-.05
Worry	-.02	-.08**	.09***	-.06*

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

Table 9

Pearson's Correlations Between Perceived Threat, Perceived Uncertainty, Perceived Control, and Worry by Hazard

Variable	1	2	3	4
		Motor vehicles		
1. Perceived threat	--	.22***	-.08**	.40***
2. Perceived uncertainty		--	<.01	.30***
3. Perceived control			--	<-.01
4. Worry				--
		Climate change		
1. Perceived threat	--	.23***	.10***	.50***
2. Perceived uncertainty		--	.03	.27***
3. Perceived control			--	.13***
4. Worry				--
		Recreational physical activity		
1. Perceived threat	--	.20***	.03	.28***
2. Perceived uncertainty		--	.00	.22***
3. Perceived control			--	-.02
4. Worry				--
		Cellular phones		
1. Perceived threat	--	.21***	-.08***	.37***
2. Perceived uncertainty		--	.06*	.28***
3. Perceived control			--	-.09***
4. Worry				--
		Terrorism		
1. Perceived threat	--	.18***	.09***	.42***
2. Perceived uncertainty		--	.01	.23***
3. Perceived control			--	.11***
4. Worry				--

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

Table 10

Summary of Sequential Regression Analyses With Perceived Threat, Uncertainty, and Control as Predictors of Worry by Hazard

	Motor vehicles			Climate change			Recreational physical activity			Cellular phones			Terrorism		
Predictor	ß	*t*	R^2	ß	*t*	R^2	ß	*t*	R^2	ß	*t*	R^2	ß	*t*	R^2
Step 1															
Age	-.12	-4.67***		-.07	-2.27**		-.09	-3.43**		.03	0.98		-.02	-0.68	
Gender	.11	3.98***		.03	1.07		.03	0.99		.06	2.06*		.08	3.09**	
			.02***			<.01			.01**			<.01			.01**
Step 2															
Age	-.08	-3.47***		-.08	-3.38***		-.08	-2.95**		.06	2.24*		-.02	-0.85	
Gender	.07	3.10***		<-.01	-0.06		.05	2.11*		.06	2.55*		.06	2.37*	
Perceived threat	.33	13.62***		.46	19.90***		.23	9.00***		.33	13.33***		.38	15.47***	
Perceived uncertainty	.22	9.14***		.17	7.22***		.17	6.74***		.22	8.66***		.16	6.63***	
Perceived control	.03	1.16		.08	3.34***		-.02	-0.88		-.07	-2.98**		.08	3.45***	
			.21***			.29***			.11***			.19***			.21***

Note. Perceived threat, perceived uncertainty, perceived control, and worry are hazard-specific indices.

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

Discussion

The primary aim of the present study was to achieve a better understanding of the way Canadians perceive terrorism. Although research on the perception of terrorism has grown in popularity in recent years, few studies have explicitly focused on identifying and examining theoretically relevant cognitive dimensions that may be involved in individual response to terrorism. Moreover, rarely have perceptions or psychological responses regarding multiple hazards been examined simultaneously and compared. Hence, a multi-method, multi-hazard approach was used to identify unique characteristics of perceptions of terrorism, and to determine how these differ from perceptions of other hazards on various key cognitive dimensions.

Findings of Content Analyses

Content analyses of responses to the word association tasks revealed that respondents had a wide range of first thoughts in relation to risks associated with the five hazards. Nevertheless, some themes recurred, providing evidence of their importance across hazards. In support of the importance of threat and control as cognitive dimensions across hazards, several themes reflecting the concept of threat or relating to the control of health risks emerged in respondents' word associations. For instance, human health impact and level of perceived risk emerged as themes for all of the hazards. Also, themes representing individual behaviour or management issues that may play a role in the control of health risks were quite prominent across hazards. These findings provide converging evidence of the longstanding importance of perceptions of threat and control in models predicting health behaviour (Rogers, 1975, 1983; Witte, 1998).

There was nevertheless a great deal of variation in themes across hazards. Most striking was the fact that several more respondents mentioned individual behaviour in response to lifestyle hazards than they did for environmental hazards. In fact, terrorism was the only hazard in relation to which more respondents mentioned management issues than individual behaviour, suggesting that Canadians may primarily consider institutions to be responsible for controlling this hazard. Also, uncertainty only emerged as a theme of word associations to climate change, cellular phones, and terrorism. With respect to cellular phones, this finding might be interpreted in light of the growing debate surrounding health risks posed by radiofrequency fields associated with this new technology (Habash, Brodsky, Leiss, Krewski, & Repacholi, 2003; Hutter, Moshammer, Wallner, & Kundi, 2004; Kuster, Schuderer, Christ, Futter, & Ebert, 2004). Uncertainty about the health risks of climate change and terrorism may be related to stated difficulties in predicting the magnitude and nature of the consequences of these environmental hazards (Kunreuther, 2002; Lemyre et al., 2005).

Another notable distinction was the salience of socio-political factors in perceptions of terrorism, but not of lifestyle hazards. This finding is consistent with those of a previous study by Gibson and her colleagues, where Canadians were found to frame their conceptualizations of terrorism within the nation's socio-political context (Gibson, Lemyre, Clément, Markon, & Lee, 2007; Lemyre, Clément, & Gibson, 2004). One criticism of the literature on health risk perceptions entails the fact that research rarely takes into account the larger social context in which these are embedded (Bruchon-Schweitzer, 2002; Tulloch & Lupton, 2003). Given that socio-political themes also emerged in word associations provided for climate change, it may seem particularly

relevant for future research on perceptions of environmental hazards to put more emphasis on the identification and consideration of relevant social contextual factors. One such factor that has received an increasing amount of attention in the literature on health risk perception is that of social trust. Indeed, Covello and his colleagues have included trust in institutions to the list of factors determining reactions to risk issues (Covello, Peters, Wojtecki, & Hyde, 2001), emphasizing that these reactions may shape behaviours in turn. Hence, greater consideration of trust or related concepts as they relate to terrorism may prove to be a fruitful direction for research in this area.

Findings of Quantitative Analyses

Having uncovered some unique characteristics of perceptions of terrorism, a next step was to examine how perceptions of this threat differed on the key dimensions of threat, uncertainty, and control, in addition to worry. Previous studies have examined perceptions of threat and control, as well as psychological reactions to terrorism (Bleich, Gelkopf, & Solomon, 2003; Fischhoff, Gonzalez, Small, & Lerner, 2005; Klar, Zakay & Sharvit, 2002; Lerner et al., 2003; Rubin, Brewin, Greenberg, Simpson, & Wessely, 2005). In general, these studies reveal the tendency for terrorism to be perceived as threatening, and to elicit stress reactions. However, all were based in countries affected by a specific attack. Findings of the present study demonstrate that perceptions of individuals residing in countries that have not recently been targeted, such as Canada, differ in important ways.

With the exception of cellular phones, terrorism was perceived as the least threatening hazard, and no more threatening than recreational physical activity (which elicited a high number of word associations referring to its benefits). Similarly, several

participants of semi-structured interviews held with individuals across the country around the same time indicated that they did not feel that terrorism was likely to happen in Canada. Rationales ranged from the belief that Canada has a friendly, pacifist image in the world to the belief that nothing has ever happened in Canada (Lemyre et al., 2004). Respondents of a study based in Sweden also perceived the risk of terrorism as low (Sjöberg, 2002).

Despite the acknowledgment of terrorism as a global threat, it should be noted that the risks of an attack occurring are in actuality low when considered next to those associated with lifestyle (Slovic, 2002b; Leithner, 2003). Instead, what has pushed terrorism to the forefront of risk management issues in recent years is an acknowledgement of the potential magnitude of its impacts, which are not necessarily dependent upon individuals' direct experience with an attack (Hyams et al., 2002; Waeckerle, Seamans, Whiteside, Pons, Burstein, & Murray, 2001). Indeed, the events of September 11, 2001 had notable indirect impacts on Canada, including devastating effects on the Canadian airline industry and Canada's involvement in the war on terror (Fiorino, 2001; Harumi & Lee, 2005). The fact that terrorism yielded low ratings on the dimension of perceived threat may therefore suggest that respondents primarily thought about the likelihood of occurrence of terrorism while making their judgements, as opposed to the seriousness of its consequences. As aforementioned, perceived threat was assessed using perceived risk to personal health as a proxy measure, since the notion of health risk is thought to encompass the likelihood of probabilistic events as well as the seriousness of their consequences to health. Including separate measures of these aspects

of health risk in future research could help determine whether the seriousness of consequences of terrorism is equally perceived as low.

Although respondents perceived terrorism as the most uncertain hazard, variation across hazards was less pronounced on this dimension. While this finding may genuinely reflect similarities in respondents' perceptions of the level of uncertainty surrounding these seemingly diverse hazards, findings should be interpreted with caution. Specifically, the high proportion of respondents who provided ratings of 5 (don't know/no opinion) in response to items assessing perceived uncertainty suggests that they may not have clearly understood this concept. In any case, the construct of perceived uncertainty would benefit from further conceptual clarification, as it appears to be an important dimension of perceptions for some types of hazards, particularly those of environmental nature.

By contrast, ratings of perceived control greatly varied across hazards. Respondents clearly perceived themselves as having the least personal control over terrorism and climate change. This finding is consistent with the relative infrequencies of themes reflecting individual behaviour in word associations for these environmental hazards. This finding likely reflects the fact that lifestyle hazards are relatively easier to control. For instance, people may choose alternate modes of transportation, opt out of participating in recreational physical activity, or refrain from using cellular phones. Climate change and terrorism, on the other hand, are harder to avoid.

As expected, regression analyses revealed that respondents invariably expressed greater worry about hazards when they felt more threatened by them and perceived them as more uncertain. However, associations involving perceptions of control were

inconsistent. Specifically, respondents with greater perceived control over cellular phones were significantly less likely to be worried about their risks, while those with greater perceived control over motor vehicles and recreational physical activity were no more likely to be worried about related risks. In direct contrast to the notion of perceived control as a protective factor, however, respondents with greater perceived control over climate change and terrorism were significantly more likely to be worried about these hazards (Skinner, 1996; Frazier & Waid, 1999).

To interpret these findings, it may help to make a few important distinctions regarding the concept of control. First is the need to differentiate one's perceived level of control from one's actual level of control. While many theorists argue that perceived control is a more powerful predictor of functioning than actual control (Skinner, 1996), researchers have suggested that environmental contingencies be considered when judging the desirability of control beliefs, noting that high perceived control may not be adaptive in uncontrollable situations (Bruchon-Schweitzer, 2002; Walker, 2001). Given the inherent difficulties of controlling terrorism and climate change, questions may therefore be raised about whether it is even beneficial for individuals to perceive themselves as having control over these environmental hazards (Walker, 2001).

Before this can be determined, additional distinctions need to be considered; namely, the fact that multiple conceptualizations of perceived control may exist. One study on perceived control within the broader domain of health demonstrated that this construct is multidimensional, regardless of one's level of health and culture (Bonetti, Johnston, Rodriguez-Marin, Pastor, Martin-Aragon, Doherty, et al., 2001). Specifically, a factor analysis was performed on the Generalized Self-Efficacy Scale, Perceived Health

Competence Scale, as well as the Multidimensional Health Locus of Control Scale (Schwarzer, 1992; Smith, Wallston, & Smith, 1995; Wallston, Wallston, & DeVellis, 1978). The analysis revealed five factors reflecting each a priori scale or subscale (i.e., Generalized Self-Efficacy, Perceived Health Competence, as well as Internal, Powerful Others and Chance Health Locus of Control). Based on these findings, authors commented on the need for researchers to clarify which dimension(s) of perceived control is (are) the subject of their work.

Although the above study focused more broadly on perceived control over health, it is possible that distinct forms exist of perceived control over specific hazards. Indeed, individuals may exert control on hazards on a number of levels (e.g., on their exposure to the hazard, on the probability that this exposure will result in negative consequences, and on the magnitude of the consequences). In a similar vein, scholars have distinguished primary from secondary control strategies (Rothbaum, Weisz, & Snyder, 1982); that is, strategies aimed at changing the situation versus those aimed at changing oneself. Going even further, a distinction could be made between efforts aimed at managing the probability that a hazard will incur its consequences and those aimed at managing its consequences.

Careful consideration of the items used to measure perceived control in the present study suggests that these assessed perceptions of the former. As such, results suggest that perceiving oneself as having this form of control over environmental hazards is unfavourable. Similarly, a survey conducted among a sample of Israeli citizens revealed that worry about terrorism was higher among individuals who perceived themselves as having more control over their ability "to reduce their chances of

victimization in terrorist attacks" (Klar et al., 2002, p. 207). However, these findings do not necessarily rule out the possibility that individuals could benefit from perceiving themselves as having other forms of control over terrorism.

In another study, Benight and his colleagues found that perceived coping efficacy (which might be considered a form of perceived control over the consequences of an event) was associated with lower trauma-related distress following the Oklahoma City bombing (Benight, Freyaldenhoven, Hughes, Ruiz, Zoschke, & Lovallo, 2000). Hence, efforts might best be placed on improving individuals' perceived efficacy in coping with potential terrorist events. One promising strategy, which was recently used in the United Kingdom, is to provide information to the public about steps to take in the event of an emergency such as a terrorist attack (HM Government, 2007). Despite being received with criticism due to concerns of raising fear, results of one study suggest that the provision of this type of information may actually mitigate fear-related behaviour following a terrorist attack (Rubin et al., 2005).

Limitations

Alternatively, inconsistent findings regarding associations between perceived control and worry across hazards may have resulted from study limitations. First, this relationship may not have reached significance for motor vehicles and recreational physical activity because of limited clarity regarding the nature of these hazards. Indeed, examination of the themes emerging in word associations for both of these hazards revealed that respondents had a wide range of issues in mind while thinking about their associated risks. For example, while most respondents thought about accidents, a large proportion of them also thought about environmental pollutants in relation to motor

vehicles. Moreover, respondents thought about a wide range of activities as examples of recreational physical activity risks. However, post hoc analyses (not presented here) performed among a subset of respondents who provided similar word associations for motor vehicles did not yield significant results. Nevertheless, this approach does not necessarily address the lack of clarity, which may have attenuated the relationship between perceived control and worry.

A second important limitation of the present study, which may have contributed to the modest proportion of explained variance in worry, is the fact that perceived threat, perceived uncertainty, perceived control, and worry were each assessed using only one item. It should be noted that this is common practice in research on health risk perception. Often, research in this area is aimed at shedding light on very current issues, and the time frame in which research of this nature is conducted is not always conducive to the rigorous development of psychometric scales. Hence, it is important to consider these limitations, and examine the issues from several angles, particularly if findings are used to guide policies. This proves to be particularly important in the present study, since the response rate was low (5.7% of all numbers dialled; 12.7% as calculated using the Performance Management and Recognition System method of calculation; Allen, Ambrose, Halpenny, & Simmie, 2003), as is often the case with telephone surveys.

While the sampling strategy ensured that the study sample was representative of the overall Canadian population in terms of province of residence, as well as age and gender within province of residence, respondents with a higher level of education and income were found to be overrepresented in the final sample. The inclusion of a wider range of age groups is nevertheless an improvement from university-aged samples, which

are commonly used in psychological research. It should also be recalled that the purpose of the present paper was simply to gain a better understanding of perceptions and worry surrounding terrorism in the Canadian context. Rather than guiding policy, findings served as a launching point for additional research by emphasizing the need to clarify the nature of some cognitive dimensions of terrorism perceptions. Most importantly, however, these underscored the importance of putting more focus on the contribution of social contextual factors that may also be of relevance.

Conclusion

In sum, the current study reveals a number of interesting findings on the way individuals perceive terrorism in Canada. Relative to other hazards, respondents did not perceive terrorism as posing much of a threat, but they did perceive it as particularly uncertain and as one over which they have little personal control. Also, support was found for the hypothesized relationships of perceived threat and uncertainty with worry about terrorism. However, higher perceived control over terrorism was unexpectedly associated with greater worry about terrorism, suggesting that it may be more appropriate to study other types of control perceptions within the context of this threat. While a good start, the contribution of these findings to the understanding of individual response to terrorism is limited in that only perceptions and worry associated with terrorism were examined. Future research is needed to examine how these are related to behavioural response to terrorism. Research of this type may not only provide risk managers with a means to predict psychological and behavioural consequences of terrorism; it is critical to the development of strategies aimed at fostering a better exchange of information on emotionally-charged issues like terrorism. Such strategies are of chief importance to the

successful resolution of any type of controversy surrounding health, safety, or environmental issues (Covello et al., 2001).

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Contributions of Co-Authors and Author Note

The work presented in this paper was conducted as part of the first author's doctoral dissertation, which received funding from the Social Sciences and Humanities Research Council of Canada and the Ontario Graduate Scholarship Program. The first author helped develop the survey questionnaire, developed the conceptual framework, planned as well as carried out all analyses presented in the paper, and wrote the manuscript. Louise Lemyre helped with the design of the survey questionnaire in addition to providing feedback on the conceptual framework and planned analyses. Daniel Krewski developed in previous work the template on which the design of the survey questionnaire was based and guided the design of the current questionnaire. These co-authors were also Principal Investigators of the larger project for which the survey was conducted. They have agreed to the use of the paper in the first author's dissertation, and to its eventual publication consistent with any limitations set by publisher requirements.

The larger project entitled *Public Perception and Acceptable Levels of Health Risk Among Canadians* was supported by a contribution agreement from Health Canada. The authors would like to thank Kevin Brand, Louise Bouchard, Christine Dallaire, and Pierre Mercier for their help with the development of the survey questionnaire. The contributions of Graham Gaylord, Marie-Pierre L. Markon, and Michelle C. Turner are also acknowledged.

CHAPTER 3: DEVELOPMENT OF THE SOCIAL-COGNITIVE MODEL

Running head: QUALITATIVE ANALYSIS OF CONCERNS AND DECISIONS REGARDING TERRORISM

Qualitative Analysis of Cognitive and Contextual Determinants of Individual Response to Terrorism: Towards a Descriptive Model

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Abstract

The potential utility of explanatory models of individual response to risk to the development of effective risk management strategies is undisputed. The objective of the present study was therefore to explore different aspects of individual response to terrorism in Canada and develop a descriptive model of the processes involved. A qualitative analysis was performed on transcripts of individual and group interviews held across Canada (N=73) wherein concerns and decisions regarding terrorism were discussed. This analysis revealed 16 emerging concepts, which were organized into six overarching themes (Threat, Uncertainty, Control, Context Issues, Psychological Response, and Behavioural Response). Psychological and behavioural responses appeared to be related, sharing a number of cognitive determinants. Results also pointed to the involvement of contextual factors such as timing relative to an event, type of terrorism scenario, and the perceived quality of terrorism risk management. Behavioural responses to terrorism were discussed less frequently than psychological responses. These primarily entailed engaging in behaviours aimed at avoiding terrorist events, although more positive responses such as individual preparedness and response were also mentioned. Implications of findings for research on individual preparedness for terrorism are discussed.

Qualitative Analysis of Cognitive and Contextual Determinants of Individual Response to Terrorism: Towards a Descriptive Model

In recent years, improving terrorism risk management has been at the forefront of Canadian public health concerns. Since research suggests that psychological and behavioural consequences can have the longest-lasting effects, these need to be considered in the development of risk management frameworks (Hyams, Murphy, & Wessely, 2002; Kunreuther, 2002; Lemyre, Clément, Corneil, Craig, Boutette, Tyshenko, et al., 2005; Lerner, Gonzalez, Small, & Fischhoff, 2003; Stein, Tanielian, Eisenman, Keyser, Burnam, & Pincus, 2004). Accordingly, Boscarino and others (Boscarino, Figley, & Adams, 2003) have emphasized the utility of explanatory models of individual response to terrorism to guiding the development of strategies aimed at fostering more positive outcomes following emergencies. With this in mind, the objective of the present study was to develop a descriptive model of cognitive and contextual determinants of individual response to terrorism in Canada.

Clearly, a first step in the development of any explanatory model is the identification of factors associated with the phenomenon of interest. To date, studies on individual response to terrorism have primarily examined demographic predictors of psychological reactions to specific events (Boscarino et al., 2003; Rubin, Brewin, Greenberg, Simpson, & Wessely, 2005; Schuster, Stein, Jaycox, Collins, Marshall, Elliott, et al., 2001), often leaving out other important cognitive dimensions. While it is important to identify groups who may be at risk of developing unfavourable psychological and behavioural responses to terrorism, it is also important to understand perceptions that give rise to particular responses, as these represent factors that can be

changed through public education (Lindell & Whitney, 2000). Indeed, an abundant literature on health risk and health behaviour documents cognitive influences on the way people feel and behave in response to different health threats (Rimal & Real, 2003; Slovic, 1987; Weinstein, 1993; Witte, 1998). Three cognitive factors that may be of particular relevance to individual response to terrorism are perceived threat, uncertainty, and control (Lee, Lemyre, & Krewski, 2007).

Given the inherent propensity for terrorism to elicit fear, the consideration of perceptions of the level of threat in models of individual response to terrorism seems like a natural first step. Encompassing one's perceived likelihood of occurrence of a particular harmful event and perceived seriousness of its consequences, perceived threat is considered to play a central role in one's adoption of preventative or precautionary behaviour (Loewenstein, Weber, Hsee, & Welch, 2001; Rogers, 1975, 1983; Rosenstock, 1974; Weinstein, 1993; Witte, 1992, 1994, 1998).

Some authors have added that fears surrounding terrorism may both elicit, and arise from perceptions of control and uncertainty (Lerner et al., 2003; Lerner & Keltner, 2001). Indeed, it has been argued that perceived control can be particularly important in highly stressful situations. Referring to one's beliefs regarding the level of control he or she has over the way a harmful event unfolds, perceived control can motivate individuals to act to reduce the danger, and thereby avoid more stress (Thompson, Schlehofer, Bovin, Dougan, Montes, & Trifskin, 2007). Also, uncertainty or "unknown" (i.e., the perception of a hazard as unobservable, unknown, new, and delayed in its manifestation of harm) is considered a key dimension of individuals' representations of risk (Slovic, 1987, 2000).

It may therefore prove to be particularly useful to also include perceived uncertainty and control in models of individual response to terrorism.

While there has been research examining terrorism-related perceptions of threat and of control, fewer studies have examined perceptions of uncertainty regarding this threat (Fischhoff, Gonzalez, Small, & Lerner, 2003, 2005; Rubin et al., 2005). In order to address this gap, a previous study examined all three variables as cognitive predictors of worry about terrorism (Lee et al., 2007). As expected, it was found that respondents who perceived terrorism as a greater personal threat and as more uncertain were more worried about terrorism. However, those who perceived themselves as having greater personal control over terrorism were more rather than less worried about it. While this result was unexpected, it is consistent with previous findings (Klar, Zakay, & Sharvit, 2002). On the other hand, control-related perceptions have also been found to be associated with decreased psychological reactions to terrorism (Benight, Freyaldenhoven, Hughes, Ruiz, Zoschke, & Lovallo, 2000).

Given these mixed findings, there is a clear need to clarify the concept of perceived control. First, this concept may consist of various dimensions, as suggested in a previous study (Bonetti, Johnston, Rodriguez-Marin, Pastor, Martin-Aragon, Doherty, et al., 2001). Alternatively, the beneficial effects of perceived control may depend on environmental contingencies. More specifically, some researchers have argued that perceived control may in fact be maladaptive in uncontrollable situations (Bruchon-Schweitzer, 2002; Skinner, 1996; Walker, 2001). Since there is considerable ambiguity and uncertainty about the likelihood of occurrence and potential consequences of terrorist events, it seems reasonable to assume that this might be the case for terrorism (Hyams et

al., 2002; Kunreuther, 2002; Viscusi & Zeckhauser, 2003). Moreover, traumatic events such as terrorist attacks are in part defined by their capacity to trigger a sense of helplessness among affected communities (Fullerton, Ursano, Norwood, & Holloway, 2003). Hence, the beneficial impacts of perceived control may not apply to terrorism threats. Research methods that are more sensitive to contextual or environmental contingencies could help identify if and why this is the case.

In addition to perceived control, it may help to clarify the concept of perceived uncertainty as it relates to terrorism. In Lee et al.'s (2007) study, this cognitive dimension appeared to be particularly relevant to perceptions of terrorism. When asked to rate terrorism in terms of uncertainty, however, a relatively high proportion of respondents reported not knowing what to answer (approximately 4%—much higher than the proportion of respondents selecting "don't know/no opinion" in response to other questions), pointing to some confusion regarding the meaning of uncertainty.

Finally, perceived threat, uncertainty, and control are but a subset of factors that might be involved in psychological and behavioural responses to terrorism. Given the highly politicized nature of terrorism (Gibson, Lemyre, Clément, Markon, & Lee, 2007; Huddy, Feldman, Taber, & Lahev, 2005), social contextual factors might also be involved in psychological and behavioural responses. Acknowledging the limits of quantitative research in the study of socio-cultural dimensions of risk perceptions, Brenot and colleagues (Brenot, Bonnefous, & Marris, 1998) urged for the application of more qualitative and contextual methods as a complement to quantitative methods. Indeed, qualitative approaches can provide deeper insight into contextual factors that shape the meaning individuals assign to risk issues (Tulloch & Lupton, 2003). They may also be

used to elaborate or re-conceptualize elements of theoretical import, so that these are more reflective of the context in which they are embedded. This approach was therefore taken in the present study in order to i) determine whether threat, uncertainty, and control are indeed salient dimensions of terrorism perceptions, ii) identify additional contextual factors shaping individual response to terrorism, and iii) examine the nature of individual response to terrorism. Transcripts of interviews held across Canada were analyzed wherein concerns and decisions regarding terrorism were discussed (Dallaire, Krewski, Lemyre, Brand, & Mercier, 2005). Since a broad range of issues on health risk and acceptability were discussed in these interviews, respondents' statements regarding their perceptions of terrorism are likely to reflect the true context wherein they were embedded, with this hazard not necessarily perceived as a health risk management priority.

Method

Participants

Thirty-seven (37) men and 36 women participated in 10 group interviews and 11 individual interviews conducted in five Canadian regions: Atlantic Provinces (22%), Quebec (21%), Ontario (18%), Alberta (22%), and British Columbia (18%). Participants were aged between 30 and 65 years. Sixty-seven percent of them were interviewed in English and 33% were interviewed in French. The majority of them had completed or achieved some university education at the undergraduate level (48%) and received an annual household income between $40,000 and $59,999 before taxes.

Measures

Guidelines were provided for semi-structured interviews. These covered the following five topics: conceptualizations of health risks, conceptualizations of health risk acceptability, health risk of greatest concern to respondents and related decisions, perceptions and decisions regarding six hazards (motor vehicles, climate change, cellular phones, recreational physical activity, terrorism, and carcinogens), as well as government control of health risks.

Procedure

Participants were recruited through newspaper advertisements and community organizations from an urban or rural area. Two group interviews and two individual interviews were conducted in each of the Canadian regions (with an additional individual interview in urban British Columbia) between September and October, 2003. An experienced qualitative interviewer conducted the interviews, which lasted approximately two hours in a group setting and approximately 45 minutes in an individual setting. The five topics were covered in the same order throughout interviews. However, questions regarding the six hazards were presented in a random order. Also, questions were sometimes not asked if the interviewer felt that relevant material had been discussed in previous portions of the interview, or that respondents were simply not concerned about the hazard being discussed. All interviews were audio-recorded and transcribed for coding purposes.

Analytical Strategy

The strategy used to analyze interview discussions was both qualitative and quantitative in nature. It was qualitative in that verbatim transcripts of all interviews were

examined for emerging themes using Nvivo software. As aforementioned, one aim of the present study was to determine whether perceptions of terrorism indeed consist of threat, uncertainty, and control dimensions. However, data were also screened for other themes of individual response to terrorism. For this purpose, only information pertaining to terrorism was analyzed. A first step involved identifying sections of transcripts that related to terrorism. Then, these sections were screened and separated into meaningful units of information (that is, an element of the text that contains a sufficient amount of information to convey an idea or thought on its own). Last, units of information were screened for expected and emerging concepts, which served as a basis for the establishment of a coding matrix that served to code the interviews. A second individual coded 10% of the transcripts (three randomly selected interviews) using the established coding matrix in order to assess inter-rater agreement by way of the Kappa coefficient.

The analytical strategy was also quantitative in that the proportion of meaningful units of information coded under each emerging themes was computed. This helped to shed some light on the relative importance of themes across individuals.

Results

From discussions of concerns and decisions regarding terrorism health risks, a total of 16 concepts subsequently organized into six overarching themes emerged. Satisfactory agreement was observed in the placement of meaningful units of information into each category of concept, as indicated by a Kappa inter-rater reliability coefficient of .79. All themes and their constituent concepts are presented in Table 11, along with the proportion of total passages and interviews they represented.

Table 11

Proportion of Total Passages and Interviews Represented by Emerging Concepts and Overarching Themes

Theme	Emerging concept	% of all passages	% of all interviews
Threat	Likelihood	19.7	81.0
	Consequences	5.4	28.6
	Vulnerable others	6.4	28.6
Uncertainty	Unpredictability	2.5	23.8
	Suspicious scenarios	2.0	19.0
Control	No control	4.9	33.3
	Terrorism as a form of control	3.4	28.6
Context Issues	Timing relative to event	5.9	33.3
	Type of terrorism	4.9	28.6
	Regulation	7.4	47.6
Psychological Response	Concern	10.8	61.9
	Sadness	1.0	9.5
Behavioural Response	No decision	4.9	42.9
	Avoiding terrorist events	9.4	42.9
	Individual preparedness and planning	3.4	19.0
	Emotion-controlling behaviour	2.5	14.3
Not Applicable	Not applicable	5.4	28.6

Threat

The theme of *Threat* was particularly apparent in respondents' discussions regarding their level of concern of health risks of terrorism. This theme comprised three concepts, each describing how respondents framed their perceived threat of terrorism risks. First, the concept of *likelihood* emerged most frequently in respondents' discussions. Some respondents briefly expressed their opinion regarding the probability of occurrence of an attack, stating "that [it] could happen" or, in contrast, that "we have better chances of winning the lotto." Others referred to aspects of terrorism that can influence the likelihood of an event. These included the ease, willingness, or ability with which an act of terror can be committed, as well as to the pervasiveness of terrorism threats. One respondent felt "it would not be difficult, for example, to create catastrophes," while another noted that:

> They [the terrorists] are extremely strong. They can come here tomorrow when they want and then they bomb the hotel, they do what they want with the metro, when they want. I believe them to be strong enough to do it. They are very intelligent.

Also, some respondents alluded to the persistence of terrorism by mentioning that it is here to stay, just beginning, always in the back of one's mind, or that terrorists are "out there."

Last, several respondents discussed the likelihood of terrorism as a function of geography. Some felt their hometowns were too remote to be potential targets, while others felt terrorists would have little interest in attacking Canada rather than countries involved in political conflicts. Other respondents did not feel that their area of residence

would be a target, but believed they would likely be affected by an attack occurring elsewhere, as expressed by one respondent: "...the probability that we will be the target population is low, but the target population could be close to us, which means that indirectly, it will influence us. In that context, yes."

A second, somewhat related concept that seemed to heighten respondents' perceived threat of terrorism entailed the *consequences* of an act of terrorism. Whereas most respondents alluded to the losses incurred by terrorism, one commented on his concern over the repercussions of terrorism rather than its likelihood:

> We're in Canada. It could happen, there, but it worries me in a global sense, the repercussions, international politics with the United States and other countries, and the lifestyle change that it brings to us in North America. More on that end, from an international point of view.

References to losses related to the number of deaths resulting from the attacks of September 11, 2001, or to the loss of valuable resources resulting from a potential scenario. For example, two groups consisting of individuals residing in rural areas of Canada further elaborated on the destruction or disruption that might stem from such a loss. For example, in discussing a power outage, one group said:

> - We were without power for a week in the dead of winter. We have no heat and we have no water. So our house could probably be pretty much destroyed/.../
>
> - Our culture's really dependent on electricity.
>
> - We are dependent on...our food sources, everything.

Also, one man elaborated on some of the problems associated with fear resulting from terrorism, referring to broader psychological consequences of this fear (e.g., suicide).

A third and final concept of *Threat* was that of *vulnerable others*. Here, concern was expressed about individuals perceived as particularly vulnerable to terrorism rather than one's own level of vulnerability. Examples primarily include references related to the impact of terrorism on future generations or children, as noted by one respondent: "I am so glad that I am not a kid anymore and I feel so badly for my grandsons that they have to grow up in a world that every time you turn around, they're worried about something negative." Concern was also expressed over the level of poverty among Afghani civilians and the level of risk imposed on some individuals due to the nature of their work (e.g., airport or government employees, military personnel).

In sum, respondents spontaneously discussed the likelihood and consequences of terrorism, as well as vulnerable others. These three notions framed respondents' perceptions of terrorism threat, which emerged as a primary rationale for their level of concern regarding the health risks of terrorism.

Uncertainty

Emerging in only a few interviews, *Uncertainty* reflected the ambiguity related to all aspects of terrorism, from the level of predictability of terrorist events to particular situations that are suspicious with regards to terrorism. A first concept, *unpredictability* touched upon uncertainty regarding the likelihood of a terrorist event. Here, respondents referred to the apparent lack of rationality of terrorists, to the randomness of events, or to the fact that events are specifically orchestrated to appear as such. Interestingly, this sense of unpredictability was at times related to a perceived inability to control terrorism,

as demonstrated with the statement: "…It's random. What can you do? Don't know where it will strike." The broader notion of control as it relates to terrorism, which emerged as its own theme, is discussed later.

In other cases, *Uncertainty* was more closely expressed as a function of *suspicious scenarios.* Here, respondents referred to situations that temporarily made them wonder whether an event was occurring or was possible. For example, some expressed being suspicious of others they perceived as fitting the profile of a terrorist:

> The last time I went to England was probably about the January after September 11th. And, you know you shouldn't stereotype but, hey, there were two young guys waiting at my gate to board and they might have been Lebanese or whatever, but they were certainly of Arab appearance to me. And it did cross my mind. I have to say it did cross my mind.

Others gave examples of the tendency to interpret ambiguous scenarios as terrorist events, which they felt characterized a post-September 11, 2001 culture. Regarding the 2003 power outage that occurred in Ontario, one woman said:

> …people were talking about it and then, some said don't believe them. It's really terrorists. Another said no way, it's not terrorism. It's just a power outage. Anyways, I paid for my gas, I left and then, I was somewhere else. Well, yet again, people were sceptical. Was it an act of terrorism?

Along with those reflecting *unpredictability*, such statements seemingly conveyed respondents' aversion to uncertainty. As much as the randomness of a terrorist event may generate concern or a sense of powerlessness, certain scenarios may generate concern, as they stimulate uncertainty about the possibility of terrorism. Respondents' interpretations

of such scenarios may be aimed at reducing this uncertainty or rendering it more bearable.

Control

The theme of *Control* encompassed two concepts. Most frequently, respondents expressed the view that they had *no control* over terrorism in discussing their level of concern about terrorism. Interestingly, only one respondent discussed being concerned about terrorism in relation to his perceived powerlessness over such threats, stating that: "Yes, yes. It's something that I fear. As an individual I am totally powerless. (Inaudible...) not even probably my opinion would count." The majority of other respondents were not concerned about terrorism precisely because they felt there was nothing they could do about it. One respondent nevertheless acknowledged the horrific nature of terrorism, stating that "...I mean, it's horrible when it happens. There's been some horrible things happening in the world. It's totally out of my control." This comment may reflect the important interplay between feelings of threat and feelings of control specified in some models of health behaviours (Witte, 1992, 1994, 1998).

The second concept related to the idea of *terrorism as a form of control*. Here, respondents referred to the idea that people should not let terrorism control their everyday lives, often using it as a rationale for the fact that they had not made any particular decisions regarding the health risks of terrorism. Upon being asked if he had made any changes because of terrorism, one respondent answered "No, because your hands are tied. Your hands are tied. You live at the mercy of terrorism. This is what they want, and this is now what they're getting." Another insisted that terrorism did "...not prevent [him] from living because [he] would no longer go out, [he] would no longer do anything."

Hence, it seemed that these respondents deliberately refrained from changing their habits in an effort to take back control over their lives. Rather, they equated behavioural response to terrorism with powerlessness.

Context Issues

In their discussions, respondents also mentioned a number of different contextual factors that were a source of concern. This theme distinguished itself from the previous three in that the focus was not on individual processes associated with concern over terrorism (e.g., its chances of affecting people, how it affects people, and how people interpret it), but rather on environmental contingencies of these individual processes and of concern. First, *timing relative to event* included references touching upon the idea that concern about terrorism was dependent upon the occurrence of an event. For example, one woman stated:

> No. No, it's only around September 11th, when my husband was travelling; I worried a lot about things happening. He went away right about two weeks after the terrorist attack; he went to Europe and every time I heard something I thought… I was very concerned. But after that, I kind of got over it.

A similarity was noted of this emerging concept with the notion of risk signals espoused by Kasperson and his colleagues (Kasperson, Renn, Slovic, Brown, Emel, Goble, et al., 1988), where these are defined as events that lead the public to believe that a new risk has emerged or that an existing risk is more serious than previously assumed. Some respondents even seemingly referred to the phenomenon of risk signal by way of a metaphor, as noted in this discussion:

> Until it happens here, there'll be no one that will pay attention to it. It's like...
>
> -Yes, there is like a comfortable distance with what has already happened.
>
> -...the curb in I don't know what city, they decided to remove the curb from the road and make it strait because there had been a fatal accident involving a bus. The bus missed the curb and...the curb of death. Now they made a strait line. People started to be fearful as soon as the accident took place. They woke up. Until there is something wrong, people don't move. They don't talk about terrorism until it happens here.

Three respondents reported only being concerned when they heard information about terrorism. One man even jokingly noted that he had not been worried about terrorism until he participated in the interview.

A second concept entailed the different *types of terrorism* that generate concern. Respondents primarily expressed concern about bioterrorism, but chemical terrorism and attacks on power stations were also mentioned. Some identified these scenarios as a source of concern because they perceived them as most likely (e.g., "To me what I'm more afraid of is chemical warfare. I really don't think it's going to be a bomb. I think it's going to be a chemical or a biological..."), whereas others seemed more concerned about the consequences of specific scenarios to health (e.g., "Well, I'm certainly afraid of bioterrorism. Yes, absolutely. I wouldn't want to be bombarded with some disease that there's no vaccine for or something."). With this in mind, it can be seen how *Context Issues* could serve as contextual factors that influence perceptions and individual response regarding terrorism. This not only further emphasizes the aforementioned

importance of considering timing relative to an event in research on terrorism, it underscores the need to assess more specific scenarios.

A last concept was that of *regulation*. Statements falling within this category primarily referred to actions that had or should be taken by authorities to deal with terrorism. Specifically, respondents called for the need to improve security or emergency management. While most respondents indicated that they felt that security measures should be increased, two respondents believed that security should be relaxed because they felt that existing measures were overly conservative. For example, one woman noted:

> But when we travel abroad, it's an additional stress because the airports are very hard, the metros, like the metro in Paris, at some point, it's hard. Surveillance is hard. The (inaudible) decide to check everyone. So that then, you are stuck in that mess. You need to take out your identity card. You need to go through the pocket to get your passport that's under…/…/. Me, I don't have it in my wallet. I find that a bit unbearable.

Others were either satisfied with current security measures, or were not particularly impressed with the way terrorism-related issues were being managed. In general, importance was placed on regulation by authorities, whereas personal control over terrorism was devalued, as demonstrated by one comment:

> …So although it's horrible and you know, I have no problem with the security checks at borders or airlines or that kind of thing, that's totally fine. You know, I don't mind the extra time spent with security checks

> because it's improving the safety for all of us, but I can't do anything about terrorism, so I don't worry about it.

Similarly, another respondent noted: "The only situation I think that I might be in danger is airplanes. And unfortunately, I place my trust in the people that are letting us get on the airplanes that they have done their job." Statements such as these emphasize a potential tendency for individuals to rely on authorities in the management of terrorism, as they feel personally helpless.

Psychological Response

Since respondents were asked about their level of concern about health risks of terrorism, it is no surprise that *Psychological Response* to terrorism emerged as a theme. In statements falling within the first concept, respondents simply stated their *level of concern* about the health risks of terrorism. Also coded under this concept were statements wherein respondents discussed their level of worry about terrorism, as respondents seemingly equated worry with concern (despite being asked about their level of concern, they replied about their level of worry). In most cases, they discussed their level of concern or worry without immediately elaborating on the reasons behind their feelings. The vast majority, but not all, indicated that they were not troubled by terrorism. In statements falling within the second concept, respondents discussed *sadness* they had personally experienced because of terrorism. Occurring in only two interviews, these statements were distinguished from those of respondents who discussed emotional reactions as problematic *consequences* of terrorism in that sadness was discussed as a personal experience rather than a general phenomenon of concern. For example, one

respondent said "I've looked at 9/11 again the other night when it was on T.V. and I tell you, the tears are just… every time I think about it".

Behavioural Response

Having also been asked about decisions they might have taken because of the health risks of terrorism, respondents gave examples of their *Behavioural Response* to terrorism. This theme comprised five concepts, each reflecting a different type of decision or action taken in response to the health risks of terrorism. Statements could relate to respondents' own response to terrorism or to response in general terms. While respondents sometimes spontaneously discussed these, in most cases, the interviewer prompted them with a question on this topic.

Avoiding terrorist events emerged most frequently. Statement included references made to the avoidance (or deliberate non-avoidance) of certain activities, places, or people out of fear of experiencing an attack. Most frequently, respondents indicated that they decided not to travel to particular locations they felt might be targeted. However, it should be noted that they were prompted to discuss altered travel plans in a number of interviews. Some emphasized that they did not avoid travelling altogether, but were rather more selective in their choice of destinations or airlines, as noted by one respondent:

> …To go to other countries where I know things aren't going well, no. But preventing myself from going to a country that will be okay because there may be trouble, no. That, no. But when things aren't going well, they aren't going well, there, I am not looking for trouble…

Despite this, a few respondents reported that they insisted on not changing their travel plans because of this threat.

No decision was also common. Here, respondents simply stated that they had not made any decisions because of terrorism. One respondent indicated that he was simply not concerned enough about terrorism to make any changes, while another stated that she did not feel it was a big enough threat. Hence, *Behavioural Response* was sometimes framed in relation to individuals' psychological responses, while at other times framed in relation to cognitive factors.

Accordingly, *emotion-controlling behaviour* encompassed references to behaviours respondents had adopted in order to improve their psychological responses to terrorism. This concept encompassed statements about efforts aimed at achieving more positive affect, as exemplified by one comment:

> …Basically, we start looking at life in a different perspective. So it's not about changing my… I'm not living in New York or the U.S., basically. But I try to enjoy a little bit more my little life since my family nucleus is basically my wife and my daughter. So we try to be together longer, and that's it.

It also covered statements about efforts seemingly aimed at avoiding negative affect, with two respondents stating that they avoided terrorism news coverage and one respondent stating that she actively tried not to think about terrorism.

Last, few respondents approached terrorism as something for which they could personally prepare. Indeed, references to *individual preparedness and planning* emerged in only four interviews. One woman discussed her engagement in household

preparedness, although in relation to the millennium computer bug more so than in relation to a terrorist threat: "Well I put away more jars. But that Y2K thing, I canned chickens, which I had not canned for maybe five, six years. And I thought this is a good little treat and I was prepared in case." In two interviews, respondents discussed seeking information about terrorism threat. For example, one man indicated: "...generally, if I am going to a country, I will get information on what is going on first. That's for sure. I won't go there without getting information."

Increased involvement in political affairs was also discussed in two interviews. One woman stated that she encouraged people to write letters to government authorities responsible for defence issues. This last statement underscores involvement as a potential strategy to deal with the aforementioned tendency of individuals to perceive themselves as powerless in relation to terrorism. One respondent noted:

> ...But perhaps that's because they feel powerless, that perhaps we have to have more civics classes where we teach kids to get involved. Hardly any kids between 18 and 24 vote. And I mean that's the only way that you're going to change things is to get out there and exercise your democratic right...

A perceived powerlessness over terrorism may also partly explain why a fair number of respondents had not made any decisions in relation to the health risks of terrorism. Again, this sense of powerlessness may be dealt with by emphasizing those aspects of terrorism threat over which individuals may exert a tangible amount of control. In one interview, one respondent noted:

> And I tell myself I don't have to go out of my way for what could happen, that I prepare myself in terms of, you know, educating myself or something like that, what I can do, things like that. But, in terms of saying that I stop living or I won't go south or I won't go there, I will not go out of my way for that.

This last statement emphasizes at once the different types of control individuals can exert over terrorism; namely, efforts can either be aimed at controlling one's chances of experiencing an event or at controlling the level of knowledge about terrorism, what to expect, and how to prepare for it. It also expresses the idea that some forms of control are easier to achieve, perhaps underscoring the need to redirect individuals' notions of control in the context of terrorism to reflect elements about the threat that can be more readily controlled.

Discussion

In sum, data from the interviews reveal six distinct overarching themes. Often, themes were framed in relation to one another, with respondents providing their perceived threat, uncertainty, control, and context issues as a rationale for their psychological and behavioural responses to terrorism. A descriptive model of findings is presented in Figure 6.

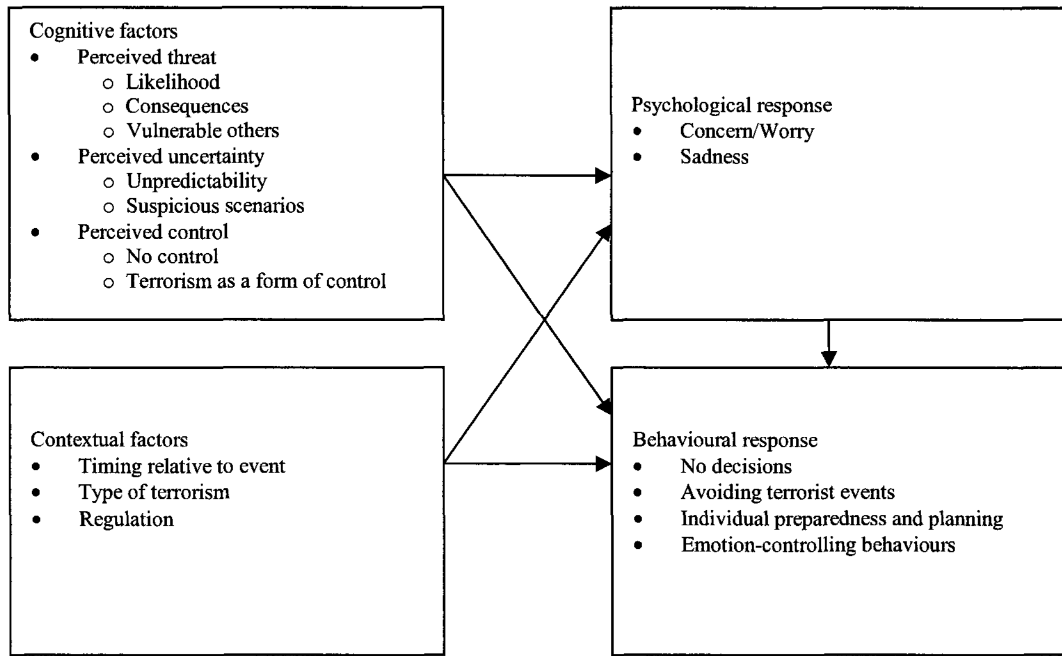

Figure 6. Model describing results of qualitative analysis.

A first aim was to determine whether threat, uncertainty, and control are indeed salient dimensions of terrorism perceptions. *Threat* encompassed elements regarding both the likelihood and potential consequences of an event, as well as concerns over the vulnerability of others. Hence, this theme shared many similarities with the concept of personal threat espoused in many models of health behaviour (Loewenstein et al., 2001; Rogers, 1975, 1983; Rosenstock, 1974; Weinstein, 1993; Witte, 1992, 1994, 1998). In their discussions surrounding *Threat*, respondents seemed to express an overarching sense that they felt others were at greater risk of being harmed by terrorism than themselves. In fact, the very emergence of *vulnerable others* as a concept directly conveyed this tendency. This finding is consistent with those of a Canadian national survey (Lemyre, Turner, Lee, & Krewski, 2006), as well as the pervasive tendency for individuals to provide more optimistic estimates regarding their own level of risk relative to that of others in research on the perception of risk (Lerner et al., 2003; Sjöberg, 2002; Weinstein, 1980, 1987). This optimistic tendency was even observed in a sample of U.S. corporate spokespersons regarding perceptions of their company's likelihood of being affected by bioterrorism (Salmon, Park, & Wrigley, 2003).

Control emerged as the second most prominent cognitive dimension in discussions surrounding terrorism. The majority of statements included in this theme reflected respondents' sense of powerlessness over terrorism. At times, they felt nothing could be done to control terrorism in general. In other cases, they felt that they personally could not do anything to control it. While some respondents reported their perceived lack of control over terrorism as a source of concern, others noted that they did not worry about terrorism because there was nothing they could do about it. However, perceived

lack of control was invariably reported as a reason for not having made any decisions in relation to the health risks of terrorism. Interestingly, respondents primarily seemed to discuss control in terms of the ability to avoid or prevent terrorism, as opposed to their ability to manage or cope with a potential event.

Uncertainty was also reflected in respondents' discussions, although to a lesser extent. Furthermore, some overlap was apparent with other themes: While at times related to the likelihood of an attack, statements falling within the concept of *unpredictability* sometimes touched upon the idea of lack of control. Additional work may help in order to clarify the precise meaning of this concept as it relates to terrorism or to health threats in general; that is, whether it is closer in perceived meaning to likelihood or control. McCormick (2002) noted the tendency for uncertainty to be equated with loss of personal control in the context of research on illness, but argued that the two concepts should remain distinct. Nevertheless, it appears that uncertainty and control are closely related, with perceptions on these dimensions potentially influencing each other.

A second aim was to identify additional factors shaping individual response to terrorism. In addition to *Threat*, *Uncertainty*, and *Control*, a theme emerged related to *Context Issues* that give rise to concern. Complementing a lack of perceived control over terrorism, respondents displayed a tendency to rely on authorities for terrorism risk management, as evidenced by some comments related to *regulation*. Accordingly, in other sections of these interviews, respondents expressed the view that the government should play a role in the regulation of health risks over which individuals have no control

(Dallaire et al., 2005). Based on findings related to the theme of *Control,* one could readily understand how health risks of terrorism might be among these.

One implication of this observed reliance on authorities may be that individuals are less likely to take personal initiatives in the risk management process. Conversely, individuals who feel that they cannot rely on authorities to manage terrorism risk may be more inclined to take matters into their own hands. Alternatively, individuals who perceive authorities as more prepared may feel more compelled to take action. Clearly, some interesting questions can be raised about the role of terrorism risk management authorities in individual response to terrorism, which would merit further scrutiny.

A third aim of the current study was to examine the nature of individual response to terrorism. In addition to *Psychological Response*, some respondents discussed their decisions and behaviours related to the health risks of terrorism. Most often, decisions were aimed at *avoiding terrorist events*. By contrast, fewer respondents reported *individual preparedness and planning* behaviours or *emotion-controlling behaviours*. A significant problem with the former involves the loss that such behaviours can incur not only to individuals' quality of life, but also to the economy. Indeed, disruption following the events of September 11, 2001 is estimated to have cost the Canadian airline industry $150,000,000 (Fiorino, 2001). While airport restrictions partly contributed to these figures, data suggest that consumer behaviours may also have played a role, since a significant and ongoing drop in demand for international travel was observed among Canadians at that time (Harumi & Lee, 2005). On the other hand, *individual preparedness and planning* or *emotion-controlling behaviours* could help a person better cope with an event if one were to take place (Eisenman, Wold, Fielding, Long, Setodji,

Hickey, et al., 2006; Finnis, 2004; Paton, 2003; Paton, & Johnston, 2001; Paton, Smith, & Johnston, 2005; Rubin et al., 2005). In fact, there is also evidence suggesting that individual preparedness could help discourage avoidance behaviour following an attack: A survey following the 2005 London transit bombings revealed that those who consulted a government leaflet on emergency preparedness had less intention to avoid travelling to central London after these incidents (Rubin et al., 2005).

In light of these findings, terrorism risk management efforts could be put on developing strategies to encourage individuals' participation in the preparedness process. This may prove to be particularly important, since both the present study and previous research on individual preparedness for other types of emergencies underscores its infrequency (Duval & Mulilis, 1999; Lindell & Whitney, 2000; Mulilis & Duval, 1995, 1997; Paton, 2003). Identifying the determinants of these behaviours is an important step of this process. Findings presented here show that *Behavioural Response* was a function of many of the same themes discussed in relation to *Psychological Response* terrorism. Moreover, respondents sometimes framed their behaviours in relation to their psychological reactions. Hence, cognitive, contextual, and psychological factors may underlie individual preparedness and planning behaviour.

Overall, the present findings provide some support for the importance of perceived threat, uncertainty, and control as cognitive dimensions associated with individual response to terrorism. They also point to contextual factors that might be of research interest. However, a few limitations are noted. A first limitation relates to the order of discussions about terrorism during the interviews, which took place closer to the end of the session. Since interviews could last up to two hours, respondents were not

necessarily most responsive during this section of the interview. As a result, they may have been more inclined to provide brief "yes or no" answers to questions about their concerns and decisions regarding terrorism. A second limitation relates to the relatively small size of the study sample. Findings should therefore be interpreted with caution, as they may not apply to the wider population. Nevertheless, it should be noted that respondents were from across Canada and represented a fairly wide range of demographic backgrounds, providing a rich overview of how terrorism may be perceived in the Canadian context. Findings also provide a good basis for guiding future research. More specifically, research using quantitative analytical strategies of data from larger, more representative samples could help confirm whether cognitive and contextual factors can predict psychological and behavioural responses to terrorism, as suggested here.

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Contributions of Co-Authors and Author Note

The work presented in this paper was conducted as part of the first author's doctoral dissertation, which received funding from the Social Sciences and Humanities Research Council of Canada and the Ontario Graduate Scholarship Program. The first author developed the conceptual framework, planned as well as carried out all analyses presented in the paper, and wrote the manuscript. Christine Dallaire developed the interview protocol and collected the data. She also provided feedback on the analytical strategy. Louise Lemyre provided feedback on the conceptual framework and analytical strategy. These co-authors have agreed to the use of the paper in the first author's dissertation, and to its eventual publication consistent with any limitations set by publisher requirements.

The study from which data were drawn was led by Christine Dallaire and conducted as part of a larger project entitled *Public Perception and Acceptable Levels of Health Risk Among Canadians* led by Louise Lemyre and Daniel Krewski. The project was supported by a contribution agreement from Health Canada. The authors would like to thank Kevin Brand, Louise Bouchard, Daniel Krewski, and Pierre Mercier for their help with the development of the interview protocol, as well as Sarah Crowe for the verification of inter-rater reliability.

CHAPTER 4: PRELIMINARY ANALYSES ON MODEL COMPONENTS

Running head: LATENT SOCIAL-COGNITIVE DIMENSIONS OF INDIVIDUAL RESPONSE TO TERRORISM

Latent Dimensions of Cognitive, Social Contextual, and Behavioural Aspects of Individual Response to Terrorism in Canada: Analyses of Data From a National Survey

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Abstract

The current study presents results of preliminary analyses conducted on data from a national survey on perceived chemical, biological, radiological, nuclear, and explosives (CBRNE) terrorism threat and preparedness. More specifically, exploratory and confirmatory factor analyses were conducted in order to shed light on dimensions underlying perceptions of terrorism, perceptions of institutional preparedness for these events, and individuals' behaviours towards this threat. Findings reveal that perceptions of CBRNE terrorism are multidimensional, with perceived probability, perceived seriousness, perceived personal impact, and perceived coping efficacy emerging as latent dimensions. Underlying perceptions of institutional preparedness were perceived governmental preparedness and perceived front-line preparedness. Last, behavioural response to terrorism encompassed individual preparedness, information seeking, and avoidance behaviours. Scales were developed based on these findings for use in subsequent studies.

Latent Dimensions of Cognitive, Social Contextual, and Behavioural Aspects of Individual Response to Terrorism in Canada: Analyses of Data From a National Survey

Over the past two decades, an abundance of research on the psychology of health has emphasized the importance of cognitive and social factors in the way individuals respond to health threats (Armitage & Conner, 2001; Witte & Allen, 2000). This has been the case for a wide range of health issues, spanning cigarette use, unprotected sex, sedentary lifestyles, cancer screening, and home radon testing (Weinstein, Sandman, & Roberts, 1990; Witte & Allen, 2000). More recently, findings of some studies have suggested that similar factors may account for the way individuals respond to terrorism (Eisenman, Wold, Fielding, Long, Setodji, Hickey, et al., 2006; Fischhoff, Bruine de Bruin, Perrin, & Downs, 2004; Han, 2005; Lee, Dallaire, & Lemyre, 2007a; Sönmez and Graefe, 1998a, 1998b). The aim of the present study is to shed greater light on the nature of these cognitive and social factors, as well as different dimensions of behavioural response to the threat of terrorism in the Canadian context.

Previous research on conceptualizations of terrorism among the Canadian public emphasizes the multidimensionality of factors shaping individual response to terrorism (Gibson, Lemyre, Clément, Markon, & Lee, 2007; Lee et al., 2007a). In one particular study, Lee and her colleagues (2007a) performed a qualitative analysis of transcripts of interviews conducted with individuals across Canada about their concerns and decisions regarding terrorism. This analysis provided a number of insights into the nature of cognitive, social contextual, and behavioural aspects of individual response to terrorism that might guide the way these are conceptualized in future research.

First, this analysis revealed that perceptions of terrorism could be characterized by three main cognitive dimensions; namely, perceived threat, uncertainty, and control. Moreover, each of these dimensions reflected a set of more specific concepts. For instance, perceived threat touched upon perceptions of the likelihood of terrorism, its consequences framed in general terms, as well as its impact on vulnerable others. Often present was an overarching sense that terrorism poses a greater level of threat to others than to oneself. Perceived uncertainty touched upon the notion of unpredictability of events and ambiguity of certain scenarios. Finally, perceived control referred to the ideas of having no control over terrorism, and of terrorism as a form of control. It was further noted that control was primarily conceived as control over the occurrence of terrorism. Given the very nature of terrorism, one can readily understand how asking individuals about their perceived ability to exert this type of control over terrorism might be inadequate. Hence, perceived control might be better conceptualized as the perceived ability to cope with a potential terrorist attack.

Additionally, a number of contextual issues related to individuals' concerns and decisions regarding terrorism were identified. Again, this theme could be broken down into more specific issues, including timing relative to an event, the type of terrorism in question, and the regulation of terrorism. The first two issues underscore the importance of considering more specific aspects of perceptions and reactions to terrorism threat. For instance, questions might assess perceptions of terrorism within a more specific timeframe relative to a hypothetical event (e.g., before, during, or after). These might also assess perceptions of more specific scenarios (e.g., bioterrorism, nuclear terrorism, bombings, etc.). By contrast, regulation of terrorism primarily emerged as a factor

influencing individual response to terrorism in and of itself. Hence, these findings point to the potential utility of including perceptions of terrorism risk management as social contextual determinants of individual response to terrorism.

Finally, the importance of distinguishing among the different types of behaviours in which individuals engage in response to terrorism was underscored. Most often, the focus has been on more negative behavioural outcomes, such as changes in travel decisions (Fischhoff et al., 2004; Han, 2005; Sönmez & Graefe, 1998a, 1998b). Accordingly, behaviours aimed at avoiding terrorist events (often by way of avoiding certain activities, places, or people) emerged as the most frequent decisions made in response to terrorism. Nevertheless, studies have shown that individuals may also respond to terrorism with more positive behaviours, for example, by engaging in preparedness activities (Eisenman et al, 2006; Jenkin, 2006). Individual preparedness and planning or behaviours aimed at improving one's emotional reactions to terrorism also characterized behavioural responses to terrorism in the analysis, although to a much lesser extent.

Clearly, findings of this previous study (Lee et al., 2007a) helped to shed light on the nature of important factors involved in the way Canadians respond to terrorism. However, the various cognitive, social contextual, and behavioural dimensions on which the study elaborated were derived from a relatively small sample. As such, it remains to be determined whether similar dimensions would emerge among a more representative sample of Canadians. For this purpose, a series of analyses were performed in the present study using data from a national survey on perceptions of chemical, biological, radiological, nuclear, and explosives (CBRNE) terrorism and terrorism preparedness.

The survey included items to assess various cognitive dimensions of perceptions of different types of CBRNE terrorism, perceptions of terrorism risk management by different institutions, and a number of behaviours that individuals may have adopted in response to terrorism. It was also designed to address some limitations inherent to previous studies on perceptions of terrorism in Canada (Lee, Lemyre, & Krewski, 2007b). To date, only item by item descriptive analyses have been performed on this data (Lemyre, Lee, Turner, & Krewski, 2007a; Lemyre, Turner, Lee, & Krewski, 2006, 2007b). Results presented in the current study are of a series of factor analyses that were performed in order to determine whether higher-order dimensions characterizing cognitive and behavioural aspects of individual response to terrorism are similar to those elaborated in Lee et al.'s (2007a) study, and to explore dimensions of perceptions of terrorism risk management by various institutions.

Method

Participants

A sample of 1,502 respondents participated in telephone interviews, 51.3% of which were women and 48.7% were men. Respondents were categorized into six age groups: 18 to 24 (representing 11.7% of participants), 25 to 34 (16.7%), 35 to 44 (22.6%), 45 to 54 (19.4%), 55 to 64 (13.1%), and 65 years of age or older (16.0%) (0.4% refused to disclose this information). A percentage of 57.9 of respondents had achieved college education (or CEGEP in Quebec) while 41.6% had some university education (0.5% refused to disclose this information). Finally, 77.2% of the interviews were conducted in English and 22.8% were conducted in French.

Measures

The survey questionnaire was based on findings in pilot work (Geffken-Graham, 2004; Lee & Lemyre, 2004; Lindsay, 2004), on concepts emerging in focus groups (Lemyre, Clément, & Gibson, 2004), and on findings of a previous national survey on health risk perception (Krewski, Lemyre, Turner, Lee, Dallaire, Bouchard, et al., 2005). More specifically, it was designed with some previous limitations in mind. It included three sections to assess i) public perceptions of CBRNE terrorism and its related impacts on communities, ii) opinions on preparedness initiatives and individual response to terrorism, and iii) CBRNE terrorism information gathering practices. Details of the survey questionnaire have been provided elsewhere (Lemyre, Lee, & Krewski, 2005; Lemyre et al., 2006, 2007a, 2007b). Only the three survey sections of interest to the present study are discussed below. During survey administration, these sections were presented in the order as presented below. However, the order of individual items was randomized within sections in order to control for order effects. Respondents provided their answers to all of these using a 5-point Likert-type scale (1 = not at all, 2 = a little, 3 = moderately, 4 = very much, and 5 = extremely). They were also given the opportunity to respond with "don't know/no opinion" if they were not sure what to answer (coded as 0).

Cognitive dimensions. Perceived likelihood, perceived seriousness (a measure of overall impact), and *perceived personal impact* (a measure of personal impact) were assessed as indices of perceived threat, as was the level of *perceived uncertainty* felt by individuals regarding different terrorist events ("How likely do you think it is that [chemical, biological, radiological, nuclear, or explosives terrorism] will occur in

Canada?", "How serious do you think it would be if [chemical, biological, radiological, nuclear, or explosives terrorism] did occur in Canada?", "If [chemical, biological, radiological, nuclear, or explosives terrorism] occurred in Canada, to what extent do you think it would have an impact on your life?", and "How uncertain do you feel currently about possible [chemical, biological, radiological, nuclear, or explosives terrorism] in Canada?", respectively).

As in index of *perceived control,* perceived ability to cope with the different terrorist events was assessed ("If [chemical, biological, radiological, nuclear, or explosives terrorism] occurred in Canada, how well do you think you would be able to cope with it?"). This item would rather reflect a sense of coping efficacy over the possible consequences of terrorism, to which findings of the previous qualitative study point as a potentially more adequate concept (Lee et al., 2007a, 2007b).

Perceived institutional preparedness. As the social contextual variables of interest, perceptions of terrorism risk management by different institutions were assessed. Respondents were presented a list of various institutions involved in emergency preparedness and were asked to indicate the extent to which they perceived each of them as prepared for terrorism ("How much do you think they are prepared for terrorism?"). Institutions included: i) the federal government, ii) the provincial government, iii) the municipal government, iv) hospital and health care services, v) first responders, vi) non-governmental organizations, and vii) local community organizations. Respondents were provided with examples of first responders, non-governmental organizations, and local community organizations to better guide their ratings. For first responders, they were given the examples of the police, paramedics, and fire department; for non-governmental

organizations, they were given the examples of the Red Cross, St-John Ambulance, and the Salvation Army; and, for local community organizations, they were given the examples of community clubs and churches.

Behavioural response to terrorism. Respondents were asked about how much they had done the following: i) consulting others for preparedness advice, ii) establishing an emergency plan, iii) putting together an emergency supply kit, iv) receiving emergency first aid or cardiopulmonary resuscitation (CPR) training, v) obtaining information about potential shelters in their community, vi) establishing a meeting area or method of contact with loves ones, vii) learning about evacuation plans of buildings occupied frequently, viii) learning about differences and similarities between different types of terrorism, ix) reading up on the topic of terrorism, x) avoiding public places, xi) refraining from watching the news to avoid coverage on terrorism issues, xii) being nervous around certain people, and xiii) seeking social support.

Procedure

Surveys lasted approximately 35 minutes and were administered between November 15, 2004 and December 15, 2004 in the official language of respondents' choice. The sample was stratified by region (Atlantic: Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick; Quebec; Ontario; Prairies: Manitoba and Saskatchewan; Alberta; and British Columbia), as well as age group (18 to 34, 35 to 54, and 55 years or over) and gender within region according to 2001 Census data. Households of potential respondents were identified through random digit dialling. Once a household was contacted, the adult whose birthday was closest to the day of the call was selected for the survey. Of the total 28,648 phone numbers dialled, 17.1% were not

valid and 28.9% were unanswered. Completed interviews represented 5.2% of all numbers dialled. Remaining calls either resulted in a refusal (42.0%), required a call-back (5.2%), or were addressed to individuals with demographic characteristics of quotas already met (1.5%).

Data Analyses

Survey weights were used throughout analyses in order that the sample be representative of the Canadian population. Design effects due to the stratified sampling procedure were examined in a random sub-sample of variables, and were found to be close to 1 (ranging from .99 to 1.00), indicating that analysis of the data using simple random sample variances would be adequate.

The three sets of items assessing cognitive, social contextual, and behavioural aspects of individual response to terrorism were each subjected to exploratory factor analyses (EFAs) in order to obtain empirical grounds for confirmatory factor analyses (CFAs). In a first step, randomly-derived sub-samples of 50% of cases were generated. Data from cases in these sub-samples were subjected to EFAs to uncover latent dimensions of cognitive, social contextual, and behavioural aspects of terrorism.

In a following step, data from the remaining cases were subjected to CFAs to test the validity of these latent dimensions. Model fit was evaluated on multiple criteria: i) the χ^2 likelihood ratio statistic, ii) the comparative fit index (CFI; Bentler, 1990), and iii) the residual mean-square error of approximation (RMSEA). The χ^2 likelihood ratio statistic measures the closeness of fit between the observed covariance matrix and the fitted covariance matrix. Small values that approximate the number of degrees of freedom are generally viewed as being indicative of a good fit (Byrne, 1994). While the χ^2 likelihood

ratio statistic is a useful measure of fit, it is highly sensitive to sample size such that values are often significant even for well-fitting models (Byrne, 1994). Use of the CFI as a practical index of fit is therefore recommended (Byrne, 1994). Based on the χ^2 statistic, the CFI is derived from the comparison of the restricted model with that of the independence model to determine goodness-of-fit. Values range from 0 to 1.0, with values of at least .90 indicating an acceptable fit (Byrne, 1994). As an alternative index, the RMSEA estimates a model's lack of fit compared to a perfectly fitting model. Values lower than .08 are considered to indicate adequate fit (Browne & Cudeck, 1993).

Results

Prior to all analyses, data were screened for missing values and violations of assumptions inherent to EFA and CFA.

Cognitive Dimensions

Exploratory factor analysis. With use of a Mahalanobis distance criterion of $p <$ .001, 39 multivariate outliers were identified. Removing outliers yielded different results (e.g., a 5- rather than 4-factor structure using eigenvalues of at least 1 as a criterion, although results were similar if the analysis including outlier cases was constrained to four factors). Outliers were therefore removed from the analysis.

An EFA was carried out in SPSS 15.0 using principal axis factoring extraction and oblimin rotation with listwise deletion of cases, for a final sample of $n = 709$.[1] With eigenvalues of at least 1 as a criterion, an initial freely estimated solution produced four factors. Accounting for 28.4% of the variance, the first factor included items pertaining to perceptions of both likelihood and uncertainty regarding CBRNE terrorism. It was

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[1] It was decided not to replace values of 0 = don't know/no opinion because respondents actively selected these values, rendering them non-equivalent to missing values

decided to name this factor Perceived Probability as the concept of probability captures at once the chance that a particular event will take place, as well as the amount of uncertainty regarding the occurrence of this probabilistic event. Accounting for an additional 12.7% of the variance, the second factor included items pertaining to the perceived seriousness of CBRNE terrorism and was therefore named Perceived Seriousness. The third factor accounted for 11.9% of the variance and included items used as indices of perceived control of CBRNE terrorism. However, it was named Perceived Coping Efficacy, as this label better reflects the type of control assessed by these items. Finally, the fourth factor, named Perceived Personal Impact, included items pertaining to the perceived personal impact of CBRNE terrorism, and accounted for 3.1% of additional variance. Results of this analysis are presented in Table 12.

Table 12

Factor Loadings, Communalities (h^2), and Percents of Explained Variance of 4-Factor Analysis With Principal Axis Factoring Extraction and Oblimin Rotation of Items on Various Dimensions of CBRNE Terrorism Perceptions

Item	F1	F2	F3	F4	h^2
C-Perceived uncertainty	.75				.57
R-Perceived likelihood	.75				.57
R-Perceived uncertainty	.73				.54
C-Perceived likelihood	.72				.54
B-Perceived uncertainty	.72				.53
E-Perceived uncertainty	.71				.52
N-Perceived uncertainty	.71				.52
B-Perceived likelihood	.71				.51
N-Perceived likelihood	.69				.48
E-Perceived likelihood	.65				.43
C-Perceived seriousness		.79			.62
B-Perceived seriousness		.78			.62
R-Perceived seriousness		.77			.59
N-Perceived seriousness		.65			.43
E-Perceived seriousness		.65			.45
C-Perceived coping efficacy			.86		.73
B-Perceived coping efficacy			.84		.71
R-Perceived coping efficacy			.82		.68
E-Perceived coping efficacy			.72		.53
N-Perceived coping efficacy			.68		.47
C-Perceived personal impact				.84	.71
R-Perceived personal impact				.79	.64
B-Perceived personal impact				.77	.63
E-Perceived personal impact				.76	.59
N-Perceived personal impact				.66	.45
Percent of variance explained	28.4	12.7	11.9	3.1	

Note. Emerging solution using eigenvalue criterion of 1; Factor labels were F1 = Perceived Probability, F2 = Perceived Seriousness, F3 = Perceived Coping Efficacy, and F4 = Perceived Personal Impact.

Confirmatory factor analysis. A CFA was performed on data from the remaining cases to evaluate the fit of the 4-factor model yielded by the EFA in EQS 6.1. Slight univariate non-normality was observed among some of the variables, although Skewness and Kurtosis values were close to 1.0. A normalized Mardia's coefficient of multivariate kurtosis of 46.8 was observed. This value departs from 0—a value that indicates multivariate normality of data. The possibility was thus recognized that maximum likelihood estimates might be affected. Non-normality of data can lead to the downward bias of standard errors and thereby result in an inflated number of statistically significant parameters (Muthén & Kaplan, 1985). In such cases, Byrne (1994) suggests to base final assessment of model fit on robust statistics (e.g., the Satorra-Bentler scaled χ^2 or S-Bχ^2, the *CFI, and the *RMSEA). Three possible multivariate outliers were identified from the list of cases with the largest contribution to normalized multivariate kurtosis provided in the output. Removal of these outliers yielded slight differences in fit indices. Therefore, these were removed from the analysis, for a final sample of $n = 607$.

This model converged in four iterations, resulting in small and evenly distributed off-diagonal values in the standardized residual covariance matrix. Some degree of misfit was observed; S-B$\chi^2(269) = 1295.08$, $p < .001$. A *CFI value of .86 and *RMSEA value of .08 were yielded by the initial model, indicating poor model fit. Examination of the Lagrange Multiplier χ^2 coefficients (LM χ^2) indicated that inclusion of correlated errors between the perceived seriousness and perceived personal impacts of biological, nuclear, and explosives terrorism would substantially improve model fit[2]. Generally, the specification of correlated error terms for purposes of achieving a better-fitting model is

[2] The drop in χ^2 values was substantially more gradual for parameters as the list continued relative to these parameters.

not acceptable practice (Byrne, 1994). However, it was not surprising to observe correlated error between these variables given that cross-loadings were observed in items assessing perceived seriousness and perceived impact in the previous EFA. The model was therefore re-specified with the parameter for error terms of these variables to be freely estimated. The revised model yielded a *CFI value of .90 and *RMSEA value of .07, indicating adequate model fit.

The 4-factor model is shown in Figure 7, along with estimates for each parameter. Circles represent the latent variables (factors) and rectangles represent the measured variables (cognitive dimension items). Absence of an arrow connecting variables indicates that no direct relationship is hypothesized among them.

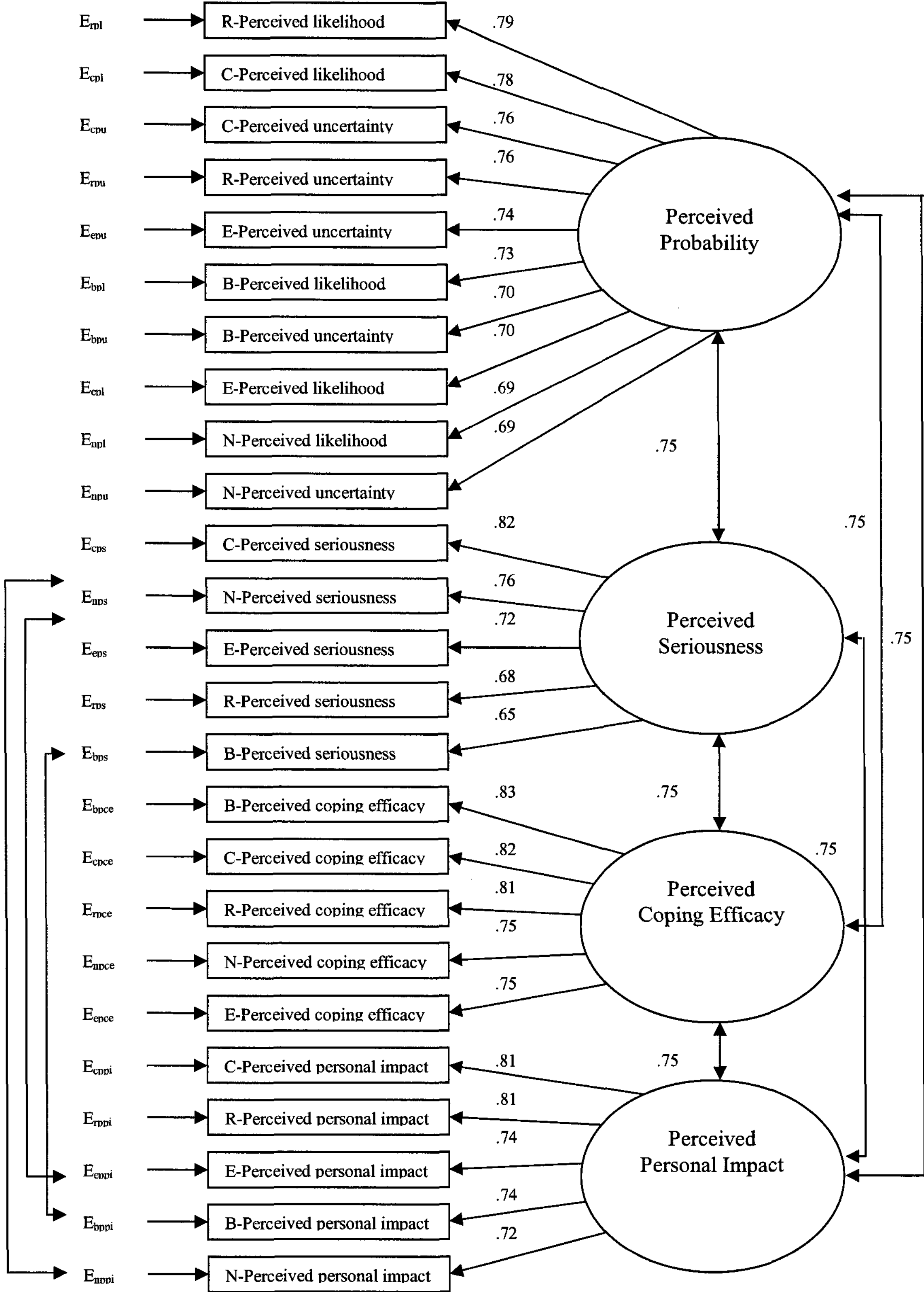

Figure 7. Diagram of the 4-factor model of cognitive dimensions of CBRNE terrorism perceptions with estimated parameter loadings.

Perceived Institutional Preparedness

Exploratory factor analysis. With use of a Mahalanobis distance criterion of $p < .001$, 13 multivariate outliers were identified. However, the analyses with outliers removed yielded few differences in findings. Therefore, results of analyses including all cases with complete data are presented below, for a final sample of $n = 699$.

With eigenvalues of at least 1 as a criterion, an initial freely estimated solution produced one factor. However, examination of the Scree plot suggested that a 2-factor solution might adequately fit the data. On the basis of interpretability, it was decided to retain a 2-factor structure. Factor loadings and percentages of explained variance are presented in Table 13. The factors were named Perceived Front-Line Preparedness and Perceived Governmental Preparedness. They explained 45.5% and 8.6% of the variance, respectively.

Table 13

Factor Loadings, Communalities (h^2), and Percents of Explained Variance of 2-Factor Analysis With Principal Axis Factoring Extraction and Oblimin Rotation of Items on Perceived Preparedness of Institutions

Item	F1	F2	h^2
First responders	.82		.64
Non-governmental organizations	.75		.50
Hospital and health care services	.56		.43
Local community organizations	.51		.32
Provincial government		-.95	.83
Federal government		-.77	.60
Municipal government		-.55	.48
Percent of variance explained	45.5	8.6	

Note. Emerging solution using eigenvalue criterion of 1; Factor labels were F1 = Perceived Front-Line Preparedness and F2 = Perceived Governmental Preparedness.

Confirmatory factor analysis. No univariate non-normality was observed among the variables related to institutional preparedness (all Skewness and Kurtosis values < 1.0). However, a normalized Mardia's coefficient of multivariate kurtosis of 9.54 was observed. Thus, the final assessment of model fit was based on the S-Bχ^2. One possible multivariate outlier was identified from the list of cases with the largest contribution to normalized multivariate kurtosis provided in the output. However, removal of the outlier yielded few differences in findings. Therefore, results of the analysis including all cases with complete data are presented below, for a final sample of $n = 682$.

An analysis was performed to test the 2-factor model of institutional preparedness. This model converged in six iterations, resulting in small and evenly distributed off-diagonal values in the standardized residual covariance matrix. Some degree of misfit was observed; S-B$\chi^2(13) = 73.68$, $p < .001$. However, a *CFI value of .96 and *RMSEA value of .05 yielded by the initial model suggested a good fit. Moreover, additional paths produced minimal improvement in fit according to LM χ^2 statistics, suggesting that the 2-factor model might best describe Canadians' perceptions of institutional preparedness. The 2-factor model is shown in Figure 8, along with estimates for each parameter.

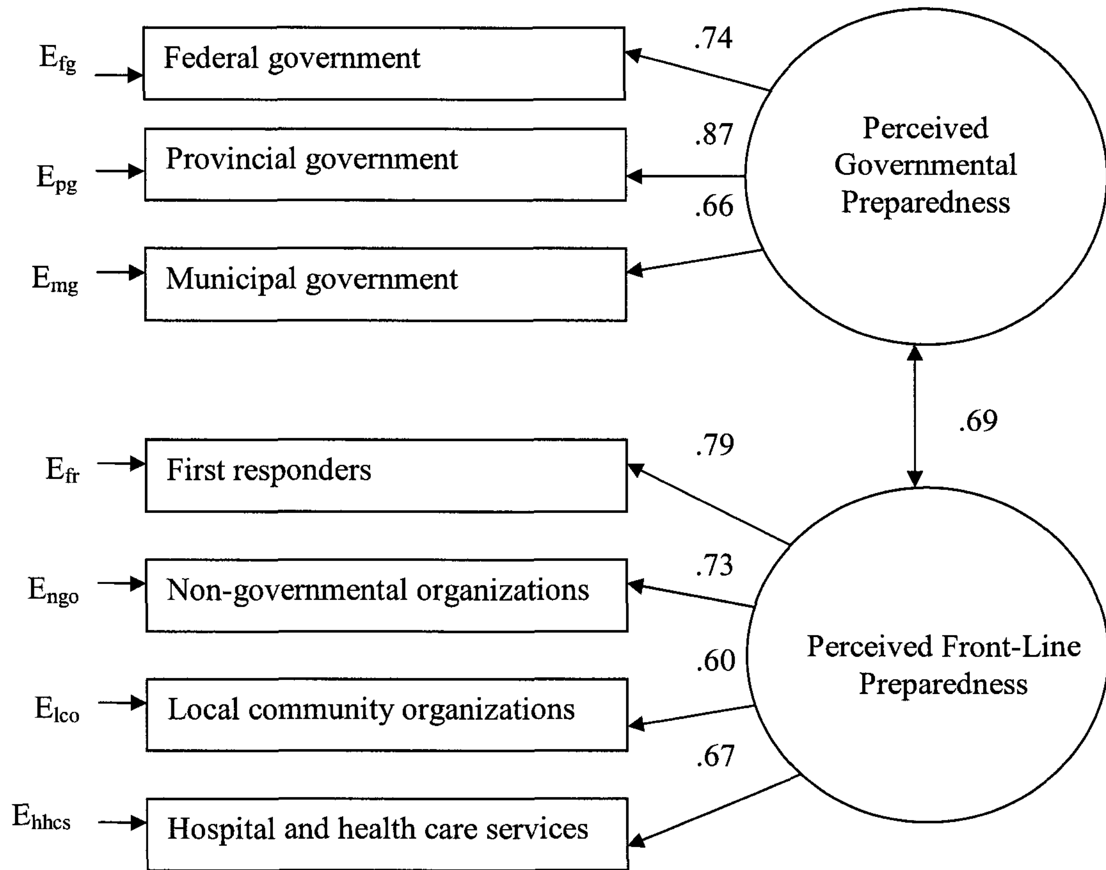

Figure 8. Diagram of the 2-factor model of perceived institutional CBRNE terrorism preparedness with estimated parameter loadings.

Behavioural Response

Exploratory factor analysis. Examination of distributions of items assessing behavioural response to terrorism revealed severe Skewness. In every case, a high proportion of respondents (close to 50% or higher) selected a rating of 1 (not at all). Moreover, screening for multivariate outliers among these variables revealed an excessively high proportion of outlier cases, raising questions about the validity of any analysis that might be performed on these data. It was therefore decided to dichotomize these variables: Ratings of 1 were assigned a value of 0 (not at all), and ratings between 2 and 5 were assigned a value of 1 (at least a little). No multivariate outliers emerged among the dichotomized variables. The EFA was therefore carried out on the dichotomized variables using MPlus version 4.1 software (Muthén & Muthén, 2006). This software uses tetrachoric correlations to estimate latent factor models with binary data. The analysis was performed using weighted least-squares with mean and variance adjustment (wlsmv) estimation and varimax rotation with listwise deletion of cases, for a final sample of n = 722. Work by Muthén, DuToit, and Spisic has found this method of estimation to be a more optimal choice for binary data (University of Texas at Austin, 2000).

With eigenvalues of at least 1 as a criterion, an initial freely estimated solution produced three factors. Factor loadings are presented in Table 14. The first factor was loaded by items related to planning or taking measures to prepare for a possible terrorist event, and was therefore named Individual Preparedness Behaviour. Consisting of two items related to obtaining information about terrorism, the second factor was named Information Seeking Behaviour. The items that loaded the third factor either involved

having avoided something related to terrorism or reflected a lack of comfort in certain scenarios. This factor was therefore named Avoidance Behaviour.

Table 14

Factor Loadings of 3-Factor Analysis With Weighted Least-Squares With Mean and Variance Adjustment Extraction and Varimax Rotation of Dichotomized Items on Behavioural Response to Terrorism

Item	F1	F2	F3
Establish meeting area/contact method	.77		
Obtain information about shelters	.76		
Establish emergency plan	.75		
Put together emergency supply kit	.69		
Consult others for preparedness advice	.62		
Learn about evacuation plans	.56		
Seek social support	.51		
Receive first aid or CPR training	.50		
Learn about terrorism types		.97	
Read up on terrorism		.55	
Nervous around certain people			.60
Refrain from watching terrorism news			.54
Avoid public places			.44
Percent of variance explained	Not available in MPlus output		

Note. Emerging solution using eigenvalue criterion of 1; Factor labels were F1 = Individual Preparedness Behaviour, F2 = Information Seeking Behaviour, and F3 = Avoidance Behaviour.

Confirmatory factor analysis. Data from the remaining cases with complete data were subjected to a CFA in order to test the fit of the 3- factor model of behavioural response to terrorism. This CFA analysis was also carried out with MPlus version 4.1 software (Muthén & Muthén, 2006). Prior to this, data were examined for outliers and violations of assumptions inherent to the analysis. Some multivariate outliers were identified, but these were on fewer than 5% of cases, and their removal from the analysis did not yield any changes in results. Therefore, results of the analysis including all cases with complete data are presented below, for a final sample of $n = 718$.

The CFA yielded some degree of misfit according to the χ^2 likelihood ratio statistic, $\chi^2(49) = 69.81, p < .05$. However, a CFI value of .99 and RMSEA value of .02 were suggestive of good model fit. The 3-factor model is shown in Figure 9, along with estimates for each parameter.

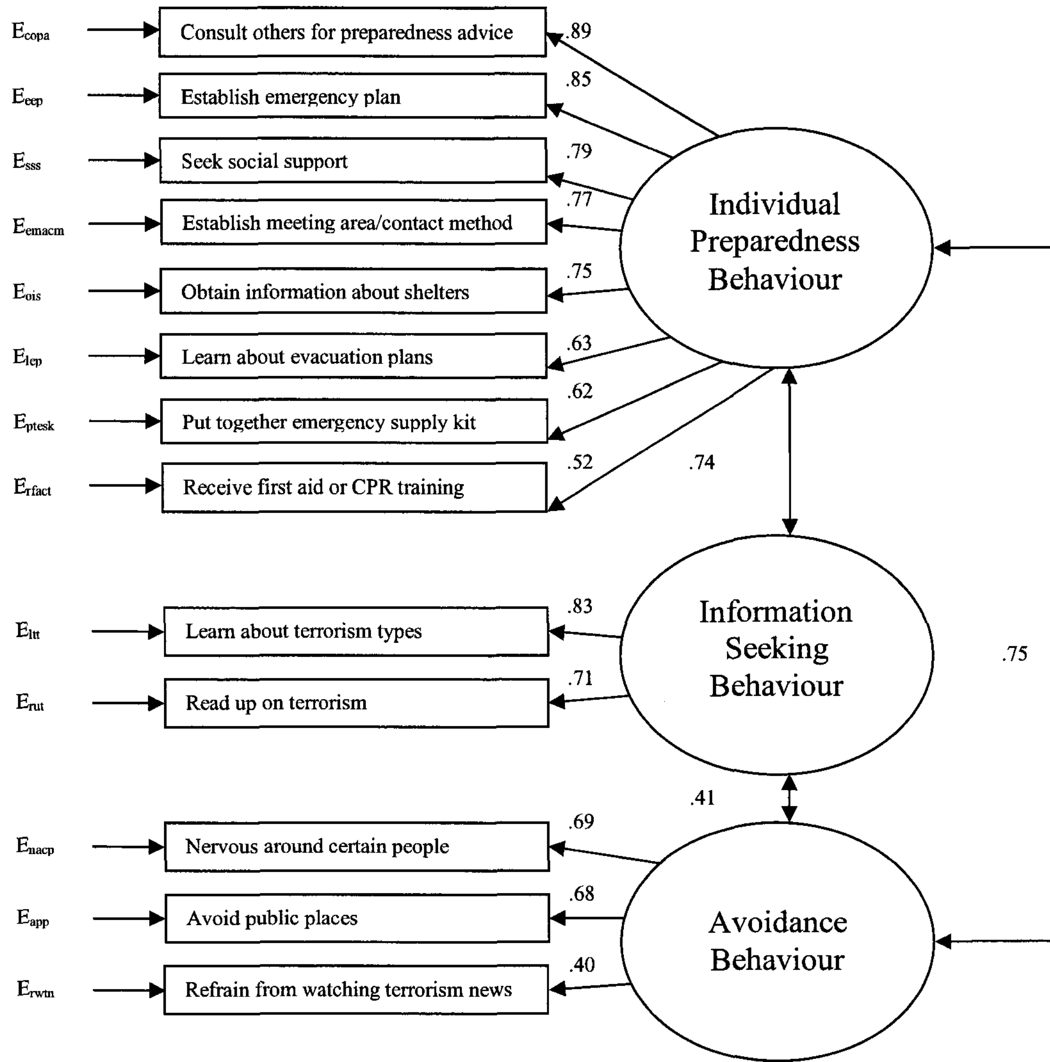

Figure 9. Diagram of the 3-factor model of behavioural response to CBRNE terrorism with estimated parameter loadings.

Discussion

Using factor analytic techniques, the present study revealed a number of interesting features about the nature of some cognitive, social contextual, and behavioural aspects of individual response to terrorism in Canada. Findings further emphasized the multidimensionality of perceptions regarding CBRNE terrorism. They also revealed the existence of an important distinction between perceptions of governmental preparedness and those of front-line preparedness. Last, results demonstrate that, although individual behaviours related to terrorism can take many forms, these can be represented by a smaller set of broader categories.

The conceptualization of hazard perceptions as multidimensional is certainly not new in the literature on health risk perception and behaviour. Indeed, a vast body of research on this topic emphasizes the importance of "dreaded" and "unknown" characteristics of individuals' representations of risk (Slovic, 1987, 2000). Hence, it was not surprising to find that several dimensions characterized perceptions of CBRNE terrorism. For the most part, findings were in line with observations made by Lee and her colleagues (2007a). Corresponding to the overarching idea expressed in these interviews that terrorism poses a greater level of threat to others than to oneself, perceptions reflecting the general consequences of CBRNE terrorism (Perceived Seriousness) emerged as distinct from those of personal consequences (Perceived Personal Impact). However, less distinction emerged in perceptions of the likelihood and uncertainty of CBRNE terrorism than might have been expected on the basis of previous observations. In an earlier survey, a high proportion of respondents selected "don't know/no opinion" in response to items about their level of uncertainty regarding various hazards, pointing to

a need for conceptual clarification (Lee et al., 2007b). The wording used to assess uncertainty in the present survey was therefore modified from that used previously to convey a clearer meaning. Unfortunately, some confusion was also apparent regarding the meaning of these items (Lemyre et al., 2007b). The fact that these items were so strongly related to those reflecting perceived likelihood in the present study is therefore noteworthy, as it helps to clarify the meaning respondents tended to assign to uncertainty while making their judgements; namely, as perceived uncertainty regarding the likelihood of CBRNE terrorism.

Another notable finding was the fact that cognitive dimensions (Perceived Probability, Perceived Seriousness, Perceived Personal Impact, and Perceived Coping Efficacy), rather than different types of terrorism (chemical, biological, radiological, nuclear, or explosives) emerged as the most salient factors of terrorism perceptions. A previous analysis revealed that respondents differentially perceived various types of terrorism on a number of dimensions (Lemyre et al., 2007b). Nevertheless, the present findings suggest that items used to assess perceptions of different types of terrorism might be used in scales to assess perceptions of CBRNE terrorism on the dimensions of probability, seriousness, personal impact, and coping efficacy. Consisting of more specific indices, these scales would contain less noise than indices that measure perceptions of terrorism in general.

Since perceptions of terrorism risk management emerged as important factors shaping concerns and decisions regarding terrorism in Lee et al.'s interviews (2007a), analyses were also performed on items used to assess respondents' perceptions of the level of terrorism preparedness of various institutions. Findings reveal that respondents

conceptualized institutional preparedness in terms of two underlying factors, with governments at all levels distinguished from the remaining institutions. Other analyses of this data have shown that federal, provincial, and municipal governments are among those institutions perceived as the least prepared and able to respond to terrorism (Lemyre et al., 2007a). However, the distinction of governments from other institutions likely reflects perceptions of shared roles and responsibilities. For instance, governments primarily play a role in developing policies, whereas the involvement of other institutions in emergency management is largely front-line. Thus, investigating perceived governmental preparedness and perceived front-line preparedness as separate social contextual correlates of individual response to terrorism may yield more meaningful findings.

Finally, the importance of understanding behavioural responses to terrorism is undisputed, as these may pose the greatest challenge to terrorism risk management (Hyams, Murphy, & Wessely, 2002; Stein, Tanielian, Eisenman, Keyser, Burnam, & Pincus, 2004). Previous research on behavioural response to terrorism in Canada had emphasized the prominence of behaviours aimed at avoiding terrorist events, and relative infrequency of those aimed at preparing and planning for terrorism (Gibson et al., 2007; Lee et al., 2007a). However, this research was predominantly qualitative in nature, and it was necessary to determine whether this was the case across a wider range of individual preparedness behaviours and among a more representative sample of Canadians. It is for this reason that more emphasis was put on assessing individual preparedness in the present survey (Lemyre et al., 2005).

Overall, results provide converging evidence of the importance of distinguishing between behaviours aimed at avoiding terrorism, and those aimed at preparing for terrorism. However, the emergence of information seeking behaviours in a separate factor emphasizes the need to additionally differentiate individual preparedness behaviours that are cognitive (i.e., learning rather than acting) from those that are behavioural in nature. Interestingly, some parallels can be drawn between these three factors and the classification of coping as active-behavioural (attempts to deal directly with the problem), active-cognitive (attempts to manage the stressfulness of the situation), and avoidance (attempts to avoid confronting the problem) discussed by Billings and Moos (1981). Hence, understanding behavioural response to terrorism within a coping with stress framework may prove to be suitable.

While results of the CFAs were generally consistent with expectations, some limitations must be acknowledged. Most importantly, a low response rate was noted (5.2% of all numbers dialled, 8.1% as calculated using the Performance Management and Recognition System method of calculation; Allen, Ambrose, Halpenny, & Simmie, 2003). This limitation is quite common in telephone surveys, particularly when these are long in duration as in the present case (Allen et al., 2003; Wilson, Roe, & Wright, 1998). It nevertheless raises questions about the generalizability of findings to the overall Canadian population. The sample was stratified to resemble the Canadian population in terms of region, as well as age and gender within region based on 2001 Census data. However, respondents of this sample tended to have a higher level of education and income than the general population. On the other hand, no research of near magnitude had yet examined these aspects of individual response to terrorism within the Canadian

context at the time the survey took place, rendering this work a meaningful contribution. Naturally, a next step entails examining how various cognitive, social contextual, and behavioural aspects of individual response to terrorism are related. Research of this type, at any rate, is necessary for the eventual development and refinement of explanatory models of individual response to terrorism that can inform population-level terrorism risk management.

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Contributions of Co-Authors and Author Note

The work presented in this paper was carried out as part of the first author's doctoral dissertation, which received funding from the Social Sciences and Humanities Research Council (SSHRC) of Canada and the Ontario Graduate Scholarship Program. The first author developed the survey questionnaire, developed the conceptual framework, planned as well as performed all analyses on which the paper reports, and wrote the manuscript. Louise Lemyre provided feedback on the conceptual framework and planned analyses. She has agreed to the use of the paper in the first author's dissertation, and to its eventual publication consistent with any limitations set by publisher requirements.

The project for which the survey was conducted was led by Louise Lemyre and supported by the CBRNE Research and Technology Initiative (CRTI) of Canada (project # CRTI02-0080RD), as well as the SSHRC. The authors would like to acknowledge the contributions of Mélanie Clément, Wayne Corneil, Daniel Krewski, Stacey Gibson, Marie-Pierre L. Markon, Tim Ramsay, Michelle C. Turner, and Michael Tyshenko in the conduct of this work.

CHAPTER 5: EVALUATION OF THE SOCIAL-COGNITIVE MODEL

Running head: SOCIAL-COGNITIVE MODEL OF INDIVIDUAL RESPONSE TO TERRORISM

Terrorism Risk Perception and Individual Response in Canada: A Social-Cognitive Perspective

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Abstract

Research on terrorism has increased since the events of September 11, 2001. However, efforts to develop a contextualized model incorporating cognitive and social contextual factors as predictors of psychological and behavioural responses to this threat have been limited. Therefore, the aim of the present study was to evaluate a series of hypotheses drawn from such a model that was generated from a series of interviews with members of the Canadian public. Data of a national survey on perceived chemical, biological, radiological, nuclear, and explosives (CBRNE) terrorism threat and preparedness were analyzed. Results demonstrated that psychological and behavioural responses to terrorism were both a function of cognitive factors in addition to perceived institutional preparedness for terrorism. Worry about terrorism partially mediated relationships of cognitive and social contextual factors with behavioural response to terrorism. Perceived coping efficacy emerged as the cognitive factor associated with the most favourable response to terrorism. Hence, findings highlight the importance of fostering a sense of coping efficacy to the effectiveness of strategies aimed at improving preparedness among local communities.

Terrorism Risk Perception and Individual Response in Canada: A Social-Cognitive Perspective

An abundant literature on terrorism documents its impact on psychological stress and related deleterious behavioural effects (Al-Krenawi, Lev-Wiesel, & Sehwail, 2007; DiMaggio & Galea, 2006; Hall, Norwood, Ursano, & Fullerton, 2003; Kron & Mendlovic, 2002; Stein, Tanielian, Eisenman, Keyser, Burnam, & Pincus, 2004). Perhaps for apparent reasons, the bulk of this research has been undertaken among communities characterized by chronic political conflict or following a specific disaster. Conversely, little research has explored the way terrorism threat might affect members of communities in the absence of an event. At first glance, such efforts may seem misguided. However, understanding the way individuals perceive and respond to this threat is a critical part of developing more effective terrorism preparedness guidelines, which has emerged as an objective of the Canadian federal government in recent years. In particular, research focusing on some more positive aspects of individual response to terrorism could help with the development of strategies that foster resilience. The current paper therefore examines the mechanisms involved in the relationship between these elements among members of the Canadian public.

Current theories in the hazard management literature identify a set of socio-demographic, cognitive, and affective factors contributing to individuals' responses to hazards (Slovic, 2002). Many of these regard such responses as problems that need to be addressed in risk management strategies. However, others emphasize the potential role of these same factors in fostering individuals' involvement in hazard preparedness (Duval & Mulilis, 1999; Mulilis & Duval, 1995, 1997; Paton, Smith & Johnson, 2005). For

example, Paton et al. (2005) developed a social-cognitive model of disaster preparedness specifying the factors that motivate people to prepare for earthquakes. Specifically, one's motivation to prepare is considered to be a function of his or her risk perception, hazard awareness, and anxiety related to earthquakes. When there is sufficient motivation, one's intentions to prepare are formed on the basis of his or her outcome expectancies and self-efficacy. Finally, whether these intentions translate to action also depends on a number of social contextual factors, including whether responsibility is transferred onto others, there is a sense of community, there is trust in information sources, and there is a perceived infrequency of hazard activity.

Given the informative potential of such research and recognition of terrorism as a global threat, the past few years have witnessed a surge in research focusing on individual response to terrorism. Examples of responses examined in this research include changes in travel decisions, the avoidance of particular activities, support of antiterrorism policies, as well as individual preparedness (Fischhoff, de Bruin, Perrin, & Downs, 2004; Greenberg, Craighill, & Greenberg, 2004; Huddy, Feldman, Taber, & Lahav, 2005; Schuster, Stein, Jaycox, Collins, Marshall, Elliott, et al., 2001). While much of this work discusses some cognitive aspects of psychological or behavioural response to terrorism, these elements are rarely integrated into a model of such responses. Moreover, less attention is put on social contextual factors that may be involved in individual response to terrorism, such as those included in Paton et al.'s social-cognitive model of disaster preparedness.

With this issue in mind, a generative approach was used in a previous study to develop an understanding of the concepts of importance to individual response to

terrorism within the Canadian context. More specifically, a model was developed to summarize results of a qualitative analysis performed on transcripts of interviews with individuals from across Canada wherein concerns and decisions regarding terrorism were discussed (Lee, Dallaire, & Lemyre, 2007a). In general, this work was supportive of the notion that psychological response to terrorism is related to cognitive factors such as perceived threat, uncertainty, and control. Findings also suggested that these same cognitive factors along with psychological response shaped the way individuals behaved in relation to terrorism. On top of these factors, however, were various contextual issues that appeared to shape individuals' psychological responses, such as opinions regarding the regulation of terrorism. For example, dissatisfaction with terrorism risk management was reported a source of heightened concern or worry about terrorism. Its relationship with behavioural response to terrorism, on the other hand, remained somewhat equivocal.

Study Objectives

As a subsequent step, a primary aim of the current study was to evaluate the model developed in this previous study in a more representative sample of Canadians. To do so, a series of analyses were performed on data from a national survey on perceived terrorism threat and preparedness (Lemyre, Lee, & Krewski, 2005). In previous analyses of this data, various dimensions of perceptions regarding terrorism and terrorism risk management (more specifically, institutional preparedness), as well as dimensions of behavioural response to terrorism threat were clarified (Lee & Lemyre, 2007). The model presented in Figure 10 is based on the one generated by Lee et al.'s (2007a) previous qualitative analysis, although adapted for the specific dimensions examined in the present study. Also, these psychological and behavioural responses to terrorism were considered

to reflect underlying stress reactions, given their pervasiveness in the face of terrorist threats and attacks (Schuster et al., 2001; Rubin, Brewin, Greenberg, Simpson, & Wessely, 2005).

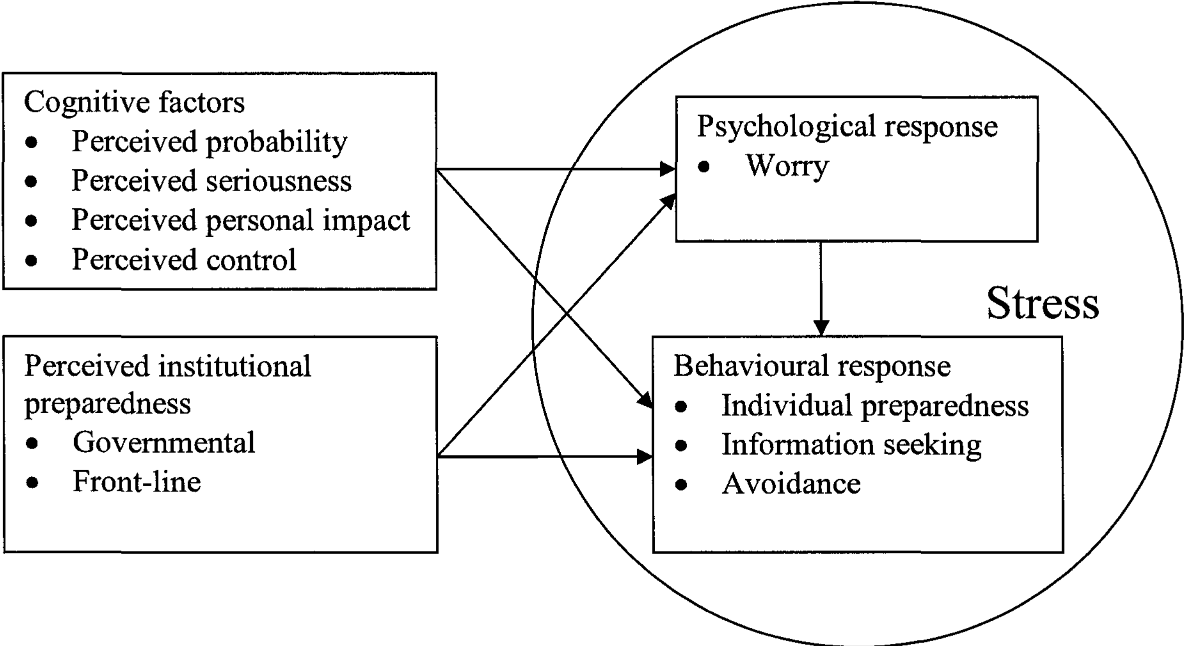

Figure 10. Model specifying relationships between perceptions of terrorism, perceptions of institutional preparedness, psychological response, and behavioural response to terrorism.

In line with previous findings and theory (Lee et al., 2007a; Lee, Lemyre, & Krewski, 2007b), it was expected that perceptions of terrorism as more threatening (i.e., as more probable, more serious, and as having a greater personal impact) would be associated with increased psychological and behavioural responses to terrorism. Perceptions of oneself as better able to cope with terrorism (e.g., higher perceived coping efficacy) were expected to be associated with decreased psychological response. However, their relationship with behavioural response was expected to depend on the type of behaviour. More specifically, they were expected to be associated with increased individual preparedness and information seeking behaviours, although decreased avoidance behaviour.

Also consistent with previous research (Lee et al, 2007a), more favourable perceptions of terrorism risk management (e.g., higher level of perceived governmental and front-line preparedness) were expected to be associated with decreased psychological response to terrorism. However, no specific hypotheses were developed about their relationship with behavioural response to terrorism given that this is a relatively unexplored area of research.

Finally, since worry has at times been regarded as a special state of the cognitive system that may potentiate response to danger (Matthews, 1990), a secondary aim was to determine whether this psychological response to terrorism mediates, in part, the relationships of perceptions of terrorism and terrorism risk management with various behavioural responses to terrorism.

Method

Participants

A sample of 1,502 Canadians of at least 18 years of age took part in the survey (731 men and 771 women). The sample was achieved using a random digit dialling technique stratified by region (Atlantic: Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick; Quebec; Ontario; Prairies: Manitoba and Saskatchewan; Alberta; and British Columbia), as well as age group (18 to 34, 35 to 54, and 55 years or over) and gender within region according to 2001 Census data.

Measures

Development of the survey questionnaire was led by the first author of the present study and was based on general findings of a national survey on health risk perception (Krewski, Lemyre, Turner, Lee, Dallaire, Bouchard, et al., 2005), a pilot questionnaire-based study on psychosocial aspects of CBRNE terrorism (Geffken-Graham, 2004; Lee & Lemyre, 2004; Lindsay, 2004), and a series of group interviews that were held in the fall of 2004 with individuals from across Canada (Lemyre, Clément, & Gibson, 2004). Issues inherent to the measures used in previous studies regarding indices of perceived threat and perceived control were considered and addressed in the design of the survey (Lee et al., 2007b).

Cognitive dimensions. Based on previous factor analyses (Lee & Lemyre, 2007), perceptions of terrorism were assessed on four cognitive dimensions. *Perceived CBRNE probability* was assessed by summing over respondents' ratings of their perceived likelihood and perceived uncertainty regarding five different terrorist events ("How likely do you think it is that [chemical, biological, radiological, nuclear, or explosives terrorism]

will occur in Canada?" and "How uncertain do you feel currently about possible [chemical, biological, radiological, nuclear, or explosives terrorism] in Canada?", respectively). This scale demonstrated good reliability, yielding a Cronbach's alpha of .91.

Perceived CBRNE seriousness, perceived CBRNE personal impact, and perceived CBRNE coping efficacy were each assessed by summing over respondents' ratings of their perceived seriousness, perceived personal impact, and perceived coping efficacy regarding these events, respectively ("How serious do you think it would be if [chemical, biological, radiological, nuclear, or explosives terrorism] did occur in Canada?", " If [chemical, biological, radiological, nuclear, or explosives terrorism] occurred in Canada, to what extent do you think it would have an impact on your life?", and "If [chemical, biological, radiological, nuclear, or explosives terrorism] occurred in Canada, how well do you think you would be able to cope with it?", respectively). Ratings on these three cognitive dimensions, as well as on perceived CBRNE probability were provided using a 5-point Likert-type scale (1 = not at all, 5 = extremely).These last three scales also demonstrated good reliabilities, yielding Cronbach's alphas of .83, .87, and .89, respectively.

Institutional preparedness. Respondents were presented a list of various institutions involved in emergency preparedness and were asked to rate the extent to which they perceived each of them as prepared for terrorism ("How much do you think they are prepared for terrorism?"). Institutions included: i) the federal government, ii) the provincial government, iii) the municipal government, iv) hospital and health care services, v) first responders, vi) non-governmental organizations, and vii) local

community organizations. All ratings were provided using a 5-point Likert-type scale (1 = not at all, 5 = extremely). Respondents were provided with examples of first responders, non-governmental organizations, and local community organizations to better guide their ratings. For first responders, respondents were given the examples of the police, paramedics, and fire department; for non-governmental organizations, they were given the examples of the Red Cross, St-John Ambulance, and the Salvation Army; and for local community organizations, they were given the examples of community clubs and churches.

Based on previous analyses (Lee & Lemyre, 2007), a measure of *perceived governmental preparedness* was computed by summing over respondents' ratings of governmental institutions (federal government, provincial government, and municipal government), while a measure of *perceived front-line preparedness* was computed by summing over respondents' ratings of institutions that play more of a front-line role in emergency preparedness (first responders, hospital and health care services, non-governmental organizations, and local community organizations). The scales each demonstrated adequate reliabilities (Cronbach's alphas of 0.81 and 0.77, respectively).

Psychological stress. Psychological stress was assessed using Lemyre and Tessier's (2003) 9-item Psychological Stress Measure (PSM). The 9-item PSM is a shortened form of the PSM (Lemyre & Tessier, 1988), a 49-item self-report paper and pencil questionnaire designed to measure the subjective experience of stress within a non-pathological population. Items consist of statements that reflect somatic, behavioural, and cognitive-affective indices of stress. Using an 8-point Likert-type scale (1 = not at all, 8 = extremely), respondents rate the degree to which they have experienced each symptom in

the past four to five days. The 9-item PSM was developed from items with strong inter-item and item-total correlations. It has yielded similar psychometric qualities as the original version, producing reliabilities as high as .89 (Lemyre & Tessier, 2003) and .92 in a more recent study (Lemyre & Lee, 2006).

Worry about terrorism. Worry about terrorism in general was assessed with one question at the beginning of the survey ("To what extent do you currently worry about terrorism in Canada?"). Ratings were provided using a 5-point Likert-type scale (1 = not at all, 5 = extremely).

Individual response to terrorism. The way the public has responded to terrorism threat was assessed with the question "How much have you actually done the following?" This was followed by a list of 13 behaviours, ranging from individual preparedness to avoidance behaviours, to be rated on a 5-point Likert-type scale (1 = not at all, 5 = extremely). Since a high proportion of respondents (close to 50% or higher) responded to this question with a rating of 1 (not at all) for most of the 13 behaviours, these variables were dichotomized: Ratings of 1 were assigned a value of 0 (not at all) and ratings between 2 and 5 were assigned a value of 1 (at least a little).

As per previous analyses (Lee & Lemyre, 2007), the number of individual preparedness behaviours in which each respondent had engaged was assessed by summing over values for consulting others for preparedness advice, establishing an emergency plan, putting together an emergency supply kit, receiving emergency first aid or cardiopulmonary resuscitation (CPR) training, obtaining information about potential shelters in their community, establishing a meeting area or method of contact with loves ones, learning about evacuation plans of buildings occupied frequently, and seeking

social support. The number of information seeking behaviours was assessed by summing over values for learning about differences and similarities between different types of terrorism, and reading up on the topic of terrorism. Last, the number of avoidance behaviours was assessed by summing over values for avoiding public places, refraining from watching the news to avoid coverage on terrorism issues, and being nervous around certain people. The scale used to assess individual preparedness behaviours demonstrated adequate reliability (Cronbach's alpha of .76). However, this was not the case for scales used to assess information seeking and avoidance behaviours (Cronbach's alphas of .56 and .40, respectively). Hence, analyses involving these scales should be interpreted with great caution.

Demographic variables. Age, education, gender, and household income were assessed. Age was assessed using the categories of 1 = 18-24 years, 2 = 25-34 years, 3 = 35-44 years, 4 = 45-54 years, 5 = 55-64 years, and 6 = 65 years and up. Education was assessed using the categories of 1 = some/completed elementary school, 2 = some/completed high school, 3 = some/completed community college (or CEGEP in Quebec), 4 = some/completed university, and 5 = some/completed graduate school. Last, household income was assessed using the categories of 1 = less than $19,999, 2 = $20,000 to $29,999, 3 = $30,000 to $39,999, 4 = $40,000 to $49,999, 5 = $50,000 to $59,999, 6 = $60,000 to $69,999, 7 = $70,000 to $79,999, and 8 = $80,000 or over.

Procedure

The survey was administered via telephone interviews between November 15 and December 15, 2004. Data were collected using Computer Assisted Telephone Interviewing (CATI). Potential respondents were identified by way of random digit

dialling, stratified as indicated above. Once a household was contacted, the adult whose birthday was closest to the day of the call was selected for the interview. Of the total 28,648 phone numbers dialled, 4,910 were not valid, 8,284 were unanswered, 12,039 resulted in a refusal, 1,483 required a call-back, and 430 were addressed to individuals with demographic characteristics of quotas already met. Completed interviews represented 5.2% of all numbers dialled.

During administration of the survey, lists of items within sections were sequenced randomly to balance for possible order effects. If respondents did not know what to answer or had no opinion regarding a specific item, they were given the opportunity to select "don't know/no opinion" as a response (coded as 0). Interviews lasted approximately 35 minutes and were conducted in the respondent's official language of preference. One-thousand one-hundred and fifty-nine (1,159) respondents completed the survey in English and 343 completed it in French.

Data Analyses

Survey weights were used throughout analyses in order that the sample be representative of the Canadian population. Design effects due to the stratified sampling procedure were examined in a random sub-sample of variables, and were found to be close to 1 (ranging from .99 to 1.00), indicating that analysis of the data using simple random sample variances would be adequate.

Bivariate correlations were computed to examine relationships between demographic variables, cognitive dimensions (perceived probability, perceived seriousness, perceived personal impact, and perceived control), perceived institutional preparedness (governmental preparedness, front-line preparedness), psychological stress,

worry, and terrorism-related behaviours (individual preparedness, information seeking, and avoidance behaviours). Effects of demographic variables found to be significantly associated with terrorism-related behaviours were controlled in further analyses.

A test of mediation was performed according to specifications of Baron and Kenny (1986). Only cases with complete data on model variables were included in the analyses in order to ensure that regression coefficients of each analysis would reflect precisely the same sample. Using a Mahalanobis criterion of $p < .001$, some multivariate outliers were identified and removed from the sample. Data from the remaining 1,100 cases (representing 72.3% of the full sample) were subjected to a series of multiple linear regression analyses to determine whether cognitive dimensions and perceived institutional preparedness predicted worry, and whether worry predicted the terrorism-related behaviours. Finally, if cognitive dimensions and perceived institutional preparedness were found to predict worry, and worry was found to predict the terrorism-related behaviour, sequential multiple regression analyses were performed to determine whether cognitive dimensions and perceived institutional preparedness also predicted the behaviour, and whether part of this relationship might be explained by worry. A p value of .05 was used as the criterion for all tests of significance.

Results

Bivariate correlations among all variables of interest are presented in Table 15. Since both gender and education were significantly associated with psychological stress, worry, and most behavioural responses, these variables were included as covariates in analyses predicting behavioural responses to terrorism.

Table 15

Intercorrelations Between Demographic, Cognitive, Perceived Institutional Preparedness, Psychological Response, and Behavioural Response Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	--	-.09***	.05	-.11***	.02	.02	-.10***	-.08**	<-.01	-.01	-.16***	.05	-.03	-.05	-.02
2. Education		--	.03	.35***	-.16***	-.08**	-.08**	.08**	-.05	-.10***	-.10***	-.18***	.01	.16***	-.05
3. Gender			--	-.10***	.15***	.17***	.21***	-.11***	.09***	.08**	.09***	.12***	<-.01	-.13***	.09***
4. Income				--	-.07*	-.03	-.02	.07*	-.07**	-.10***	-.06*	-.10***	.02	.07**	-.03
5. PP					--	.35***	.33***	-.06	.06*	.12***	.17***	.59***	.26***	.14***	.27***
6. PS						--	.65***	-.01	.02	.08**	.10***	.22***	.08**	.04	.12***
7. PPI							--	-.06*	.06*	.10***	.15***	.33***	.11***	.07**	.16***
8. PCE								--	.07**	.08**	-.08**	-.10***	.07*	.13***	-.02
9. PGP									--	.58***	<.01	.11***	.12***	.04	.02
10. PFP										--	.02	.14***	.15***	.02	.08**
11. Stress											--	.17***	.09***	.01	.24***
12. Worry												--	.24***	.17***	.28***
13. IPB													--	.43***	.38***
14. ISB														--	.14***
15. AB															--

Note. PP = Perceived probability, PS = Perceived seriousness, PPI = Perceived personal impact, PCE = Perceived coping efficacy, PGP = Perceived governmental preparedness, PFP = Perceived front-line preparedness, IPB = Individual preparedness behaviour, ISB = Information seeking behaviour, AB = Avoidance behaviour.

$^*p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Predictors of Psychological Stress

Given the pervasiveness of stress reactions following terrorist events (Schuster et al., 2001; Rubin et al., 2005), one objective was to determine to what extent perceptions of CBRNE terrorism threats and institutional preparedness might be associated with overall psychological stress levels among Canadians. This was assessed in a sequential linear multiple regression analysis, with gender and education entered in a first step, perceptions of CBRNE terrorism on the four cognitive dimensions entered in a second step, and perceptions of institutional preparedness entered in a final step as predictors of psychological stress. Results of this analysis are presented in Table 16. The final analysis revealed that cognitive dimensions and perceived institutional preparedness significantly predicted gender- and education-adjusted psychological stress; adjusted $R^2 = .05$, $F(8, 1112) = 8.559$, $p <.001$. This relationship was largely attributable to perceived probability ($\beta = .15$, $t = 4.55$, $p < .001$) and perceived coping efficacy ($\beta = -.07$, $t = -2.31$, $p < .05$), which emerged as significant unique predictors. Addition of perceived institutional preparedness variables into the equation did not significantly improve the prediction above and beyond the contribution of cognitive dimensions.

Table 16

Demographic, Cognitive, and Perceived Institutional Preparedness Variables as Predictors of Psychological Stress

Predictor	*B*	*SE B*	*β*	Adjusted R^2
Step 1				
Gender	2.59	.65	.12***	
Education	-.74	.32	-.07*	.02***
Step 2				
Gender	1.54	.66	.07*	
Education	-.27	.32	-.03	
Perceived probability	.21	.05	.15***	
Perceived seriousness	.04	.11	.01	
Perceived personal impact	.17	.10	.07	
Perceived coping efficacy	-.15	.06	-.07*	.05***
Step 3				
Gender	1.56	.66	.07*	
Education	-.27	.32	-.03	
Perceived probability	.21	.05	.15***	
Perceived seriousness	.04	.11	.01	
Perceived personal impact	.17	.10	.08	
Perceived coping efficacy	-.14	.06	-.07*	
Perceived governmental preparedness	-.09	.16	-.02	
Perceived front-line preparedness	.02	.13	.01	.05***

Note. $\Delta R^2 = .04$ for step 2 ($p < .001$); $\Delta R^2 < .01$ for step 3 (p = n.s.).

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

In light of the general nature of psychological stress, it was not surprising to find that this analysis only accounted for 5% of the variance in psychological stress. A higher proportion of explained variance could be expected if the response being predicted were more specific to terrorism. Analyses were therefore also performed with cognitive dimensions and perceived institutional preparedness as predictors of terrorism-related worry and behaviours to determine whether this was the case. For the analyses that follow, only cases with complete data on all cognitive, social contextual, and behavioural variables involved in the mediation model were included.

Predictors of Worry About Terrorism

As shown in Table 17, it was found that cognitive dimensions and perceived institutional preparedness significantly predicted gender- and education-adjusted worry about terrorism; adjusted $R^2 = .41$, $F(8, 1091) = 95.98$, $p <.001$. Forty-one percent of the variance in worry was accounted for by this model. This relationship was largely attributable to the cognitive dimensions, with three of them emerging as significant unique predictors of gender- and education-adjusted worry about terrorism. More specifically, gender- and education-adjusted worry about terrorism was positively associated with perceived probability ($\beta = .56$, $t = 21.67$, $p < .001$) and perceived personal impact ($\beta = .19$, $t = 5.75$, $p < .001$), while it was negatively associated with perceived seriousness ($\beta = -.11$, $t = -3.41$, $p < .001$).

Table 17

Demographic, Cognitive, and Perceived Institutional Preparedness Variables as Predictors of Worry About Terrorism

Predictor	*B*	*SE B*	*β*	Adjusted R^2
Step 1				
Gender	.28	.06	.14***	
Education	-.22	.03	-.22***	.07***
Step 2				
Gender	.05	.05	.02	
Education	-.09	.02	-.09***	
Perceived probability	.08	<.01	.56***	
Perceived seriousness	-.03	.01	-.11**	
Perceived personal impact	.04	.01	.19***	
Perceived coping efficacy	-.01	.01	-.04	.40***
Step 3				
Gender	.04	.05	.02	
Education	-.09	.02	-.09***	
Perceived probability	.07	<.01	.56***	
Perceived seriousness	-.03	.01	-.11***	
Perceived personal impact	.04	.01	.19***	
Perceived coping efficacy	-.01	.01	-.05*	
Perceived governmental preparedness	.02	.01	.04	
Perceived front-line preparedness	.02	.01	.05	.41***

Note. $\Delta R^2 = .34$ for step 2 ($p < .001$); $\Delta R^2 = .01$ for step 3 ($p < .01$).

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

Predictors of Behavioural Response to Terrorism

The model used to predict psychological stress and worry about terrorism above was also used to predict terrorism-related individual preparedness, information seeking, and avoidance behaviours. The model was found to significantly predict all of these behaviours, although the proportion of explained variance was much lower than it was for worry (ranging from 6% to 10%).

Individual preparedness behaviour. As shown in Table 18, cognitive dimensions and perceived institutional preparedness significantly predicted gender- and education-adjusted individual preparedness behaviour; adjusted $R^2 = .10$, $F(8, 1091) = 15.25$, $p < .001$. This relationship was largely attributable to perceived probability ($\beta = .25$, $t = 7.98$, $p < .001$), perceived coping efficacy ($\beta = .06$, $t = 2.15$, $p < .05$), and perceived front-line preparedness ($\beta = .15$, $t = 4.06$, $p < .001$), which emerged as significant unique predictors.

Table 18

Demographic, Cognitive, and Perceived Institutional Preparedness Variables as Predictors of Individual Preparedness Behaviour

Predictor	*B*	*SE B*	*β*	Adjusted R^2
Step 1				
Gender	.07	.13	.02	
Education	<-.01	.06	<-.01	< -.01
Step 2				
Gender	-.08	.13	-.02	
Education	.10	.06	.05	
Perceived probability	.07	.01	.27***	
Perceived seriousness	-.03	.02	-.06	
Perceived personal impact	.03	.02	.06	
Perceived coping efficacy	.03	.01	.08**	.07***
Step 3				
Gender	-.14	.12	-.03	
Education	.12	.06	.06*	
Perceived probability	.07	.01	.25***	
Perceived seriousness	-.03	.02	-.06	
Perceived personal impact	.03	.02	.06	
Perceived coping efficacy	.03	.01	.06*	
Perceived governmental preparedness	.02	.03	.03	
Perceived front-line preparedness	.10	.02	.15***	.10***
Step 4				
Gender	-.15	.12	-.04	
Education	.14	.06	.07*	
Perceived probability	.05	.01	.19***	
Perceived seriousness	-.03	.02	-.05	
Perceived personal impact	.02	.02	.04	
Perceived coping efficacy	.03	.01	.07*	
Perceived governmental preparedness	.02	.03	.03	
Perceived front-line preparedness	.09	.02	.14***	
Worry	.24	.08	.12***	.11***

Note. ΔR^2 = .07 for step 2 ($p < .001$); ΔR^2 = .03 for step 3 ($p < .001$); ΔR^2 = .01 for step 4 ($p < .001$).

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

Information seeking behaviour. Cognitive dimensions and perceived institutional preparedness also significantly predicted gender- and education-adjusted information seeking behaviour, as shown in Table 19; adjusted $R^2 = .06$, $F(8, 1091) = 9.98$, $p <.001$. Here, all four of the cognitive dimensions emerged as significant unique predictors. Gender- and education-adjusted information seeking was positively associated with perceived probability ($\beta = .16$, $t = 4.88$, $p < .001$), perceived personal impact ($\beta = .08$, $t = 1.93$, $p = .05$), and coping efficacy ($\beta = .10$, $t = 3.43$, $p < .001$), while it was negatively associated with perceived seriousness ($\beta = -.08$, $t = -2.05$, $p < .05$).

Table 19

Demographic, Cognitive, and Perceived Institutional Preparedness Variables as Predictors of Information Seeking Behaviour

Predictor	*B*	*SE B*	*β*	Adjusted R^2
Step 1				
Gender	-.15	.05	-.09**	
Education	.10	.02	.12***	.02***
Step 2				
Gender	-.18	.05	-.11***	
Education	.12	.02	.15***	
Perceived probability	.01	<.01	.16***	
Perceived seriousness	-.02	.01	-.08*	
Perceived personal impact	.01	.01	.08*	
Perceived coping efficacy	.02	.01	.11***	.06***
Step 3				
Gender	-.19	.05	-.12***	
Education	.12	.02	.15***	
Perceived probability	.01	<.01	.16***	
Perceived seriousness	-.02	.01	-.08*	
Perceived personal impact	.01	.01	.08*	
Perceived coping efficacy	.02	.01	.10***	
Perceived governmental preparedness	.02	.01	.01	
Perceived front-line preparedness	.01	.01	.03	.06***
Step 4				
Gender	-.19	.05	-.12***	
Education	.13	.02	.17***	
Perceived probability	.01	<.01	.08*	
Perceived seriousness	-.01	.01	-.07	
Perceived personal impact	.01	.01	.05	
Perceived coping efficacy	.02	.01	.11***	
Perceived governmental preparedness	.02	.01	.05	
Perceived front-line preparedness	.01	.01	.03	
Worry	.11	.03	.14***	.07***

Note. $\Delta R^2 = .04$ for step 2 ($p < .001$); $\Delta R^2 = .01$ for step 3 ($p < .05$); $\Delta R^2 = .01$ for step 4 ($p < .001$).

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

Avoidance behaviour. Last, cognitive dimensions and perceived institutional preparedness significantly predicted gender- and education-adjusted avoidance behaviour; adjusted $R^2 = .08$, $F(8, 1091) = 12.25$, $p <.001$. However, as shown in Table 20, only perceived probability ($\beta = .25$, $t = 7.64$, $p < .001$), perceived personal impact ($\beta = .09$, $t = 2.10$, $p < .05$), and perceived front-line preparedness ($\beta = .09$, $t = 2.35$, $p < .05$) emerged as significant unique predictors.

Table 20

Demographic, Cognitive, and Perceived Institutional Preparedness Variables as Predictors of Avoidance Behaviour

Predictor	*B*	*SE B*	*β*	Adjusted R^2
Step 1				
Gender	.17	.05	.10***	
Education	-.03	.03	-.04	.01***
Step 2				
Gender	.09	.05	.05	
Education	.01	.03	.02	
Perceived probability	.03	< .01	.25***	
Perceived seriousness	-.01	.01	-.05	
Perceived personal impact	.02	.01	.08*	
Perceived coping efficacy	< -.01	.01	-.01	.07***
Step 3				
Gender	.08	.05	.05	
Education	.02	.03	.02	
Perceived probability	.03	< .01	.25***	
Perceived seriousness	<-.01	.01	-.06	
Perceived personal impact	.02	.01	.09*	
Perceived coping efficacy	< -.01	.01	-.01	
Perceived governmental preparedness	-.02	.01	.05	
Perceived front-line preparedness	.02	.01	.09*	.08***
Step 4				
Gender	.08	.05	.05	
Education	.03	.03	.04	
Perceived probability	.02	< .01	.16***	
Perceived seriousness	-.01	.01	-.04	
Perceived personal impact	.01	.01	.06	
Perceived coping efficacy	< -.01	.01	-.01	
Perceived governmental preparedness	-.02	.01	-.05	
Perceived front-line preparedness	.02	.01	.08*	
Worry	.12	.03	.15***	.09***

Note. $\Delta R^2 = .07$ for step 2 ($p < .001$); $\Delta R^2 < .01$ for step 3 (p = n.s.); $\Delta R^2 = .01$ for step 4 ($p < .001$).

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

Mediation Tests

Since previous research suggests that individuals' behavioural responses to terrorism may also be a function of the extent to which they worry about terrorism, the potential role of worry as a mediator of the relationships of cognitive dimensions and of perceived institutional preparedness with behavioural responses to terrorism was examined in a final series of analyses.

First, a multiple linear regression analysis using data from this sample revealed that cognitive dimensions and perceived institutional preparedness significantly predicted worry about terrorism; adjusted $R^2 = .40$, $F(6, 1093) = 124.29$, $p < .001$. As shown in Table 21, results were similar to those of the previous analysis predicting gender- and education-adjusted worry about terrorism, with the exception of additional significant positive associations of perceived coping efficacy ($\beta = -.06$, $t = -2.51$, $p < .05$) and perceived front-line preparedness with worry ($\beta = .06$, $t = 2.03$, $p < .05$).

Table 21

Cognitive and Perceived Institutional Preparedness Variables as Predictors of Worry About Terrorism

Predictor	*B*	*SE B*	*β*	Adjusted R^2
Step 1				
Perceived probability	.08	< .01	.58***	
Perceived seriousness	-.03	.01	-.11***	
Perceived personal impact	.04	.01	.20***	
Perceived coping efficacy	-.01	.01	-.05*	.40***
Step 2				
Perceived probability	.08	< .01	.57***	
Perceived seriousness	-.03	.01	-.11***	
Perceived personal impact	.04	.01	.20***	
Perceived coping efficacy	-.01	.01	-.06*	
Perceived governmental preparedness	.02	.01	.04	
Perceived front-line preparedness	.02	.01	.06*	.40***

Note. $\Delta R^2 = .01$ for step 2 ($p < .001$).

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

Second, a set of sequential multiple linear regression analyses revealed that worry significantly predicted gender- and education-adjusted individual preparedness behaviour, adjusted $R^2 = .05$, $F(3, 1096) = 21.95$, $p < .001$, with $\beta = .25$, $t = 8.10$, $p < .001$; information seeking behaviour, adjusted $R^2 = .05$, $F(3, 1096) = 21.80$, $p < .001$, with $\beta = .19$, $t = 6.22$, $p < .001$; and avoidance behaviour, adjusted $R^2 = .07$, $F(3, 1096) = 28.61$, $p < .001$, with $\beta = .26$, $t = 8.51$, $p < .001$.

Third, worry was added into the model predicting individual preparedness following the cognitive dimensions and perceived institutional preparedness variables (Table 18). This only led to a slight reduction in the relationships of perceived probability ($\beta = .19$, $t = 4.94$, $p < .001$) and of perceived front-line preparedness ($\beta = .14$, $t = 3.91$, $p < .001$) with gender- and education-adjusted individual preparedness behaviour. These mediation effects were found to be statistically significant, as indicated by Sobel test statistics of 7.68, $p < .001$ and 2.04, $p < .05$, respectively (Sobel, 1982; Soper, 2007).

Similarly, adding worry into the model predicting information seeking behaviour attenuated the relationships of perceived probability ($\beta = .08$, $t = 2.10$, $p < .05$), of perceived seriousness ($\beta = -.07$, $t = -1.67$, $p > .05$), and of perceived personal impact ($\beta = .05$, $t = 1.28$, $p > .01$) with gender- and education-adjusted information seeking behaviour (Table 19). According to Sobel test statistics, worry only significantly mediated the effects of perceived probability (6.11, $p < .001$) and of perceived personal impact (4.34, $p < .001$) (Sobel, 1982; Soper, 2007).

Last, relationships of perceived probability ($\beta = .16$, $t = 4.29$, $p < .001$), of perceived personal impact ($\beta = .06$, $t = 1.42$, $p > .05$), and of perceived front-line preparedness ($\beta = .08$, $t = 2.16$, $p < .001$) with gender- and education-adjusted avoidance

behaviour were significantly reduced when worry was added to the equation, yielding Sobel test statistics of 8.18, $p < .001$; 4.93, $p < .001$; and 2.05, $p < .05$, respectively (Sobel, 1982; Soper, 2007) (Table 20).

Discussion

The purpose of the present study was to evaluate some hypotheses drawn from a model integrating cognitive and social contextual factors as predictors of individual response to terrorism. Overall psychological stress and worry about terrorism were related to perceptions of terrorism on various cognitive dimensions. Although to a much lesser extent, there was some evidence of a relationship between worry and perceptions of terrorism risk management. Also, behavioural response to terrorism appeared to be associated with many of the same factors as worry about terrorism. An examination of its relationship with perceptions of terrorism risk management suggested that these may play a role by establishing "social norms" regarding individual preparedness. Last, further analyses revealed that worry partially mediated the relationships of perceptions of terrorism and terrorism risk management with some types of behavioural response to terrorism.

Stress reactions are among the most well-document effects of terrorist events (DiMaggio & Galea, 2006; Schuster et al., 2001; Rubin et al., 2005). It was nevertheless interesting to find that mere perceptions of the threat of terrorism were also significantly, although modestly, associated with overall psychological stress. This relationship could mostly be attributed to the perceived probability and perceived coping efficacy regarding CBRNE terrorist events. As such, these findings are consistent with a transactional conceptualization of stress and coping, where the degree of psychological stress

experienced by individuals during stressful situations is considered to be a function of their appraisals of threat and coping surrounding the event (Lazarus & Folkman, 1984). Given the fairly broad nature of psychological stress, the modesty of its relationships with perceptions of terrorism and terrorism risk management was not surprising.

When relationships of perceptions of terrorism and terrorism risk management were examined with worry about terrorism—a more specific index of psychological response—much stronger associations were observed. Similar to previous findings for the most part, individuals who perceived terrorism as more probable, as having a greater personal impact, and who had a lower perceived coping efficacy were more worried about terrorism (Lee et al., 2007b). However, individuals who perceived terrorism as having more serious consequences were less worried about it.

This last finding is particularly interesting, since perceived seriousness was associated with increased worry in bivariate correlations. Given the high correlation (r = .65) observed between perceived seriousness and perceived personal impact, one possible interpretation is that any contribution of perceived seriousness to heightened worry above and beyond that already accounted for by perceived personal impact in the regression analysis produced diminishing returns. More specifically, at some point, terrorism may be regarded as having such serious consequences that individuals feel there is no point in worrying about it. This interpretation may also relate to some comments made by respondents in the previous qualitative study regarding their perceived control over terrorism (Lee et al., 2007a). In particular, one woman indicated that she was not worried about terrorism, no matter how horrible it was, because there was nothing she could do about it. Possibly, heightened awareness of the seriousness of terrorism contributes to a

sense of powerless over this threat, which ultimately gives rise to a tendency to respond apathetically.

Despite the fact that all cognitive dimensions were significantly associated with worry about terrorism, it was clear that perceived probability was the strongest predictor. In light of the fact that Canada has not experienced a recent major attack, it seems reasonable that Canadians would be more affected by their evaluations of the likelihood and uncertainty of such an occurrence. This finding is also reminiscent of some observations made in the disaster literature. Although research has shown that people very rarely react to disaster situations with panic, it has been noted that such states of intense fear are a function of i) the perceived immediacy of danger, ii) the perception of only a few escape routes, iii) the perception that these are closing, and iv) a lack of communication about the situation (Helsoot & Ruitenberg, 2004; Lindell & Perry, 2003). Thus, perceptions of a likely threat and uncertainty about the situation appear to be central to panic reactions. While important conceptual distinctions exist between panic and worry, it seems reasonable that a similar set of cognitive factors were found to underlie worry in the present study. Hence, perceptions of the likelihood and uncertainty regarding terrorism may arouse fear-related processes at both pre-event and event phases.

Consistent with the well-articulated idea that control-related perceptions serve a protective function (Bonetti, Johnston, Rodriguez-Marin, Pastor, Martin-Aragon, Doherty, et al., 2001), the present findings also revealed a tendency for those with a higher perceived coping efficacy to be less worried about terrorism in general. In previous studies, perceived control was found to be associated with higher rather than lower worry about terrorism (Klar, Zakay, & Sharvit, 2002; Lee et al, 2007b). Indeed, it

has been noted that perceived control may not be a positive attribute in uncontrollable situations (Walker, 2001; Wallston & Wallston, 1981). Given the relative difficultly of predicting and preventing terrorist events, one can readily understand how terrorism might be construed as one such situation. The present study nevertheless demonstrates the possible benefits of perceived control over some aspects of terrorism; namely, its consequences. As such, findings stress the importance of terrorism risk management strategies that focus on fostering coping efficacy for a potential event among individuals and communities.

Worry was also associated with some elements of perceived institutional preparedness in addition to cognitive factors, although only in bivariate correlations and the regression analysis without adjustment for gender and education. In general, perceived institutional preparedness was associated with increased worry. This finding is in contrast to observations made in the previous qualitative study (Lee et al., 2007a). While this finding may seem counter-intuitive, it may relate to a greater awareness of terrorism-related concerns among respondents who perceive authorities as taking action to prepare for possible events.

In addition to worry, the present study examined individual preparedness, information seeking, and avoidance as behavioural responses to terrorism. Analyses revealed that many of the same factors associated with worry are associated with behavioural response to terrorism. For instance, perceived probability and perceived personal impact of CBRNE terrorism were associated with increased engagement in most, if not all behavioural responses, providing converging evidence of the longstanding view that perceived threat can motivate individuals to protect themselves (Weinstein,

1988, 1993, 2000; Weinstein, Sandman, & Roberts, 1990; Witte, 1998). On the other hand, perceived seriousness of CBRNE terrorism was associated with decreased information seeking in the regression analysis. Accordingly, an abundant literature on fear appeals documents the paradoxical role of excessively high perceived threat in motivating protective or precautionary behaviour (Witte, 1998), as it may lead to the perception that one's resources to cope with the threat are exceeded.

As expected, perceived coping efficacy was associated with individual preparedness and information seeking. Again, support was found for the protective function of perceived control as that which fosters health protective and preventative behaviours (Baranowski, Perry, & Parcel, 2002; Bonetti et al., 2001; Janz & Becker, 1984; Rogers, 1975, 1983; Walker, 2001; Weinstein, 1988). Taken with the fact that perceived coping efficacy was not significantly associated with avoidance behaviour, the potential utility of interventions aimed at fostering such beliefs are further emphasized. More specifically, these findings suggest that raising individuals' awareness about their ability to manage the consequences of possible attacks may reduce worry about terrorism, as well as encourage individual preparedness and information seeking behaviour. What is more, doing so is not likely to result in undesired avoidance behaviour.

Although to a lesser extent than perceptions of terrorism, perceptions of terrorism risk management were also associated with some behavioural responses to terrorism. More specifically, a higher perceived level of front-line preparedness significantly predicted increased engagement in individual preparedness and avoidance behaviours. Reminiscent of some health behaviour theories (e.g., theory of reasoned action, theory of planned behaviour; Ajzen, 1991; Fishbein & Ajzen, 1975), perceived institutional

preparedness may play a role similar to that of social norms by fostering greater individual action. Accordingly, Tierney (1993) noted that "sustained hazard reduction efforts are not likely to occur without the involvement of organized interests that act as 'champions' or 'advocates', (i.e., scientists, public officials, grass-roots citizens' advocacy groups)" (p. 17). Nonetheless, findings suggest that the contribution of perceived institutional preparedness is secondary to that of perceptions of terrorism.

Given the fact that behavioural response to terrorism was predicted by many of the same variables as worry, it was not surprising to find that this variable also partially mediated some of the significant associations between these factors and behavioural response to terrorism. Evidence was strongest for mediation of the relationship between perceived probability of CBRNE terrorism and indices of behavioural response to terrorism. Although to a lesser degree, worry also partially mediated the relationship between perceived front-line preparedness and indices of behavioural response to terrorism.

While a "social norms" hypothesis might explain the positive association between perceived front-line preparedness and individual preparedness behaviour, the basis for its positive association with avoidance is less clear. A number of mechanisms could explain this relationship. For instance, awareness of actions taken by front-line workers to prepare for terrorism might lead individuals to believe that an attack is more likely. In turn, this may heighten worry about the occurrence of an attack and encourage any behavioural means to cope with this worry. Alternatively, this may directly trigger attempts to control the occurrence of terrorism by avoiding places perceived as potential targets. While either explanation is possible, exploration of this issue was beyond the

scope of the present study. Rather, this study paints a general picture of avoidance behaviour, which requires further attention in future research. It should also be stressed that the measure used to assess avoidance behaviour did not demonstrate adequate reliability, despite emerging as a separate factor of behavioural response in exploratory and confirmatory factor analyses (Lee & Lemyre, 2007). As such, findings pertaining to avoidance should be interpreted with caution.

Additional limitations of this study must be acknowledged. First, its cross-sectional nature limited interpretations of the findings. As noted by Weinstein and Nicholich (1993), a major difficulty with correlational research on the association between risk perception and behaviour relates to the reciprocal nature of their relationship: As much as perceived risk can determine the extent to which one will take precautions over a hazard, the extent to which one has already taken precautions can also determine the level of risk perceived to be associated with the hazard. Cross-sectional designs make it difficult to disentangle these different processes, oftentimes attenuating the magnitude of observed relationships (Weinstein & Nicholich, 1993). Research on the way individuals perceive and respond to terrorism over time will shed greater light onto the dynamic relationships among these variables.

Second, the self-report nature of the data raises concerns about reporting biases as well as common method variance. Although self-report measures of health behaviour are generally regarded as providing valid and reliable information, their reliability can be impacted by random recall error (that is, non-systematic mistakes in recalling past behaviours; Palmer, Graham, Taylor, & Tatterson, 2002). Measures affected by random recall error are less precise, again potentially attenuating the magnitude of observed

relationships. As a result, the use of self-report measures might also have contributed to the fact that a large proportion of variance in behavioural responses to terrorism remained unexplained. Nevertheless, predicting behaviour remains a challenge (Gebhardt & Maes, 2001; Ogden, 2003; Sutton, 1998). Particularly in the context of individual preparedness, a number of additional factors can act as barriers to taking action, including the community resources individuals have at hand to help them prepare for an emergency, or their level of trust in various information sources (Finnis, 2004; Paton et al., 2005). The present study only examined a subset of predictors of behavioural response to terrorism and does not dismiss the possible contribution of other unmeasured factors.

A final limitation entails the low response rate of the survey (5.2% of all numbers dialled, 8.1% as calculated using the Performance Management and Recognition System method of calculation; Allen, Ambrose, Halpenny, & Simmie, 2003). Although common in telephone surveys of longer length (Allen et al., 2003; Wilson, Roe, & Wright, 1998), this limitation raises questions about the generalizability of findings to the overall Canadian population. Despite being stratified to resemble the Canadian population in terms of region, as well as age and gender within region based on 2001 Census data, this sample tended to have a higher level of education and income than the general population. This limitation must therefore be taken into consideration when evaluating the implications of findings for public policy.

To conclude, the present study represents an important step in understanding and modelling the factors related to behavioural response to terrorism. Such models can be informative to the development of risk management strategies not only by shedding light onto what psychological or behavioural issues might ensue in the face of a crisis and

why, but also in terms of their eventual potential of informing the design of programs aimed at improving the way individuals respond to terrorism. In the present study, findings suggest that campaigns aimed at raising awareness about the threat of terrorism could help encourage individual preparedness and planning. However, they also point to possible undesirable effects of these campaigns on worry and avoidance behaviours. What is more, attention is focused on the potentially counterproductive effects of overemphasizing the threatening nature of terrorism in efforts to motivate information seeking about potential scenarios. Strategies emphasizing what individuals can do to most effectively cope with a potential event may prove to be an effective means of tempering such reactions. By accounting for more dynamic relationships, future research using longitudinal designs could help identify other means to improve the way individuals respond to terrorism.

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Contributions of Co-Authors and Author Note

The work presented in this paper was carried out as part of the first author's doctoral dissertation, which received funding from the Social Sciences and Humanities Research Council (SSHRC) of Canada and the Ontario Graduate Scholarship Program. The first author developed the survey questionnaire, developed the conceptual framework, planned as well as performed all analyses on which the paper reports, and wrote the manuscript. Louise Lemyre provided feedback on the conceptual framework and planned analyses. She has agreed to the use of the paper in the first author's dissertation, and to its eventual publication consistent with any limitations set by publisher requirements.

The project for which the survey was conducted was led by Louise Lemyre and supported by the CBRNE Research and Technology Initiative (CRTI) of Canada (project # CRTI02-0080RD), as well as the SSHRC. The authors would like to acknowledge the contributions of Mélanie Clément, Wayne Corneil, Daniel Krewski, Stacey Gibson, Marie-Pierre L. Markon, Tim Ramsay, Michelle C. Turner, and Michael Tyshenko in the conduct of this work.

CHAPTER 6: GENERAL DISCUSSION

The goal of this thesis was to further develop, test, and refine a social-cognitive model of individual response to terrorism. Doing so is recognized as an important step in developing strategies aimed at improving the management of terrorism threats (Boscarino, Figley, & Adams, 2003; Lemyre, Clément, Corneil, Craig, Boutette, Tyshenko, et al., 2005). Based on the literature, a preliminary model was developed in the introduction to serve as a framework on which to base empirical investigations. A first study examined the specificity of terrorism risk perceptions through comparisons with those of other hazards using data of a national survey on health risk perception. This analysis underscored the need to further clarify some concepts and identify additional contextual factors that might also contribute to individual response to terrorism. Hence, a qualitative approach was taken in a second study specifically to address these gaps. Based on findings, a descriptive model was developed of cognitive and contextual determinants of individual response to terrorism. In subsequent studies, some concepts and parameters of this model were further elaborated and evaluated in a larger sample of Canadians. This last model extended existing theory by incorporating perceptions of institutional preparedness as social contextual factors related to individual response to terrorism in Canada. In the next section, findings of each of these studies are discussed along with recommendations for future research and implications for terrorism risk management.

Specificity of Terrorism Perceptions

In the face of events such as the attacks of September 11, 2001 and the Madrid or London bombings of 2004 and 2005, respectively, it is not surprising that the body of research on terrorism has grown in recent years. For the most part, this work has taken

place in countries directly affected by these events, often focusing on their effects on the public's perceptions, psychological health, and behaviours (Fischhoff, Gonzalez, Small, & Lerner, 2003; Halpern-Felsher & Milstein, 2002; Huddy, Feldman, Capelos, & Provost, 2002; Miguel-Tobal, Cano-Vindel, Iruarrízaga, González-Ordi, & Galea, 2005; Rubin, Brewin, Greenberg, Simpson, & Wessely, 2005; Schuster, Stein, Jaycox, Collins, Marshall, Elliott, et al., 2001). As such, these studies provide less insight into how terrorism might be perceived at pre-event stages of an attack. Moreover, missing from many of these studies is a contextualized understanding of perceptions regarding this threat. Most studies focus on perceptions of terrorism alone, and it remains unclear whether respondents would truly identify this threat as a risk management priority relative to all other hazards they face.

In order to address these gaps, a multi-method, multi-hazard approach was used to compare perceptions of terrorism with those of other hazards in a sample of Canadians. In a first step, general perceptions of terrorism as well as other hazards were assessed using a word association task. Results revealed a number of interesting features about perceptions of terrorism. A most striking finding was that socio-political factors (i.e., political groups/leaders, government, conflict) were much more salient in respondents' representations of terrorism relative to other hazards. Also, this hazard elicited the fewest number of word associations reflecting individual behaviour. In fact, terrorism emerged as the only hazard for which management issues (i.e., measures taken by authorities to control terrorism) emerged more frequently than individual behaviours in individuals' representations, pointing to a possible tendency for individuals to assign responsibility for the control of terrorism to higher-level authorities. Hence, findings of the word

association tasks underscored the tendency for terrorism to be perceived as relatively difficult to control. Similar results were observed throughout this first study.

In a second step, perceptions of terrorism were compared with those of other hazards on the key dimensions of threat, uncertainty, and control. Of particular interest was the fact that respondents typically did not perceive terrorism as posing a relatively high level of threat. This finding is in contrast to observations made in studies undertaken in the United States (Eisenman, Wold, Fielding, Long, Setodji, Hickey, et al., 2006; Fischhoff, Gonzalez, Small, & Lerner, 2005). For instance, 59% of respondents in a Los Angeles county survey reported believing that a terrorist attack on Los Angeles was somewhat or very likely (Eisenman et al., 2006). Similarly, respondents of a longitudinal study by Fischhoff and his colleagues estimated the probability of being hurt in a terrorist attack in the next 12 months to be 19.2% and 20.3% on average in 2001 and 2002, respectively (Fischhoff et al., 2005).

Despite perceiving terrorism as a relatively low threat, respondents perceived it as the most uncertain and uncontrollable of hazards. A previous study among Israeli and Turkish citizens revealed similar trends regarding perceived control over terrorism (Klar, Zakay, & Sharvit, 2002). Notwithstanding this similarity, an obvious distinction between Canadians and American, Israeli, or Turkish citizens entails the fact that no terrorist attacks have recently taken place on Canadian soil. From this angle, it can readily be understood how Canadians might have more relative difficulty imagining an attack on Canada. Canada's limited experience with terrorism may also give rise to tremendous uncertainty regarding what to expect from an event or how to respond. Accordingly, in a series of qualitative interviews conducted a few months after this survey, several

participants indicated that they did not know what actions to take in order to protect their safety or the safety of their family should anything happen (Lemyre, Clément, & Gibson, 2004). Such uncertainties may contribute to a perceived lack of control over this threat.

In addition to comparing perceptions of terrorism to those of other hazards on these key dimensions, their patterns of relationships with worry were compared across hazards. In line with previous studies, perceived threat and perceived uncertainty were associated with increased worry for all hazards (Dröttz-Sjöberg & Sjöberg, 1990; Schnur, DiLorenzo, Montgomery, Erblich, Winkel, Hall, et al., 2006; Sjöberg, 1998). However, the pattern of relationships between perceptions of control and worry was less consistent. While associated with decreased worry for some hazards (cellular phones), perceived control was unexpectedly associated with increased worry for both terrorism and climate change. Indeed, perceptions of the level of threat, uncertainty, and control associated with these hazards were most similar (and most strongly correlated in post hoc analyses [not presented here]), pointing in favour of their distinction from the other hazards as "environmental" rather than "lifestyle" hazards. Hence, findings suggested that high perceived control over environmental hazards may not be adaptive.

In general, perceptions of control are considered beneficial, as they have been associated in several studies with better physical health and psychological well-being (Bonetti, Johnston, Rodriguez-Marin, Pastor, Martin-Aragon, Doherty, et al., 2001; Skinner, 1996). Nevertheless, it has been noted that "total reliance on personal control is likely to be maladaptive in uncontrollable situations" (Bruchon-Schweitzer, 2002; Naus, Price, & Peter, 2005; Walker, 2001, p. 3). Given that both terrorism and climate change risks relate to a wide set of social issues (as opposed to individual activities), these

hazards might be considered examples of such situations. However, findings of previous studies examining the relationship between perceived control and psychological response have been mixed. One recent study revealed that perceived control over terrorism was associated with decreased negative affect among Turkish and Israeli university students (Shiloh, Güvenç, & Önkal, 2007). In contrast, another study among Israeli citizens found that perceived control was associated with increased worry about terrorism (Klar et al., 2002).

In addition to the fact that these studies examined different psychological responses, differential conceptualizations of perceived control might also account for these inconsistencies. In the first study, indices used to assess perceived control seemed to express an underlying lack of fatalism rather than a sense of personal control. By contrast, perceived control in the second study was assessed as citizens' perceived ability "to reduce their chances of victimization in terrorist attacks" (Klar et al., 2002, p. 207). This latter conceptualization is arguably closer to the one adopted in the first study of this thesis, where indices of perceived control reflected one's level of "personal control over terrorism risks."

Also noteworthy is the fact that these indices appear to reflect one's perceived control over the occurrence of terrorism. In light of inherent difficulties in predicting and assessing terrorist events (Kunreuther, 2002), examining individuals' perceptions of control over the consequences rather than the occurrence of terrorism may be more relevant. Indeed, Benight and his colleagues found that perceived coping efficacy (which might be considered a form of perceived control over the consequences of an event) was associated with lower trauma-related distress following the Oklahoma City bombing

(Benight, Freyaldenhoven, Hughes, Ruiz, Zoschke, & Lovallo, 2000). Hence, this form of control may have beneficial rather than detrimental effects. This issue was therefore addressed in later studies.

Towards a Social-Cognitive Model of Individual Response to Terrorism

Having used a multi-hazard approach in the first study, a better understanding was achieved of the specific characteristics of perceptions of terrorism in Canada. Terrorism was not only perceived as posing a low threat, as highly uncertain, and highly uncontrollable; representations of this threat also encompassed a wide range of socio-political factors. Hence, findings of the first study pointed to the need to elaborate on some social contextual factors in order to develop a more tailored model of individual response to terrorism. In order to do so, a qualitative approach was taken, as it was believed that it would provide more insight into such factors.

Transcripts of 21 interviews that took place across Canada with members of the public on their health risk perceptions were subjected to a qualitative analysis. Sections of interest were those pertaining to discussions about concerns and decisions regarding terrorism. Respondents discussed a number of themes that were consistent with the ideas of perceived threat, uncertainty, and control as important cognitive dimensions associated with individual response to terrorism. Most importantly, however, this study helped identify some additional social contextual factors of import. Specifically, respondents discussed a number of *Context Issues* in relation to their concerns and decisions regarding terrorism. This theme encompassed references made to timing relative to an event, various types of terrorism of concern, and attitudes towards the regulation of terrorism

risk. Hence, the importance of conducting research and developing distinct models of response at pre-event, event, and post-event phases of an event was made clear, as well as the need to assess perceptions regarding more specific types of terrorism. Most notably, however, findings suggested that it might be useful to include attitudes towards regulation in models of individual response to terrorism.

In addition to clarifying these cognitive and social contextual factors, this second study also revealed some important characteristics of individual response to terrorism in Canada. For instance, respondents were typically not concerned or worried about terrorism, contrasting findings of U.S. and U.K. based studies (Boscarino et al., 2003; Redlener, Markensen, Grant, Berman, & McKenzie, 2004; Rubin et al., 2005). Also, the majority of behaviours reported were aimed at avoiding potential attacks through altered travel plans, providing additional support to the numerous studies documenting changes in travel decisions in the face of terrorism (Fischhoff, Bruine de Bruin, Perrin, & Downs, 2004; Han, 2005; Sönmez & Graefe, 1998a, 1998b). By contrast, respondents rarely reported behavioural changes aimed at preparing or planning for a potential attack. These findings are consistent with the literature on preparedness, which highlights the widespread tendency for individuals to remain unprepared for various potential disasters (Duval & Mulilis, 1999; Lindell & Whitney, 2000; Mulilis & Duval, 1995, 1997; Paton, 2003). Unfortunately, individual preparedness is considered to be of chief importance to building resilience in communities facing a threat (Finnis, 2004; Paton, 2003; Paton & Johnston, 2001). Findings therefore drew attention to the potential need for enhanced individual preparedness in Canada. In order to shed light on potential strategies that might help achieve this, the remaining studies evaluated the interplay of cognitive and

social contextual correlates of psychological and behavioural responses to terrorism observed and modeled in this second study.

Evaluating the Social-Cognitive Model of Individual Response to Terrorism

Overall, findings of the second study suggested that psychological and behavioural responses to terrorism are a function of cognitive and contextual factors. They also appeared to support the idea that psychological response gives rise to behavioural response, possibly pointing to its mediating role in relationships of cognitive and contextual factors with behavioural response. Nevertheless, a quantitative evaluation of hypotheses was not possible in the second study, nor were its findings necessarily generalizable to larger samples. This model was therefore evaluated using survey data from a larger sample of Canadians. Prior to doing so, however, a series of preliminary factor analyses were performed to clarify the nature of some cognitive, contextual, and behavioural dimensions to be included in the model, and to determine the extent to which these were consistent with observations made in the second study.

For the most part, results of these preliminary analyses were consistent with cognitive dimensions found to be associated with individual response to terrorism in the second study. However, it was found that perceptions of terrorism on the dimensions of likelihood and uncertainty were strongly linked, forming a single latent factor. McCormick (2002) noted in previous work in the context of illness that uncertainty was often equated with loss of personal control. On the other hand, Mishel (1984) identified unpredictability as an important factor of uncertainty. Given the strong relationship

between perceived likelihood and the concept of prediction, findings therefore pointed in favour the latter perspective.

As contextual factors, perceptions of the level of preparedness of various authorities who play a role in the regulation of terrorism were examined. Findings revealed an important distinction between perceptions of the level of governmental preparedness and that of authorities playing more of a front-line role in disaster management. This distinction likely reflected perceived roles and responsibilities of these different categories of authorities in terrorism risk management.

Some parallels were also evident between the resulting latent dimensions of behavioural response to terrorism and those observed in the second study. However, much more emphasis had been put on individual preparedness behaviours in the survey from which data were drawn. Additional distinctions therefore emerged between individual preparedness and information seeking behaviours. Avoidance behaviours emerged as a distinct factor, although it consisted of fewer items and the scale used to measure these was less reliable.

In a next step, a series of analyses were performed in order to evaluate some of the parameters of the social-cognitive model developed in the second study, although adapted for observations made in preliminary analyses reported in the third study. Given the pervasiveness of stress reactions following terrorist events and the potential for worry and behavioural responses to reflect these (Schuster et al., 2001; Rubin et al., 2005), an additional objective was to determine whether perceptions of terrorism and institutional preparedness were associated with psychological stress. Overall, findings confirmed the view that cognitive factors were associated with psychological responses such as stress

and worry about terrorism. However, significant predictors of psychological stress only included perceived probability and perceived coping efficacy. In line with Lazarus and Folkman's (1984) transactional conceptualization of stress, psychological stress was associated with heightened perceived probability and lower perceived coping efficacy.

As expected, perceived probability of terrorism and personal impact were associated with increased worry. Similarly, Fischhoff and his colleagues (2004) observed a positive relationship between the perceived risk of being involved in a terror attack in various travel destinations (i.e., 1 in 10,000, 1 in 100,000, or 1 in 1,000,000, etc.) and worry about problems when travelling abroad. However, perceived seriousness of terrorism was associated with decreased worry, despite the fact that the converse was observed in bivariate correlations. A possible interpretation is that additional perceived seriousness of terrorism above and beyond personal impact could overwhelm individuals, giving rise to the view that there is no point in worrying about terrorism. Some fear appeals models of health behaviour (Rogers, 1975, 1983; Witte, 1992, 1994, 1998) posit that overly heightened perceptions of threat can give rise to defensive avoidance or denial. Possibly, respondents who perceived terrorism as having highly serious consequences reported less worry as a form of denial.

Also consistent with expectations was the finding that perceptions of control were associated with decreased worry when conceptualized as perceived coping efficacy. This relationship was consistent with findings of previous studies, where positive associations were observed between coping self-efficacy and trauma-related distress (Benight et al., 2000; Benight & Bandura, 2005).

Among social contextual factors, a higher level of perceived front-line preparedness was associated with increased worry about terrorism. However, it was noted that this relationship only achieved significance in analyses that did not control for demographic variables. While this finding is counter-intuitive, it may relate to greater awareness of terrorism-related concerns among respondents who perceive front-line workers as taking action to prepare for possible events. Consistent with this idea, Otway and Wynne (1989) noted that providing residents with vivid and memorable messages about emergency procedures can accentuate their anxiety in the process of siting hazardous plants.

Similar to worry, cognitive and social contextual factors were associated with the various types of behavioural response to terrorism. Consistent with most health behaviour models (Loewenstein, Weber, Hsee, & Welch, 2001; Rogers, 1975, 1983; Rosenstock, 1974; Weinstein, 1993; Witte, 1992, 1994, 1998), higher perceived probability and personal impact predicted greater engagement in most, if not all types of behaviours. As was worry, information seeking behaviour was associated with a higher perceived seriousness of the consequences of terrorism. Also in line with fear appeals models (Rogers, 1975, 1983; Witte, 1992, 1994, 1998), respondents who perceived terrorism this way may have engaged in less information seeking as a form of defensive avoidance.

Of particular interest was the fact that perceived coping efficacy only predicted increased engagement in individual preparedness and information seeking behaviours. Accordingly, perceptions of control are typically thought to draw individuals towards engaging in more adaptive forms of behaviour when faced with a health threat (e.g., behaviours aimed at controlling the threat) (Rimal & Real, 2003; Rogers, 1975, 1983;

Witte, 1992, 1994, 1998). On the other hand, specifications regarding the relationship between perceived control and less adaptive forms of behaviour are less clear (e.g., behaviours aimed at managing the fear). Findings of one study suggest that perceptions of control may reduce one's propensity to engage in avoidance behaviours. Specifically, this study revealed that respondents who read a government leaflet on terrorism preparedness (a behaviour which might have resulted in increased perceived control) were less likely to have the intentions of reducing their travel by bus, train, or tube into central London following the bombings of July 7, 2005 (Rubin et al., 2005). Nonetheless, findings of the fourth study suggest that the benefits of perceived control may be limited to its association with more adaptive behaviours.

Despite its association with increased worry about terrorism, perceived front-line preparedness was also associated with increased individual preparedness. This finding points to the potential role of favourable perceptions of risk management authorities in fostering rather than discouraging individual preparedness. Specifically, perceptions of institutional preparedness may play a role similar to that of social norms. However, their implication was clearly secondary to that of cognitive factors in the fourth study, perhaps as these are relatively more distal factors. Alternatively, such perceptions may be involved in individual response to terrorism through pathways other than those examined. For instance, they may play a more prominent role in shaping individuals' perceptions of terrorism. In line with Paton's social-cognitive model of disaster preparedness, they may also be involved in the gap between intention to prepare and actual preparedness (Paton, 2003; Paton, Smith, & Johnson, 2005). Unfortunately, examining the relationship

between such social contextual factors and individual response to terrorism in more detail requires longitudinal research.

In a last set of analyses, relationships of some cognitive and social contextual factors with individual response to terrorism were found to be partially mediated by worry about terrorism. Findings were most consistent for perceived probability and perceived front-line preparedness. Some researchers have argued that affective responses such as worry are critical to the formation of tendencies, decisions, and intentional actions (Damasio, 1994). Accordingly, an aforementioned study by Klar et al. (2002) revealed that worry was a stronger predictor of terrorism-related behavioural precautions among a sample of Israeli citizens than perceived threat (Klar et al., 2002). While worry was among the strongest predictors of engagement in individual preparedness, information seeking, and avoidance behaviours, perceived probability also emerged as a strong predictor. This finding may relate to the fact that only one item was used to asses worry about terrorism, as opposed to the 10 used to assess perceived probability. This limitation may also explain why worry only accounted for a small part of the relationships of cognitive and contextual factors with behavioural responses to terrorism.

In addition, findings regarding the role of worry as a mediator may have been attenuated as a result of the cross-sectional nature of this data set. Specifically, respondents' current levels of worry about terrorism in general may have influenced their ratings of different types of terrorism on the various cognitive dimensions. Reciprocal relationships between cognitive and psychological reactions to health hazards are consistent with the "risk-as-feelings" conceptualization of risk response (Finucane, Alhakami, Slovic, & Johnson, 2000; Lerner & Keltner, 2000, 2001; Lerner, Gonzalez,

Small, & Fischhoff, 2003; Loewenstein et al., 2001; Slovic, 2002). Again, longitudinal research would be best suited to address this problem. Alternatively, affective responses other than worry may have mediated the relationship between perceived probability of a CBRNE event and worry about terrorism.

While worry is often considered an affective response in the literature on health risk perception (e.g., Loewenstein et al., 2001), it is predominantly considered a cognitive activity in the psychological literature (although one that is intimately related to affect) (Borkovec, Robinson, Pruzinsky, & DuPree, 1983; Borkovec, Ray, & Stober, 1998; Kelly & Miller, 1999). Other variables that are more purely affective in nature (e.g., fear) might have accounted for a greater portion of relationships between perceptions and behavioural responses to terrorism. Lerner and her colleagues identified a number of different affective responses that might be reciprocally related to cognitive dimensions of risk including anger, surprise, or sadness (Fischhoff et al., 2003; Lerner & Keltner, 2000, 2001). Future studies should examine whether these might also mediate the relationship between perceived threat and behaviour.

Implications of Findings

Throughout the present thesis, it has been argued that development of an empirically-based, social-cognitive model of individual response to terrorism might shed light on some potential strategies aimed at improving individual response to terrorism. The need for interventions in this area has been well articulated in recent years (Hyams, Murphy, & Wessely, 2002; Lemyre et al., 2005; Reissman, Spencer, Tanielian, & Stein, 2005; Stein, Tanielian, Eisenman, Keyser, Burnam, & Pincus, 2004). As noted by Boscarino et al. (2003), "population-level pre-attack interventions should be encouraged,

including workplace and family-based education and public service announcements" (p. 206). These authors further note that such initiatives may not only help reduce worry, but also encourage members of the public to prepare for terrorism. Moreover, evidence points in favour of the benefits of individual preparedness in mitigating the impact of disasters on individuals and communities (Eisenman et al., 2006; Rubin et al., 2005). Unfortunately, individuals' pervasive inclination towards inaction in several domains of emergency preparedness calls attention to the many challenges of promoting individual preparedness (Lindell & Whitney, 2000; Paton, 2003; Paton et al., 2005).

Several findings presented above have important implications for the development of interventions aimed at improving preparedness. At first glance, findings seem to emphasize the potential value of raising awareness among Canadians about the possibility of terrorism to promoting individual preparedness. Indeed, perceived probability emerged as a strong predictor of individual preparedness and information seeking behaviours. However, other important findings must be considered; namely, the fact that perceived probability was also strongly associated with increased worry about terrorism and engagement in avoidance behaviour. Together, these findings call to attention the fact that strategies aimed solely at raising awareness about the possibility of terrorism in Canada may have additional undesired effects. Indeed, studies have documented the dangers of risk communication-based interventions aimed at raising awareness about threat without providing guidelines of how to control the threat (Cho, 2003; Witte 1992, 1994, 1998; Witte & Allen, 2000). Likewise, observed negative relationships of perceived seriousness of terrorism with worry and information seeking

highlight the potentially counterproductive effects of overemphasizing the catastrophic potential of terrorist events in campaigns aimed at promoting individual preparedness.

Most importantly, findings highlight the need to provide Canadians with a greater sense of control over terrorism. A common belief is that risk communication-based interventions fostering a greater sense of control can guide individuals towards engaging in adaptive rather than maladaptive behaviours with regards to health and safety (Witte, 1992, 1994, 1998; Witte & Allen, 2000). Others have found evidence that maladaptive and adaptive behaviours can simultaneously take place in response to a particular hazard, regardless of perceived control (Roskos-Ewoldsen, Yu, & Rhodes, 2004). Disentangling these effects was not an aim of the present thesis; nevertheless, it was found that perceived coping efficacy was associated with increased individual preparedness and information seeking (potentially adaptive responses), but was not related to avoidance behaviour (a generally undesirable response). Moreover, perceived coping efficacy was associated with decreased worry about terrorism. Hence, perceptions of control may not eliminate undesirable responses to terrorism altogether. However, they may promote individual preparedness, which can in turn lead to enhanced recovery following a disaster (Eisenman et al., 2006; Finnis, 2004; Paton, 2003; Paton & Johnston, 2001; Paton et al., 2005; Rubin et al., 2005).

While findings of the present thesis provide supporting evidence of the potential benefits of fostering a sense of control among members of the public, they also emphasize important differences in the type of perceived control to foster. For instance, the first study demonstrated that perceived control was associated with greater worry about terrorism if conceptualized as control over the occurrence of an event. On the other

hand, perceived control was associated with lesser worry when operationalized as perceived coping efficacy in the last study. These results are not only consistent with findings in the literature on terrorism threat (Benight & Bandura, 2005; Benight et al., 2000; Klar et al., 2007); they are also reminiscent of a general theme in the literature on perceived control over health issues. Specifically, it has been shown that one's perceived control over his or her illness is beneficial only to the extent that the illness is not highly severe. When illness is severe, perceived control may lead to enhanced distress, as resulting efforts to control the illness are marked by repeated failures (Bruchon-Schweitzer, 2002).

Hence, it is important that strategies aimed at promoting individual preparedness foster a realistic sense of control among members of the public. Based on the fact that respondents seemed to primarily think of actions that control the occurrence of terrorism (e.g., avoidance of terrorist events, as found in the second study), it will be important to call their attention to those elements of terrorism they can more realistically manage, such as the extent to which they are prepared to cope with a potential disaster. Risk communication could serve this purpose. As noted by Covello and his colleagues (Covello, Peters, Wojtecki, & Hyde, 2001), "a legitimate sense of control can be given to those under threat, especially in advance of an attack by public education, by public participation in the preparation process, and by providing the public with a voice in the decisions that will affect them" (p.389). Additionally, public education and public participation in the preparation processes can be taken as an opportunity to raise awareness about the efforts being put in place by various authorities to prepare for terrorism. In turn, this may help improve individuals' perceptions of these authorities

with regards to their roles in terrorism risk management. While seemingly desirable, it should be recalled that more favourable perceptions of authorities were associated with both desirable and undesirable characteristics: On the one hand, individuals who perceived front-line authorities as better prepared for terrorism were more likely to engage in individual preparedness behaviour; on the other, these individuals were more likely to worry about terrorism and engage in avoidance behaviour.

Ironically, a common approach used in communications on public health threats is to reassure the public, often with information about which measures are being taken to ensure safety and manage the situation. Yet, field experts have cautioned against over-reassuring the public, as it may paradoxically raise worry (Otway & Wynne, 1989; Sandman, 2002; Sandman & Lanard, 2004). In order to avoid such scenarios, it is suggested that reassuring information be put in subordinate clauses (i.e., presenting bad along with reassuring news) (Sandman & Lanard, 2004). Providing information to the public about the measures being taken by authorities to prepare for terrorism along with a realistic assessment of their limits could therefore help reduce possible undesired effects of perceived institutional preparedness on worry and avoidance behaviour, without necessarily eliminating its potential positive effects on individual preparedness behaviour. Given the potential tendency for individuals to assign responsibility for the control of terrorism to authorities (as suggested by findings in the first study), discussing the limits of institutional preparedness may additionally open the door to raising awareness about those responsibilities individuals are in a position to take in the preparedness process.

Recently, a nation-wide public education campaign aimed at raising awareness about individual emergency preparedness was launched: In May of 2006, *72 hours is your family prepared?* emerged as an emergency preparedness guide available to Canadian families in both leaflet and electronic formats (Public Safety Canada, 2007). On the whole, findings of this thesis are supportive of the approach. For instance, the guide asks readers to consider the possibility that various emergency situations will occur in their community (including terrorism), rendering more salient the level of threat posed by different emergency situations. Second, the guide addresses the tendency for individuals to assign responsibility for the control of emergency situations to authorities. It starts by discussing the three day delay which could take place between the occurrence of an emergency and the availability of aid, emphasizing the importance for individuals to be prepared for this delay. Finally, the guide touches on the notion of coping efficacy by emphasizing that household emergency plans can help individuals and their family better deal with a potential emergency.

Despite these strengths, there is room for improvement. While the guide mentions the fact that authorities are working hard to keep Canadians safe, it includes no specific examples of steps they are taking to prepare. Such information could help enhance individuals' perceptions regarding the level of preparedness of authorities, further strengthening their propensity to engage in individual preparedness. Moreover, an increased recognition of the need to move toward public participation in emergency preparedness processes in recent years calls for a better exchange between authorities and individuals (Lemyre, Lee, Turner, & Krewski, 2007; Paton, 2005; Pearce, 2003). It seems that informing the public of the steps authorities are taking to prepare for emergencies

would contribute to opening this exchange. Of course, strategies other than information guides could also achieve this. Community-based emergency drills represent one promising approach. This approach has not only been found to have a marked positive impact on individual participants within the context of earthquake preparedness (Nelson & Perry, 1991; Simpson, 2002); it may also help foster more positive attitudes towards authorities' level of preparedness and strengthen individuals' desire to prepare for diverse emergencies.

Study Limitations

Findings presented in this thesis provide insight into which strategies to use in managing terrorism at the pre-event stages of a disaster. Moreover, results of the first and final studies of the thesis are based on surveys of two large samples of Canadians, representative of the population in terms of region, age, and gender. Notwithstanding these strengths, some methodological challenges are acknowledged. First, each survey was designed to assess a number of issues in addition to the ones discussed in the thesis. The survey tools had to be designed around the (sometimes competing) aims of different researchers involved in the projects. As a result, the concepts, items, or rating scales used in each tool were sometimes less ideal for the aims of the present thesis in favour of other considerations. A first example entails the use of perceived risk to personal health as an index of perceived threat in the first study, or the use of a single item to assess worry about terrorism in the last study. In a related fashion, less than optimal rating scales may have been used in both cases so that comparisons might be made with findings of previous surveys on similar topics (e.g., results of surveys by Slovic, Flynn, Mertz, & Mullican, 1993, and by Lasker, 2004).

Also resulting from the fact that studies were not necessarily designed for the specific purposes of the present thesis was a lack of consistency in the way constructs were assessed across different studies of the thesis. On the other hand, the fact that terrorism risk perceptions and individual response were examined using a wide range of approaches may be considered a strength. Indeed, despite varying methodologies, measures, and study contexts, there was an impressively tremendous degree of consistency and coherence in findings across studies. Consequently, one can be more confident about the validity of results. While the value of mixing quantitative and qualitative methods has been recognized for a number of years (Jick, 1979), it is only emerging in research on risk perception. Yet, use of this approach in the present thesis was a clear example of the utility of complementing quantitative with qualitative research in order to achieve a more complete, contextualized understanding of risk issues.

A second methodological issue relates to the cross-sectional nature of the surveys from which data were drawn. This limitation has particular implications for relationships involving worry about terrorism. As aforementioned, worry about a particular hazard can be conceptualized as both shaping, and as emerging from perceptions of the hazard (Kobbeltved, Brun, Johnsen, & Eid, 2005; Loewenstein et al., 2001; Roseman, Antoniou, & Jose, 1996). As such, observed relationships between perceived control over terrorism and worry, in particular, might have been attenuated. Similarly, individuals who worry more about terrorism may be more likely to prepare for terrorism; however, preparing for terrorism may help reduce worry about terrorism. Hence, the occurrence of both phenomena in this cross-sectional data set may have led to a weaker observed relationship between worry and individual response to terrorism. As previously

mentioned, future research in this area would benefit from longitudinal research designs. Such research would enable determination of if, and to what extent worried individuals are more apt to develop pessimistic cognitive evaluations of terrorism threats that might lead to less favourable responses. It could also provide deeper insight into the potential for improved individual preparedness for terrorism to reduce worry. Last, it is noted that relationships among the variables, as well as their relative importance to individual response to terrorism would likely differ following an event. Stronger associations may be observed between the perceived seriousness of an attack and individual response to terrorism following an event.

Finally, despite including social contextual in addition to cognitive factors, the model only accounted for a small portion of variance in behavioural responses to terrorism. Notwithstanding the modesty of this result, these predictors were able to account for 41% of the variance in worry in the final study (in contrast to 21% in the first study), emphasizing the value of having so meticulously clarified cognitive and social contextual concepts in the second and third studies. It should also be noted that modest relationships are typical in research aimed at predicting health-related behaviour (Ogden, 2003). For example, a review of the literature suggests that the health belief model explains on average only between 10 and 15% of the variance (Bruchon-Schweitzer, 2002). Also, models of health behaviour have been criticized for overlooking the contribution of larger societal-level factors to health-related behaviour (Bruchon-Schweitzer, 2002; Joffe, 2002b). While it was believed that perceived governmental and front-line preparedness might be construed as such, it could be argued that these variables remained within the realm of cognitive factors, since they were assessed through

respondents' opinions, as opposed to more objective indices. A similar point has been made regarding the inclusion of the concept of "social norms" in some models of health behaviour (Bruchon-Schweitzer, 2002). Future work in this area would nevertheless benefit from the consideration of social and environmental characteristics that give rise to the way individuals respond to terrorism.

Conclusion

In conclusion, the goal outlined at the start of this thesis was successfully accomplished in that a social-cognitive model of individual response to terrorism was developed, tested, and refined with additional social contextual variables. The work presented in this thesis helped provide a better context from which to understand the way Canadians perceive and feel about terrorism. With relatively little research having taken place on terrorism in Canada, or in other countries where no serious event has recently taken place, little information was available on the nature of individuals' response to this threat and which factors might shape such responses. The present thesis did not only shed light on theoretical bases on which to guide such work; it also provided preliminary empirical evidence that individual response to terrorism can be understood by a social-cognitive model similar to those developed to explain health behaviour—albeit adapted to address issues of specific relevance to terrorism. Further work of longitudinal nature is required to understand more specific processes that might mediate or moderate different types of response. This work could also further benefit from the consideration of social and environmental characteristics that give rise to the way individuals respond to terrorism. As a complement to this groundwork, these research avenues would

undoubtedly provide additional valuable guidance to the identification of effective terrorism risk management strategies.

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APPENDIX A: HEALTH RISK PERCEPTION SURVEY QUESTIONS

Project: UO1964E	Module: QPrint
17	INT01

F6notes: ***f6*** **________________________________ Phone: $N (*phbk1*) [project # 1964] ____________________________ Good morning/afternoon/evening. My name is _________. I'm calling from Goss Gilroy, a management consulting firm, on behalf of the Institute of Population Health at the University of Ottawa. With funding from Health Canada, we are conducting a survey among men and women concerning health issues that Canadians are facing today and would appreciate someone from your household participating in this project. We are not selling anything. We are simply interested in your attitudes and opinions.**

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	RFO	=> END
BC - Bad Contact Information	BCO	=> END
LN - Language Barrier, does not speak English or French	LNO	=> END
FR - French Interviewer Required	FR	=> END
DU - Duplicate Name	DUO	=> END
NB - Number blocked by Bell	NB	=> END

18	SCRE1

Your household has been selected randomly and we would like the opinions of one of the members of your household. To make sure I'm interviewing the right person in this household, I'd like to ask you a few introductory questions. Including everyone, how many people live in this household?

`$R.0 0 96`

Refused	97

19	SCRE2

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

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

`$R.0 0 96`

Refused	97

20	SCRE3

and how many females are 18 years of age and older?

`$R.0 0 96`

Refused	97

21	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? This survey will take approximately 25 to 30 minutes of your time. Can we begin now? This survey 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.
** (if new respondent) My name is _________. I'm calling from Goss Gilroy, a management consulting firm, on behalf of the Institute of Population Health at the University of Ottawa. With funding from Health Canada, we are conducting a survey among men and women concerning health issues that Canadians are facing today and would appreciate someone from your household participating in this project. We are not selling anything. We are simply interested in your attitudes and opinions. This survey will take approximately 25 to 30 minutes of your time. Can we begin now? This survey 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.**
*************************************** F6 Notes: *F6***

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	RFO	=> END
LN - Language Barrier, does not speak English or French	LNO	=> END
FR - French Interviewer Required	FR	=> END
NA - No answer/ busy	NA	=> END

22 Q147

DO NOT READ Note Gender of Respondent

Male	01
Female	02

23 Q148

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

24 INT1

That's all the questions I have for you. Thank you very much for your time.

=> +1
si NOT Q148=97

Refused - Age Group Question	RA	=> END

29 PRE1

I'm going to read you a list of items relating to health risks. First, I'm going to ask you for your opinion about the amount of health risk posed by each item. Then, I'm going to ask you about the degree of personal control you feel you have over the risk, how much knowledge you have about the risk, how much you worry about the risk, how much uncertainty there is about the risk, and, finally, about the acceptability of the risk.

30	Q5

When you hear about risks from motor vehicles what is the first word or image that comes to mind?

31					Q6
	Almost None	Slight	Moderate	High	Don't know/ No opinion
To what extent are motor vehicles a risk to the health of Canadians? Would you say there is (read scale)?	☐	☐	☐	☐	☐
To what extent are motor vehicles a risk to your personal health?	☐	☐	☐	☐	☐
How much personal control do you feel you have over motor vehicle risks?	☐	☐	☐	☐	☐
How much knowledge do you feel you have about motor vehicle risks?	☐	☐	☐	☐	☐
How much do you worry about motor vehicle risks?	☐	☐	☐	☐	☐
What level of uncertainty do you think there is, in general, about motor vehicle risks?	☐	☐	☐	☐	☐
What level of risk from motor vehicles do you think is acceptable?	☐	☐	☐	☐	☐

38	Q13

When you hear about risks from climate change what is the first word or image that comes to mind?

39	Q14

	Almost None	Slight	Moderate	High	Don't know/ No opinion
To what extent is climate change a risk to the health of Canadians? Would you say there is (read scale)?	☐	☐	☐	☐	☐
To what extent is climate change a risk to your personal health?	☐	☐	☐	☐	☐
How much personal control do you feel you have over climate change risks?	☐	☐	☐	☐	☐
How much knowledge do you feel you have about climate change risks?	☐	☐	☐	☐	☐
How much do you worry about climate change risks?	☐	☐	☐	☐	☐
What level of uncertainty do you think there is, in general, about climate change risks?	☐	☐	☐	☐	☐
What level of risk from climate change do you think is acceptable?	☐	☐	☐	☐	☐

46	Q21

When you hear about risks from recreational physical activity what is the first word or image that comes to mind?

47	Q22

	Almost None	Slight	Moderate	High	Don't know/ No opinion

To what extent is recreational physical activity a risk to the health of Canadians? Would you say there is (read scale)?	☐	☐	☐	☐	☐
To what extent is recreational physical activity a risk to your personal health?	☐	☐	☐	☐	☐
How much personal control do you feel you have over recreational physical activity risks?	☐	☐	☐	☐	☐
How much knowledge do you feel you have about recreational physical activity risks?	☐	☐	☐	☐	☐
How much do you worry about recreational physical activity risks?	☐	☐	☐	☐	☐
What level of uncertainty do you think there is, in general, about recreational physical activity risks?	☐	☐	☐	☐	☐
What level of risk from recreational physical activity do you think is acceptable?	☐	☐	☐	☐	☐

54 Q29

When you hear about risks from cellular phones what is the first word or image that comes to mind?

55 Q30

	Almost None	Slight	Moderate	High	Don't know/ No opinion
To what extent are cellular phones a risk	☐	☐	☐	☐	☐

to the health of Canadians? Would you say there is (read scale)?					
To what extent are cellular phones a risk to your personal health?	☐	☐	☐	☐	☐
How much personal control do you feel you have over cellular phone risks?	☐	☐	☐	☐	☐
How much knowledge do you feel you have about cellular phone risks?	☐	☐	☐	☐	☐
How much do you worry about cellular phone risks?	☐	☐	☐	☐	☐
What level of uncertainty do you think there is, in general, about cellular phone risks?	☐	☐	☐	☐	☐
What level of risk from cellular phones do you think is acceptable?	☐	☐	☐	☐	☐

62 **Q37**

When you hear about risks from terrorism what is the first word or image that comes to mind?

63 **Q38**

	Almost None	Slight	Moderate	High	Don't know/ No opinion
To what extent is terrorism a risk to the health of Canadians? Would you say there is (read scale)?	☐	☐	☐	☐	☐
To what extent is terrorism a risk to your personal health?	☐	☐	☐	☐	☐

How much personal control do you feel you have over terrorism risks?	□	□	□	□	□
How much knowledge do you feel you have about terrorism risks?	□	□	□	□	□
How much do you worry about terrorism risks?	□	□	□	□	□
What level of uncertainty do you think there is, in general, about terrorism risks?	□	□	□	□	□
What level of risk from terrorism do you think is acceptable?	□	□	□	□	□

Now in order to classify the data, I need some basic information about you. I will treat all of the following information as confidential. 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
Refused to answer	97

181 **Q155**

In which of the following classifications does your total household income fall 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
Refused to answer	97

182 **Q156**

Is your residence located in a rural or urban area?

a rural area	01
an urban area	02

183 **Q157**

Could you please provide the first 3 characters of your postal code.

A9A	
Don't Know	X0X

APPENDIX B: TERRORISM HEALTH RISK PERCEPTION INTERVIEW QUESTIONS

Public Perception and Acceptable Levels of Health Risk Among Canadians

INTERVIEW QUESTIONS

- Are the health risks of terrorism of concern to you?
- Why are the health risks of terrorism of concern (or of no concern) to you?
- Have you made specific decisions or choices because of this health risk?
    - Can you give me an example?
- What were the important factors that influenced your decision?

If we have the time:
Is this an acceptable or unacceptable risk?

APPENDIX C: 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

PRE1:

During the interview you may hear terms you are unfamiliar with, please feel free to skip those questions by indicating this is the case or ask for clarification. In the first section, I would like to get some general information about the way you perceive the threat of terrorism in Canada. Please respond using a 5-point scale, where 1 is not at all, 2 is a little, 3 is moderately, 4 is very much, and 5 is extremely.

Q7:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q12. To what extent do you currently worry about terrorism in Canada?	☐	☐	☐	☐	☐	☐

PRE2:

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

Q13:

If the respondent does not understand the question record 'don't know'; if they have no response BECAUSE NOTHING COMES TO MIND record 'no response'

Q13. When you hear about terrorist bombings (use of non-nuclear explosives) what specific type of attack first comes to mind?

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:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q14. How likely do you think it is that a terrorist bombing will occur in Canada?	☐	☐	☐	☐	☐	☐
Q15. How uncertain do you feel currently about possible terrorist bombings in Canada?	☐	☐	☐	☐	☐	☐
Q16. How serious do you think it would be if a terrorist bombing did occur in Canada?	☐	☐	☐	☐	☐	☐
Q17. If a terrorist bombing occurred in Canada, to what extent do you think it would have an impact on your life?	☐	☐	☐	☐	☐	☐
Q18. If a terrorist bombing occurred in Canada, how well do you think you would be able to cope with it?	☐	☐	☐	☐	☐	☐

Q19:

If the respondent does not understand the question record 'don't know'; if they have no response BECAUSE NOTHING COMES TO MIND record 'no response'

Q19. When you hear about chemical terrorism what specific type of attack first comes to mind?

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:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q20. How likely do you think it is that chemical terrorism will occur in Canada?	☐	☐	☐	☐	☐	☐
Q21. How uncertain do you feel currently about possible chemical terrorism in Canada?	☐	☐	☐	☐	☐	☐
Q22. How serious do you think it would be if chemical terrorism did occur in Canada?	☐	☐	☐	☐	☐	☐
Q23. If chemical terrorism occurred in Canada, to what extent do you think it would have an impact on your life?	☐	☐	☐	☐	☐	☐
Q24. If chemical terrorism occurred in Canada, how well do you think you would be able to cope with it?	☐	☐	☐	☐	☐	☐

Q25:

If the respondent does not understand the question record 'don't know'; if they have no response BECAUSE NOTHING COMES TO MIND record 'no response'

Q25. When you hear about biological terrorism what specific type of attack first comes to mind?

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:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q26. How likely do you think it is that biological terrorism will occur in Canada?	☐	☐	☐	☐	☐	☐
Q27. How uncertain do you feel currently about possible biological terrorism in Canada?	☐	☐	☐	☐	☐	☐
Q28. How serious do you think it would be if biological terrorism did occur in Canada?	☐	☐	☐	☐	☐	☐
Q29. If biological terrorism occurred in Canada, to what extent do you think it would have an impact on your life?	☐	☐	☐	☐	☐	☐
Q30. If biological terrorism occurred in Canada, how well do you think you would be able to cope with it?	☐	☐	☐	☐	☐	☐

Q31:

If the respondent does not understand the question record 'don't know'; if they have no response BECAUSE NOTHING COMES TO MIND record 'no response'

Q31. When you hear about radiological terrorism what specific type of attack first comes to mind?

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:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q32. How likely do you think it is that radiological terrorism will occur in Canada?	☐	☐	☐	☐	☐	☐
Q33. How uncertain do you feel currently about possible radiological terrorism in Canada?	☐	☐	☐	☐	☐	☐
Q34. How serious do you think it would be if radiological terrorism did occur in Canada?	☐	☐	☐	☐	☐	☐
Q35. If radiological terrorism occurred in Canada, to what extent do you think it would have an impact on your life?	☐	☐	☐	☐	☐	☐
Q36. If radiological terrorism occurred in Canada, how well do you think you would be able to cope with it?	☐	☐	☐	☐	☐	☐

Q37:

If the respondent does not understand the question record 'don't know'; if they have no response BECAUSE NOTHING COMES TO MIND record 'no response'

Q37. When you hear about nuclear terrorism what specific type of attack first comes to mind?

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:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q38. How likely do you think it is that nuclear terrorism will occur in Canada?	☐	☐	☐	☐	☐	☐
Q39. How uncertain do you feel currently about possible nuclear terrorism in Canada?	☐	☐	☐	☐	☐	☐
Q40. How serious do you think it would be if nuclear terrorism did occur in Canada?	☐	☐	☐	☐	☐	☐
Q41. If nuclear terrorism occurred in Canada, to what extent do you think it would have an impact on your life?	☐	☐	☐	☐	☐	☐
Q42. If nuclear terrorism occurred in Canada, how well do you think you would be able to cope with it?	☐	☐	☐	☐	☐	☐

PRE5:

Now, I would like to get some information about your perceptions of terrorism preparedness. The following is a list of various organizations that are involved in emergency preparedness. For each, please indicate: 1) How much you think they are prepared for terrorism, AND 2) How confident you are in their ability to respond to terrorism?

Q67:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q67. Federal government (Canadian) - preparedness	☐	☐	☐	☐	☐	☐
Q68. Federal government - Confident	☐	☐	☐	☐	☐	☐
Q69. Your provincial government - preparedness	☐	☐	☐	☐	☐	☐
Q70. Your provincial government - Confident	☐	☐	☐	☐	☐	☐
Q71. Your municipal Government (City) - preparedness	☐	☐	☐	☐	☐	☐
Q72. Your municipal Government - Confident	☐	☐	☐	☐	☐	☐
Q73. Hospital and health care services - preparedness	☐	☐	☐	☐	☐	☐
Q74. Hospital and health care services - Confident	☐	☐	☐	☐	☐	☐
Q75. Non-governmental organizations such as Red Cross, St.-John Ambulance, Salvation Army - preparedness	☐	☐	☐	☐	☐	☐
Q76. Non-governmental organizations such as Red Cross, St.-John Ambulance, Salvation Army - Confident	☐	☐	☐	☐	☐	☐
Q77. First responders (police, paramedics, fire department) - preparedness	☐	☐	☐	☐	☐	☐
Q78. First responders (police, paramedics, fire department) - Confident	☐	☐	☐	☐	☐	☐
Q79. Local community	☐	☐	☐	☐	☐	☐

organizations (e.g., community clubs, churches) - preparedness						
Q80. Local community organizations (e.g., community clubs, churches) - Confident	☐	☐	☐	☐	☐	☐

PRE7:

Now, there are many things that individuals may do in relation to terrorism. I am going to read you a list of items related to things you may have done. Please indicate 1) How much you have thought about doing the following, AND 2) How much you have actually done it.

Q97:

	1. Not at all	*2. A little*	*3. Moderately*	*4. Very Much*	*5. Extremely*	*Don't Know/ No Opinion*
Q97. Consulting others for advice about how to prepare for terrorism-related emergencies - Thought it	☐	☐	☐	☐	☐	☐
Q98. Consulting others for advice about how to prepare for terrorism-related emergencies - Done it	☐	☐	☐	☐	☐	☐
Q99. Establishing a terrorism-related emergency plan - Thought it	☐	☐	☐	☐	☐	☐
Q100. Establishing a terrorism-related emergency plan - Done it	☐	☐	☐	☐	☐	☐
Q101. Putting together an emergency supply kit (including extra batteries, a flashlight, food and water, radio) - Thought it	☐	☐	☐	☐	☐	☐
Q102. Putting together an emergency supply kit (including extra batteries, a flashlight, food and water, radio) - Done it	☐	☐	☐	☐	☐	☐
Q103. Receiving emergency First Aid or CPR training - Thought it	☐	☐	☐	☐	☐	☐

Q104. Receiving emergency First Aid or CPR training - Done it	☐	☐	☐	☐	☐	☐
Q105. Obtaining information about potential shelters in your community - Thought it	☐	☐	☐	☐	☐	☐
Q106. Obtaining information about potential shelters in your community - Done it	☐	☐	☐	☐	☐	☐
Q107. Establishing a meeting area or method of contact with loved ones - Thought it	☐	☐	☐	☐	☐	☐
Q108. Establishing a meeting area or method of contact with loved ones - Done it	☐	☐	☐	☐	☐	☐
Q109. Learning about evacuation plans in buildings you occupy frequently - Thought it	☐	☐	☐	☐	☐	☐
Q110. Learning about evacuation plans in buildings you occupy frequently - Done it	☐	☐	☐	☐	☐	☐
Q111. Learning about the differences and similarities between different types of terrorism - Thought it	☐	☐	☐	☐	☐	☐
Q112. Learning about the differences and similarities between different types of terrorism - Done it	☐	☐	☐	☐	☐	☐
Q113. Reading up on the topic of terrorism - Thought it	☐	☐	☐	☐	☐	☐
Q114. Reading up on the topic of terrorism - Done it	☐	☐	☐	☐	☐	☐
Q115. Being nervous around certain people - Thought it	☐	☐	☐	☐	☐	☐
Q116. Being nervous around certain people - Done it	☐	☐	☐	☐	☐	☐
Q117. Avoiding public places - Thought it	☐	☐	☐	☐	☐	☐
Q118. Avoiding public places - Done it	☐	☐	☐	☐	☐	☐

Q119. Refraining from watching the news to avoid coverage on terrorism issues - Thought it	☐	☐	☐	☐	☐	☐
Q120. Refraining from watching the news to avoid coverage on terrorism issues - Done it	☐	☐	☐	☐	☐	☐
Q121. Seeking social support - Thought it	☐	☐	☐	☐	☐	☐
Q122. Seeking social support - Done it	☐	☐	☐	☐	☐	☐

PRE11:

Now, I would like to ask about your general state of health and wellbeing. For the next set of items, please indicate the number that best indicates the degree to which each statement applies to you recently, that is in the last 4-5 days. Please use an 8 point scale, 1 being not at all and 8 being extremely.

Q147:

	1. Not at all	*2. Not really*	*3. Very little*	*4. A bit*	*5. Somewhat*	*6. Quite a bit*	*7. Very much*	*8. Extremely*	*Don't Know/ No Opinion*
Q147. I feel calm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q148. I feel rushed; I do not seem to have enough time	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q149. I suffer from physical aches and pains; sore back, headaches, tensed neck, stomach aches	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q150. I feel preoccupied, tormented or worried	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q151. I feel confused; my thoughts are muddled; I lack concentration and I cannot focus my attention	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q152. I feel full of energy and keen	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q153. I feel a great weight on my shoulders	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q154. I have difficulty controlling my reactions, emotions, moods or gestures	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q155. I feel stressed	☐	☐	☐	☐	☐	☐	☐	☐	☐

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PRE12:

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

Q158:

Q158. Were you born in Canada?

Yes 01
No 02

Q159:

(Do not read list)

Q159. May I ask you to which religion you identify with, if any?

Christian 01
Jewish 02
Muslim 03
Agnostic 04
Atheist 05
Other (specify) .... 97 O
None 00

Q160:

Do not read list. Prompt if necessary.

Q160. To which ethnic or cultural background(s) do you identify? (specify as many as required)

Canadian 01
French 02
English 03
Chinese 04
Chilean 05
Cree 06
Dutch 07
East Indian 08
Filipino 09
German 10
Greek 11
Inuit (Eskimo) 12
Irish 13
Italian 14
Jamaican 15
Jewish 16
Lebanese 17
Métis 18
Micmac 19
Polish 20
Portuguese 21
Scottish 22
Somali 23
Ukranian 24
Vietnamese 25
Other (Specify) .... 97 O

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